

# **A VETERINARY PERSPECTIVE ON THE USE OF ANIMALS IN PRESCHOOL EDUCATION**

by

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## DECLARATION

I declare that the dissertation submitted herewith for the degree *Doctor Philosophiae* (Veterinary Ethology) at the University of Pretoria has not been submitted previously for a degree at any other University and that it is my own work.

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C M E McCrindle



## **DEDICATION**

**This large volume of prose is dedicated without reservation to my husband and children. Without them I would not have gravitated into the orbit of the preschool and stayed there, with one child after another, for ten fascinating years.**

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*Without the motivation of my promoter, Professor Odendaal, this study would not have been completed. His leadership in the field of human-animal interactions and veterinary ethology, both in South Africa and internationally, is an inspiration in itself.*

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*Dr Calitz is thanked, as co-promoter, for her patience in acting as a sounding board and source of valuable insight into a field not previously familiar to veterinary science, that of preschool education.*

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## **SUMMARY**

### **Keywords:**

**Veterinary Ethology, preschool education, human-animal interactions, zoonosis, paediatric diseases, primary health care, zoo visit, urban farms, mediated learning experience, children's literature.**

**The aim of this study was to investigate human-animal interactions in the triad comprising the veterinarian, the animal and the preschool and in so doing to elucidate the role of the veterinarian in the health and education of preschool children. The area of focus was a comparison of preschools in high and low income areas in and around Pretoria by means of qualitative and quantitative observational methods.**

**It was found that all preschools investigated, included animals in the curriculum and a majority visited the zoo. Interactions included direct contact between children and animals kept permanently or temporarily at school, animal themes and topics, animal protagonists in books, videos, toys and games and excursions to the zoo, urban farms, agricultural museums and animal welfare societies. Teachers felt that child-animal interactions contributed positively to the holistic development of the preschool child, but were worried about management of animals at school and the possibility of zoonotic diseases. As protein of animal origin, such as milk, eggs, meat and fish, formed part of the diet of preschool children, this could also result in a risk of zoonotic disease, particularly in developing areas, where meat and milk hygiene were found to be inadequate.**

**In order to address these fears, the literature was reviewed with regard to zoonotic diseases which could affect preschool children in South Africa. Incidence and prevalence were not well documented and the comparative significance could not be assessed. Therefore the comparative morbidity of diseases diagnosed by the paediatric department of a hospital serving the low income areas studied and a private practice serving the high income areas, were investigated. It was discovered that zoonotic disease formed**

a very minor proportion of diseases diagnosed. The diagnoses were, however, based on symptoms rather than aetiology and zoonotic causes for, in particular, respiratory and gastro-intestinal disease, could not be excluded. In the light of this, criteria were proposed for the prevention of zoonotic disease outbreaks at preschools.

An outbreak of zoonotic disease at a preschool was documented and the application of primary health care principles suggested. Constraints were found to be mainly administrative. Co-operation between the departments of Health and Agriculture was complicated by financial implications which had not been budgeted. Despite this, the intervention was successful in controlling the disease and preventing further outbreaks. The presence of a veterinarian as part of the primary health care team was advocated.

Within the preschool it was found that teachers lacked knowledge in the fields of animal ethology and management. Cost, ease of management and appeal to children were taken into account in the choice of animals by preschools. Rodents and birds were considered preferable to carnivores. Housing was evaluated and criteria suggested for management systems which would benefit both children and animals. Death and euthanasia of animals kept permanently at preschool was investigated and suggestions made for a teaching strategy to facilitate understanding by children of the abstract concepts of life, death and grief.

A method was developed for the analysis of animal content in literature, games and toys at preschools. It was found that animals were central to the theme of a majority of the books and toys. Realistic fiction where anthropomorphic animals were the central protagonists, had most appeal for children and it was suggested that these could be used in veterinary extension materials for prevention of zoonotic diseases or promotion of animal welfare. An evaluation system was proposed which included the input of veterinary ethologists.

Animal facilities visited by preschools during excursions were evaluated. It was found that they were not sufficiently child-centred and environmentally safe for young children. It was suggested that veterinary public health officials should become involved in order to improve animal well-being,

particularly with regard to handling facilities and hygiene.

In conclusion, a schematic representation of the multitude of roles for veterinarians in the holistic development of the preschool child was drawn up. The roles for different veterinary specialities were also tabulated in order to illustrate the important part played by this profession in the health and education of preschool children.

## SAMEVATTING

### **Slutelwoorde:**

Veterinêre Etologie, kleuteropvoeding, mens-dierinteraksie, soönose, kindersiektes, primêre gesondheidsorg, dieretuinbesoeke, stadsplase, leerondervinding, kinderliteratuur.

Die doel van die studie was om mens-dier-interaksies in die driehoek tussen veearts, dier en die kleuterskool te ondersoek om sodoende die rol van die veearts in die gesondheid en opvoeding van die voorskoolse kind aan te dui. Kwalitatiewe en kwantitatiewe navorsingsmetodes is gebruik om kleuterskole in die lae en hoë inkomste-gebiede in en om Pretoria te vergelyk.

Alle kleuterskole wat ondersoek is, het diere in die kurrikulum ingesluit en die meerderheid skole het uitstappies na die dieretuin onderneem. Kind-dierinteraksies het die volgende ingesluit: direkte kontak tussen kind en dier op skool; diere in temas, stories, boeke, speletjies en speelgoed; asook uitstappies na die dieretuin, landelike museums, stedelike plase en dierwelsynsorganisasies. Onderwyseresse het gemeen dat dié interaksies positief bygedra het tot die holistiese ontwikkeling van die voorskoolse kind, maar het kommer uitgespreek oor bestuur en siektes van diere. Omdat proteïene van dierlike oorsprong deel uitmaak van die dieet van voorskoolse kinders, was soönose ook 'n moontlikheid, veral in kinders van ontwikkelende areas waar dit uitgewys was dat higiëne met betrekking tot vleis en melk, nie na wense was nie.

'n Literatuurstudie het aangetoon dat die algemeenheid en omvang van soönotiese siektes, wat moontlik gevaarlik kon wees vir voorskoolse kinders, nie volledig genoeg omskryf was nie. Die vergelykende morbiditeit van siektes by Ga-Rankuwa Hospitaal se kinderafdeling (pasiënte van lae-inkomste gebiede) en 'n private praktyk in die oostelike voorstede van Pretoria (hoë inkomste gebied), is dus ondersoek. Soönotiese siektes het 'n klein deel uitgemaak van die siektes wat gediagnoseer was, maar die diagnose was op simptome, eerder as die etiologie van die siektes,

gebaseer. Die vermoede bestaan dat veral siektes wat gediagnoseer is as respiratories en gastro-enteries, 'n soönotiese oorsprong kon gehad het.

'n Uitbreek van 'n soönotiese siekte by 'n kleurtelskool is ondersoek en daar is voorgestel dat primêre gesondheidsorgmetodes gebruik word om dit te bekamp. Teenkantiing op administratiewe vlak was die belangrikste probleem wat ondervind was, maar ten spyte daarvan kon die ondersoek suksesvol verloop. Die rol van die veearts as deel van die primêre gesondheidspan is ook hierdeur beklemtoon.

Binne die kleuterskool is gevind dat daar 'n gebrek aan kennis is oor diere-etologie en dierebestuur. Koste, praktiese versorgingsmetodes en die stimuluswaarde van diersoorte, was belangrike aspekte in die keuse van diere wat by skole aangehou is. Daarom was knaagdier, voëls en vissies was meer gewild as honde en katte. Die behuising van die diere is geëvalueer volgens voorgestelde kriteria wat tot voordeel van beide diere en kinders kan strek. Die dood en genadedood van diere by twee kleuterskole is ondersoek en voorstelle is gemaak uit 'n opvoedingkundige oogpunt, om die kinders konsepte betreffende lewe, dood en rou te laat begryp en ook om dit te kan verwerk.

'n Metode is ook ontwerp vir die analise van boeke en speelgoed en daar is bewys dat diere 'n hoofrol gespeel het in die meerderheid boeke en speelgoed by voorskole. Kinders het boeke verkies waar die hoofkarakters antropomorfiëse diere was en die omgewing vergelykbaar was met die lewenswêreld van kinders. 'n Voorstel is dus gemaak dat sulke karakters gebruik word om veeartsenykunde voorligtingsboodskappe oor soönotiese siektes of dierwelsyn oor te dra aan jong kinders.

Stedelike plasies, die dieretuin, landboumuseums en die Dierbeskermingsvereniging in Pretoria is besoek en daar is bevind dat dit nie veilig genoeg vir jong kinders is nie. Daar word dus aanbeveel dat veeartse in diens van plaaslike owerhede se gesondheidsdienste sulke plekke besoek, om voorstelle oor verbeterde veiligheid en higiëne te maak.

Ten slote is 'n skematiese voorstelling van die veelsydige rol van veeartsenykundiges in die holistiese ontwikkeling van die voorskoolse kind

saamgestel. Die verskillende rolle vir verskillende spesialiteite is ook voorgelê om die belangrike bydrae van veeartsenykunde tot die gesondheid en opvoeding van voorskoolse kinders aan te dui.



## DEFINITIONS

*For the purposes of this investigation, the following definitions will apply:*

**Accidental or incidental host:** A susceptible species that is not the primary host, but that becomes infected when exposed to the disease through an unusual set of circumstances (Reinecke, 1989)

**Aetiological agent:** An organism which is a direct cause of a disease, more than one aetiological agent may be necessary before a disease occurs (Schwabe, 1984).

**Animal density:** The number of animals per unit of floor-space.

**Animals:** All animals, both vertebrates and invertebrates.

**Anthropomorphic:** A descriptive term suggested for cartoon animals which wear clothes or behave entirely like humans, eg Mickey Mouse.

**Bibliographic record:** A transcription which provides all the information necessary to distinguish a particular book from another book in the same collection and also indicates its location (Burger & van der Merwe, 1990)

**Catalogue:** The index, description or list of materials in a library (Maltby, 1978)

**Child:** The term used in this study when the age of the child is not specified.

**Classification:** The system used for the arrangement of books in collections in libraries or media centres. Classification facilitates formal, orderly access to the books, documents or films by the user (Burger & Van der Merwe, 1990; Maltby, 1978).

**Cognition:** The cognitive structure of an experience which relates to the total situation, ie the true relation between stimuli in the environment. Learning involves the development of insight, ie the development of a more adequate cognitive structure of the total situation (Mouly, 1973; Wiechers, 1991).

**Companion animals:** The term used in this study for domesticated animals which are usually kept as pets, that is, dogs, cats and horses.

**Concepts:** Primary abstractions or conceptual symbols which summarise experiences into a grouping or generalisation. Examples are colours, near and far, under and over, yesterday and tomorrow, numbers, sizes (Mouly, 1973).

**Curriculum:** The sequence of experiences through which the school attempts to promote the education of its pupils. It may also be defined as the written document that serves as a blueprint and guideline for the preparation, presentation and evaluation of activities. The behaviour of the pupil exposed to this sequence of experiences may be termed learning (Mouly, 1973).

**Day programme:** A day programme is a general plan or outline of the day's activities at a preschool (Grobler et al, 1990).

**Definitive host:** The host in which the parasite or infective organism reaches maturity and reproduces sexually (Reinecke 1989).

**Development:** Maturation or differentiation, which may be measured in terms of complexity of functions or degree of performance skill, whereas growth is merely an increase in physical size (Sahler & McAnarney, 1981)

**Disadvantaged child:** A child being brought up under conditions where financial deprivation is a limiting factor in the education of that child. This is compounded by the social and cultural deprivation inherent in the whole poverty cycle (Pretorius, 1987; Rickards, 1991; Verhoef, 1991).

**Ecology:** The external requirements, such as climate and nutrition, which are necessary for the survival and multiplication of any living creature (Schwabe, 1984).

**Educare:** The promotion of the development of the total child by providing conditions in which each child can grow and flourish to their fullest extent (Grobler et al, 1990).

**Environmental education:** The process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness between man, his culture and his surroundings (International Union for Conservation of Nature and Natural Resources (IUCN, 1971).

**Epidemiological classification of zoonoses:** The classification of zoonoses according to the method of transmission, that is, direct zoonoses, cyclozoonoses, metazoonoses or saprozoonoses (Schwabe 1984).

**Ethology:** The scientific study of animals in their natural environment.

**Format:** The actual structure of a book - its size, shape, binding, illustrations, cover, paper, typography and spacing, eg picture book. (Rothlein & Meinbach, 1991).

**Genre:** The content of a book, eg poetry or prose. Prose is further divided into fiction and non-fiction, with subdivisions under each heading (Tiedt, 1979).

**Health:** The term will be used in this study to include both the physical and mental health of the child.

**High/Scope:** A curricular model developed by the staff of the High/Scope Educational Research Foundation, Michigan, USA, which defines a "plan-do-review" approach (Berrueta-Clement et al, 1984; Short, 1985; Weikert, 1991). This is a curricular model used in several countries including South Africa (Ter Morzhuizen, 1987). It is a refinement of the discovery learning model and also incorporates the child development ideas of Jean Piaget (Piaget, 1970; Weikert, 1991).

**Host:** The species of animal susceptible to a disease, it may show symptoms or be a carrier (Schwabe, 1984).

**Humanised:** A term proposed by this study to describe animal protagonists to which human speech or feelings were ascribed, but that behaved in essence normally, eg Fred Basset in the cartoon strip of that name.

**Illustrated book:** A book consisting mainly of words with pictures interspaced for the sake of clarity.

**Immunity:** Resistance to disease resulting from contact with the disease or vaccination causing the production of antibodies or cells which specifically combat the disease (Coetzer et al, 1994; Quinn et al, 1994; Schwabe, 1984).

**Intermediate host:** The host in which the immature stages of an organism develop and or multiply so as to become infective to the definitive host. (Reinecke, 1989).

**Kwashiorkor:** A disease syndrome resulting from protein deficiency in young children (Polnay & Hull, 1985).

**Laboratory animals:** The term used in this study for rodents commonly used in laboratory experiments, ie rabbits, rats, mice and guinea pigs.

**Life cycle:** Various stages of the development of a parasite which follow each other in a cyclical fashion (Reinecke 1989; Schwabe, 1984)

**Life-world:** The "life-space" described in Lewin's Vector theory, it may also be defined as the psychological world in which the child lives and includes the people, objects and surroundings of the child. In the case of the preschool child, it would typically include home, parents, pets and toys. Once at preschool, the child's life-world enlarges to include fellow pupils, teachers and the school (Mouly, 1973).

**Marasmus:** A disease, which, in the very young child (< 2 years), results when formation of nervous tissue is permanently impaired or stunted by dietary protein deficiency (Polnay & Hull, 1987).

**Malnutrition and undernutrition:** An imbalanced diet (deficiency of protein with adequate energy) can lead to malnutrition, whereas a deficiency of food (starvation) can lead to undernutrition.

**Multifactorial aetiology:** A situation where an organism alone will not cause disease, other variables such as environmental factors, contact with the vector and susceptibility of the child play a role and the disease therefore has multiple, interrelated causes (Schwabe, 1984).

**Overcrowding:** An overcrowding coefficient  $> 1$  calculated using the equation in Chapter 7.

**Overcrowding coefficient:** The sum of the number of animals of each particular species and weight multiplied by the minimum floor space ( $\text{cm}^2$ ) for that species and weight, divided by the total floor area ( $\text{cm}^2$ ) of the cage (see equation 7.1).

**Paratenic host:** Larvae may enter a paratenic host passively and do not develop further. Larvae can pass from one paratenic host to another until it does or passes to the definitive host where the cycle is completed (Reinecke, 1989).

**Pathogen, pathogenic:** Organisms which cause pathological changes in the organs of the host which they infect. The more pathogenic an organism, the more severe the changes and symptoms caused in the host (Coetzer et al, 1994; Quinn et al, 1994; Schwabe, 1984).

**Perception:** This is what the individual sees as reality and is based on needs, purposes and experiences. The senses of sight, hearing, touch and smell can all stimulate perceptions (Mouly, 1973).

**Physiological parameters:** A quantitative measurement of the normal physiology of animals, these include heart rate and respiration rate. Deviations from the measurements regarded as normal, usually indicate the presence of disease (Fraser, 1986).

**Picture book:** The term proposed in this study for a book in which all pages are illustrated, less than 15 lines of text per page, with words in large type.

**Preschool child:** The child of preschool age, that is not less than 30 and not more than 84 months (approximately 3 to 7 years) of age, where the child has not yet started primary school.

**Primary host:** The main or first host affected by a disease entity (Schwabe 1984).

**Qualified teacher:** A teacher with the qualification Higher Education Diploma (preprimary) (Unisa) or similar.

**Random sample:** A simple random sample is selected by drawing a list of all sample units (eg preschools) in a study population and selecting units randomly, eg by using random number tables (Thrusfield, 1988).

**Realistic:** A term proposed in this study for animal protagonists which behaved realistically in a manner typical of the normal behaviour for that species, eg a dog that fetched a ball.

**Reservoir host:** A susceptible species other than the definitive host, which may pass the infection on to another species (Reinecke, 1989).

**Retrospective survey:** A survey where historical data is used from a database initiated prior to the onset of the study (Thrusfield, 1988).

**Sensitivity:** Is the probability of a finding being positive if the disease is present (Venter, 1992).

**Serology:** Using antisera to identify organisms, from this come the terms serovar and serotype (Quinn et al , 1994).

**Share the care:** A humane education curriculum developed in conjunction with educational bodies in Minnesota, USA, in 1982. The project promotes awareness of animals, their environment and interrelationships with humans. The aim of the curriculum was to instil compassion and respect for animals and improve human-animal interactions.

**Socialisation:** The process by which society trains children to act like adults of that society with regard to interactions with other members of society (Sahler & McAnarney, 1981).

**Structured interview:** An interview which is conducted according to a laid-down set of questions which may or may not be open-ended (Marshall & Rossman, 1989; Walker, 1988).

**Specificity:** Is the probability of a finding being negative if the disease is absent (Venter, 1992).

**Subject:** This was used in this study only in regard to the animal content of the books. If no animals were present, the content was not further analysed. If animals were present, their role was defined as central (C) to the story (the animal as one of the main characters of the plot) or incidental (I) to the story (animals appear in the story, but not as main characters).

**The affective domain:** Attitudes and values according to Bloom's taxonomy of educational objectives (Bloom, 1956).

**The cognitive domain:** Concepts, principles, verbal association and problem solving, according to Bloom's taxonomy of educational objectives (Bloom, 1956).

**The Dewey decimal system:** A classification system which arranges all knowledge as represented by library materials into ten broad subject classes numbered from 000 to 900. The more specific the work being classified, the longer the number classification (Maltby, 1978).

**The discovery learning model:** A learning model based on questioning, creativity and life-world discovery. It emphasises the development of skills needed to acquire knowledge rather than merely the transfer of facts from teacher to child. The informal approach is emphasised to provide the pupil with the maximum opportunities for self-discovery (Penning, 1990).

**The Library of Congress (LC):** A system of classification which utilises letter and number combinations for subject grouping, with classes and subclasses (Maltby, 1978).

**The psychomotor domain:** Skill development such as fine motor development, eye-hand co-ordination and so on, according to Bloom's taxonomy of educational objectives (Bloom, 1956).

**The veterinarian as a teacher or parent resource:** The private veterinary practitioner is available in the community and might be prepared to offer expert advice about animals. It is proposed in this study, that by doing so, the veterinarian is acting as a resource for parents or teachers.

**Veterinarian:** A person qualified to practice as such in South Africa in terms of Act 19 of 1982 on Veterinary and Paraveterinary professions.

**Veterinary ethology:** The scientific study of the needs of domestic animals in their usual environment (Odendaal, 1994a, p264).

**Veterinary Public Health:** That part of public health which uses professional veterinary skills, knowledge and resources for the protection and improvement of human health (WHO/FAO, 1990).

**Zoonosis:** Infections which are naturally transmitted between vertebrate animals and man (World Health Organisation, 1979).



# CONTENTS

	<b>Page</b>
<b>DECLARATION</b>	i
<b>DEDICATION</b>	ii
<b>ACKNOWLEDGEMENTS</b>	iii
<b>SUMMARY</b>	iv
<b>SAMEVATTING</b>	vii
<b>DEFINITIONS</b>	x
<b>CONTENTS</b>	xviii
<b>LIST OF TABLES</b>	xxvii
<b>LIST OF FIGURES</b>	xxxiii
<b>LIST OF PLATES</b>	xxxvi
<b>CHAPTER 1: INTRODUCTION</b>	<b>1</b>
1.1 Background and motivation	1
1.2 Problem statement	4
1.3 Hypothesis	4
1.4 Aim and objectives of the study	5
1.4.1 General objectives	5
1.4.2 Specific objectives	6
<b>CHAPTER 2: INTERFACES BETWEEN THE PRESCHOOL CHILD, ANIMAL AND VETERINARIAN</b>	<b>8</b>
2.1 Introduction	8
2.2 The importance of preschool education as a part of child development	9
2.2.1 Normal physical and mental development	9
2.2.2 The importance of sufficient stimulation and nutrition	13

		xix
2.2.3	The link between education and learning theory	14
2.2.4	Educare as part of the solution	17
2.2.5	Long term effects of preschool education	27
2.3	The child-animal interaction	28
2.3.1	Human-animal interaction in different societies	28
2.3.2	Different views on the significance of the child-animal interaction	30
2.3.3	Animal-interaction in education	30
2.3.4	Animal-interaction and child development	32
2.3.5	Animal contact in the preschool	34
2.3.6	Preschool excursions to animal facilities	36
2.3.7	Negative factors in child-animal interactions	38
2.4	The role of the veterinarian in the community and the scope of veterinary science	40
2.4.1	The role of the veterinarian in the community	40
2.4.2	Benefits to animals	42
2.4.3	Human-animal interaction and the veterinary curriculum	43
2.4.4	Zoonoses	44
2.4.5	Euthanasia of animals by veterinarians	46
2.5	Summation	47
<b>CHAPTER 3: A VETERINARY PERSPECTIVE ON DISEASES OF ANIMALS AND PRESCHOOL CHILDREN</b>		<b>50</b>
3.1	Introduction	50
3.2	Hygiene and disease prevention in preschools	50
3.3	Role of the veterinarian in the control of zoonoses	51
3.4	Classification of zoonoses	52

		xx
<b>3.4.1</b>	<b>Primary epidemiological classification</b>	<b>53</b>
<b>3.4.1.1</b>	<b>Direct zoonoses</b>	<b>53</b>
<b>3.4.1.2</b>	<b>Cyclozoonoses</b>	<b>54</b>
<b>3.4.1.3</b>	<b>Metazoonoses</b>	<b>54</b>
<b>3.4.1.4</b>	<b>Saprozoonoses</b>	<b>55</b>
<b>3.4.2</b>	<b>Classification according to primary host</b>	<b>55</b>
<b>3.4.3</b>	<b>Classification according to aetiological agent</b>	<b>56</b>
<b>3.5</b>	<b>Summation</b>	<b>56</b>
<b>CHAPTER 4: ZONOSSES WHICH COULD AFFECT PRESCHOOL CHILDREN</b>		<b>58</b>
<b>4.1</b>	<b>Introduction</b>	<b>58</b>
<b>4.2</b>	<b>Zoonoses caused by viruses</b>	<b>59</b>
<b>4.2.1</b>	<b>Rabies</b>	<b>62</b>
<b>4.2.2</b>	<b>Bovine spongiform encephalopathy (BSE)</b>	<b>64</b>
<b>4.3</b>	<b>Zoonoses caused by bacteria</b>	<b>65</b>
<b>4.3.1</b>	<b>Anthrax</b>	<b>71</b>
<b>4.3.2</b>	<b>Brucellosis and Tuberculosis</b>	<b>72</b>
<b>4.3.3</b>	<b>Psittacosis</b>	<b>74</b>
<b>4.3.4</b>	<b>Gastroenteritis and food poisoning</b>	<b>75</b>
<b>4.4</b>	<b>Rickettsial diseases which are zoonoses</b>	<b>77</b>
<b>4.5</b>	<b>Zoonoses caused by protozoa</b>	<b>79</b>
<b>4.5.1</b>	<b>Toxoplasmosis</b>	<b>81</b>
<b>4.5.2</b>	<b>Cryptosporidium</b>	<b>82</b>
<b>4.6</b>	<b>Mycotic zoonosis</b>	<b>83</b>
<b>4.6.1</b>	<b>Dermatomycoses</b>	<b>84</b>

		<b>xxi</b>
<b>4.6.2</b>	<b>Sporotrichosis</b>	<b>85</b>
<b>4.6.3</b>	<b>The mycoses</b>	<b>85</b>
<b>4.7</b>	<b>Parasitic helminths which cause zoonoses</b>	<b>86</b>
<b>4.7.1</b>	<b>Cestodes</b>	<b>86</b>
<b>4.7.2</b>	<b>Trematodes</b>	<b>90</b>
<b>4.7.3</b>	<b>Nematodes</b>	<b>91</b>
<b>4.8</b>	<b>Ectoparasitic infestations</b>	<b>94</b>
<b>4.9</b>	<b>Summation</b>	<b>97</b>
 <b>CHAPTER 5: MANAGING ANIMALS KEPT AT PRESCHOOLS</b>		 <b>101</b>
<b>5.1</b>	<b>Introduction</b>	<b>101</b>
<b>5.2</b>	<b>Choice of animals for preschools</b>	<b>101</b>
<b>5.2.1</b>	<b>Suitable species for preschools</b>	<b>102</b>
<b>5.2.2</b>	<b>Calculating the costs involved</b>	<b>103</b>
<b>5.3</b>	<b>Housing design</b>	<b>104</b>
<b>5.3.1</b>	<b>Types of housing</b>	<b>104</b>
<b>5.3.2</b>	<b>Cage size</b>	<b>105</b>
<b>5.3.3</b>	<b>Temperature, humidity and ventilation</b>	<b>106</b>
<b>5.3.4</b>	<b>Drainage</b>	<b>107</b>
<b>5.3.5</b>	<b>Ethology and environmental enrichment</b>	<b>108</b>
<b>5.3.6</b>	<b>Security</b>	<b>109</b>
<b>5.3.7</b>	<b>Ease of management</b>	<b>110</b>
<b>5.4</b>	<b>Day to day management of animals kept at school</b>	<b>110</b>
<b>5.4.1</b>	<b>Feeding and watering</b>	<b>110</b>
<b>5.4.2</b>	<b>Bedding</b>	<b>111</b>

		xxii
5.4.3	Cleaning and disinfecting	112
5.5	Management and the child-animal interaction	112
5.6	The role of the veterinarian with regard to housing and management	113
5.6.1	Housing and the health status of animals	113
5.6.2	Housing and management in relation to veterinary ethology	116
5.7	Summation	118
 <b>CHAPTER 6: CATALOGUING AND CLASSIFYING THE ANIMAL CONTENT OF LITERATURE, GAMES AND TOYS AT PRESCHOOL</b>		 119
6.1	Introduction	119
6.2	Cataloguing children's books	120
6.3	Classifying children's books	121
6.4	Evaluating books in the preschool	124
6.5	Animals in literature and other media	127
6.6	Summation	129
 <b>CHAPTER 7: METHODS USED TO STUDY THE INTERFACES BETWEEN PRESCHOOL CHILDREN, ANIMALS AND VETERINARIANS</b>		 132
7.1	Introduction	132
7.2	Aim of the investigation	132
7.3	Populations and samples	132
7.4	Procedures, methods and statistics	133
7.4.1	The opinion of teachers on the use of animals in preschool education	135
7.4.1.1	Survey of preschools in advantaged areas	135
7.4.1.2	Preschools in disadvantaged areas	137

7.4.1.3	Retrospective study of practice records	137
7.4.2	Survey of the paediatric disease profiles in two communities at different socio-economic levels	138
7.4.2.1	Patients from high income communities	139
7.4.2.2	Patients from low-income communities	139
7.4.3	The primary health care approach to an outbreak of zoonotic disease (cutaneous larva migrans) in a preschool	141
7.4.4	An evaluation of the management of animals in five preschools	142
7.4.5	An investigation of teacher attitudes and teaching strategies following the death and euthanasia of animals kept at preschool	145
7.4.6	A survey of animal topics in children's literature, games and toys at the preschool	147
7.4.6.1	High income group	148
7.4.6.2	Low income group	149
7.4.7	Teacher mediated learning and an evaluation of preschool excursions which involved child-animal interactions	150
<b>CHAPTER 8: SURVEY OF CHILD-ANIMAL INTERACTIONS IN PRESCHOOLS</b>		<b>152</b>
8.1	Introduction	152
8.2	Results	152
8.2.1	Human-animal interaction in the preschools investigated	152
8.2.2	Clinical cases seen by veterinarian	158
8.3	Discussion	159

		xxiv
<b>CHAPTER 9: RELATIVE MORBIDITY OF ZONOOSES IN TWO POPULATIONS</b>		<b>164</b>
9.1	Introduction	164
9.2	Results	165
9.3	Discussion	169
<b>CHAPTER 10: USING A PRIMARY HEALTH CARE APPROACH DURING AN OUTBREAK OF ZONOTIC DISEASE IN CHILDREN OF PRESCHOOL AGE</b>		<b>177</b>
10.1	Introduction	177
10.2	Problem recognition and definition	178
10.3	Goal setting	179
10.4	Organisation	181
10.5	Evaluation and monitoring	183
10.6	Discussion	183
<b>CHAPTER 11: AN EVALUATION OF THE MANAGEMENT OF ANIMALS IN FIVE PRESCHOOLS</b>		<b>187</b>
11.1	Introduction	187
11.2	Results	187
11.2.1	Species selection	187
11.2.2	Evaluation of housing and management systems	191
11.3	Discussion	195
<b>CHAPTER 12: TEACHING STRATEGIES FOLLOWING THE DEATH OR EUTHANASIA OF ANIMALS AT PRESCHOOL</b>		<b>200</b>
12.1	Introduction	200
12.2	Results	202
12.2.1	Direct observation	202

		xxv
12.2.2	Designing the teaching strategy	204
12.2.3	Evaluating the teaching strategy	204
12.2.4	Observed results of using the strategy	207
12.2.5	Re-evaluation of teaching strategy	208
12.3	Discussion	211
 <b>CHAPTER 13: ANIMALS IN LITERATURE, GAMES AND TOYS AT PRESCHOOLS</b>		 215
13.1	Introduction	215
13.2	Results	216
13.2.1	Classification and cataloguing systems found at the preschools	216
13.2.2	Developing a system to analyse animal contact	218
13.2.3	Comparison of children's and adults' books	227
13.2.4	Books that preschool children chose	230
13.2.4.1	Preschools in high income areas	230
13.2.4.2	Preschools in low income areas	237
13.2.5	An evaluation system for preschool books	238
13.2.6	Animal themes in regard to toys and games	243
13.3	Discussion	244
13.3.1	Classification and cataloguing of books	244
13.3.2	Animal themes in books and toys	245
13.3.3	Children from low-income areas	247
 <b>CHAPTER 14: EXCURSIONS BY PRESCHOOL CHILDREN TO URBAN FARMS, PRETORIA SPCA AND THE ZOO</b>		 249
14.1	Introduction	249



		xxvi
14.1.1	Environmental education	249
14.1.2	Urban farms and agricultural museums	253
14.1.3	Excursions to the zoo	255
14.1.4	Animal welfare and humane education	256
14.2	Results	256
14.2.1	Teaching strategy for preschool excursions to animal facilities	257
14.2.2	Evaluating facilities	260
14.3	Discussion	267
<b>CHAPTER 15: CONCLUSIONS, EVALUATION AND RECOMMENDATIONS</b>		<b>269</b>
15.1	Introduction	269
15.2	Summation of study objectives	270
15.2.1	Child-animal interaction and holistic child development	270
15.2.2	The role of the veterinarian	272
15.3	Critical evaluation of the study	275
15.4	Contribution of the study	276
15.5	Recommendations and suggestions for further research	276
<b>REFERENCES</b>		<b>279</b>
<b>APPENDIX</b>		<b>App-1</b>

# TABLES

		<b>Page</b>
2.1	Stages of cognitive development according to Piaget	11
2.2	Subdivisions of Piaget's pre-operational phase which are important to the psychological development of the preschool child	12
2.3	Behavioural theories pertinent to learning	15
2.4	Scheme for the classification of preschool programmes currently used in South Africa	19
2.5	Example of a day programme at a preschool	23
2.6	Components of a preschool curriculum	24
2.7	Principle social contexts and the way in which animals are utilised	29
2.8	Children's attitudes to animals at different ages	33
2.9	The sequential approach to teaching thinking skills in children	37
2.10	Five main categories of the functions of a veterinarian	41
3.1	Classification of zoonoses according to their epidemiology	53
3.2	Classification of zoonotic diseases according to the primary host	55
4.1	Groups of viruses with examples of zoonoses in each group	59
4.2	Alphabetical list of bacterial zoonoses	65
4.3	Enteropathogenic bacteria found in children between the ages of 3 and 5 years with acute diarrhoea (n = 140)	75
4.4	The categories of rickettsioses	78
4.5	Protozoal zoonoses	79

4.6	Systemic fungal infections occurring in both man and animals	90
4.7	Trematodes of animals that can occur in man	92
4.8	Nematodes of animals which cause disease in man	92
4.9	Miasis of animals which also affects man	96
4.10	Suggested methods for the prevention of zoonotic diseases in preschool children	99
5.1	Animals suitable for use at the indoor nature table and the outdoor pet's corner	102
5.2	Minimum space requirements for the housing of laboratory animals	106
5.3	Optimal temperature specifications for laboratory animals	107
5.4	Normal physiological parameters for animals	115
5.5	Reproductive and gestation data for laboratory animals used in preschools	117
6.1	Summary of animal topics in videos supplied by the National Film Library Catalogue (1992) for use in preschools	121
7.1	Zoonoses and possible zoonoses for which there are codes in the British Paediatric Association Classification of Diseases (1979)	140
8.1	Child-teacher ratios and percentage of qualified teachers at preschools in Pretoria where animals were kept on the premises permanently, occasionally or not at all	153
8.2	Frequency and relative frequency of schools where animals were used for themes and kept permanently, temporarily or not at all, or that visited the zoo	153
8.3	Reasons given for not keeping animals permanently on preschool premises	155
8.4	Parties responsible for care-giving and the costs involved in keeping animals permanently at preschools	156

8.5	<b>Teachers' opinions on the educational, psychological and social value of animal interaction for preschool children</b>	157
8.6	<b>Diagnoses made on cases seen between 79.07.01 and 89.07.01 by a private practice serving two preschools in the advantaged group</b>	158
9.1	<b>A comparison of the proportions of aetiological diagnoses and symptomatic descriptions found in the data bases obtained from Ga-Rankuwa Paediatric Department and a private practice in Pretoria</b>	166
9.2	<b>Symptomatic diagnoses which could have had a zoonotic aetiology</b>	167
9.3	<b>The frequency of the ten most commonly made diagnoses taken from the paediatric disease profile at Ga-Rankuwa Hospital</b>	168
9.4	<b>Paediatric disease profile at Ga-Rankuwa hospital 90.05.08-91.05.08 according to age group of patients</b>	169
10.1	<b>The difference between primary and specialised health care</b>	177
10.2a	<b>Qualitative analysis of the prevalence (%) of helminth parasites in the faeces of dogs examined at Pieterskraal</b>	180
10.2b	<b>Quantitative analysis of the number of nematode eggs per gram (EPG) found in the faeces of the dogs at Pieterskraal</b>	180
10.3	<b>Survey of the comprehension of community members of information presented during an information day on helminth infestations of man and animals</b>	182
11.1	<b>Reasons given by preschool teachers (n = 100) for choosing or not choosing certain animals for preschools</b>	188
11.2	<b>Average ranking score of each species with regard to cost as estimated by preschool teachers (n = 100)</b>	189
11.3	<b>Species of animals kept in outdoor housing systems at preschools (n = 5)</b>	191

		xxx
11.4	Evaluation of the management and housing of animals kept at preschools (n = 5)	192
11.5	Consequences of deficiencies in housing systems observed at the preschools (n = 5) during the period 1988-1993	193
11.6	Guidelines for housing and management of animals at preschools in terms of meeting objectives for well-being of the animals, needs of children and prevention of zoonotic diseases	198
12.1	Results of structured interviews with teachers at two preschools following the death of two rabbits, one at each school	203
12.2	Number of children in each class and age group of each class (n = 5) at preschool 1	205
12.3	Ways in which the teachers (n = 5) planned to prepare the children (n = 101) for the euthanasia of the rabbit	206
12.4	Number of questions about the euthanasia of the rabbit asked over a five day period by children at preschool 1	208
12.5	Type of questions about death and euthanasia asked over a five day period, by children at preschool 1	208
12.6	Details of questions asked by the children and further observations by the teachers	209
12.7	Retrospective evaluation by teachers (n = 5) of the approach used to inform the children about the euthanasia of the rabbit	210
13.1	Classification and cataloguing systems used for the libraries at Eastern Suburbs and Brooklyn Park Nursery Schools and the Resource Centre	217
13.2	System for the analysis of format, genre and subject of books used in the preschool (corresponding variable symbols in brackets)	219
13.3	Relative frequency distribution (%) of books in each format category for the three preschools	222

13.4	Relative frequency distribution of books in each genre category for all three preschools, standardised by conversion to percentage	223
13.5	Relative frequency distribution of subject groups for all three preschools, standardised by conversion to percentages	225
13.6	Relative frequency distribution by subject of books with adult format compared to the other formats	228
13.7a	Relative frequency of genre in lending library books for children	232
13.7b	Relative frequency of subject in lending library books for children	233
13.8	Ten favourite library books at Eastern Suburbs and Brooklyn Park Nursery Schools	234
13.9	Frequency, relative frequency and ranking of library book configuration found in the children's lending library at Eastern Suburbs and Brooklyn Park Nursery Schools	235
13.10	Books in five low-income, semi-rural preschools in North-West Province (formerly Bophuthatswana)	238
13.11	Interactions of significance to veterinarians, classified in terms of educational objectives, which could be influenced by stories in children's books	239
13.12	Classification of toys according to animal themes	243
14.1	Factors which were used to design a teaching strategy for use by preschools during a visit to the zoo	258
14.2	Results of informal interviews with teachers regarding visits to the zoo	259
14.3	Evaluation of whether educational objectives were met at urban farms in Pretoria (n = 5) used for preschool excursions	263
14.4	Evaluation of whether criteria were met for child-orientated design by urban farms in Pretoria (n = 5) used for preschool excursions	264

14.5	Evaluation of whether criteria were met for animal well-being by urban farms (n = 5) used for pre-school excursions	265
14.6	Species, condition scoring and health evaluation of animals seen at urban farms (n = 5) used for preschool excursions	266
14.7	Uses to which animal put and evaluation of available handling facilities at different urban farms (n = 5) used for preschool excursions	266
15.1	The different roles which could be filled by different veterinary specialities in the health and education of the preschool child	273

## FIGURES

		<b>Page</b>
2.1	Schematic representation of the overlap between the veterinarian, the child and the preschool	8
2.2	Physiological growth from birth to adulthood	10
2.3	The schematic representation of a curricular web with the theme "water"	20
4.1	Life cycle of the hookworm <i>A braziliensis</i>	93
5.1	Factors to be taken into account when calculating the cost of keeping animals	103
5.2	Characteristics of an outdoor pet's enclosure at a preschool	105
5.3	General recommendations for the management of animals to prevent disease	114
5.4	Checklist for the health status of laboratory animals	116
6.1	Example of a bibliographic record	120
6.2	Classification of children's books according to Glazer (1986)	122
6.3	Classification of children's books according to Rothlein and Meinbach (1991)	123
6.4a	Criteria for the evaluation of children's books according to Tiedt (1979)	126
6.4b	Evaluation according to Glazer (1986)	126
6.4c	Evaluation according to Rothlein & Meinbach (1991)	126
7.1	Questions put to preschools in advantaged and disadvantaged areas	135
7.2	Using primary health care principles	140



7.3	Checklist for evaluating the housing and management of animals at preschools	143
7.4	Ethological checklist for assessing animal welfare	144
7.5	Diagram illustrating the qualitative method of research used for the development and evaluation of a teaching strategy	146
8.1	Type of animals kept permanently on the premises at preschools	154
8.2	Examples of answers received from teachers at preschools in disadvantaged areas	156
10.1	Interactions between the environment, zoonotic diseases, animals and children	184
10.2	Time frame between initial diagnosis and intervention at primary health care level	185
12.1	Questions asked during a structured interview with teachers at two preschools following the natural death of two rabbits, one at each school	202
12.2	Suggested teaching strategy for approaching the subject of death or euthanasia of an animal at preschool	204
12.3	Questionnaire for the observation of the effect of the teaching strategy used after euthanasia of an animal at preschool	207
13.1	Drawings of animals in different subject groups	220
13.2	(a) Bar diagram and (b) Pie diagram showing relative frequency of animals as subject matter in books for preschool children compared to books for adults	229
13.3	Bar charts showing the relative frequency of (a) format, (b) genre and (c) subject of children's books	231
13.4	Frequency of FP GFR ACA books in each school	236

13.5	Suggested evaluation criteria for books intended for preschool children, where animals are central to the plot or theme	240
14.1	The Tblisi principles (UNEP, 1977, p 1-8)	250
14.2	A holistic view of environmental education	251
14.3	Objectives for environmental education in the preschool	252
14.4	Educational aims of the National Federation of City Farms (WFCF, 1993, p3)	254
14.5	Key used in Tables 14.5 to 14.9	262
15.1	The various roles which could be played by veterinarians in the holistic development of the preschool child	272

# PLATES

		<b>Page</b>
2.1	Interest table illustrating the theme "invertebrates"	21
8.1	Children interacting with the different types of animals kept at preschools	161
11.1a	Pigeon-cote in playground at a preschool	190
11.1b	Children interacting with pigeons at tea-time	190
11.2	Cage for housing rabbits and budgies at a nursery school. Features of the cage include correct animal density for cage size, drainage into a septic tank, concrete walls and floors, some environmental enrichment for budgies and rabbits and strategic location in the centre of the playground. The height of the floor has been raised so children can see more easily what the rabbits are doing	194
12.1	Carcass of baby rabbit that died at a preschool, covered with flowers by children during a farewell ceremony	203
12.2	Children at preschool and the dead rabbit which was euthanased by a veterinarian	205
12.3	Drawings made by two children of preschool age following the euthanasia of their pet dog after a road accident	211
14.1	Teacher with tired, bored children at the zoo	261
14.2	Children enthusiastic and interested at the zoo	261

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background and motivation

*"Being close to nature and associating with animals is a basic human need. In the childhood of mankind people solved their problems by observing and learning from nature"* (Levinson, 1975, p8).

Animals form an integral part of the human experience. Therefore the veterinarian, whose vocation is animals, is involved in aspects pertaining to the human sciences as well as the natural sciences (Odendaal, 1991). On the subject of interaction of animals and young children, the veterinarian and animal behaviourist Bruce Fogle (1981) has the opinion that, without companion animals in our lives, and especially during the critical years of childhood, our lives would surely be impoverished. Through this "animal connection" we may discover our own animality and at the same time fulfil our obligations as the responsible compassionate stewards of animals.

Contact with animals and the use of topics involving animals is a part of early childhood education (Pullen & McCrindle, 1990). It is therefore logical to consider the veterinarian in relation to the use of animal topics in preschool education.

Shortly after birth, a child will begin to display signs of motor, emotional, social and intellectual behaviour. The baby grows rapidly and development is influenced by both inherited potential and environmental influences (Louw, 1990; Sahler & McAnarney, 1981). Supportive loving interaction between parent and child is important for satisfactory nutrition, growth

and development, no matter what the genetic make-up of the child (Hemlock, 1978). It is because of the influence of the environment on genetic potential that teaching and learning become a means of influencing development (Mouly 1973).

Several stages of development converge in the child between the ages of three and seven years (Breckenridge & Murphy, 1969; Nijkamp, 1968). Physically they have developed to the point that they have achieved some measure of gross- and fine-muscle development and are able to move about easily and freely (Calitz, 1985). Mentally they have developed basic language capabilities and can use objects for chosen purposes (Van der Merwe, 1988a; Wiechers, 1991). The child is inquisitive, eager to learn, and socially able to accept new faces and new surroundings (Polnay & Hull, 1987; Wiechers, 1991). In short, the child is ready for preschool educare.

Modern society would like to see children develop their full potential and become caring, responsible adults. Unfortunately many children do not receive sufficient stimulation or adequate diets in their formative years as their parents are in the workplace or are ignorant of the true needs of the young child. The preschool provides a safe and caring environment where children between the ages of three and seven years can be provided with opportunities for the development of life-skills and be supplemented with a balanced diet.

It is generally considered that preschool education has a positive influence on the later life of a child. A child learns by encountering new experiences and interpreting them in the light of past experience, in other words, the "life-world" of the child. Preschool teachers mediate learning, by working from what the child already knows (eg home, parents, pets) to the new discoveries (eg animals at preschool, the zoo, travelling by bus). As a result a child not only sees the features of the surrounding world (perception) but also begins to understand how it all interacts (cognition).

Levinson (1972) motivated strongly for the keeping of animals at day care centres. Preschool resource books describe how certain animals could be kept in schools and suggest themes which involve animals (Flemming et al, 1977; Stachel, 1986). Animals in the preschool could also be considered to be part of the broader topic of environmental education (Calitz, 1993a; De Bruyn, 1986). They might also be regarded as an integral part of the curriculum, linking to a number of other activities and themes (Grainger-Allan, 1991).

The sphere of interest of the preschool and the preschool child overlaps with that of the veterinarian where it has to do with themes involving animals and animal products, the nutrition of the young child and the risk of zoonotic diseases. The scope of the veterinarian includes interactions between young children and animals, zoonoses and improved animal production.

A high percentage of veterinary clients have also been found to be parents with young children (Harris, 1988; Odendaal, 1988). It is therefore to the advantage of the private practitioner to become involved in matters pertaining to young children. According to the American Veterinary Medical Association's (AVMA) booklet on Marketing Strategies for the Companion Animal Practice, 30% to 80% of new clients are estimated to be the result of word-of-mouth referrals. The American Marketing Association suggests two key sources for referrals, these are clients and personal social structures, including schools (American Veterinary Medical Association, 1987). This has also been recognized in South Africa by the introduction of Pet Care Week under the auspices of the South African Veterinary Association. However, most of the information disseminated is aimed at the school-going child who is already literate without due consideration being given to the preschool child where the type of communication is entirely different and more analogous to communication with an illiterate of any age.

There is a possibility of zoonotic disease inherent in any human-animal interaction. Godin et al (1989) reported that parents and teachers interviewed were very worried about the transmission of zoonotic disease to children. Zoonotic diseases are, however, not only transmitted through direct contact with animals but also by contact with animal products. The risk of disease depends on certain variables, and these variables should be described with respect to preschools and preschool children if the risk is to be managed and decreased.

It is difficult to establish the relationship between man and animals in the absence of systematic and objective data. If positive interactions and contact with animals has social, emotional and cognitive value for the preschool child, then it is axiomatic that such interactions should be promoted in the preschool. This cannot be done without a rigorous examination of all the facets involved in the interface between the preschool child, animal and veterinarian.

## 1.2 **Problem statement**

From the above discussion of the background and motivation for this study, the following two research questions will be investigated:

- For what purpose and to what extent are animals currently involved in the education and health of the preschool child?
- What is the veterinary perspective on child-animal interaction as it bears on physical and mental health and education during the preschool years.

## 1.3 **Hypothesis**

The hypothesis upon which this study is based, can be stated

as follows:

*Living animals and animal-related topics play a major role in the holistic development of the preschool child therefore the veterinarian has a significant role to play in the success of this interaction.*

#### 1.4 **Aim and objectives of the study**

The aim of this study is to investigate how the fields of veterinary science and preschool education (see Fig 2.1) could be integrated, to the advantage of both. This will be achieved by elucidating the scope of involvement with animals in the preschool. Such involvement will then be considered with reference to the value animal contact has for the preschool child in terms of physical and mental well-being as well as risks to the child. The role of the veterinarian will be examined with reference to aspects of human health and the well-being of the animals concerned, as well as direct or indirect educational benefits for the preschool child. Specific and general objectives to achieve this aim, will be discussed in more detail below.

##### 1.4.1 **General objectives**

The general objectives of this study are broad-based, as the education of preschool children is holistic and interactions with animals occur at many different levels and in many different ways. Although creches have been included in some of the investigations, preschool education in South Africa is limited to children between the ages of thirty and eighty-four months. The role of the veterinarian is also not simple or well-defined and both actual and possible interactions need to be clarified. In order to do this successfully present knowledge, in the form of a literature review, will be established and the gaps in this knowledge scientifically explored.



### 1.4.2 Specific objectives

The specific objectives are divided into those regarding the review of the literature for gaps in present knowledge and the methods which will be used to gain this knowledge. Each of the different ways or levels at which the sphere of the preschool impacts on the sphere of the veterinarian and or the animal, will be examined. They may be summarised as follows:

- to supply a theoretical basis by doing a literature survey to illustrate the interfaces between preschool education, the animal and the veterinarian; a veterinary perspective on animal diseases; zoonotic diseases which could affect preschool children; management and care of animals and animals in preschool literature
- to investigate and compare, by means of a survey, the ways in which animals and animal topics appear in the preschool curricula at preschools in high and low-income areas in and around Pretoria
- to estimate the relative morbidity of zoonotic disease in children in these areas so as to discover whether fears regarding diseases transmitted by contact with animals were valid
- to investigate whether primary health care methods could be used to prevent or control an outbreak of zoonotic disease at a preschool
- to evaluate the management and care of animals at preschools and suggest checklists for the design of animal housing at preschools
- to examine the impact of death or euthanasia of animals kept at preschools on the children at preschool

- to develop a method to analyse books, games and toys and use it to survey and evaluate the ways in which animals appeared in literature, games and toys at preschool
- to evaluate the management and care of animals at locations used for preschool excursions and suggest educational objectives for excursions featuring animals

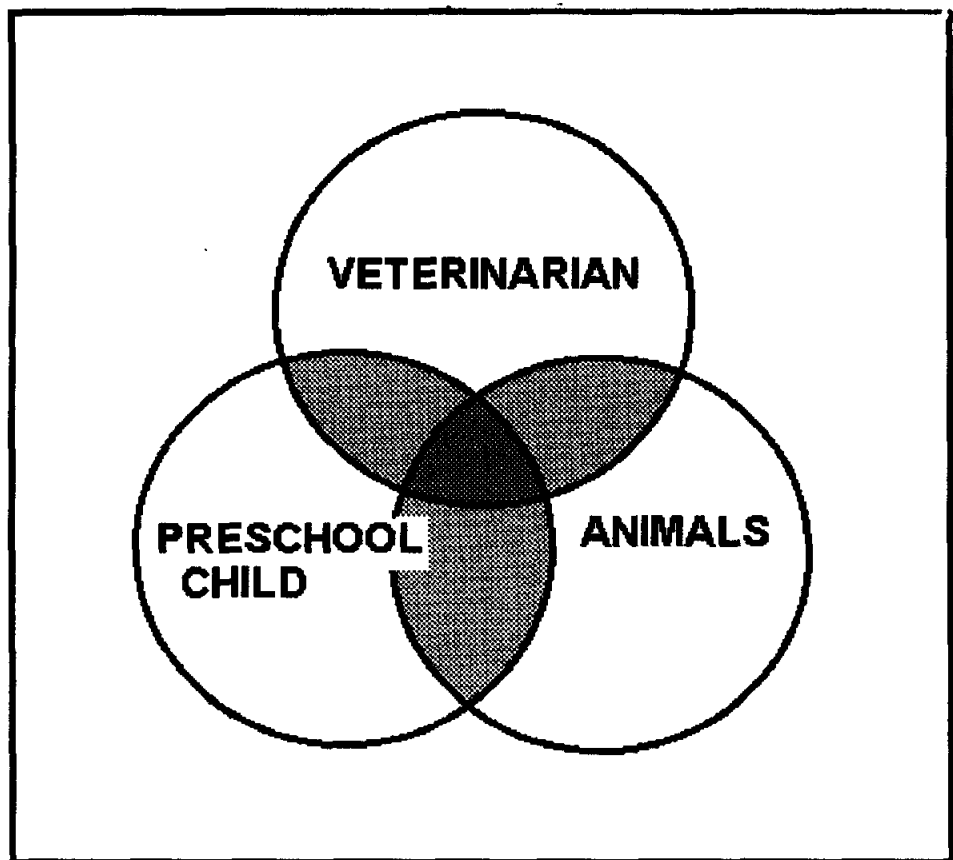
Although it is known that animals are used in preschool education and several authors advocate interaction between children and animals, very little has been published on the extent of this involvement. The role of the veterinarian in this interaction has not been elucidated. As a consequence, this study should make a contribution to the interaction that exists in the triad comprising preschool children, animals and the veterinarian. The interrelationships within this triad will be discussed in further detail in the next chapter.

## CHAPTER 2

### INTERFACES BETWEEN THE PRESCHOOL CHILD, ANIMAL AND VETERINARIAN

#### 2.1 Introduction

There are three interfaces that motivated the choice of study field. These were the importance of preschool education as a part of child development, the child-animal interaction and the veterinarian. They are illustrated schematically in Fig 2.1.



**Figure 2.1: Schematic representation of the overlap between the veterinarian, the child and the preschool**

The study will be limited to the overlap between the spheres of interest of veterinary science the preschool child and the animal (darkened areas in Fig 2.1). In order to investigate this overlap, the importance of preschool education to child development, the child-animal interaction and the sphere of interest of the veterinarian will be discussed in further detail below.

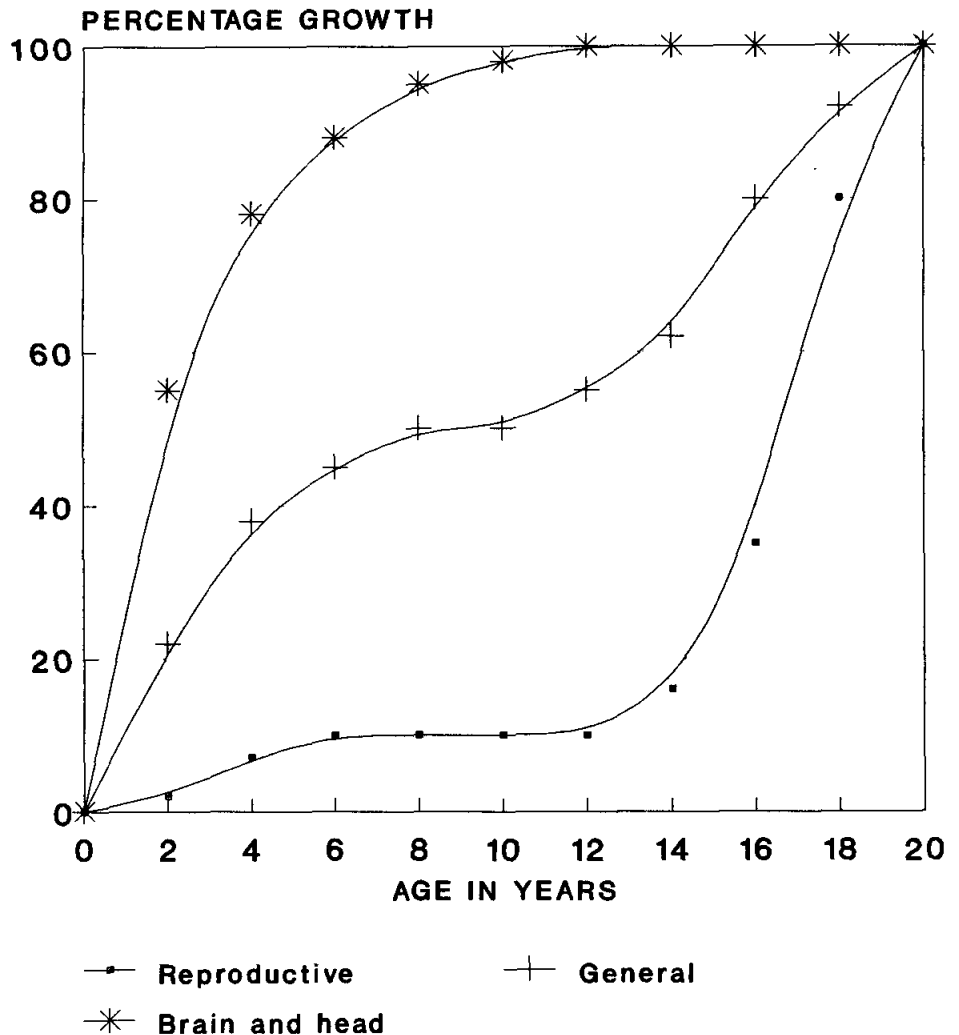
## **2.2 The importance of preschool education as a part of child development**

Mouly (1973) suggests that it is important that teachers be concerned with the whole child and resist the temptation to think of any single phase of development as more important than another. In contrast to this Louw (1990), says that there are certain critical and optimal periods during the development of a child where environmental influences can have a strong positive or negative effect. The normal physical and mental development of a child, the importance of sufficient stimulation and nutrition and the role of learning theory will be discussed further in relation to the short and long term benefits of preschool education.

### **2.2.1 Normal physical and mental development**

The importance of adequate stimulation and nutrition in the young, growing child, is linked to the stages in the development of the child, particularly in regard to the nervous system. Growth and development are related and interdependent, but they are separate processes that can proceed to some extent independently (Sahler and McAnarney, 1981).

The brain grows rapidly in the first few years after birth (Noback and Demarest, 1981). This growth tails off as the child reaches the age of six or seven and practically ceases by the age of puberty (Fig 2.2).



**Figure 2.2: Physiological growth from birth to adulthood**  
(Sahler and McAnarney, 1981, p8)

The five senses do not develop simultaneously. The newborn infant's first impressions of the world are through its touch receptors (Noback and Demarest, 1981; Calitz, 1991b). Smell and taste are also present at birth, but only well developed by the second or third month (Cratty, 1979). There is some controversy about the hearing of the newborn child.

Jordaan and Jordaan (1989), indicated that unborn fetuses were aware of sounds and the newborn infant will respond positively to the human voice. Noback and Demarest (1981), on the other hand, suggested that the infant is actually deaf at birth, but within a few days hearing becomes acute and by one month, the child will recognise voices. The visual perception of the child continues to develop from birth until the seventh or eighth year. In spite of the above general outline, much has still to be learned about the way in which a child's visual and perceptual attributes evolve, fragment and diffuse so that, as adults, they can make complex judgments (Cratty, 1979).

There are various theories of psychological development. The most recognised of these are the developmental theories of Freud, Erikson, Piaget, Kohlberg and Sears (Sahler and McAnarney, 1981). The theories of both Erikson and Piaget are used in different preschool curricular models (Excell, 1990). However, it is considered that the most comprehensive view of child development is the cognitive developmental theory of Piaget (Mouly, 1973). The stages in development he described are summarised in Table 2.1.

**Table 2.1: Stages of cognitive development according to Piaget (after Mouly, 1973, p 34)**

STAGE	AGE GROUP	CHARACTERISTICS
1 Sensorimotor	Birth - 7 years	The child progresses from a reflex stage where his world is undifferentiated, to a complex level where the sensorimotor fraction of his world is beginning to become organised.
2 Pre-operational	2 - 7 years	Thinking is egocentric. As the child lacks experience-based values when forming his concept of the world, points of reference are centred on his own being. The child often draws false conclusions when evaluating cause and effect.
3 Concrete operations	7 - 11 years	Perceptual schemes start to be organised into logical operational systems by the child.
4 Formal operations	11 years onwards	The child can now reason without reference to concrete things.

Several authors contend that the age limits are not absolute and vary from child to child. The stages also are contiguous or overlapping (Louw, 1990; Sahler and McAnarney, 1981; Zemanek, 1992).

In the pre-operative stage of cognitive development, the child believes that it is the centre of the universe (Piaget and Inhelder, 1969). Thereafter the child must learn to limit demands on others and change from an egocentric to a socialised self. This is necessary in order to develop an adequate self-concept and learn through this development how to meet the demands of reality.

This development is encouraged by the social climate at a preschool where children can encounter and interact with others of the same age. Piaget regarded it as most important that young children be exposed to situations in which they could gain experience and knowledge. He showed that thought or actualization of experience, grew from sensori-motor and concrete activities. Preschools could provide the child with many and varied opportunities of direct interaction with concrete, rather than abstract, experiences (Mouly, 1973). This is illustrated in Table 2.2.

**Table 2.2: Subdivisions of Piaget's pre-operational phase which are important to the psychological development of the preschool child (Mouly 1973, p 34)**

STAGE	AGE GROUP	CHARACTERISTICS
Pre-operational Pre-conceptual	2 - 4 years	The child learns empirically
Pre-operational Intuitive	4 - 7 years	Objects and events start to take on a symbolic meaning

Based on the phenomenon of "imprinting", it has also been postulated that there are certain "critical" phases of development in children. That is, developmental stages during which they show an intense responsiveness to particular environ-

mental stimuli. If such critical periods exist in children this is all the more reason to emphasise the value of adequate preschool educare (Sahler and McAnarney, 1981).

### **2.2.2 The importance of sufficient stimulation and nutrition**

Adequate sensory stimulation is an absolute necessity for every child (Thompson and Gruzec, 1970). Maternal neglect resulting in non-organic failure to thrive has been shown to be caused by inadequate stimulation of young children. It has been explained in terms of a psychologically mediated effect on the release of pituitary hormones and can be reversed by improving the social environment of the child (Sahler and McAnarney, 1981).

Sufficient stimulation during the preschool stage, when there is rapid intellectual development, is vital to later school performance. This can be at least partly achieved by effective preschool educare (Polnay and Hull, 1987; Pretorius, 1987; Short, 1985; Van der Merwe, 1988a; Weikert, 1991).

Adequate nutrition is also important to realise the genetic potential of the child, not only as regards growth but also intellectual development. During the period of rapid growth (Fig 2.2), the nervous tissue is sensitive to a deficiency of vital nutrients, in particular protein deprivation. Children suffering from such a deficiency will never attain normal intellectual development (Jordaan and Jordaan, 1989; Noback and Demarest, 1981). In the child older than 2 years, the impairment of intellectual attainment as a result of protein deficiency may be a part of kwashiorkor (Polnay and Hull, 1987).

As marasmus and kwashiorkor are both diseases resulting from protein deficiency they could be prevented by supplying adequate amounts of animal products in the diet of young children. This provides a link between the sphere of interest of the veterinarian (production animals and food hygiene) and the child of preschool age.



It is thus seen that positive sensory stimulation and nutrition are important for the normal intellectual development of the child younger than seven. These two ingredients for healthy development are not always available in the homes of South African children. Atmore (1991) quoted a National Education Coordinating Committee statement as follows:

*"Endemic violence, the ravages of poverty, the absence of the basic necessities of life such as food, water, good sanitation, decent housing ... have become predominantly the features of the lives of the seven million children of preschooling age in South Africa" (Atmore, 1991, p39).*

Nutrition may be a limiting factor in the developing child due to economic factors or ignorance. Sensory stimulation may be inadequate due to lack of parental knowledge or involvement even in a household where both parents are at home. Even wealthy parents may spend too little quality time with young children and nutrition may be affected by so-called "fad diets". The children, however, who most need a good educare program, looking not only to their physical needs, but also to mental stimulation, are the children whose parents are in the workplace and not at home to provide the support needed (Hildebrand, 1991; Plaatjies, 1991; Pretorius, 1987; Rickards, 1991). In South Africa it was estimated that in 1987, women comprised 34,8% of the economically active population (Atmore, 1991). The children of these mothers, many of whom are working because of financial constraints, need educare facilities.

### **2.2.3 The link between education and learning theory**

The parents and home are the place in which a child is "educated" in a spontaneous and informal way in a protective environment. Community values, norms, knowledge and skills are handed down from parent to child generation after

generation. Any school is a supplementary source of education. It is a social institution established because parents did not feel themselves well enough equipped to undertake the task of educating their children to the standard required by society (Swanepoel, 1990).

As well as being a centre for educating children, the school also fulfils a primary socialising function. Various communication media such as literature, radio, television and art or other cultural products, may also influence socialisation (Louw, 1990).

**Table 2.3: Behavioural theories pertinent to learning  
(from Mouly, 1973, p 23-40)**

THEORY	CHARACTERISTICS
1. ASSOCIATIVE	Aristotle's concept of association of ideas: similarity, contrast and contiguity
1.1 Connectionism	Trial and error until right effect is rewarded (Thorndike).
1.2 Conditioning	
1.2.1 Classical conditioning	Pavlov's conditioned response following conditioned stimulus. Reflex.
1.2.2 Contiguous conditioning	Association established at full strength (all or none basis) on first pairing of stimulus and response (Guthrie). Behavioural reinforcement results in learning (Hull).
1.2.3 Instrumental conditioning	Operant conditioning. In order to get a reward the organism must "operate" on its environment. Each step is selectively reinforced to get closer to the ultimate goal. Non-reflex.
2. FIELD OR COGNITIVE	Waltheimer's gestalt theory was the basis. Human experiences have field properties that make the total more than the sum of the separate parts. A relativistic approach.
2.1 Vector/ Topological	Lewin's concept of life-space.
2.2 Purposive behaviourism	Cognitive structure facilitates effective use of the environment in the attainment of goals (Tolman).
2.3 Phenomenological	Behaviour is determined by perceptual rather than objective reality. Related to existentialism and humanistic psychology (Combs, Maslow, Rogers).
2.4 Hierarchical	Learning and cognitive capacity are linked to life-stage or age (Freud, Hunt, Gagne, Piaget).

The curriculum offered in the preschool should capitalise on the child's basic need to grow and be synchronised with the developmental stage of the pupil. Contemporary theories of learning are summarised in Table 2.3.

Teachers can utilise behavioural theory in constructing teaching models. Calitz (1990b) described three models currently used in preschool education. These were: a behaviour modification model, a rational or cognitive model and a discovery learning model. She felt that the discovery learning model best suited the informal environment of the preschool.

In order to comprehend cognitive or field theory as it relates to preschool education, it is necessary to understand the terms perception and cognition (see Definitions). Learning involves the development of insight, for example the development of a more adequate cognitive structure of the total situation. Learning is not additive, it begins with undifferentiated wholes whose parts are gradually differentiated and reorganised into meaningful patterns. It proceeds from perception of a complex unit that is partially understood to a gradual cognitive clarification through organisation, classification and meaningfulness of its parts (Mouly 1973).

Wiechers (1991) concluded that cognition followed perception more readily if the initial discovery was mediated by the teacher. Calitz (1993b) agreed, she suggested that mediated learning experience (MLE) was essential to successful environmental education.

*"Mediated learning experience takes place when the educator places himself between the child and reality and systematically but playfully explains his experiential world to the young child" (Wiechers, 1991, p135).*

The key to successful MLE lies in successful communication with the child of preschool age, who is in Piaget's preoperative phase of development. Piaget, however, stressed that a child learns through his own experience, all that was necessary was that the educator should place the child in a stimulating environment, whereas Feuerstein (1980) suggested that there should be a partnership in learning and that the educator must play the role of mediator.

Between the ages of 3 and 6 years, the child's vocabulary expands at the rate of approximately 50 words a month, yet by the age of 5, children still may interpret facts incorrectly (Grobler et al, 1992). This is probably because they have the vocabulary to hear what is being said correctly (perception) but can only conceptualise the facts in terms of what they already know. If the new fact refers to something outside the child's life-world, the educator needs to tie it to something within the child's experience. Wiechers (1991) calls this bridging.

Successful communication with a child of preschool age is not only determined by the reading style of the communicator, but also by the ability of the child to understand. The younger the child, the less likely it is that they will communicate in return. It is only after 3 years of age that a child will answer direct questions with direct answers. Communication with peers is also limited because the child is too egocentric.

These special features of communication with young children are very relevant to veterinary extension. Explanations about the loss of a pet, pet-care, zoo or farm animals or animal products as food, should all be carefully designed to make the message comprehensible to this target group.

#### **2.2.4 Educare as part of the solution**

The aims of preprimary education (educare) have been formulated by Grobler et al (1992) as follows:

- the all-round development of young children
- promotion of the socio-emotional development of the young child
- accompaniment of the child on the road to adulthood.

In Southern Africa the objective of the programmes followed in most preprimary schools is to ensure the total development of the preschool child in a nonformal setting:

*"The informal nature of the daily programme is a notable feature of this approach. It is the teacher's preparation and planning that is structured rather than the content. The value of play, both creative and free, is emphasised. The child learns through self exploration and discovery"*  
(Excell, 1990, p78).

Government policy regarding separate facilities for separate races was not applied to preschools because they were regarded as informal rather than formal education structures and therefore not part of the government's responsibility (Calitz, 1990a and 1991b). For the purposes of this study, stratification was done on the basis of socio-economic status and geographical location and not racial, ethnic or cultural divisions.

Excell (1990) laid out schemata for classifying the different early childhood programmes (see Table 2.4).

The traditional programme is that most commonly found in South African preschools (Excell, 1990). It concentrates on the total development of the child in regard to affective, psychomotor and cognitive aims. Although all three are present in the curriculum, the emphasis differs depending on the stage of development of the children (Bloom, 1956; Grobler et al, 1990).

These three categories are encountered at schools following

the traditional curriculum, but the order in which they occur and the emphasis placed on each varies from school to school (Grobler et al, 1992). The degree of structuring also varies, in the discovery model a minimum of structuring is preferable (Calitz, 1990b).

**Table 2.4: Scheme for the classification of preschool programmes currently used in South Africa (from Excell, 1990, p 72-94)**

Type of school	Characteristics
Traditional	<ul style="list-style-type: none"> <li>* Informal daily programme</li> <li>* Total development of the child</li> <li>* Structured preparation and planning</li> <li>* Value of creative and free play emphasised</li> <li>* Exploration and discovery model</li> <li>* Thematic approach</li> </ul>
Montessori	<ul style="list-style-type: none"> <li>* Child-centred: teacher as observer and facilitator</li> <li>* Structured environment but "freedom for the children to interact with the environment"</li> <li>* Emphasis on theory of "critical periods" in development of child</li> <li>* Planned sequence of activities leads specifically to academic work</li> <li>* Theory that every child has the capacity for "self-education".</li> <li>* Training and refining of the senses</li> </ul>
Bank street	<ul style="list-style-type: none"> <li>* Play is a core concept</li> <li>* Through play a child explores and experiments with stimuli</li> <li>* Development-interaction approach</li> <li>* Learning by example</li> <li>* Teacher is the model for learning, thinking, communication, and interpersonal relations.</li> </ul>
Waldorf	<ul style="list-style-type: none"> <li>* Rudolf Steiner's spiritual reality concept</li> <li>* Education as a cultural and spiritual concern</li> <li>* Need for authority figure : teacher moves with class</li> <li>* Emphasis on arts, crafts, music and rhythm</li> </ul>
Matal	<ul style="list-style-type: none"> <li>* Developed in Israel for teaching science</li> <li>* Four units:               <ol style="list-style-type: none"> <li>1. Observing the world around us</li> <li>2. Sensing and knowing</li> <li>3. Shaping and relating</li> <li>4. Sorting and classifying</li> </ol> </li> <li>* Four concepts:               <ol style="list-style-type: none"> <li>1. Identifying of objects</li> <li>2. Diversity and individuality</li> <li>3. Continuity and change</li> <li>4. Relationship between structure and action</li> </ol> </li> </ul>
Compensatory	<ul style="list-style-type: none"> <li>* eg "Head Start" and "Grassroots"</li> <li>* Assistance to disadvantaged children</li> <li>* Continually being adjusted to meet current needs</li> <li>* Involvement of parents and communities in "self-help".</li> </ul>

The subject matter of the curriculum at the traditional type of preschool is grouped on a weekly or biweekly basis on the basis of "themes". Themes are the name given to a selection

of content around which learning takes place in the preschool (Grobler et al, 1992; Machado and Meyer, 1984; Van der Merwe, 1988c). Certain themes pertain directly to animals, eg birds, pets, zoo animals and insects. Animals may also be involved indirectly in other themes, eg spring (baby birds and animals) (Sobut and Bogen, 1991). The thematic approach is based on the "Field theory" of learning behaviour (see Table 2.3). A central theme is connected to related concrete objects or to other themes using a web format (Machado and Meyer, 1984; Rothlein and Meinbach, 1991). The theme or centre of this "web" conforms to the "undifferentiated whole" (Mouly, 1973) of cognitive theory, whose parts (the related theories or objects) are reorganised into meaningful patterns. For example the "whole" or "theme" may be "water", but the parts may include uses, inhabitants, equipment or sports (see Fig 2.3).

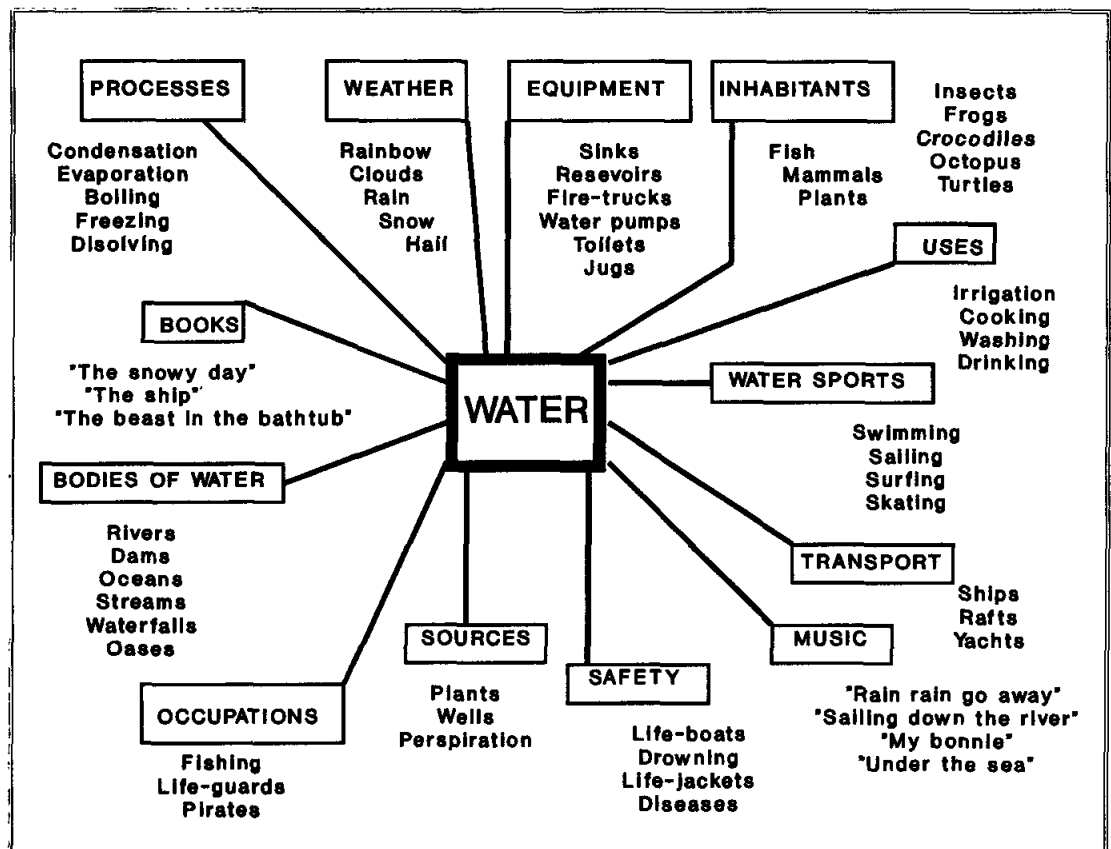


Figure 2.3: The schematic representation of a curricular web with the theme "water"



These parts are actually symbols which would be incomprehensible to a child in Piaget's pre-operational phase of development (Piaget and Inhelder, 1969) without concrete and sensorimotor examples such as actual water, songs, actions, creative work and stories. There is therefore a link-up and interplay between cognitive, affective and psychomotor activities and curricular webs are planned according to the developmental stage of the class (Watson, 1986).



Plate 2.1: Interest table illustrating the theme "Spring" and including animals and plants.



As previously mentioned it is desirable to stimulate as many senses as possible. Children should not just hear and see, they should also feel, smell and touch (Short, 1987). For this reason an interest table and outings are part of the preschool themes (Van der Merwe, 1988c). A typical interest table is illustrated in Plate 2.1.

It is regarded as important that children should be actively involved with the objects on such a table. They should be encouraged to contribute to the table (for instance bring a milk carton from home if the theme is farm animals) and should be allowed to touch and play with objects on the table (Pullen, 1991: Personal communication).

Karen van der Merwe, in her book, "A place for learning", sets out a detailed plan for the daily routine at a preschool. This makes allowance for routine times (arrival, meals, rest, hygiene and toilet) as well as structured (creative activities, music circle, story time) and unstructured (free play, outdoor play) activities (Van der Merwe, 1988b). A good day programme shows a balance between activities which are outdoor and indoor, structured and unstructured, individual and group, silent and noisy (Grobler et al, 1990; Sobut and Bogen, 1991; Van der Merwe, 1988a). The principle of progressing from the simple to the complex, from concrete to abstract, from the familiar life-world to the unfamiliar, is very important in the preschool (Grobler et al, 1990).

Day programmes are worked out so that the child will know what to expect each day as this increases the child's sense of security (Table 2.5).

It is accepted that children learn best when teaching is developmentally appropriate and designed to meet their physical, perceptual and cognitive level (Grobler et al, 1992). Teachers are expected to create a developmental curriculum for preschool children by establishing certain goals and

objectives. Sobut and Bogen (1991) define teaching goals as long term and broad based, whereas objectives are defined as a behaviour or skill that can be defined, observed and measured.

**Table 2.5: Example of a day programme at a preschool (Grobler et al, 1992: 38)**

Day programme for children 3-6 years old	
07:00-07:30	Arrival
07:30-08:00	Breakfast
08:00-08:15	Informal conversation on activities of the day
08:15-09:45	Play with toys and creative activities
09:45-10:00	Washing and toilet routine
10:00-10:45	Light refreshments
10:45-11:45	Outdoor play
11:45-12:00	Washing and toilet routine
12:00-12:30	Lunch
12:30-12:50	Story
12:50-13:30	Nap
13:30-14:45	Play with toys, jigsaws, games, attention to language
14:45-15:00	Washing and toilet routine
15:00-15:15	Light refreshments
15:15-16:15	Outdoor play
16:15-16:45	Prepare children for departure
17:00	Departure

The curriculum may also be regarded as the written document that serves as a blueprint and guideline for the preparation, presentation and evaluation of activities. At present there is no fixed curriculum that refers to content areas or goals to be achieved in a specific period of time for preschools in South Africa (Grobler et al, 1990).

The curricular content in the preschool should be dove-tailed with the sequential learning phase of the children. In other words, it should depend on the developmental stage of the group at preschool. In South Africa, preschool children are

divided on the basis of age into the junior group (first year at preschool), the middle group (second year at preschool) and the senior group (third year at preschool) (Grobler et al, 1990).

The curriculum has different components (Sobut and Bogen, 1991). These components are listed in Table 2.6.

**Table 2.6: Components of a preschool curriculum**

Sobut and Bogen (1991)	Van der Merwe (1988a)
Language, cognitive skills and concepts Perception Motor skills Self-help skills Social skills Readiness for primary school Pre-math Music Dramatic play Art Snack	Physical development - Routines (eating, toilet) - Large muscle development - Fine muscle control Social and emotional - Social relationships - Self-control - Independence - Initiative and creativity - Self-confidence and pride Mental development - Learning about the world - Thinking skills - Communication skills Parental involvement - Posters - Meetings

The differences between the different authors' groupings, as shown in the above table, were more than just semantic. There is also considerable overlapping between the different components.

Preschool teachers are encouraged to use a hands-on approach, assessing children's needs, strengths and progress continuously in order to integrate curriculum, instruction and assessment (Calitz, 1985; Grobler et al, 1992; Swanepoel, 1990). The curricular content is actively connected to the child's experiences and the teacher acts as mediator and facilitator on the road to the child's discovery learning (Kunesh, 1991; Wiechers, 1991). The current emphasis is on educare, that is, promoting the development of the total child by providing conditions in which each child can grow and

flourish to their fullest extent (Grobler et al, 1990). Teacher-resource books such as Fleming et al (1977) as well as Sobut and Bogen (1991) provide suggestions for arranging the learning environment in such a way as to meet these objectives. The aims of early childhood education are set out schematically in Figure 2.4.

The other types of preschools of particular interest to this study are those focusing on compensatory education. Rickards (1991), who is the director of the Grassroots Trust, supplying preschool education to developing communities, describes the educare programme as follows:

*"Our curriculum of active learning builds the children's self-esteem and self-confidence on the basis of learning from direct experience of the world around them. Starting from where they were they construct their own knowledge" (Rickards, 1991, p59).*

This method was often termed the discovery learning model (Calitz, 1990a) and was based on questioning, creativity and life-world discovery. It emphasised the development of skills needed to acquire knowledge rather than merely the transfer of facts from teacher to child. The informal approach was emphasised to provide the pupil with the maximum opportunities for self-discovery (Penning, 1990).

The term life-world refers to the "life-space" described in Lewin's Vector theory (Mouly, 1973). It may be defined as the psychological world in which the child lives and includes the people, objects and surroundings of the child. In the case of the preschool child, it would typically include his home, parents, pets and toys. Once he is at preschool, his life-world enlarges to include fellow pupils, teachers and the school.

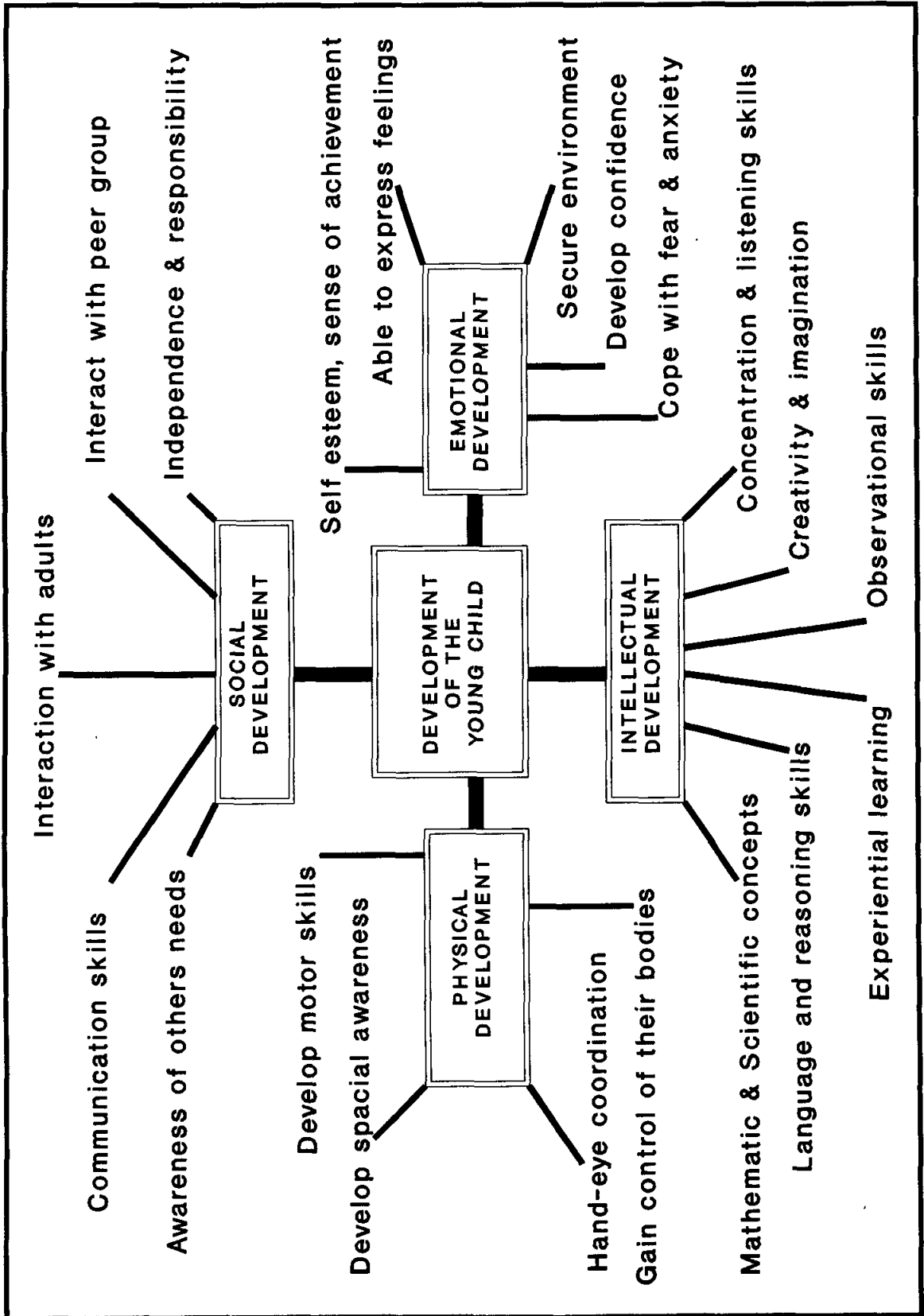


Fig 2.4 : The aims of early childhood education

The young child's readiness to enter into relationships and explore his life-world is directly influenced by emotional security. The learning environment should be so planned that the child is given a sense of self-worth and develops a positive self-concept (Grobler et al, 1990).

High/Scope, a curricular model developed by the staff of the High/Scope Educational Research Foundation in Michigan, USA, defines a "plan-do-review" approach (Berrueta-Clement and Schweinhart, 1984; Berrueta-Clement et al, 1985; Short, 1985; Weikert, 1991). This is a curricular model used in several countries including South Africa (Ter Morzhuizen, 1987). It is a refinement of the discovery learning model and also incorporates the child development ideas of Jean Piaget (Piaget, 1970; Wiechers, 1991).

This curricular model began in 1962 with the Perry preschool programme operated at the Perry preschool in Ypsilanti, Michigan to assist children to combat the negative scholastic effects of poverty (Ter Morzhuizen, 1987). The ideas were later used by the American National "Head Start" compensatory programme (Ter Morzhuizen, 1991).

#### **2.2.5 Long term effects of preschool education**

Longitudinal studies have shown that preschool programmes provided advantages that lasted until adulthood (Berreuta-Clement et al, 1985; Brown, 1985; Ter Morzhuizen, 1991; Verhoef, 1991). In Israel the high failure rate in mathematics and science at matric level could be traced to the way in which children acquired information at preschool level. From this developed the Matal early childhood programme which focused on science education for preprimary and primary school children (Stachel, 1986; Tanchel, 1991).

The Early Learning Centre in Kewtown, Cape, which started in 1972, has found very definite long-term benefits for disadvantaged children attending preschools (Van der Ross, 1987).

### **2.3 The child-animal interaction**

The interaction between animals and preschool children should be assessed in terms of educational objectives in the affective, cognitive and psychomotor domain. This will be done by reviewing human-animal interactions in different societies, the significance of child-animal interactions, human-animal interaction in education and the role of animal-interaction in child development.

#### **2.3.1 Human-animal interaction in different societies**

The place of animals in society and the consequent possibilities for child-animal interaction are greatly influenced by the level of development of that society. Schwabe (1984) has discussed the principal social divisions in terms of undeveloped, developing and developed communities with regard to animal uses (Table 2.7).

In the case of undeveloped, mainly pastoral communities, animals were highly integrated culturally and economically within the social fabric, used as indicators of status or as part of social practices such as weddings. Developing communities used individual animals to fulfil multiple utilitarian purposes central to the family and wider economy, for example camels are used for both transport and milking in North Africa. Developed communities have animals with highly specialised functions such as direct food providers (eg dairy cattle), companion animals (eg dogs and cats) or providers of recreation or pleasure (eg zoo animals).

**Table 2.7: Principle social contexts and the way in which animals are utilised (from Schwabe, 1984, p 5-7)**

Social context	Social characteristics and animal uses
Undeveloped (eg Sudan)	<ul style="list-style-type: none"> <li>* Pastoral economy</li> <li>* Little division of labour: leadership, social forms, religion, economics.</li> <li>* Animals highly integrated culturally and economically within social fabric</li> <li>* Extensive grazing</li> </ul>
Developing (eg India)	<ul style="list-style-type: none"> <li>* Traditional mixed plant/animal agriculture</li> <li>* More complex division of labour. Social institutions intermediate</li> <li>* Individual animals have multiple utilitarian purposes central to family</li> <li>* Cultivated crops with scavenger livestock production and also extensive grazing</li> </ul>
Developed (eg USA)	<ul style="list-style-type: none"> <li>* Industrial with monoculture agriculture</li> <li>* Highly differentiated social institutions. "Disciplines" like medicine and engineering</li> <li>* Animals with highly specialised functions: dairy cattle, race-horses</li> <li>* Intensive confinement feeding, crop rotation, intensive and extensive grazing</li> </ul>

Cultural factors may also play a role. James Serpell (1986b) studied the different attitudes to dogs in different cultures. He concluded that societies in which dogs were used for hunting or for no utilitarian purpose, tended to treat them as companions. Societies in which dogs were used to pull sleds or were used as a food source, allowed no emotional involvement with these animals. This was not always the case, as Eskimo women without children could adopt a puppy and rear it like a child.

The history of domestication of animals is of interest when elucidating the nature of the interaction between man and animals, and has been extensively reviewed (Bustad and Hines 1984; Fogle, 1983; Lockwood, 1983; Odendaal, 1988; Serpell, 1986a).

Odendaal and Weyers (1990b) have summarised the interaction between man and his companion animals (specifically dogs and cats) throughout history in different cultures. They found that the relationship had not changed in principle over the ages in different cultures in different geographical regions,



but that it had changed in terms of variety and intensity of interaction.

### **2.3.2 Different views on the significance of the child-animal interaction**

Several authors have discussed the educative, social and psychological value of the human-animal relationship (Anderson et al, 1984; Beck and Katcher, 1983; Cusack, 1988; Corson et al, 1975; Guttman et al 1986; Levinson, 1972; Odendaal, 1981, 1990a; Odendaal and Weyers, 1990b; Siegmund and Tembrock, 1986). When this interaction was examined with more specific relevance to contact between children and animals, a variety of opinions was found. Some were directed to advantages in the affective domain, or value education (Guttman et al 1986; Levinson 1972 and 1975; McGinnis, 1978; Salk 1985). Others suggested that animal interaction promoted cognitive skills (Condoret 1983; Kidd and Kidd 1987; Margadant-Van Arken, 1983).

Levinson (1972) mentioned that the child gained physical benefits (psychomotor domain) from playing with pets. Horse-riding for the disabled has also been used to promote the development of motor skills in disabled children (DePauw, 1984; McCulloch, 1986).

In addition to this, animals have been successfully used in the psychotherapy of emotionally disturbed children (Cusack, 1988; DePauw, 1984; King, 1983; Levinson, 1964, 1965, 1972, 1975; McCulloch, 1986; Odendaal 1988, 1990a; Ross et al, 1984; Smith 1983).

### **2.3.3 Animal-interaction in education**

The Latham Foundation, formed in 1918 for the promotion of humane education, believed that mankind is best served by a

clear understanding of the vital importance of universal kinship and respect for all life. Latham believed that a child taught to respect animals and all living things would grow to respect his fellow man as well (Arkow, 1984).

In South Africa, Bergensen (1989) investigated the results of contact between pets and children in a special "pet-ownership" programme in a primary school. She found that children in the programme developed a higher level of self-esteem and socialisation after being assigned responsibility for the welfare of the chosen animals at school over a period of nine months.

Jones, Katcher and Beck (1984) developed a school curriculum which emphasised observation and awareness of animals as a means of education. All of the above focused on the cognitive domain. Pro-dogs, a British organisation, used voluntary workers to visit schools with trained dogs and audiovisual material. In 1982, 75 000 children between the ages of 7 and 12 years were exposed to this programme (Odendaal, 1988).

Using animals for the education of people was seen by Fox (1981) as an exploitive, utilitarian relationship. He stated:

*"A pet that is kept primarily as a 'learning experience' is in this category of utilitarian-exploitation if the learning is not integrated with empathy. As elaborated in my recent book, 'Between animals and man', this essentially utilitarian view can be one of the most destructive and dehumanising forces that distorts our perceptions and world view" (Fox, 1981, p31).*

In contrast to this, Siegmund and Tembrock (1986) regarded attainment of certain pedagogic and educational goals (ie "learning experiences") as compatible with human-animal

interaction. These included goals in the cognitive sphere such as gaining specific knowledge using data from observations, photographs and tape-recordings. There was no indication that this would be done without empathy.

None of the above authors, however, explored the role of the animal in child development.

#### **2.3.4 Animal-interaction and child development**

Kellert (1984), in a study of 267 children ranging in age from 6 to 16 years, categorised three stages in the knowledge and attitudes regarding animals. These three stages began with an affective emotional emphasis (6-9 years), later shifting to a cognitive emphasis (10-13 years) and finally to an ethical-ecological concern (13-18 years). Kidd and Kidd (1985) interviewed 300 children between the ages of 3 and 13 years and found that 90% were current pet owners. Their attitudes to their pets differed according to their developmental stage. The grouping of the children differed from that of Kellert and the results were therefore not comparable. Filliatre et al (1986) delineated the interaction between young children and dogs in terms of the behavioural characteristics of each.

Dr Michaela Zemanek (1992), of the Department of Psychology at the University of Vienna, interpreted children's relationships with animals in terms of Piaget's theories of cognitive development (Table 2.3). She stated that the stage of development affected the experiences, preferences, fears and imaginings and functioning of the child with regard to animals at different development stages are summarised in Table 2.8.

She also felt strongly that children in the preoperative phase of cognitive development should be given appropriate opportunities for cognitive and emotional learning in respect to animals.

**Table 2.8: Children's attitudes to animals at different ages (from Zemanek, 1992: 58-64)**

AGE OF CHILD	ATTRIBUTES
12 months	<ul style="list-style-type: none"> <li>* Realises the difference between toy an animal because of movements by animal</li> <li>* Movability triggers feelings of anxiety</li> <li>* These disappear through contact with animal</li> </ul>
36 months	<ul style="list-style-type: none"> <li>* Animals conceptualised as living creatures</li> <li>* Egocentricity determines child's concept of animals</li> <li>* Skills and feelings they do not possess are attributed to animals</li> <li>* Animals may be anthropomorphized</li> <li>* The animal's actions are judged in terms of the child's egocentric standards</li> </ul>
48-84 months	<ul style="list-style-type: none"> <li>* Genuine relationship may develop</li> <li>* Child initiates contact and play with animals</li> <li>* Animals may make a considerable emotional impression on children</li> <li>* Rough handling is a consequence of egocentricity - the child cannot put himself in the place of the animal (empathy) and relate to the pain or discomfort being experienced.</li> <li>* In the pre-operative stage a child cannot appreciate consequence of his actions(cause and effect) and may injure an animal while trying to find out about it.</li> </ul>

Although Levinson (1975) advocated contact with pets from a very early age, VanLeeuwen (1981) felt that during infancy, a child had little need for anything apart from nurturing, "holding" parents. In fact, the young infant should be protected from animals and shielded from even their most affectionate ways. Once, however, the child began to explore the world, a true interaction with things and animals could lead to appropriate relationships:

*"This does not mean that every family should have a companion animal, because there are so many ways in which nature and animal life can be enjoyed. Awareness of the need to provide intelligent care and take responsibility for animals and the ability to feel genuine warmth towards them do not depend on one-time ownership of an animal" (VanLeeuwen, 1981, p175).*

### **2.3.5 Animal contact in the preschool**

The above contention by Van Leeuwen underscores the value of animals in the preschool where the animals are not "owned" by the children or in constant contact with them. Levinson (1972) felt that day-care centres, where children spent any hours away from their mothers during a crucial developmental stage, would greatly benefit from the use of animals in their programmes. These benefits he saw in terms of children with emotional problems relating to the animals before they could begin interacting with other children. He did not specify the age of the children in the centres.

Pitcher and Prelinger (1963) collected free-fantasy stories from a group of preschool children and found that approximately one third of the characters were animals. The young child's exploration of his world brings him into contact with his environment. His self-image, level of conceptualisation and development of scientific thought processes can be influenced by environmental education in the preschool (Calitz, 1991a). Animals form a part of this environment. They should, however, be living animals, as the effect of stuffed animal displays is not comparable (Brucklacher, 1992).

Gladys Blue, Associate professor of Early Childhood Education at North Carolina Agricultural and Technical State University felt that contact with animals helped children to establish a greater sense of security, trust and belief in themselves. In her opinion this centred upon the following six areas:

- love, attachment and comfort
- sensorimotor and non-verbal learning
- responsibility, nurturing and sense of competence
- learning about life, death and grief
- therapeutic benefits to psychological and physical health
- nurturing humaneness, ecological awareness and ethical responsibility (Blue, 1986).

However, limiting factors preventing animals being kept permanently at schools are lack of knowledge regarding the management, housing and diseases of these animals as well as considerable anxiety about zoonoses and allergies (Godin and Lemaire, 1987; Godin et al, 1989).

A child's empathy and compassion for an animal needs to be taught and carefully monitored. Van Leeuwen (1981) suggested that:

*"The preschool years present a certain risk when the child asserts himself and experiments with his strength; he can be strong willed and disobedient. He may blame others and even hand out punishment like a great imitator. Both the animal and the child may become victims during this stage"* (VanLeeuwen, 1981, p177).

This view was underscored by the findings of Kellert (1984). He studied the attitudes to animals of children in the age-group 6-9 years (which includes 2 years of preschool). Negativistic, utilitarian and doministic attitudes were higher and moralistic attitudes to animals were lower than those of older children. Filiatre et al (1986), found that two year old children had a higher level of aggression towards pet dogs than older children.

Because of the variables involved in any human-animal encounter, it is particularly important that children should be carefully monitored and guided during their first interactions with animals. How this is done determines to a great extent the advantages the encounter will have for a particular child and whether it will produce the desired effect. Professor Johannes Odendaal (1988), in his thesis on the role of the companion animal in modern societies, felt that the success of animal projects in schools would be dependent on the ability and interest of the specific teacher. Not every teacher would

be equally successful as not every teacher had the same feelings for animals.

### **2.3.6 Preschool excursions to animal facilities**

In addition to keeping animals at the preschools, preschool children are taken on excursions. The extent to which this takes place at preschools is reported in Chapter 8. The motivation for taking preschool children on excursions is provided by Machado and Meyer (1984). They have suggested that activities for young children should capture and hold their attention and provide first hand sensory experiences, with explanations where necessary. Excursions provided an opportunity to encounter situations and observational opportunities beyond those in the classroom (De Bruyn, 1986).

Experience with concrete objects is considered essential for the preschool child (Grobler et al, 1990). Taking preschool children on excursions therefore presents an ideal opportunity for them to experience concrete objects beyond those encountered at home and at the preschool.

According to the theories of Piaget, the child in the pre-operational stage of development must undergo a transition from the animistic and magical mode of thought, characteristic of children and primitive peoples, to the logical mode of thought characteristic of adults (Piaget and Inhelder, 1969). Experience only becomes meaningful as it is organised into cognitive structure. Therefore the young child seeing different animals, cannot determine what to expect from each until he has categorised them (Mouly, 1973). Wiechers (1991) suggested that this was best done through MLE, where the teacher or parent leads the child towards problem solving and cognitive thinking through mediation. The mediator gives information, but merely in order to influence the sequence and direction of the child's mental activities. The type of ques-

tions asked and the way in which questions should be asked to facilitate mediation in environmental education have been suggested by Calitz (1993a).

Concepts summarise experiences into a grouping. Instead of having to describe an object in all its complexity (eg "the jacket you are wearing looks like those flowers over there") a generic name can be used (eg "your jacket is red"). This conceptualisation is also the key to mastery of language and mathematics, which is, in essence, only a series of symbols and concepts which a specific group of people understand (Ault, 1983; Barry et al, 1987; Mouly, 1973). The sequential approach to developing thinking skills in children is illustrated in Table 2.9.

**Table 2.9: The sequential approach to teaching thinking skills in children (from Mouly, 1973, p163)**

STAGE	COGNITIVE TASKS	SEQUENTIAL OPERATION
I	Concept formation	1. Differentiation 2. Grouping 3. Labelling (categorisation)
II	Interpretation and inferences	1. Assembling concrete information (facts) 2. Formulating inferences
III	Applications (formation of hypotheses)	1. Hypothesis formation 2. Establishing parameters for hypothesis testing

Because the child is in the pre-operational stage, only stage I of the above table is applicable. Teaching strategies should therefore be arranged sequentially, the child cannot categorise until grouping is mastered and cannot group before learning differentiation. Each task thus requires a special set of questions and sequencing of questions by the mediator (Mouly, 1973). This is, in effect, an argument against the purist's approach to child-centred discovery learning in the absence of a mediator (Table 2.4) as described by Excell



(1990). Without mediation, the trial and error method, or learning by approximation, is likely to be very time-consuming.

Excursions could thus provide an opportunity for concept formation through both MLE and discovery learning.

### **2.3.7 Negative factors in child-animal interactions**

Any child could be rough with an animal due to inexperience or carelessness, but deliberate cruelty such as torturing or killing companion animals is not regarded as normal behaviour (Zemanek, 1992). Kellert and Felthaus (1985) have linked childhood cruelty to animals with violent crime in adults. Hellman and Blackman (1966) and VanLeeuwen (1981) regard deliberate cruelty as a sign of trouble that warrants psychiatric assessment of the child concerned. Hutton (1983) found a positive correlation between animal abuse and child abuse in families.

This, however, does not mean that all those who are kind to animals are equally kind to people. Tyrants of Greece, Rome and ancient China as well as modern-day war criminals, were known to keep pet animals (Levinson, 1975; Serpell, 1986a). Yet the Humane Society of the United States of America promotes humane education as a method of teaching empathy and altruism to children (Broun et al, 1984). Zahn-Waxler et al (1983) concluded that humane behaviour to animals as well as humans, could be taught to young children.

Animal bites may also be regarded as a negative factor in child-animal interaction. Van Leeuwen (1981) mentioned that his hospital treated approximately 300 children a year for dog bites. Jones and Beck (1984), surveyed 3 200 children aged 4 to 18 years about dog bites and their attitudes to dogs. They found a bite rate of 0,45%, with the highest rate occurring in children 7 to 12 years of age.

It was suggested by McCrindle et al (1994a) that dogs in low-income areas were mainly kept for security purposes. Possibly because the dogs in these areas are small (> 15kg), injuries caused to children were less severe. It was, however, considered that there was a high risk of rabies due to the roaming behaviour of these dogs. This suggestion was later substantiated by an outbreak in dogs which occurred in the area in July 1995. Segal (1994) suggested that fear often follows a dog-bite and this is sometimes linked to a specific breed of dog rather than canines in general. This fear may be adaptive, in that it prevents a re-occurrence of the situation, or it may be disruptive, and lead to phobia. In such a case the psychological affects on a child could be more severe than the physical trauma of the bite. Veterinarians could play a role in selecting against aggression in dog breeds, educating the public or giving therapeutic advice in the field of behavioural or clinical approaches (Odendaal, 1994b).

Fear and disgust in relation to animals are discussed by Zemanek (1992). She calculated mean anxiety scores rated on a verbal scale for different animals. At the top of the fear scale was the rat, followed by spiders and jellyfish. In terms of the "hierarchy" of disgust-inducing animals, the rat once again headed the scale followed by spiders and cockroaches. With regard to animals in general, the lowest anxiety level (fear of animals) was encountered in the group whose parents had encouraged contact with animals while they were children.

Other negative factors described in human-animal interactions are pollution due to faecal contamination by animals and zoonotic diseases (Schwabe, 1984). Loss of an animal can also impact negatively on the owners of companion animals (Anderson et al, 1984). These will be discussed in greater detail in later chapters.

## 2.4 **The role of the veterinarian in the community and the scope of veterinary science**

The concept that a veterinarian is only there to "look after animals" is a truism. The role of the veterinarian is indeed far wider.

### 2.4.1 **The role of the veterinarian in the community**

According to Odendaal (1991), client perceptions of the role of the veterinarian differ widely. There are those who see him in the role of an animal-loving "Mother Theresa" who is prepared to give his all to the comfort and welfare of animals, with no or little financial benefit. Others see the veterinarian in the opposite light as an emotionless or poorly adjusted personality who experiments on animals or as purely motivated by material gain. Fortunately the majority of clients see the veterinarian in a more positive and realistic light as a caring professional.

A systems analysis of the role of the veterinarian shows that different authors regard different components as important. Shurtleff (1983), regards only the human component:

*"Veterinary medicine is a human activity which treats animals as dictated by the needs and demands of other human beings; in many instances the needs of the animal are secondary, if considered at all"* (Shurtleff 1983, p512).

In contrast, Odendaal (1991), perceived it as a triangular interaction between the veterinarian, the client and the animal concerned. This in turn reflected the role of the companion-animal practitioner within the community:

*"Die kliënt maak 'n belangrike deel uit van die sisteem in 'n veeartskonsultasiekamer. 'n Mens kan so ver gaan om te sê dat sonder die kliënt daar geen sodanige sisteem bestaan nie"* (Oden-  
daal 1988, p130).

Yet companion animal practice is only one facet of the work done by veterinarians. Shurtleff (1983) mentions that, although we refer to "the veterinary profession" as though it was a separate and independent entity, veterinarians perform a large variety of different tasks with different species of animals.

**Table 2.10: Five main categories of the functions of a veterinarian (Modified from Schwabe 1984, p1-15)**

<b>FUNCTION</b>	<b>CAREERS</b>
Food and human nutrition	Production animal practitioner Poultry specialist Pig specialist Fish farming Veterinarian in Industry
Zoonosis and medical research	State veterinarian (zoonosis control) Public health inspector (municipal, provincial or state) Abattoir veterinarian Research officer
Epidemiology and population medicine	Production animals: herd health Poultry and pig specialists Veterinary diagnostic laboratory staff Public health advisors State veterinarians: animal disease control
Environmental quality, sport and recreation	Aquatic animal practitioner Parks board veterinarian Zoo veterinarian Equine practitioner
Mental health and humane values	Companion animal practitioner Animal welfare veterinarian Education: tertiary institution academic staff

Van der Made (1986) described the veterinary profession as being made up of a variety of independent careers which serve the community in different ways. He perceived the relationship as an interaction at a level which pertains to the health of the animal and man.

This viewpoint was shared by McCulloch et al (1983). They, however, included the environment as part of the equation:

*"The practice of veterinary medicine involves people, animals and the environment in which they live. The veterinarian is required to make decisions that can affect the emotional, physical, social, economic and political well-being of clients as well as others within the community"* (McCulloch et al, 1983, p489).

It is interesting that this definition of the veterinarian's role goes so far as to include economic and political aspects in the interaction.

Schwabe (1984) defined the sphere of the veterinarian at its most empirical as the science of animal disease management. The different functions of the veterinarian in terms of human social and health related needs are set out in Table 2.10.

For the purposes of this study, a veterinarian will be considered to be a person qualified to practice as such in South Africa in terms of Act 19 of 1982 on Veterinary and Paraveterinary professions.

#### 2.4.2 **Benefits to animals**

The well-being of the human side of the interaction has been stressed in the discussion above. It has, however, also been found that interactions with humans may have positive effects for animals (Fogle, 1983; Karsh, 1983; Kilgour, 1984; Smith, 1983). Studies on petting of dogs showed that patting and stroking the head resulted in marked bradycardia and slower, deeper respiration. This was ascribed to tactile response (Gantt, 1972). Hemsworth et al (1991) suggested that, with the exception of the immediate family, many humans interact more with domesticated animals than they

did with other humans. These interactions were often frequent and intense and consequently strong social relationships could be formed between humans and domesticated animals.

There may also be benefits for production animals. The literature on the human-farm animal interaction has been extensively reviewed by Professor Stanley Diesch, who practised as a large-animal veterinarian in Iowa and Illinois (Diesch, 1984) and by Ron Kilgour of New Zealand (Kilgour, 1984). A large number of species are traditionally associated with man, however, the sheep, goat, cow, pig, horse and hen were considered by Kilgour (1984) to represent domestic or farm animals. Hemsworth et al (1991) found that the productivity of farm animals was linked to the interaction with the person who looked after them. If this interaction was good (eg the woman in charge of the pigs treated them "kindly"), the productivity (measured in terms of average daily gain) improved. The converse was also true.

As regards non-domestic animals, Veselovsky (1986), has motivated for the contention that keeping animals in zoos is an extension of pet-keeping. One of his strongest arguments was that keeping animals in captivity was particularly beneficial for endangered species. It also allowed scientists to gain knowledge on captive animals which could be applied to the benefit of free-living animals of the same species. The relevance to this study is that domestic and wild animals as well as companion animals are associated with preschool education (McCrinkle, 1989; Pullen and McCrinkle, 1990). Visits by preschools to the zoo will be discussed further in Chapter 14.

### **2.4.3 Human-animal interaction and the veterinary curriculum**

Despite the fact that the human factor plays such an important part in day to day veterinary practice after graduation, the

undergraduate curriculum focuses chiefly on traditional technical medicine (Harris, 1984a; Odendaal, 1988; Odendaal, 1991). Until very recently, aspects of human-animal interaction were limited to lectures in public health, veterinary economics and client relationships (practice management). McCulloch et al (1983) have summarised the teaching of aspects of the human-animal interaction at American universities and found them to be poorly catered for.

In South Africa this subject is taught to second and third year students as companion- and production-animal interaction in veterinary practice by the Department of Veterinary Ethology at the University of Pretoria.

#### 2.4.4 Zoonoses

Zoonotic diseases or zoonoses, are also an area of importance to the veterinarian (Editorial Veterinary Record, 1991a and c). Van der Made (1986) felt that human health was the primary concern and animal health of secondary concern to veterinarians. Zoonotic disease can be a major cause of death in humans. There are, according to Wandeler (1992), 210 000 human fatalities world-wide due to rabies every year, 99% of them caused by dogs.

Whether the primary emphasis is placed on human health or whether it is placed on the health of animals, interaction between man and animals entails health risks for both. It is regarded by Harris (1984a) as a veterinarian's duty to be constantly aware of the possibility of such diseases. However, this can be taken too far:

*"Daar is kiembewuste mense wat glo dat elke kontak met 'n dier 'n mens blootstel aan doodsgevaar"* (Odendaal 1980, p11).

Although the control and prevention of zoonotic disease may be considered an important part of the duties of a veterinarian, as mentioned by Odendaal (1980) above, it is only in the public health sector that this will be the primary directive. In other branches of veterinary science, the primary directive is the promotion of animal health, with human health as a desirable result thereof.

Besides health risks of the animal and human partners of the human-animal interaction, there are health benefits. Veterinarians treat and cure sick animals and they work for animal welfare agencies. Veterinary research also covers many other fields of direct benefit to the preservation of animal species and optimisation of their living conditions. This directly benefits animals. There are also benefits to humans. Traditional veterinary medicine certainly regards the promotion of animal production as beneficial to human nutrition and economics (Van der Made, 1986). Other human psychological and physical health benefits mediated by veterinarians are well documented (Brodie, 1981; Cusack, 1988; Katcher, 1983; Wallin, 1978). It is suggested that veterinarians should work hand-in-hand with other health professionals to promote these benefits (Editorial Veterinary Record, 1991d; Harris, 1984a; Odendaal, 1988; Odendaal, 1990a; Editorial, Veterinary Record, 1991d).

In the case of private practitioners, the health of the animal will be the aspect that concerns the client, and the type of client seen by the veterinarian may have considerable influence on the nature and priorities of the practice. Odendaal and Weyers (1990a) have given a breakdown of the clients seen in a suburban companion-animal practice in South Africa. The profile of the most commonly seen client was a young, working mother with two children, living in a suburban house and owning two pets. This profile is similar to that found in other countries such as Australia (Salmon and Salmon, 1983; America (Harris, 1988) and Canada (Whittaker, 1979).



#### 2.4.5 Euthanasia of animals by veterinarians

Professor Johannes Odendaal, currently head of the department of Veterinary Ethology at the University of Pretoria, felt that part of the teaching programme should include the veterinarian's involvement in the euthanasia (humane killing) of animals:

*"Dit is uiters noodsaaklik dat die veearts oor die meerdere kennis sal beskik om die eienaar so in te lig dat 'n rasonele besluit oor genadedood geneem kan word. Die veearts moet die situasie rondom die verlies van 'n geselskapsdier kan hanteer"* (Odendaal, 1988, p249).

Death is final. The judgement needed to decide which animal should live and which should die has become a great responsibility. Murder is strongly condemned by society and religion and implies that a person is deliberately put to death unlawfully by another. In many cases the owner could see a companion animal as "part of the family" (Bryant, 1986; Cusack, 1988; Odendaal, 1986; Odendaal, 1988) and grieve accordingly if the animal dies. The veterinarian should be careful that the owner does not regard the euthanasia of such an animal as a sort of murder, or that the veterinarian does not feel like a murderer:

*"Euthanasia is the part of the practice I find most difficult. On the surface, it seems the antithesis of what I should be doing. I should be curing, not killing. It has taken a long time to accept that it is a necessary and beneficial act in many instances"* (Fogle 1983, p101).

Antelyes (1981) notes the reasons that veterinarians are unable to deal with the grief involved in euthanasia and pet-loss are the following:

- general cultural taboo against talking about death
- the fact that veterinarians are regarded as scientists, and as such are supposed to be objective and unemotional.

Veterinarians performing euthanasia should consider the impression they make on young children (Odendaal, 1986). In a survey of 300 children, Kidd and Kidd (1985) found that one third of each age group said that the veterinarian hurt or frightened their pets. Only two youngsters, a 3-year old and a 5-year old, were positive about veterinarians. This is most important when considering the perception of veterinarians that may develop in children while they are still of preschool age.

## 2.5

### Summation

From the literature surveyed in this chapter, it may be seen that animals could function as facilitators in the education of children and adults. In terms of educational objectives, most of the literature refers to interaction which would be classified as falling into the affective and cognitive domain. One author (Fox, 1981) goes so far as to argue that the use of animals for education in the affective domain is acceptable, whereas use for acquiring knowledge (cognitive domain) is not.

There seems to be some controversy as to whether the use of animals in education is justifiable. "Utilitarian exploitation" is a term which may possibly be applied to the use of animals for dissection to teach biology in high schools or when living animals are used for surgical practice during the training of university students. Humane education, on the other hand, is advantageous to both animal and child, and cannot therefore be regarded as exploitive.

The literature with respect to interactions between children and animals is also complicated by the multiplicity of ill-defined terminology. What are "animals"? For some authors they are exclusively household pets, others include only mammals, or broaden the scope to include all vertebrates or even the entire range of the animal kingdom. The scope of this study includes all animals, both vertebrates and invertebrates.

With regard to the literature reviewed, the definition of "child", in particular the preschool age-group, is also problematical. Many authors do not qualify their findings with respect to age-group. Others divide children into groups empirically. Many of these groups overlap, making comparisons difficult. Vague synonyms are used such as "early childhood", "young children" or "adolescents".

The informal system of education, as used in the preschool, allows the necessary latitude, yet provides sufficient supervision to make the child-animal interaction a success. Selection of the right teacher is important to successful interaction. However, the danger of dog-bites, hygiene and the possibility of zoonosis need to be taken into consideration when choosing animals for young children. From the point of view of the animal, its housing and well-being are linked to knowledge of the ethology of that species.

The general perception of the veterinarian is merely "someone who treats sick animals", however, the profession is far more diverse. It is orientated not only to the animal, but to the human with whom the animal or animals interact - the interests of the animal may be secondary to the interests of the client and or the community. A particular example of this is in the field of zoonotic diseases, where the health of the human is paramount. Many health benefits for both human and animal also result from interaction and can be mediated by the veterinarian.

The profile of the most common client seen by a companion-animal practitioner is a suburban, working mother with two young children and two pets. How a veterinarian is viewed by mothers and their children is therefore relevant to the success of such a practice. In this regard the finding by Kidd and Kidd (1985) that children had poor perceptions of veterinarians is important. Particularly in the case of preschool children, such perceptions would have long term effects.

For a preschool child the animal world presents an enormous variety of opportunities for learning by discovery: household pets, books and films, zoos and nature reserves, even an open field teeming with living creatures. On the other hand, the veterinarian is possibly unaware of the needs of the preschool child, although surveys (Harris, 1988; Odendaal 1988) have indicated that a large proportion of veterinary clients are parents with young children. In addition to this are the fears of possibly exposing children to zoonotic diseases through contact with animals. The next chapter will explore further the veterinary perspective on diseases of animals and pre-school children.

## CHAPTER 3

### A VETERINARY PERSPECTIVE ON DISEASES OF ANIMALS AND PRESCHOOL CHILDREN

#### 3.1 Introduction

Teachers have expressed a fear of zoonotic diseases occurring at preschools (Godin & Lemaire 1987). The risk of zoonotic diseases for children at preschools is linked to the presence of the disease itself, or its vector, in the environment, as well as the susceptibility of that age group of children to the particular disease. Not all zoonotic diseases, however, present the same risk. In order to discover whether this fear was justified, it would therefore be necessary to explore the hygienic practices used at preschools and the role played by the veterinarian in the prevention and control of zoonotic diseases. Classifications used for zoonoses are also relevant as these are linked to the occurrence and method of spread of these diseases.

#### 3.2 Hygiene and disease prevention in preschools

Behaviour related to personal hygiene has been linked to risk of disease in young children (Khin-Maung et al, 1994). Van der Merwe (1988b) regards a healthy environment as very important at the preschool. Emphasis is placed on facilities such as playroom, kitchen, toilet and outdoor play areas being clean and hygienic at all times. Cleanliness and personal hygiene is specifically taught to children and time is put aside for them to wash their hands. This is further extended to encompass regular visits by a clinic sister, vaccination records and guidance to teachers and educate workers on symptoms of disease in children (Grobler et al, 1992).

This carefulness about the hygiene and health of children may not extend to animals kept at preschools. Godin and Lemaire

(1987) reported that very few teachers (18% of a total of 126 teachers questioned) took hygienic precautions in regard to animals kept in their classrooms. Although no cases of zoonoses were reported by this study, the authors felt that the teacher's knowledge of zoonoses was inadequate.

### 3.3 Role of the veterinarian in the control of zoonoses

The World Health Organisation (WHO) has stated that an improved man-animal-environment relationship is important for achieving an acceptable standard of global health and that veterinary public health has a fundamental role in primary health care (WHO/FAO, 1990).

Veterinarians are involved in disease prevention and public health (Du Preez & Van den Heever, 1992; Mossel, 1990). It was through the development and demonstration of tactics for disease management in animal populations that veterinary medicine has made major contributions to human health (Martin et al, 1987; Thrusfield, 1980). Besides preventing and treating disease in living animals, the veterinarian plays an important part in the production of healthy food of animal origin. This also forms a part of veterinary public health (Lynch, 1990; Schwabe, 1984).

According to Turner (1990), the WHO has defined veterinary public health as:

*"... that part of public health which uses professional veterinary skills, knowledge and resources for the protection and improvement of human health"* (Turner, 1990, p8).

Food-borne illness is a major public health concern worldwide and leads to costs resulting from human illness and economic losses. For example, the cost of food-borne disease in the USA was estimated at \$23 billion. Bacterial diseases made up

approximately 80% of this total (Waites & Arbuthnot, 1990). In effect this involved inspecting meat, milk and other animal products for the presence of disease-causing organisms (Kvysgaard, 1990). Veterinarians performing these duties are employed by abattoirs to inspect animals before and after slaughter and by municipalities to inspect dairies and monitor the communities milk supply by means of routine laboratory tests (Turner, 1990). The veterinarian is therefore active in preventing food-borne zoonotic diseases and is in a position to advise preschools on the safe handling of animal products used as food.

Although veterinarians have played a major role in public health since the beginning of the profession, this role is not always recognised by the public, who picture veterinarians as private practitioners (Mossel, 1990). Turner (1990) discusses the possibility that veterinarians may need to develop new skills to identify and deal with problems at the population level. He maintains that treating individual animals, is not the only direction veterinary science should take. Venter (1992) stated that during the last two decades, there has been a shift of emphasis away from mere laboratory investigation of infectious agents to a holistic inquiry into the causes and effects of animal diseases. This was part of the field covered by veterinary epidemiology (Davies, 1983; Evans, 1987; Lillienfield, 1978). Fields in which veterinarians are trained, which may be of significance to the prevention of zoonotic diseases in the preschool child, include epidemiology, animal management and food hygiene. They may therefore have an important role to play in preventing the transmission of zoonotic diseases to preschool children.

### **3.4 Classification of zoonoses**

Zoonoses are a heterogeneous group of diseases caused by a variety of different agents (Fraser, 1986). As a result a variety of different classification systems have been proposed.

Schwabe (1984) has suggested that classification systems should reflect in some way the way in which zoonoses are spread. This he calls a primary epidemiological classification.

### 3.4.1 Primary epidemiological classification

The primary epidemiological classification described by Schwabe (1984) and adopted by the World Health Organisation (WHO) is useful when considering the prevention and control of this group of diseases (Table 3.1).

**Table 3.1: Classification of zoonoses according to their epidemiology (modified from Schwabe, 1984, p196)**

Maintenance cycle	Epidemiology	Examples
Direct zoonoses	May be perpetuated by a single vertebrate species	Rabies Brucellosis
Cyclozoonoses	Require more than one vertebrate species for maintenance cycle	Taeniasis Hydatid disease
Metazoonosis	Maintenance cycle requires both vertebrates and invertebrates	Arbovirus infections Trypanosomiasis
Saprozoonosis	Depend on inanimate reservoirs or development sites as well as vertebrate hosts	Sporotrichosis Cutaneous larva migrans

This system is based on the nature of the disease, the manner in which it is transmitted and the ecological niche occupied by the vectors and hosts. It is therefore considered to be an epidemiological approach. The subdivisions of this classification are discussed in more detail below.

#### 3.4.1.1 Direct zoonoses

As only one species is required to perpetuate the infectious agent in direct zoonoses, the organism causing the disease does not undergo any metamorphoses or change (Schwabe, 1984). Direct transmission may occur through contact with the infected animal, its tissues, excretions or products. It may also occur as a result of inhaling or ingesting airborne droplets or dust originating from contamination of the environment



(Schnurrenberger & Hubbert, 1981). This, in effect, may be the route of transmission of zoonoses transmitted to preschool children by direct handling of animals or ingestion of animal products. As a group, direct zoonoses probably hold most risk for preschool children.

#### **3.4.1.2 Cyclozoonoses**

In the case of zoonoses classified as cyclozoonoses, more than one vertebrate host, but no invertebrate host, is required for completion of the cycle. The majority of cyclozoonoses are parasitic diseases whose life-cycle includes more than one host (Reinecke, 1989; Schwabe, 1984). Hydatid disease, which is transmitted from infected animals to humans via dogs or other canids, is probably the most dangerous zoonosis in this group and infects children of preschool age world-wide. It will be discussed in further detail in Chapter 4.

#### **3.4.1.3 Metazoonoses**

Metazoonoses are transmitted biologically by invertebrate hosts. The agent of disease may multiply in the invertebrate host and it is also possible that more than one invertebrate host is involved in the life cycle of the agent (Schwabe, 1984; Soulsby, 1982). Trypanosomiasis or sleeping sickness is a disease in this group which may be dangerous to young children in Africa. The vector, Tsetse fly, has fortunately been eliminated from South Africa, but if veterinary control fails, could return.

It should be noted that certain of the zoonoses listed as metazoonoses may also act as direct zoonoses. Q-fever and Congo haemorrhagic fever, for example, may be transmitted by direct contact with infected material or by an invertebrate host (Du Preez & Van den Heever, 1991; Fraser, 1986; Quinn et al, 1994; WHO, 1979 & 1982).

#### 3.4.1.4 Saprozoonoses

According to Schwabe (1984), the saprozoonoses are those zoonoses which require a non-animal site to serve as a reservoir or an essential phase in development. This author also divides the group further into types I, II and III, depending on the epidemiology of infection. Sporotrichosis, which falls into this category, has been described in South Africa and a child may be infected by scratches from rose-thorns. If untreated the disease may be fatal. It will be discussed in further detail in Chapter 4.

Certain examples such as *Erysipelothrix rhusiopathiae* are also listed as direct zoonoses. This overlapping between the four groups of zoonoses is the chief disadvantage of this system of classification.

#### 3.4.2 Classification according to primary host

Another way in which zoonoses may be classified, is to divide them according to the primary host, into anthroozoonoses, zooanthroozoonoses and amphizoosoonoses (Du Preez & Van den Heever, 1992). This classification is illustrated, with examples, in Table 3.2.

**Table 3.2: Classification of zoonotic diseases according to the primary host**  
 (from Du Preez & Van den Heever, 1992, p 2-5)

Type of zoonoses	Primary host	Example
Anthroozoonosis	Animals	Rabies
Zooanthroozoonosis	Man	Tuberculosis
Amphizoosoonosis	Animals and man	Staphylococcus

This classification is useful for determining the relative importance of a zoonosis in a particular species, however, it is not always easy to determine which is the primary host as

the disease may be inapparent in that host, for instance, in the case of Marburg virus infection (Fraser, 1986; Morse & Schuederberg, 1990).

### **3.4.3 Classification according to aetiological agent**

Zoonoses can also be classified according to the aetiological agent, or cause of disease. An example is the listing used by Schnurrenberger and Hubbert (1981) and Quinn et al (1994), who list the zoonoses under the headings of bacterial, rickettsial, viral, mycotic and parasitic diseases. The last mentioned category includes protozoa and helminths as well as ascarides and insects. It is a more logical and practical classification method than either of the two methods described previously and will be followed in the next chapter, when discussing the zoonoses most likely to affect preschool children.

### **3.5 Summation**

The definition and classification of zoonoses remains a controversial subject. The primary epidemiological classification suggested by Schwabe (1984) and adapted by the WHO is clumsy and complicated and has the disadvantage that there is considerable overlapping between the four groups. Q-fever and Congo fever, for example, may act either as direct or as metazoonoses. Classification according to primary host is also confusing. Not only is the terminology difficult (zoo-anthropozoonosis is a nineteen letter word) but the primary host is not always known, as the disease may be unapparent in that host, for example Marburg virus infection.

None of the classifications make allowance for the multifactorial aetiology that characterises most diseases. This is of particular relevance to the preschool where the disease is not caused only by the presence of the organism but is also influenced by a multitude of variables such as the susceptibi-

lity of the children, environmental factors and the likelihood that the children will come into contact with the organism.

The term zoonosis is in itself confusing. Although the WHO has accepted a definition of zoonoses, various authors, including the WHO itself, list different diseases as zoonoses. There is considerable argument, for example, as to whether Giardiasis is a zoonosis (Eckert, 1989; Faubert, 1988; Kasprzak & Pawlowski, 1988). This is highlighted by the fact that different text-books and works of reference do not have the same diseases on their lists of zoonotic diseases. There are, however, diseases such as rabies, hydatid disease, cysticercosis, plague, anthrax, salmonellosis, brucellosis and tuberculosis, which feature on every list.

In the next chapter the zoonotic diseases most likely to be a risk to preschool children will be discussed in more detail. The diseases will be listed in order of their aetiological classification, that is those caused by viruses, bacteria, rickettsiae, protozoa, fungi and parasites.

## CHAPTER 4

### ZOONOSES WHICH COULD AFFECT PRESCHOOL CHILDREN

#### 4.1 Introduction

Schwabe (1984) has suggested that four-fifths of infectious diseases of man are zoonoses, however, not all zoonotic diseases are dangerous to man and many are very rare in occurrence. Newcastle disease of poultry, for example, although lethal and highly contagious to fowls, occurs very infrequently in man and causes only a mild fever and pharyngitis (Schnurrenberger & Hubbert, 1981). However, zoonoses which cause relatively minor symptoms in healthy children could become life-threatening to children infected with the human immuno-deficiency virus (HIV) (Angelo et al, 1994; Gill & Stone, 1992).

Several authors provide a complete list of zoonoses (Du Preez & Van den Heever, 1992; Fraser, 1986; Quinn et al, 1984; Schnurrenberger & Hubbert, 1981; Schwabe, 1984). These lists do not coincide with one another. Diseases regarded by one author as zoonotic, do not appear on other lists. Not all diseases listed as zoonoses by the WHO occur in South Africa and many of them are unlikely to be encountered in the preschool child.

Preschool children could come into contact with species of animals kept permanently or temporarily at preschools, or could encounter animals during excursions. The diet of children between the ages of three and six is also likely to include foods of animal origin such as meat, milk, eggs and fish. It may be deduced from the above that children of preschool age might become infected by zoonoses which are transmitted by the animals or foods mentioned above. Those zoonotic diseases most likely, as a result of their epidemiology, to be transmitted to the child of preschool age

will be discussed further in the following sections. The criteria for inclusion of diseases were the recorded incidence of the disease in South Africa, the likelihood that a preschool child might come into contact with the vector, age susceptibility and the severity of symptoms caused in man. Diseases which are important in other parts of the world and which might spread to South Africa have also been included. Zoonoses are discussed below in order of their aetiological classification.

#### 4.2 Zoonoses caused by viruses

The groups of viruses where transmission occurs between man and animals are listed with examples in Table 4.1 below. Those most likely to be a risk for preschool children according to the criteria mentioned above, have been marked with an asterisk and will be discussed in further detail.

**Table 4.1: Groups of viruses with examples of zoonoses in each group (modified from WHO Expert Committee, 1982, p 89-115)**

Group	Examples of zoonoses in that group
Poxvirus	Cowpox*, Pseudocowpox*, Vaccinia*, Orf*, Monkeypox, Bovine pustular stomatitis,
Herpesvirus	Herpes simplex*, Simian herpes*
Arbovirus	Crimean/Congo haemorrhagic fevers*, Rift Valley fever*, yellow fever*, Venezuelan, Eastern and Western equine encephalitis, Louping ill.
Arenavirus	Lymphocytic choriomeningitis, Lassa fever, Argentine and Bolivian haemorrhagic fever
Orthomyxovirus	Influenza viruses*
Paramyxoviruses	Newcastle disease*
Rhabdoviruses	Rabies*, Vesicular stomatitis
Picornaviruses	Foot-and-mouth disease*, swine vesicular disease, Encephalomyocarditis, Viral hepatitis A
Unclassified	Marburg/ebola disease

\* Zoonoses most likely to pose a risk to preschool children

Not all these viral diseases have significant consequences for children of preschool age. Most of the poxviruses, for example, merely result in a transient skin lesion in persons

who have direct contact with the infected animals (WHO, 1982). Humans may contract cowpox, pseudocowpox or vaccinia through contact with an infected udder, while they are milking a cow. This could happen if children of preschool age look after cattle, as happens in rural areas in South Africa, or during a preschool excursion to a farm. In man the lesion manifests as a raised, irritated skin lesion, which responds well to medical treatment (Myburgh & Da Costa Mendes, 1993). The vaccinia virus is, of course, also used for vaccination against smallpox in humans.

Orf, also known as contagious pustular dermatitis, is a disease that causes papules and nodules on the skin of sheep and goats. The main focus of infection is around the lips and muzzle, but the virus may also affect the eyelids, nostrils, ears, teats and nostrils (Coetzer et al, 1994). The distribution is world-wide and the disease is occasionally spread to man through direct contact, causing a papule or pustule, usually on the hands, but occasionally elsewhere (Kennedy & Lyall, 1984). As in the case of cowpox, children could come into direct contact with infected sheep or goats if they live in a rural area or during preschool excursions.

Herpes simplex causes what is often termed the common cold-sore. Although it is relatively mild in man, it causes a severe disease in monkeys. Simian herpes, although comparatively rare in man, is very severe and has a fatality rate of 85% (Fraser, 1986; WHO, 1982). Both these infections are a strong argument against keeping primates at preschools. The three diseases caused by arenaviruses are extremely dangerous, but fortunately not found in Southern Africa (Coetzer et al, 1994; Schnurrenberger & Hubbert, 1981).

In the case of arthropod-borne viruses, man may be an accidental victim. These diseases undergo a cycle which involves an animal and an insect or ixodid as intermediate host or vector (WHO, 1982). If a person is bitten by this intermedi-

ate host, or comes into contact with tissues infected with the virus, the disease ensues (Berkow, 1977). Outbreaks may occur when climatic conditions favour the multiplication of the vector, eg yellow fever, or when, after accidental transmission to man by an infected tick, the disease is directly transmitted from one person to the next, eg Congo fever (Schwabe, 1984; Swanepoel et al, 1985). Congo haemorrhagic fever is a highly fatal disease and is transmitted by a tick frequently found in South Africa (Coetzer et al, 1994). Rift Valley fever occurs mainly in sheep in South Africa and causes retinal lesions in man (Quinn et al, 1994).

Influenza viruses cause world-wide epidemics in man and different antigenic types may similarly cause infections of epidemic proportions in horses, pigs and birds. It is postulated that genetic recombination within the different strains results in viruses changing their host specificity, for example a strain which causes disease in pigs could mutate to cause influenza in man. Transmission from man to man is, however, far more significant than transmission from animal to man (WHO, 1982). Newcastle disease, as mentioned previously, causes very mild symptoms in man (Quinn et al, 1994).

Rabies is probably the most significant of all the viral zoonoses (Wandeler et al, 1988) and will be discussed in more detail in the next section.

Of the picorna viruses, only foot-and-mouth disease has relevance to South Africa, mainly because it can cause serious economic losses in cloven hoofed domestic and wild animals (Coetzer et al, 1994). Although the disease in human is mild, it is important for the control of foot-and-mouth disease in animals that man may be an unapparent carrier (WHO, 1982). As a result of the fact that the virus may be spread by meat and skins from affected animals, movement of animals and animal products in and out of areas where foot-and-mouth may occur (the so-called Red-line areas) in South Africa is



controlled by legislation (Animal Diseases Act, No 35 of 1984).

Viral hepatitis A is primarily a disease of man, which may be sporadically transmitted to primates and back to man (WHO, 1982). It is therefore a further reason for not keeping primates at school. Marburg/Ebola disease, which is highly fatal in man, is known to be transmitted by contact with the green monkey (*Cercopithecus aethiops*) (Schnurrenberger & Hubbert, 1981). Marburg and Ebola are regarded as emergent viruses whose natural host is unknown and it has recently been postulated that such viruses held a potential danger for humans if ecologic changes were to occur, which brought humans into contact with the natural host (Morse & Schneiderberg, 1990). An outbreak of this disease occurred in Africa in 1995 and caused world-wide alarm as the mortality was very high.

#### 4.2.1 Rabies

Rabies is a viral disease which attacks the nervous system. All warm-blooded animals are susceptible and the virus is transmitted through the saliva after a bite wound has occurred (Fekadu, 1994). The incubation period before symptoms appear, is between 10 days and six months, but may be even longer. There is unfortunately no way of treating the person or animal successfully after symptoms appear and death occurs within 10 days (Godlonton, 1993).

Rabies is recognised as a serious zoonosis world-wide (Wandeler, 1994; WHO, 1984). Infected dogs accounted for most of the cases of human exposure to the disease (Wandeler, 1992). In developing areas the disease is mainly transmitted by dogs, whereas in developed areas, where the incidence of the disease is low, it is transmitted mainly by wildlife (Aubert, 1994; Swanepoel et al, 1994; Wandeler et al, 1988). This could in part be a result of the strict control exercised in

developed countries. In America, for instance, the National Association of State Public Health Veterinarians (NASPHV) annually produces a compendium on Rabies control (Clark, 1994).

In South Africa there are also stringent control measures and the incidence of the disease is lower than it is in other parts of Africa and Asia, although it is endemic over a wide area (Brückner, 1993; Swanepoel et al, 1994). The number of human deaths due to rabies had increased from 6 in 1985 to 29 in 1992 and 800 people had to be treated in 1992 after being exposed to rabies, most were young children (Krige, 1993; Van Niekerk, 1993).

The ecology of dogs is of considerable importance to the prevention of dog bites (De Balogh et al, 1994; Fekadu, 1994; Perry, 1994). During a survey of the veterinary needs of a semi-rural village in a developing area in North-west Province (formerly Bophuthatswana) in 1990, a structured interview was conducted with dog owners to shed further light on this aspect of the human-animal interaction. It was found that the demography and ecology of the dogs in these developing areas resulted in a greater risk of the transmission of zoonotic diseases such as rabies, than serious injury (McCrindle et al, 1994a & 1994b).

Vaccination of susceptible dogs and cats is a very important aspect in the control of this disease. Rabies vaccination was found in 40% of the dogs surveyed in Zimbabwe (Brooks, 1990). In the Kwazulu Natal region of South Africa, where rabies is endemic, only 30% of the susceptible dog population was vaccinated (Bruckner, 1993; Kloek 1995). It was considered that this level of vaccination was insufficient to prevent rabies outbreaks in dogs (Brooks, 1990).

There was also some difficulty with diagnosing the disease in animals as non-specific symptoms made clinical diagnosis

difficult (Fogelman et al, 1993; Kretzmann, 1993). A problem in developing areas was that human cases of rabies could be underreported (Godlonton, 1993). The clinical diagnosis is difficult, and victims might not be brought for treatment as the disease in children could be ascribed to witchcraft. Primary health care was inadequate in certain remote areas, and children who had been presented for treatment of dog bite subsequently died of rabies because no or incorrect prophylactic measures were applied (Wandeler, 1994). There were also cultural and bureaucratic constraints preventing autopsies which could confirm the disease (Godlonton, 1993).

Awareness of the symptoms and prevention of rabies in humans and animals is needed for effective control. Kloek (1993) and Bruckner (1993) suggested that education had an important role to play in the control of rabies. Children were found to be involved in the management of dogs and information on the management of dogs and prevention of rabies should therefore be targeted at this age group as well as the adult age group (McCrindle et al, 1994a). Clinic personnel treating children who have been bitten by dogs, should be informed that prophylactic treatment against rabies is important (Chutivongse et al, 1990; Godlonton, 1993). The importance to the preschool is that teachers should be aware of this disease as it often occurs in young children. Veterinary extension messages for the prevention of rabies should also be targeted at preschools in the area of an outbreak.

#### **4.2.2 Bovine spongiform encephalopathy (BSE)**

This is a new disease which is recognised as a member of the transmissible degenerative encephalopathies (Taylor, 1989). It has not positively been identified as being caused by a virus and therefore is discussed under a separate heading. It is sometimes called "mad-cow disease" (Editorial: Nature, 1990). Infections were attributed to the feeding of meat and bone meal from animals infected with a scrapie-like agent, and

have been diagnosed in cattle, as well as several South African species of wild buck kept in zoos in England (Kirkwood et al, 1990). It has also been diagnosed in cats (Fraser et al, 1994; Meldrum, 1990; Wyatt et al, 1990) and it has been suggested that people eating meat or milk from infected cases could become infected (Taylor, 1989). No cases have yet been diagnosed in South Africa. However the significance of the disease in man has not, as yet, been determined and it has an extremely long incubation period.

#### 4.3 Zoonoses caused by bacteria

Not all bacterial zoonoses pose a risk for children of preschool age in South Africa. Certain of the diseases do not occur in this region and others do not infect animals with which preschool children are likely to come into contact (Coetzer et al, 1994; Quinn et al, 1994). Zoonotic diseases caused by bacteria are listed in Table 4.2. Those diseases listed in the table, which, according to the available literature, might affect children in this age group, have been marked with an asterisk (Du Preez & Van den Heever, 1992; Fraser, 1986; Schwabe, 1984; Schnurrenberger & Hubbert, 1981).

**Table 4.2: Alphabetical list o bacterial zoonoses  
(from Du Preez & Van den Heever, 1992, p111)**

<i>Actinomycosis</i>	<i>Enterocolitic Yersiniosis</i>	<i>Pseudotuberculous Yersiniosis-</i>
<i>Animal Erisipelas*</i>	<i>Glanders</i>	<i>Rat-bite fever</i>
<i>Anthrax*</i>	<i>Leprosy</i>	<i>Salmonellosis*</i>
<i>Botulism*</i>	<i>Leptospirosis*</i>	<i>Shigellosis*</i>
<i>Brucellosis*</i>	<i>Listeriosis*</i>	<i>Staphylococcal food poisoning*</i>
<i>Campylobacteriosis*</i>	<i>Lyme disease</i>	<i>Streptococcosis*</i>
<i>Cat Scratch Disease*</i>	<i>Melioidiosis</i>	<i>Tetanus*</i>
<i>Clostridial food poisoning*</i>	<i>Necrobacillosis</i>	<i>Tick-borne relapsing fever</i>
<i>Clostridial wound infections*</i>	<i>Nocardiosis*</i>	<i>Tularaemia</i>
<i>Colibacillosis*</i>	<i>Nontuberculous Mycobacteriosis</i>	<i>Zoonotic tuberculosis*</i>
<i>Corynebacteriosis</i>	<i>Pasteurellosis*</i>	
<i>Dermatophilosis</i>	<i>Plague*</i>	

\* Bacterial zoonoses which, because of their known epidemiology, are likely to infect children of preschool age in Southern Africa.

The diseases which are considered to be the most important threat to preschool children will be discussed separately in the following sections. The other diseases which pose a lesser threat to children of preschool age will be discussed further below.

Erysipeloid in humans is caused by the organism *Erysipelothrix rhusiopathiae*, which also causes the economically important disease erysipelas in swine (Blood & Radostis, 1989). Humans are usually infected when the bacterium enters a wound in their skin after contact with infected pigs or fish. The disease is related to the professions of farmer, slaughterman, veterinarian and fisherman (Du Preez & Van den Heever, 1992). It is, however, possible that a young child could get the disease by handling freshly caught fish or raw pork, because, as mentioned previously, preschools encourage the stimulation of as many senses as possible in children. Touching is therefore encouraged. In humans the main symptom is a painful reddened area of the skin, usually involving the hands and fingers. It could, also cause septicaemia or vegetative endocarditis, usually in immunosuppressed patients. Fortunately it is very susceptible to treatment with penicillin (Merchant, 1990b).

Cat scratch fever, or non-specific regional lymphadenitis, is usually a mild self-limiting illness of children and adults that follows after a bite or scratch from a cat, but can also cause severe disease (Quinn et al, 1994). It is a zoonosis whose existence has long been recognised, but it is only recently that the causative organism has been isolated and described as *Rochalimaea henselae*. This organism has been linked in humans to polioma, relapsing bacteraemia and bacillary angiomatosis as well as cat-scratch fever (Groves & Harrington, 1994). These manifestations as well as abdominal visceral granulomas caused by the same organism, are more likely to occur in immunocompromised patients such as those suffering from the acquired immunodeficiency syndrome (AIDS) (Delahoussaye & Osborne, 1990).

Some of the Clostridia cause gas-gangrene in humans and animals. The organisms most usually considered dangerous in man are *Cl perfringens type a*, *Cl oedematiens* and *Cl septicum* (Coetzer et al, 1994). These anaerobic organisms are widely distributed in soils and may also be found in the faeces of animals (Gillespie & Timoney, 1981). Wound contamination is the usual source of the disease, although cases where humans have been infected through surgery to their intestines have been reported (Smith & Williams, 1984). *Cl tetani* is particularly dangerous as it forms a toxin which causes fatal asphyxia due to spasms of the muscles in both man and animals (Berkow, 1977). The organism was also found in soil and the manure of herbivores. Tetanus could occur a few days or weeks after a deep wound become contaminated, as the organism grew and began to release toxin (Schnurrenberger & Hubbert, 1981). The clostridial organisms are important as they could contaminate a wound in a child of preschool age. This is realised and children are vaccinated against tetanus during annual visits by clinic sisters to preschools.

Leptospirosis has a world-wide occurrence. Most mammalian species are susceptible to at least one of the 175 known serovars (Fraser, 1986). Abraded skin or mucous membrane in contact with urine, either directly, or in water, is the main route of transmission (Baldwin & Atkins, 1987). Rodents could show subclinical infections and transmit the disease by contaminating the food or drinking water of other animals or man (Schnurrenberger & Hubbert, 1981).

Leptospirosis was reported in a dog owner treated for alveolar bleeding at Grootte Schuur Hospital in the Cape. All three of his dogs were found to be serologically positive for *L icterohaermorrhagiae* and successfully treated (Directorate of Animal Health, 1993a). In Zimbabwe 11% of canine sera were found to be positive for *L icterohaermorrhagiae* (Kelly et al, 1994).

In man leptospirosis is also known as Weil's disease or infectious spirochaetal jaundice. The disease is characteristically biphasic and symptoms may include fever, jaundice and abortion (Berkow, 1977). An indication of the risk of infection with this disease was given by the fact that the Weekly Epidemiological Review (1989) reported that 670 cases were diagnosed in France in 1988 (Direction Generale de la Sante, 1989). The increase in the number of cases was ascribed to people becoming infected while enjoying water-sports. The incidence of disease in humans was found to be closely related to the wettest areas with high rainfall and humidity because the organisms survived for very long periods in infected water or mud (Everard, 1992). Although the disease was not as prevalent in South Africa as elsewhere (Myburgh & Otto, 1990; Myburgh et al, 1992), preschool children could come into contact with vectors such as dogs and rats or could contract the disease by playing in contaminated water.

*Listeria monocytogenes* is considered to be a common soil saprophyte capable of persisting for many years under favourable conditions (Meridith & Schneider, 1984). In South Africa it has been reported in goats, sheep, gerbils and chinchillas and a dog, although it is known to infect a wide range of mammals and birds (Du Toit, 1977; Meridith & Schneider, 1984; Schroeder & Van Rensburg, 1993). In humans, infection results in an influenza-like disease, sometimes with meningoencephalitis and abortion, endocarditis, pneumonia and pustular cutaneous lesions (Campbell, 1990; Schnurrenberger & Hubbert, 1981). According to Schroeder & Van Rensburg (1991), there was no proof that people could be infected by contact with infected animals, although Du Preez and Van den Heever (1992) listed it as one of the zoonoses known to be transmitted in milk. It has also been found in cheese and in an outbreak in 1985 in the USA, 147 people were infected and 47 died after eating "Mexican soft cheese" (Papadopoulos & Simos, 1989; Samuelson et al, 1987; Waites & Arbuthnot, 1990).



As cheese features in the diets of children at preschools in South Africa, preschool children could be at risk, particularly if the cheese was unpasteurised. No data could be found on the incidence of Listeriosis in man and animals in South Africa as only case reports have been published.

*Nocardia*, although classified as a bacterium, is one of the organisms responsible for mycetoma in man and animals (Magoub & Murray, 1973). It has a world-wide distribution and causes a subacute pneumonia as well as abscessation which may spread to the brain or bone. In cattle it could cause mastitis. Transmission is by wound infection or inhalation of infected pus or soil. The incidence is sporadic and the disease was not common (Schnurrenberger & Hubbert, 1981). It is possible that a child of preschool age could become infected through an untreated wound.

*Pasteurella multocida* is a small gram-negative coccobacillus found as part of the normal oral flora of many animals. The most common infections in man result from bites and scratches by dogs and cats according to Vartian (1989). The organism is an opportunistic pathogen of both man and animals suffering from other diseases, and could cause pneumonia and systemic infections in such patients (Weber et al, 1984). *P haemolytica*, *P pneumotropica* and *P reae* less frequently cause disease in man and animals (Schnurrenberger & Hubbert, 1981). *Pasteurella* spp could cause a severe reaction in a wound, should a child of preschool age be bitten by an animal which carries the organism as an oral commensal.

Plague was responsible for the epidemic known as the Black Death in the 14th Century AD. South Africa was affected for the first time in 1894, when the disease was brought from Hong Kong by flea-infested rats on board ships docking in South Africa ports. The disease is still endemic in certain parts of South Africa and Namibia and is notifiable (Du Preez & Van den Heever, 1992). Plague is caused by *Yersinia pestis*



and it is transmitted from diseased rats to human beings by the rat-flea. This form of the disease is called bubonic plague. Once established in the human population, the disease may be transmitted by aerosol from one person to another and is then known as pneumonic plague (Chief Directorate: Primary Health Care, 1993). The cycle is maintained in wild rodents throughout Africa, man being an incidental host (Schnurrenberger & Hubbert, 1981).

In 1984, during an outbreak of plague in America, a child was infected by a scratch from a cat. The cat's claws were probably contaminated with *Y pestis* by catching wild rodents infected with the disease (Weniger et al, 1984). Chonel et al (1994) found that titres of antibodies to plague were higher in cats and dogs from areas in the USA where outbreaks had occurred in humans. Although no direct information on the incidence of plague in South Africa was found, the disease was notifiable and sporadic outbreaks occurred in rural areas (Chief Directorate: Primary Health Care, 1993).

*Yersinia pseudotuberculosis* has been described as a cause of disease in children of preschool age in Japan, where a link with the ingestion of water contaminated with the faeces of diseased cats has been established. Cats with this disease showed severe vomiting and diarrhoea (Fukushima et al, 1989). The organism has not, as yet, been demonstrated to be present in South Africa, but is a known risk for preschool children.

As well as causing food poisoning, *Staphylococcus aureus* could cause suppurative lesions and skin infections in both man and animals. Transmission could be through direct contact with pus, although the infective dose is fairly high in healthy subjects (Schnurrenberger & Hubbert, 1981; Quinn et al, 1994; Webster & Uhler, 1986). *S aureus* was found in 76,4% of 102 cases studied by Rao et al (1987), with a high frequency of incidence in children under 5 years of age. Of the isolates, 18,2% were phage variety bovis and 2,6% were

phage variety canis, indicating a zoonotic origin. However, in only 9 cases was zoonotic transfer proved. Folliculitis, furunculitis and impetigo were the most common symptoms seen. Because there was a high incidence of staphylococcal infections in children under 5 years, this disease poses a risk to children at preschools through food poisoning or wound infections.

*Streptococcus spp* cause suppurative conditions, septicaemia and pneumonia in both animals and man. They have a world-wide distribution and many healthy animals and people are carriers of the different species (Webster & Uhler, 1986). Skin rashes, nephrosis and rheumatic fever may result from immune reactions to the antigens of streptococci (Schnurrenberger & Hubbert, 1981). This was also an organism which could be transmitted through unpasteurised milk (Du Preez & Van den Heever, 1992). Potenza (1994) also isolated the organism from wounds caused by dog bites.

Certain zoonoses caused by bacteria are more common or more severe than the bacterial zoonoses discussed in the previous section. They are reviewed in more detail below.

#### 4.3.1 Anthrax

Anthrax is an infectious bacterial disease caused by *Bacillus anthracis*. It has considerable economic importance because large numbers of animals could die when an outbreak occurs (Quinn et al, 1994). Fortunately the disease may be controlled by vaccinating susceptible animals (Du Preez & Van den Heever, 1992). However, post-vaccination occurrence of anthrax in cattle has recently been recorded in Australia (Salmon & Ferrier, 1992). Humans may be infected by eating or handling infected meat or by inhaling spores from the wool or hides of animals which have died of the disease. The disease may, if untreated, be highly fatal in man (Kutluk et al, 1987; Epidemiology Division, Ministry of Health, 1989).

*Anthrax is a notifiable disease and sporadic outbreaks occur in production animals and game in South Africa (Coetzer et al, 1994). As it was found by McCrindle et al (1994b), that meat inspection did not take place in low-income semi-rural areas in South Africa, children at preschools in such areas could be exposed to infected meat.*

#### 4.3.2 **Brucellosis and Tuberculosis**

Other than the fact that they are both caused by bacteria, these two diseases are not related. However, they have been discussed under the same heading as the primary source of both infections is unpasteurised milk.

Brucellosis is a disease affecting mainly cattle, swine, goats and dogs. It is caused by different species of *Brucella*: *B abortus* infects cattle, *B mellitensis* infects goats, *B suis* infects pigs and *B canis* infects dogs. All species may infect man (Fraser, 1986). The disease is characterised by abortion in female animals and undulating fever in man (Directorate of Animal Health, 1992). Abattoir workers have been exposed to aerosol infection from infected carcasses and veterinarians have been infected through contact with uterine discharges and aborted fetuses. Because the disease is easily transmitted through unpasteurised milk, *B abortus* and *B mellitensis* are probably the most likely species to infect man (Currier, 1989). A survey of human brucellosis in Texas showed that 331 confirmed cases occurred between 1977 and 1986. During the first 5 years, a majority of cases (72%) were persons occupationally exposed to cattle or swine whereas during the second 5 years a majority (72%) were persons drinking unpasteurised goat's milk. The age incidence in man varied from 1-92 years (Taylor & Perdue, 1989).

A serological investigation carried out in the Molopo district of Bophuthatswana (now the North-Western Province of South Africa), indicated a prevalence of 2,1% in cows, despite

compulsory annual vaccination of heifers (Bakunzi et al, 1993). Although this was low in comparison to a prevalence of 17,8% found in California by Salman et al (1990), and an indication from the Directorate of Animal Health (1993b) that 20% of South African dairy herds are infected, it was still important that milk from cows in developing areas was seldom pasteurized (McCrindle et al, 1994b). In the developing areas in Zimbabwe, bovine brucellosis was found to be endemic, and undulating fever, in humans who drink unpasteurised milk, is widespread (Mzizi & Madsen, 1994). Farm dogs exposed to infected cattle herds could also become infected and pose a risk to man through aborted pups (Forbes, 1990). Children of preschool are therefore at risk if they drink unpasteurised milk.

The disease in man is debilitating and the diagnosis is difficult as the symptoms, which include irregular fever, headaches, weakness, sweating, arthralgia, weight loss and generalised aches, are also seen in other diseases (Currier, 1989). Neurobrucellosis, where the disease affects central or peripheral nervous tissue, has also been described (Ayala-Gaytan et al, 1989). Although only 10% of reported cases of human brucellosis in the USA were found in children, this does not necessarily mean that they were more resistant to the disease and paediatricians were advised to consider the diagnosis of brucellosis in any child with prolonged fever of unknown origin (Ulrich et al, 1993).

Tuberculosis is a disease caused by mycobacteria and has a world-wide distribution. *Mycobacterium tuberculosis* is primarily responsible for the disease in humans, whereas *M bovis* infects mainly cattle and *M avium* is mainly responsible for the disease in pigs and birds (Blood & Radostis, 1989). Despite efforts to eradicate the disease in man, human tuberculosis remains an international health concern, particularly in the case of HIV-positive persons (Gill & Stone, 1993). Companion animals may become infected by infected persons

and become a reservoir of infection for other persons (Clerks et al, 1992; Ryan et al, 1993; Wileysmith & Clifton-Hadley, 1994). Bovine tuberculosis can be transmitted to humans via unpasteurised milk and cause a severe form of disseminated tuberculosis in young children (Schwabe, 1984). Due to stringent control methods, the incidence of tuberculosis in cattle has decreased over the last 50 years. By the end of March 1992, there were only 34 herds still infected (Directorate of Animal Health, 1993b). Unpasteurised milk, could however, be a source of infection for preschool children. Although the incidence of the disease is at present low in cattle in South Africa, this was because of stringent veterinary control in the past (Coetzer et al, 1994).

#### 4.3.3 Psittacosis

Psittacosis or Ornithosis is a disease caused by *Chlamydia psittaci*. The disease has been described in more than 100 species of domesticated and wild birds, of which more than 70% are members of the parrot family. It is more common in caged birds than in free-living birds (Burr, 1989; Grimes, 1987; Puolakkainen et al, 1988). In man, the symptoms vary from a mild respiratory disease to a severe pneumonia (Mukai et al, 1985). The disease can be fatal but tetracyclines are an effective treatment. Even so, up to 1% of infected patients could die (Riordan et al, 1988).

Human infection usually occurs after inhaling dust from the faeces, or by droplet infection from an infected bird (Berkow, 1977). Workers in poultry plants have been infected after contact with the internal organs of infected birds (Hedberg, et al, 1989). The disease has been diagnosed in birds and humans in South Africa and as such constitutes a risk for those in contact with infected cage birds, particularly of the psittacine variety (Directorate of Animal Health, 1991, 1994b). Children could come into contact with an infected bird kept at preschool and it is therefore important that a veterinarian be consulted if cage birds became ill.

#### 4.3.4 Gastroenteritis and food poisoning

It has been estimated by Quadri et al (1990) that five hundred million cases of acute diarrhoea occur annually in children under the ages of 5 years, world-wide. Certain organisms were identified as enteropathogens for young children. These are listed in Table 4.3.

**Table 4.3: Enteropathogenic bacteria found in children between the ages of 3 and 5 years with acute diarrhoea (n = 140) (from Quadri et al 1990, p281)**

Enteropathogenic bacteria	Frequency (n = 140)	Relative frequency (%)
<i>Salmonella spp</i>	8	5,7
<i>Shigella spp</i>	17	12,1
<i>Campylobacter jejuni</i>	5	3,6
Enteropathic <i>Escherichia coli</i>	1	0,7
Others	1	0,7

The importance to this investigation is that these bacteria are found in animals as well as man (Quinn et al, 1994; Schwabe, 1984).

Although there are 2200 known serovars of *Salmonella*, not all are equally dangerous to man or animals, as the severity of disease after infection depends to a great degree on the dose and pathogenicity of a specific serovar (Scott, 1994). *Salmonella* species have been found in farm feeds and feed ingredients in South Africa (Durand et al, 1990). There is evidence that the organism may spread from feeds to the animals consuming them and then, through, in particular, pork and poultry products, to man (Mason & Vines, 1986; Williams, 1975). Although Durand et al (1990) maintain that salmonellosis is mainly a food-borne disease, there is considerable evidence to indicate that contact with infected animals may also lead to infection (Allenstein, 1994). The control of the disease in animals has been shown to decrease salmonellosis in humans (Editorial, Veterinary Record, 1991b; Wray, 1985).

Since 1988 *Salmonella enteridis* has been the most common serotype isolated from cases of human salmonellosis in England and Wales. Outbreaks have followed the consumption of poultry meat and eggs from infected chickens (Mintz et al, 1994; Threllfall et al, 1994; Waites & Arbuthnot, 1990). Cases have also been reported in South Africa (Directorate of Animal Health, 1994a).

*Campylobacter jejuni* was brought into prominence as a cause of diarrhoea in both man and animals in 1977. It caused abortion in sheep, hepatic infections in chickens and diarrhoea in cattle, horses, primates, cats and dogs and man (Du Preez & Van den Heever, 1992). According to Waites & Arbuthnot (1990), campylobacteriosis has become the most commonly reported cause of food-borne infection in England and the USA. Infection occurs following the ingestion of untreated surface water, unpasteurised milk, incompletely cooked meat or other contaminated food products (Shane & Montrose, 1985). Juvenile companion animals suffering from diarrhoea could also serve as a source of infection (Baxter & Leck, 1984).

In contrast to *Salmonella* and *Campylobacter*, *Shigella* organisms were found mainly in humans, and animals were only incidental hosts (Schwabe, 1984).

*Escherichia coli* is a facultative pathogen with a world-wide distribution (Coetzer et al, 1994; Fraser, 1986). Certain strains are more pathogenic than others and the organism is widely distributed in nature. Serotypes which cause symptoms in certain animals could be entirely innocuous for other animals or man. As the organism was ubiquitous, most adult animals and man developed an immunity to the serotypes with which they came into contact (Blood & Radostis, 1989). Colibacillosis is an important cause of dehydration and death in young animals, but can also cause mastitis, metritis and joint ill (Schnurrenberger & Hubbert, 1981). In humans it is

responsible for infantile diarrhoea, cystitis, prostatitis, pyelonephritis, septicaemia and, less commonly, meningitis (Berkow, 1977).

Food poisoning is a disease entity caused by the ingestion of food containing specific toxins produced during bacterial multiplication (Waites & Arbuthnot, 1990). Certain of these bacteria are carried by animals and can be found in animal products such as meat, milk, eggs and fish.

Contamination of foods not of animal origin by these bacteria could also lead to the organisms multiplying and liberating toxins which could cause symptoms or even death in the person consuming the food (Schwabe, 1984). Bacteria which may produce toxins in food include *Clostridium perfringens* Type A, *Cl botulinum* and *Staphylococcus aureus* (Schnurrenberger & Hubbert, 1981; Smith & Williams, 1984). Du Preez and Van den Heever (1992) also regarded salmonellosis as a form of food poisoning, although the disease entity in man is caused by the ingestion of bacteria rather than a bacterial toxin.

As preschools prepare food for consumption by pupils at school, the prevention of food-poisoning and gastroenteritis due to the above organisms, is important to the health of the children. More specifically, teachers should be aware that uncooked food of animal origin (raw meat, eggs or fish), unpasteurised milk and contaminated water, pose a risk to children at preschool.

#### **4.4 Rickettsial diseases which are zoonoses**

Members of the order Rickettsiales are, with some exceptions, obligate intracellular organisms which have some features in common with both viruses and bacteria. Like bacteria, they have enzymes and cell walls; like viruses, they require living cells for growth. Rikhisa (1991) classified them as obligate



intracellular bacterial parasites. The different categories of rickettsioses are illustrated in Table 4.4.

**Table 4.4: The categories of rickettsioses (Berkow 1977, p 67)**

Category	Examples
Typhus group	Epidemic typhus Brill-Zinsser disease Murine (endemic) typhus Scrub typhus
Spotted fever group	Rocky-mountain spotted fever Eastern tick-borne rickettsiosis Rickettsial pox
Q-fever	Q-fever
Trench fever	Trench fever

Of the diseases discussed in the above table, the one usually regarded as most significant is Q-fever. This disease has a world-wide incidence, although its frequency in man has diminished during the last decade. "Q" stands for "Query" because the disease found in abattoir workers in Australia was originally of unknown origin. It was later found to be caused by a micro-organism named *Coxiella burnetti* (Du Preez & Van den Heever, 1992). Q-fever is mainly transmitted to man via the aerosol route, although there is a possibility it could also be transmitted by unpasteurised milk. A serological survey carried out in California in 1990 showed that 57% of dairy cows carried antibodies to the organism (Marrie, 1990). Although the disease has been described in South Africa, it occurs infrequently (Coetzer et al, 1994) and therefore poses only a slight threat of infection to children at preschools through unpasteurised milk.

Although not specifically mentioned in the above table, tick-bite fever is regularly diagnosed in children and adults bitten by ticks in Southern Africa (Kelly et al, 1994a, 1994b). *Rickettsia conori* is recognised as the causative organism in man and as it has also been isolated from ticks of cattle and dogs in Zimbabwe, it was considered to be a zoonosis (Kelly & Mason, 1991a, 1991b).

Canine ehrlichiosis is well established in South Africa as a tick-borne disease which causes a severe chronic disease in dogs. (Rautenbach et al, 1991). It might be quite important as a zoonosis as well, as specific identification of the pathogen is seldom done in cases of human tick fever. Maeda et al (1987) described a case of tick fever in a 51 year old man caused by *Ehrlichia canis* and Taylor et al (1988) showed serological evidence that the disease could be widespread in man in America. Ticks could, therefore, pose a threat of disease for children at preschool and efforts should be made to keep the animals and environment with which preschool children come into contact, tick-free.

#### 4.5 Zoonoses caused by protozoa

Zoonoses caused by protozoa are listed in Table 4.5. Only those posing a risk or potential risk to preschool children in South Africa will be discussed further. They are marked with an asterisk.

Table 4.5: Protozoal zoonoses (W H O 1979, p 36-49)

Category	Examples	Host	Transmission
Toxoplasmosis*	<i>Toxoplasma gondii</i>	Cat	Cat faeces
		Sheep, cattle	Raw meat
Leishmaniasis*	<i>Leishmania spp</i>	Mammals	Sandfly
African trypanosomiasis*	<i>Trypanosoma spp</i>	Game animals Cattle	Tsetse fly
American trypanosomiasis	<i>T cruzi</i>	Mammals	Bloodsucking reduviid bugs
Malaria*	<i>Plasmodium spp</i>	Primates	Mosquitoes
<i>Pneumocystis carinii</i> infection	<i>P carinii</i>	Rodents and other mammals	Dust
Babesiosis*	<i>Babesia spp</i>	Cattle, rodents	Ticks
Giardiasis*	<i>Giardia spp</i>	Rodents and other mammals	Faecal contamination of food and water
Balantidiasis	<i>Balantidium coli</i>	Pigs	Faecal contamination of water
Amoebiasis*	<i>Entamoeba histolytica</i>	Dogs, primates	Faecal contamination of food and water
Cryptosporidium*	<i>Cryptosporidium spp</i>	Mammals	Faecal contamination

\* Protozoal diseases which pose a risk or potential risk, to preschool children in South Africa

Toxoplasmosis and cryptosporidiosis, although included in the table, will be discussed in more detail in the following sections, as they are the two protozoal diseases most likely to pose a risk to preschool children in South Africa.

Leishmaniasis is found chiefly in areas where sandflies, (*Phlebotomus* spp) are ubiquitous. There are three types, the visceral type (kala azar), the Old World type and the New World type (Schnurrenberger & Hubbert, 1981). Although it is a problem in Kenya, it has not yet been reported from South Africa (WHO, 1979). The importance of the disease is that it poses a potential severe risk to preschool children should it be introduced to this country.

African trypanosomiasis, or sleeping sickness, is caused by several species of trypanosome and is transmitted by the tsetse fly, *Glossina* spp (Coetzer et al, 1994; Schwabe, 1984). The trypanosomes that cause sleeping sickness in man closely resemble *T brucei*, which causes trypanosomiasis in domestic animals and is carried by wild game (Quinn et al, 1994). There are some indications that changes in resistance to human serum may occur in some isolates of *T brucei*, which results in a possibility of zoonotic transmission (Fraser, 1986). Sleeping sickness causes a progressive disease in humans of all ages. Affected people become lethargic and emaciated (Schwabe, 1984). The vector has been eliminated from South Africa, but could return (Coetzer et al, 1994). This disease therefore poses a serious potential threat to preschool children in South Africa, particularly in rural areas where wild game or cattle are present. Should veterinary disease control measures fail, this disease would return to South Africa.

Although malaria is an extremely important cause of disease in Africa, the possibility that it is transmitted from non-human primates to man is remote (WHO, 1979). Malaria poses a

severe potential threat to preschool children in certain areas of South Africa, but the link to animals is tenuous and transmission is likely to involve only man and mosquitoes.

Babesiosis, which frequently causes disease in cattle, dogs and horses in South Africa, has only been described in human patients who have been splenectomised (Coetzer et al, 1994; WHO, 1979). It could therefore logically be a disease which could affect children suffering from AIDS, but would only be a risk if children were in contact with ticks which transmitted the disease.

Giardiasis causes severe diarrhoea in man. There was some controversy as to whether it was a true zoonosis, however, the consensus is that the species were not host-specific and beavers have been implicated in the contamination of drinking water (Faubert, 1988). The organism has also been found in companion animals (Bemrick & Erlandsen, 1988; Kasprzak & Pawlowski, 1989). This disease, like cryptosporidiosis, balantidiosis and amoebiasis, is much more readily transmitted from person to person and animals only seem to play an incidental part in the epidemiology (Eckert, 1989). All three diseases pose a potential risk in the preschool situation. Giardiasis has been described as the cause of an outbreak of diarrhoea in a preschool in Canada (Woo & Patterson, 1986). Hygiene and the provision of safe, clean water at preschools is therefore of major importance in prevention.

#### 4.5.1 Toxoplasmosis

Toxoplasmosis is caused by the protozoan parasite *Toxoplasma gondii*. It is a disease with a world-wide incidence (Dubey, 1987). Godin & Lemaire (1987) indicated that this disease was often reported in the media and that this made teachers unduly anxious about the possibility of children being infected by contact with animals, particularly cats. Approximately one third of adults were found to be seropositive

prevalence. However, symptoms were only shown when a woman was infected during pregnancy and either aborted or gave birth to a child with the disease (Du Preez & Van den Heever, 1992). Toxoplasmosis has also been found to be the most significant cause of abortion in sheep in the USA (Dubey & Kirkbride, 1990).

Cats are the definitive hosts of this intracellular protozoan, which reproduces in the intestines of domestic and wild felines (Fishback & Frenkel, 1990). The intermediate stages occur in a wide range of hosts, including man (World Health Organisation, 1979). The disease is transmitted to humans through ingestion of sporulated oocysts from cat faeces older than two to three days, or by eating undercooked meat containing cysts. Cats probably play a more important part in infecting sheep whose meat was then eaten by humans, than by direct transmission (Dubey, 1986, 1987; Lappin et al, 1991). However, it is important to note that children infected with the disease do not show clinical signs, they merely became immune. The disease poses more of a threat to a teacher who is pregnant, than the children at the school. Meat should therefore be eaten well-cooked and plastic gloves should be worn when changing cat-litter boxes in order to prevent transmission to humans.

#### 4.5.2 **Cryptosporidium**

Although *Cryptosporidium* was first described in 1907 in mouse stomach cells, it was not until 1976 that a human infection was reported (Fripp & Bothma, 1987). The range of known hosts for this small, ovoid parasite included 7 orders of mammals, 4 orders of birds, one order of reptiles and 2 orders of fish (O'Donoghue, 1985). Cryptosporidiosis causes an acute enteritis in young animals and in children. In children the peak incidence was found to be between one and five years of age (Hunt, 1984). In immunocompromised adults, such as those suffering from HIV infections, the disease could be fatal (Casemore, 1990).

Cryptosporidiosis has been diagnosed in South Africa in both man and animals (Berkowitz et al, 1988; Fripp & Bothma, 1987; Howerth, 1981; Smith & Van der Ende, 1985). Children could become infected after contact with diseased calves or lambs or companion animals (Fripp & Bothma, 1987; Mtambo et al, 1991; Turnwald et al, 1988). They could also be infected by drinking water contaminated with the faeces of animals or humans carrying the disease (Quigly, 1994).

Of all the protozoal zoonoses, cryptosporidiosis probably poses the greatest likelihood of an outbreak in a preschool in South Africa. If an outbreak occurred, the disease would spread rapidly through the children. Walters et al (1988) reported an outbreak of cryptosporidiosis causing enteric illness in 51 children at a day-care centre in Durban. It was considered that the high incidence was due to person to person spread, rather than infection by animals, and hygienic measures were found to be very effective for the control of the disease. Outbreaks in day-care centres have also been reported from Britain and the USA (Centres for Disease Control, 1984).

#### 4.6 **Mycotic zoonosis**

Mycotic diseases are caused by fungi. Dermatophytosis is the name given to fungal diseases of the skin, whereas mycoses are systemic fungal infections (Mahgoub & Murray, 1973; Van Cutsem & Rochette, 1991). Many different fungal diseases occur in both man and animals. Mycoses, however, are uncommon and due to environmental exposure, while dermatophytoses are caused by cross-species contagion (Fraser, 1986).

Schnurrenberger & Hubbert (1981) stated that mycotoxicosis, where the toxins of fungi growing in food caused symptoms in persons or animals ingesting that food, should also be regarded as a zoonosis as it affected both man and animals.

#### 4.6.1 Dermatomycoses

Ringworm is a dermatophytosis or dermatomycosis caused by fungi belonging to the genera *Microsporum* and *Trichophyton* (Quinn et al, 1994). The organisms are world-wide in distribution and have a saprophytic phase in which they grow in damp soil and rotting wood. The three species most commonly responsible for dermatophytosis in man are *M canis*, *T equinum* and *T verrucosum* (Fraser, 1986; Van Cutsem & Rochette, 1991). Dermatophytosis or ringworm, refers to an infection of keratinized tissue of the skin, hair or nails by one of the above organisms.

Transmission occurs via direct contact with an infected animal or human host or contaminated environment. (Du Preez & Van den Heever, 1992). The disease in humans is described as *Tinea capitis* or *T corporis* according to whether the lesion is located on the head or body. It is commonly seen in children as a papulosquamous, annular lesion. Except in debilitated or immunocompromised patients, ringworm responds well to treatment (Berkow, 1977).

According to Merchant (1990a), the most common cause of ringworm in companion animals and their owners is *M canis*. The organism accounts for approximately 98% of infections in cats and 70% of infections in dogs. Jungerman and Schwartzman (1972) reported that 10% of family members were infected when the dog was positive for ringworm, whereas 30% of cat owners became infected. In animals, particularly cats, the disease could remain subclinical for a number of years and children could become infected from an apparently healthy carrier. The spores may also remain viable in the environment for months or years (Merchant, 1990a). An infected animal or even the cage of an infected animal, could therefore pose a risk of infection to a preschool child. The infected child could then infect other children at the preschool.

#### 4.6.2 Sporotrichosis

*Sporothrix schenckii* infections also have a cutaneous manifestation. This dimorphic fungus grows naturally on soil and vegetation. Sources of infection include rose-thorns, contaminated straw or wood, contaminated wound-dressings and the mouths or skin of infected animals (Merchant 1990a). It is distributed world-wide and causes a granulomatous disease seen in man and animals. Nodules develop at the site of infection and spread along the lymphatic system (Jungerman & Schwartzman, 1972). The disease may also manifest in a more serious systemic form following inhalation of fungal elements (Fraser, 1986).

Zamri-Saad et al (1990) regarded feline sporotrichosis as an important zoonotic disease in Malasia. They described how four veterinary students had to be hospitalised with clinical symptoms of the disease after having been bitten or scratched by cats who had fight wounds infected with *S schenckii*. It is possible, therefore, that children at a preschool could become infected by being bitten or scratched by an infected cat. It is probably more likely that the disease would result from an infected wound resulting from a thorn or splinter, as it grows easily on vegetable material (Merchant, 1990a).

#### 4.6.3 The mycoses

The mycoses that occur in both man and animals and might therefore be considered as zoonoses, are listed in Table 4.6.

*C albicans* has been found to be commensal in 25-30% of humans investigated and is probably as wide-spread in animals. Transmission could be oral, vertical or direct, but is usually associated with debility or prolonged antibiotic treatment. Although common, this disease is more likely to be transmitted person to person than from animals. Hygiene precautions would be adequate for prevention (Schnurren-



berger & Hubbert, 1981). The other mycoses listed in the table were found very infrequently and transmission was due to environmental contamination (saprozoonosis) although it could result from direct inoculation of pus from an infected lesion, usually at necropsy (Fraser, 1986; Quinn et al, 1994). Cases are rare and sporadic; and mycoses, unlike dermatomycoses, pose a very low risk to children at preschool.

**Table 4.6: Systemic fungal infections occurring in both man and animals (from Schnurrenberger & Hubbert, 1981, p 64-73)**

Disease	Causative agent
Aspergillosis	<i>Aspergillus flavus, A fumigatus, A niger</i>
Blastomycosis	<i>Blastomyces dermatidis</i>
Candidiasis	<i>Candida albicans</i>
Coccidiomycosis	<i>Coccidioides immitis</i>
Cryptococcosis	<i>Cryptococcus neoformans</i>
Geotrichosis	<i>Geotrichum candidum</i>
Histoplasmosis	<i>Histoplasma capsulatum, H duboisii</i>
Phycomycoses	<i>Absidia spp, Mucor spp, Rhizopus, spp, Basidiobolus spp</i>

#### 4.7 Parasitic helminths which cause zoonoses

Helminthology is the study of parasitic worms and their relationship with their hosts. Helminths which are of zoonotic importance belong to the phyla Nematoda (roundworms) and Platyhelminthes (tapeworms and flukes). Tapeworms are classified into the subphylum Cestoda and flukes belong to the class *Trematoda* (Reinecke, 1989). Both cestodes and trematodes have a life-cycle which includes more than one host (Schwabe, 1984).

##### 4.7.1 Cestodes

According to Reinecke (1989), the cestodes of animals that occur in man are *Taenia multiceps* (Coenurosis cerebraalis), *T solium* and *T saginata* (Cysticercosis), *Echinococcus granu-*

*losus* (Hydatid cyst), *Dipilidium caninum* (dog tapeworm) and *Spirometra erinacei* (Plerocercoid sparganum).

*T multiceps* occurs in the adult or tapeworm form in the intestines of wild and domesticated canines. The cysts, or onchospheres, occur in the brains of goats, sheep, cattle, wild ruminants and occasionally, man (Fraser, 1986). In man the disease is known as Coenurus cerebralis (Reinecke, 1989). Because the cysts are found in the nervous tissue of the brain or spinal cord, paralysis, incoordination and death are frequent outcomes to infection in both man and animals (Schwabe, 1984; Soulsby, 1982). However, neither WHO (1979) nor Schnurrenberger and Hubbert (1981) listed this as a zoonosis. This may be because of its infrequent occurrence in man (Schwabe, 1984) or may be due to confusion with hydatid disease, resulting from the fact that the eggs of *Taenia spp* infecting canidae are indistinguishable from those of *Echinococcus spp* (Fraser, 1986).

Hydatid disease is considered by the World Health Organisation (WHO, 1979) to be a public health problem of global dimensions. It has a world-wide distribution, from the Arctic Circle to the islands of New Zealand (Schwabe, 1984).

In South Africa the incidence of the parasite is fortunately lower than elsewhere. Verster and Collins (1966) and Verster (1979) reported the incidence of hydatidosis as 1% in all species of livestock. This contrasts to 10% for Libya (Gusbi, 1988) and 10% for Britain (Andrews & Lancaster, 1990).

As in the case of rabies, the dog is an important reservoir for hydatid disease, particularly where livestock are reared in association with dogs (Reinecke, 1989). A survey conducted in Libya between 1984 and 1987 showed a very strong correlation between the feeding of raw offal to dogs and hydatid disease in the families owning the dogs (Gusbi, 1988). According to Reinecke (1989) the disease is transmitted to

man via embryophores on the hair and paws of dogs and can also be transmitted by flies or direct contact with dog faeces. The symptoms in man are dramatic as the cysts grow in any part of the body and enlarge until the swelling is visible externally. Both children and adults can be affected and the treatment of the disease is mainly surgical. The disease has been recognised since the time of Hippocrates (Schwabe, 1984). The classification of *E granulosus* has given rise to some controversy in the past and is still in question as different strains or subtypes are found in different species of animals. It is not known whether all are equally infective to man (Andrews & Lancaster, 1990; Schwabe, 1984; WHO, 1979). Because of the life-threatening risk to young children, it is advisable that dogs be regularly dewormed and not fed raw offal or meat (Reinecke, 1989).

Although hydatid disease is primarily a disease of livestock, where man is an accidental host, this is not the case in cysticercosis, where man is an obligatory host (Schwabe, 1984). The adult or tapeworm form of both *T solium* and *T saginata* are found in the intestines of humans, whereas the cyst form is found in the tissues of pigs and cattle (Kyvsgaard et al, 1990). Infections in man result from eating undercooked meat containing cysts, while the animals are infected by eating human faeces containing infective segments (Reinecke, 1989). Because of the considerable risk of infection to man, beef and pork is routinely inspected at abattoirs for the presence of cysts (Kyvsgaard, 1990). It might be possible, in high-risk areas, to vaccinate people against cysticercosis in order to prevent infection (Eckert, 1989).

Infection with the adult tapeworm does not produce severe symptoms, unfortunately, however, humans could reinfect themselves or others with eggs via contaminated vegetables or unwashed hands. Such auto-infection could result in human cysticercosis (WHO, 1979). Computed tomography in

a group of 77 randomly selected epileptic patients in Natal showed that in 30% of cases the disease was due to cerebral cysticercosis. Children in the age-group 5-10 years were the group found to have the highest frequency (Naidoo et al, 1987). This finding was of considerable significance with regard to the risk to children of preschool age. Children could ingest eggs from other children at school or could be infected if the school served infected meat. Hygienic precautions, meat inspection and proper cooking of meat would prevent the disease.

*Dipilidium caninum*, in contrast to the diseases discussed above, does not present much danger of infection to man although it is a common parasite of domesticated and wild canines and felines (Fraser, 1986). The reported prevalence of this parasite in faeces of cats and dogs varied from 2,7% in Australia, to 88,3% in Nigeria (Boreham, 1990). In South Africa the prevalence in dogs has been reported as 33%. The intermediate host is the flea (*Ctenocephalides canis*, *C felis* and *Pulex irritans*) and man could become a definitive host by swallowing an infected flea (Reinecke, 1989).

*S. erinacei* is of some importance as a zoonosis in Australia and South East Asia, where it is transmitted to man by eating undercooked meat from feral pigs (Reinecke, 1989). In South East Asia it is also transmitted by handling or eating the raw meat of fish and frogs, which act as intermediate hosts (WHO, 1979). In addition to the above, the World Health Organisation listed *Diphyllobothrium spp* as a tapeworm which could be transmitted to humans or other mammals eating raw fish (WHO, 1979). These parasites have not been described in South Africa, but are included as it points out the danger of children eating insects, raw fish, or amphibians.

#### 4.7.2 Trematodes

The trematodes or flukes that can occur in man, are listed in Table 4.7.

**Table 4.7: Trematodes of animals that can occur in man (summarised from Reinecke, 1989, p319)**

Parasite	Intermediate host	Disease caused by
<i>Dicrocoelium hospes</i>	Snails and ants	Eating contaminated plants
<i>Dicrocoelium dendriticum</i>	Snails and ants	Eating contaminated plants
<i>Faciola gigantica</i>	Water snails ( <i>Lymnaea spp</i> )	Eating contaminated plants
<i>Faciola hepatica</i>	Water snails ( <i>Lymnaea spp</i> )	Eating contaminated plants
<i>Schistosoma mattheei</i>	Water snails ( <i>Bulinus africanus</i> )	Swimming in or drinking infected water

Of the above, the parasite which is the most dangerous to man, because of the severe damage which can be caused to the liver, pancreas and even lungs, is *F gigantica* or liver fluke (Reinecke, 1989). The disease can be prevented by adequately washing vegetables which are to be eaten raw. As raw vegetables are part of the diet suggested at preschools (Grobler et al, 1992) and infected water could be used for irrigating these vegetables, washing of vegetables should be emphasised.

Schistosomiasis, or bilharzia, is one of the most widespread trematode infections of both man and animals. *S mattheei* is common in ruminants, solipeds and baboons in Africa. The eggs of this parasite can be found in human urine and faeces, but the disease is considered to be milder than human bilharzia, and self-limiting (WHO, 1979). "Swimmers itch" can occur in children swimming in water infected with cercaria of this parasite as well as other species whose normal hosts are aquatic birds (Reinecke, 1989).

Children should therefore be discouraged from playing, paddling or swimming in dams and vleis.

#### 4.7.3 Nematodes

Nematodes or roundworms occur in both man and animals.

In general these parasites are fairly host specific and symptoms are related to whether man is a definitive, paratenic or accidental host. The nematodes from animals, which occur in man are presented in Table 4.8.

A wide variety of nematodes of animals could infect humans. Fortunately most of these infections are rare. Two which are of importance are visceral larva migrans and cutaneous larva migrans as they can be transmitted to children by their pets (Reinecke, 1989).

Visceral larva migrans is a syndrome that results from humans accidentally swallowing the eggs of the roundworms *T canis* or *T cati*, which are found in domestic and wild canines and felines. Other ascarids can also be implicated, including those normally found in man. Young children playing in areas contaminated with the faeces of infected dogs are at risk because of the likelihood of them eating contaminated soil (Jones, 1990). Persons having close contact with dogs are frequently sero-positive for *T canis* (Gillespie, 1988).

In humans, the larvae which hatch from ingested eggs, migrate in the tissues and can land in any organ, including the liver and eye. The larvae do not develop further and the host's defense mechanisms come into play, encysting the larvae and forming an eosinophilic granuloma. In most cases these have no significance. If, however, they develop in the eye, the granulomas could cause partial blindness (Soulsby, 1983). The disease has been diagnosed in children in South Africa (Reinecke, 1989). At the hospital for Tropical Diseases in London, between 20 and 30 patients were treated annually for toxocariasis (Gillespie, 1988). The World Health Organisation reported an incidence in England of 2%, and in Africa 30%, of persons over 10 years of age were seropositive for toxocariasis (WHO, 1979).

**Table 4.8: Nematodes of animals which cause disease in man  
(from Reinecke, 1989, p317)**

Disease in man	Nematode species	Man infected by
Cutaneous larva migrans*	<i>Ancylostoma caninum</i> <i>A brazilienses</i> <i>A spp</i> <i>Bunostomum phlebotomum</i>	Skin penetration by larvae, usually through bare feet under damp conditions
Dermatitis	<i>Strongiloides</i>	Skin penetration
Conjunctivitis	<i>Thelezia spp</i>	Unknown, rare
Eosinophilic granuloma of the intestine	<i>Spirocerca lupi</i> <i>Gnathostoma spinigerum</i> <i>Anisakis spp</i>	Eating raw insects, lizards Eating raw mammal or bird flesh Eating raw fish
Visceral larva migrans*	<i>Toxocara canis</i> <i>Toxocara cati</i> Ascarid species	Eggs in faeces of host animal, accidentally swallowed
Eosinophilic granuloma of the eye*	<i>Toxocara canis</i>	Contamination of food, hands or by dog faeces, eggs swallowed
Subcutaneous nodules	<i>Dirofilaria immitus</i>	Inoculation by insects
Lesions of mouth and oesophagus	<i>G pulchrum</i>	Eating raw insects
Meningo-encephalitis	<i>T canis</i> <i>G spinigerum</i>	Eggs swallowed Eating raw flesh
Pneumonitis	<i>Ascaris suum</i> <i>Metastrongylus spp</i>	Contamination of food or hands by faeces of pigs Eating raw earthworms
Intestinal infestation	<i>Trichuris vulpis</i>	Contamination of food or hands by faeces of wild or domestic canines
Eosinophilic granuloma of the liver	<i>T canis</i> <i>Capillaria hepatica</i> <i>Gnathostoma spp</i>	Ingestion of eggs from faeces of dogs Ingestion of eggs from faeces of rodents Eating raw flesh of insects, mammals, birds or reptiles

\* Likely risk for preschool children in South Africa

According to Schnurrenberger and Hubbert (1981), *Gnathostoma spinigerum* could also cause visceral larva migrans. In this case the disease is contracted by eating uncooked meat. Visceral larva migrans is considered to be a significant risk for children (Reinecke, 1989) and efforts should be made to remove dog faeces from areas where children play. Young children eating sand or picking up and eating food that has fallen onto soil, are at risk of contracting this disease.

# HOOKWORM LIFE-CYCLE

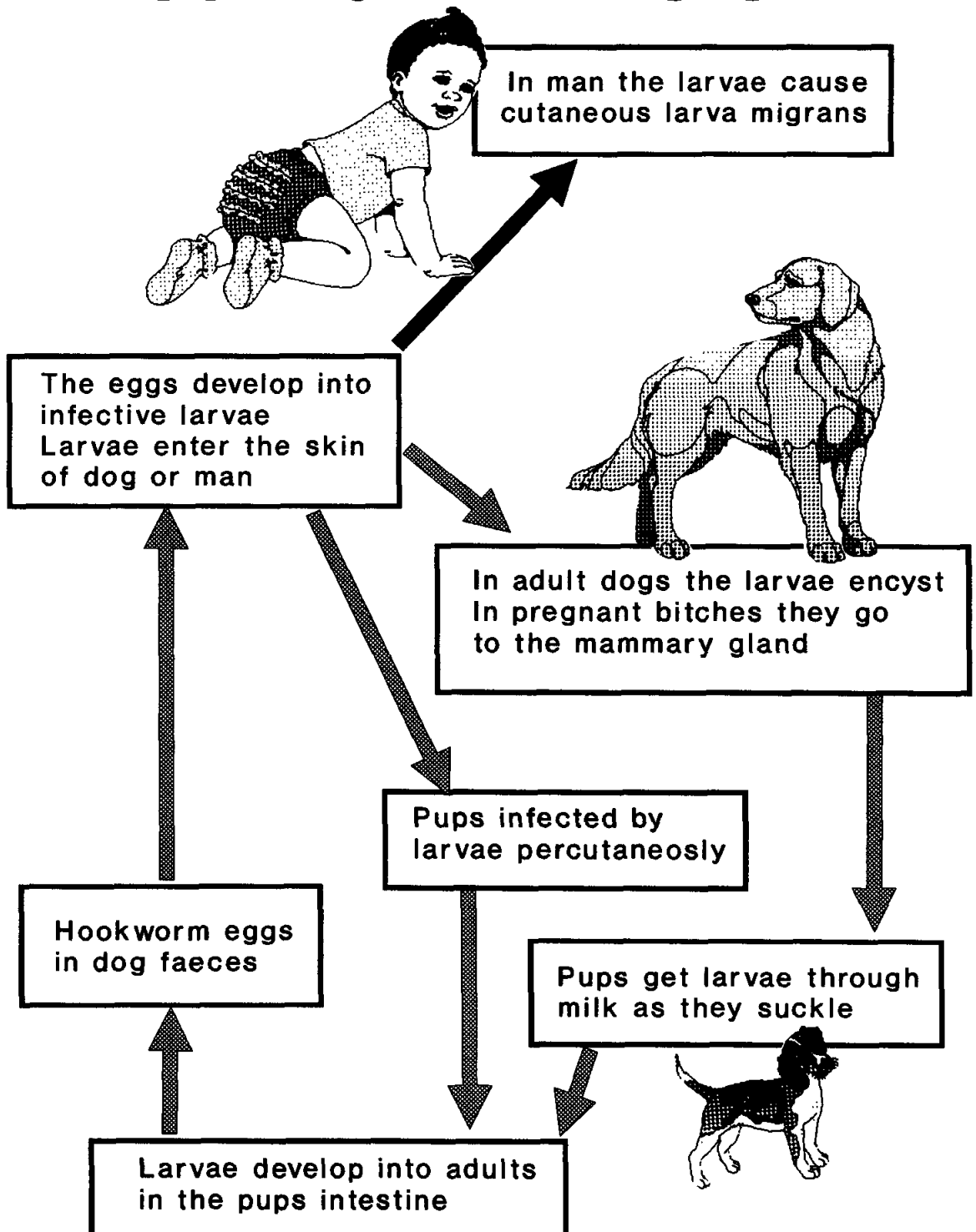


Fig 4.1: Life cycle of the hookworm *A. braziliensis*



Cutaneous larva migrans or creeping infection, is caused mainly by the larvae of *Ancylostomum braziliensis*, a hook-worm found in dogs and cats. The life-cycle of this parasite is shown in Figure 4.1.

The parasite is deposited on the ground in dog or cat faeces (Berkow, 1977). Other nematodes such as *A caninum* (dogs), *Bunostomum phlebotomum* (cattle), *Gnathostomum spinigerum* (pigs), and *Strongyloides stercoralis* (humans, monkeys), could also cause the disease (Schnurenberger & Hubbert, 1981). Larvae persist under damp conditions and penetrate skin coming into contact with soil or moist grass (Reinecke, 1989). Lesions are most frequently found on the feet, legs, buttocks and back. In humans, the larvae remain under the skin, causing a dermatitis along the migratory tracts. These are seen as a winding red thread-like trail, which is characterised by intense pruritus (Berkow, 1977). Once again, removal of dog faeces from areas where children played and regular deworming of dogs should help to prevent the disease in children (Reinecke 1989).

An outbreak of disease caused by this parasite in children at a preschool is described in Chapter 10.

#### 4.8 Ectoparasitic infestations

External parasites of animals could also infest man. Ticks, fleas and mites are important as, besides causing dermatitis and pruritus, they could transmit diseases (Berkow, 1977; Quinn et al, 1994). Flies could also lay their eggs on humans, resulting in various forms of miasis (WHO, 1979).

Ticks are common parasites of domestic and wild animals in Southern Africa and they frequently play a role in the transmission of viral, bacterial and protozoal infections. Besides the transmission of disease, certain species of ticks produce toxins which can lead to tick-paralysis in man. The presence

of animals in the environment is fundamental to the multiplication of ticks, as man is only an accidental host (WHO, 1979).

Fleas may be found in both rural and urban environments. Twenty species of fleas are known to infest man world-wide (Schnurrenberger & Hubbert, 1981). The dog and cat fleas (*Ctenocephalides canis* and *C felis*), rarely transmit disease, but can have considerable nuisance value and will bite humans in the absence of their natural hosts (Soulsby, 1982; WHO, 1979). These bites result in severe short term localised pruritus, particularly in children. Occasionally, an allergic reaction can result from bites (Schnurrenberger & Hubbert, 1981). The rat flea (*Xenopsylla cheopsis*) <sup>is</sup> was very important, as it can transmit bubonic plague (Du Preez & Van den Heever, 1992).

Mites from animals can cause dermatitis in humans. The three species of the fur-mite *Cheyletiella*, are able to go freely to different hosts and are found on dogs, cats and rabbits (Scarff, 1989). Persons owning these animals can show a patchy, pruritic dermatitis, which usually resolves within 4-6 weeks, once they are no longer in contact with the infected animals (WHO, 1979). *Sarcoptes scabiei* can also be contracted from dogs and cats, and *Dermanyssus gallinae* from chickens and wild birds.

Rodent and bird mites can affect humans, sometimes by dissemination from air-conditioners, when the intake-valve is located near infested bird nests (Brockis, 1989; Schnurrenberger & Hubbert, 1981; Yeates, 1994). Allergenic mites are an important cause of respiratory and contact allergies in man and are almost world-wide in distribution. The mites themselves as well as their excreta, debris and dust, cause so-called "house dust mite allergies" which result in allergic rhinitis and asthma, particularly in children (WHO, 1994).

From the above it should be obvious that external parasites are undesirable on any animal which comes into contact with preschool children. Fortunately, this is a subject well-known to veterinarians, who can offer advice on the prevention and control of external parasites on animals.

Miasis is a condition in which humans and other vertebrate animals are infested with dipterous fly larvae. Some of these, like *Oestrus ovis* (the nasal bot of sheep) are facultative parasites which normally develop in rotting carcasses or decaying vegetable matter (WHO, 1979). The causes of zoonotic miasis are listed in Table 4.9.

**Table 4.9: Miasis of animals which also affects man (WHO, 1979, p 92-94)**

Organism	Disease in animals	Disease in man
<i>Oestrus ovis</i> <i>Rhinoestrus purpureus</i>	Nasal bots of sheep Nasal bots of equine	Larvae in one or other natural orifices of man
<i>Gasterophilus spp</i>	Horse bots	Creeping cutaneous miasis
<i>Hypoderma lineolatum</i> <i>H bovis</i>	Warble flies of cattle	Dermal or subdermal miasis and, rarely, ophthalmomiasis
<i>Dermatobia hominis</i>	Latin American bot fly	Cutaneous lesions
<i>Cordylobia anthro- pophagus, C rodhaini</i> *	Tumbu fly in rats and dogs	Boil-like cutaneous miasis
<i>Cochlyomyia hominivorax</i> * <i>Chrysomyia bezziana</i> *	Screw worm and wound maggots	Maggots in wounds or natural orifices

\* Likely to affect preschool children in South Africa

None of the miasas listed above, except the tumbu fly and screw worm, are commonly found as zoonoses in Southern Africa (WHO, 1979). The tumbu fly is found in the warmer north-eastern parts of South-Africa and Zimbabwe. The adult fly lays its eggs on clothing, often nappies. Larvae hatch and enter the skin where they mature. Later the adult larvae emerge from a boil-like eruption on the skin (Bryson, personal communication, 1994). It is therefore possible that wash-cloths left out to dry at a preschool could become infected

and might need to be ironed before use in endemic areas. These larvae have been seen on dogs treated at Medunsa veterinary clinic and the parasite is therefore known to be present in the low-income areas surveyed during this investigation.

Maggots result after flies lay their eggs on wounds or external orifices. The condition is most frequently associated with poor hygiene, where flies lay their eggs on external orifices contaminated with faeces or urine, or in suppurating wounds (Schnurrenberger & Hubbert, 1981). Such conditions could occur in cases of child-neglect but are unlikely to happen at a well run preschool or creche. There is no direct link to the presence of animals.

#### 4.9 Summation

In order to decide on the relative importance of a specific zoonosis in preschool children, it would be useful to know the incidence or prevalence of that disease. It is, however, not easy to estimate the true incidence or prevalence of disease in a particular population (eg preschool children) or even on a national level. During the literature survey, it was found that many of the references were case reports which discussed a single outbreak in depth but did not even attempt to estimate the incidence or prevalence of the disease.

This may in part be due to lack of detailed knowledge of the epidemiology of some of the diseases surveyed. Even in the case of rabies, for example, which has been known since the time of Hippocrates (Ngubane, 1993), the reason for the fluctuating level of cases was as yet unknown (Kloek, 1993). Another possibility is that the available diagnostic techniques were not sufficiently specific, for instance the difficulty encountered in differentiating between the eggs of *Taenia spp* and *Echinococcus* in faeces (Fraser, 1986).

A further constraint to comparative determinations of the incidence and prevalence of disease was that different methods were used for the diagnosis of different diseases or even the same disease. Which diagnostic test was used to determine the presence or absence of disease could depend more on the ease with which the test could be administered and the financial support available for the investigation, than on the sensitivity and specificity of the results. In some cases, therefore, the organism was isolated from diseased or healthy individuals, or from the environment, while in others serological surveys were done (Kustner, 1980). Each method had advantages and disadvantages, but it was not logical to compare the prevalence or incidence of different diseases as the sensitivities and specificities of each method were different.

Monthly or annual statistics prepared and disseminated on a national level by government agencies, could be considered to reflect the relative importance, or frequency, of a disease. These too, had drawbacks. Usually statistics were only provided for a specified list of diseases (eg notifiable diseases) and only outbreaks which were diagnosed and of which the state was aware, were recorded. Comparative morbidity statistics would perhaps therefore give a better idea of the relative importance of zoonoses as a cause of disease in children (see Chapters 7 and 9).

From the literature reviewed, it was found that the incidence of zoonoses was considerably lower in developed countries, where veterinary disease control and hygiene were effective, than in the developing countries where the infrastructure was deficient. This pointed directly to the important role of the veterinarian in preventing and controlling diseases which could constitute a risk to the physical health of the preschool child. It also indicated a role for certain principles which could be followed at a preschool, so as to decrease the possibility of a zoonotic disease occurring.

In Table 4.10 the routine precautions which could be taken at preschools, have been listed together with the diseases which could be prevented.

**Table 4.10: Suggested methods for the prevention of zoonotic diseases in preschool children**

Method of prevention	Diseases prevented in this way
Wash hands after contact with animals	Salmonellosis, cryptosporidiosis, hydatid cyst disease, visceral larva migrans
Do not eat raw meat	Foot-and-mouth disease, salmonellosis, anthrax, BSE, brucellosis, rabies, campylobacter, toxoplasmosis, tuberculosis, cysticercosis
Do not eat raw fish	Erisipeloid, salmonellosis, diphyllobothrium
Prevent contact with sick animals	Rabies, ornithosis, cowpox, orf, pseudocowpox, salmonellosis, colibacillosis, campylobacteriosis, erisipeloid, staphylococcus, streptococcus, cryptosporidium, giardiasis, ringworm, sporotrichosis
Vaccinate companion animals	Rabies, leptospirosis
Deworm companion animals	Visceral larva migrans, cutaneous larva migrans, hHydatid disease, Dipilidium caninum
Do not keep monkeys	Simian herpes, monkey B virus, tuberculosis
Pasteurise milk	Brucellosis, colibacillosis, leptospirosis, listeriosis, staphylococcal food poisoning, streptococcus infections, tuberculosis, campylobacteriosis, salmonellosis, q-fever, rift valley fever
Treat all animal bites and scratches, use tetanus and rabies prophylaxis where indicated by a physician	Rabies, tetanus, cat-scratch fever, bacterial wound infections, gangrene due to clostridia, erisipeloid, nocardiosis, sporotrichosis
Handle and store food hygienically	Salmonellosis, listeriosis, staphylococcus, campylobacteriosis, clostridial food poisoning, colibacillosis
Do not eat unwashed vegetables	Salmonellosis, liver fluke
Dispose of faeces hygienically	Salmonellosis, visceral and cutaneous larva migrans, toxoplasmosis
Do not play in or drink dirty water	Leptospirosis, colibacillosis, salmonellosis, bilharzia, liver fluke
Control rats	Bubonic plague, salmonellosis, leptospirosis
Control ticks	Congo fever, rickettsiosis
Control fleas	Bubonic plague (rat fleas), dipilidium caninum
Do not eat insects, lizards, etc raw	Eosinophylic granulomas of the digestive tract

The review of the literature also showed that, although zoonoses were infectious diseases, the cause was usually multi-factorial. In the case of rabies, for example, the chance of a child dying from the disease was influenced by a number of variables, such as the vaccination status of dogs, the possibility of a child interacting with a rabid dog and the type of treatment given to the bite wound. Some of these could be addressed in the preschool, for example, motivation towards having dogs vaccinated, information to children on avoiding strange dogs and parent information on treatment of animal bites.

It will be seen from Chapter 5 that management and housing of animals play an important role in the prevention and control of zoonotic diseases. The next chapter will review the literature regarding methods for caring for animals which may be applicable to the preschool situation.

## **CHAPTER 5**

### **MANAGING ANIMALS KEPT AT PRESCHOOLS**

#### **5.1 Introduction**

Animals at preschools may be kept in runs or pens outside, allowed free in the garden, and allowed to move around or kept in cages (tanks in the case of fish) in the classroom (Flemming et al, 1977; Hallett, 1985). Each of these might need a different management system, but there are certain common features for the prevention of disease. As well as managing animals for disease prevention, the animals well-being should be considered, and design and management should also incorporate features which promote positive interactions between the children and animals at the preschool.

It was found by Godin et al (1989) that the majority of teachers considered animal interaction valuable for the preschool child, but that more information was needed on housing and managing animals kept at preschools. The literature was thus reviewed with regard to the choice of animals, the factors to be taken into account when designing housing for animals at preschools and the day-to-day management of animals. This was then discussed with reference to the role of the veterinarian and the interactions between animals and preschool children.

#### **5.2 Choice of animals for preschools**

Both the suitability of the species and the cost involved in keeping them at preschool should be considered when choosing a particular type of animal.



### 5.2.1 Suitable species for preschools

There is some difference of opinion as to the animal species most suitable for preschools. Fleming et al (1977) suggested cats, dogs, gerbils, hamsters, guinea pigs and parakeets (budgerigars). Stachel (1986), on the other hand, suggested carp, turtles, ring-doves, mice and guinea pigs so that at least one representative of each group of animals (fish, reptiles, birds and mammals) is seen by children. Hallett (1985) divided animals on the basis of whether they were to be used at the nature table (indoors) or at the pet's corner (outdoors) (Table 5.1):

**Table 5.1: Animals suitable for use at the indoor nature table and the outdoor pet's corner (from Hallett, 1985, p22)**

<b>Animals for the nature table</b>	<b>Animals for the pets' corner</b>
Birds Chameleons Earthworms Goldfish Hamster Silkworms Tadpoles Terrapins Vivariums White mice	Ducks Tortoises Guinea pigs Hens and chicks Hedgehogs Rabbits

Hallett suggested that dogs were not suitable for the pet's corner, but that cats could be considered. None of these authors made any mention of the sex, breed or age of the animals to be kept, although Stachel (1986) suggested that only healthy animals obtained from a reputable source should be used.

Various categories of invertebrates could be kept at preschools, ranging from insects (eg silkworms) to arachnids (eg spiders) and molluscs (eg snails) (Flemming et al, 1977; Hallett, 1985). Frequently, insects formed part of the nature-table and were kept in glass bottles or terrariums long enough for the life-cycle to be observed (Hallett, 1985). In South Africa Struik has published a series of pocket guides, including

one on spiders and another on insects, that give practical details on their identification, ecology and how to manage them in captivity. In the case of spiders, information is provided on the recognition of poisonous species and the treatment of spider bites (Newlands, 1988).

Stachel (1986) gave detailed instructions on keeping caterpillars and snails in the preschool environment and an excellent review was published in the Veterinary Record on snails and snail farming, which described in detail the biology, management, diseases, anatomy and anaesthesia of these molluscs (Cooper & Knowler, 1991).

### 5.2.2 Calculating the costs involved

According to teachers interviewed, cost played a part in the selection of animals for preschools (McCrinkle & Pullen, 1990). It is, however, not always possible to accurately calculate the costs involved in keeping animals (Porter & Lane-Petter, 1962).

<p><b>Storage of food</b></p>	<p><b>Maintenance</b></p> <ul style="list-style-type: none"> <li>- Buildings</li> <li>- Equipment</li> </ul>
<p><b>Operating budget</b></p> <ul style="list-style-type: none"> <li>- Salaries &amp; wages</li> <li>- Food</li> <li>- Bedding</li> <li>- Purchase of animals</li> <li>- Laundry</li> <li>- Disinfectants</li> <li>- Veterinary</li> </ul>	<p><b>Depreciation</b></p> <ul style="list-style-type: none"> <li>- Buildings</li> <li>- Equipment</li> <li>- Cleaning materials</li> <li>- Disposable utensils</li> <li>- Refuse disposal</li> <li>- Sacks</li> <li>- Capital equipment</li> <li>- Repairs</li> <li>- Replacements</li> </ul>
<p><b>Capital expenditure</b></p> <ul style="list-style-type: none"> <li>- New items</li> </ul>	<p><b>Security</b></p>

**Fig 5.1: Factors to be taken into account when calculating the cost of keeping animals (Lane-Petter & Pearson, 1971, p141-170)**

Figure 5.1 suggests a method used for estimating the cost of keeping laboratory animals in a breeding colony by calculating the cost of all the different factors which may play a role (Lane-Petter & Pearson, 1971).

Using this method, they estimated that the production costs at age of sale, of the various species were as follows (prices in British currency):

Mice (5 weeks old)	11 pence
Rats (5 weeks old)	45 pence
Guinea pigs (3 months old)	Two pounds and sixty pence
Dogs (6 months old)	69 pounds

Although the criteria do not fit those used for the preschool, it does give some idea of the relative costs of feeding and managing the species listed. A modification of this method of calculating costs could be used by a preschool which needs to budget for keeping animals (see Chapter 7).

### 5.3 Housing design

Cage and housing design is known to influence the health and well-being of animals (Charmove, 1989; Fraser, 1986). Factors to be taken into consideration when designing housing for animals include types of housing and minimum sizes for each species, temperature, humidity and ventilation, drainage, access to feed and water, environmental enrichment and security (De Klerk, 1990; Fox, 1986; United States Federation for Animal Welfare (UFAW), 1976; United States Department of Health and Human Services (USDHH), 1985a). These factors could also possibly be considered when designing housing for animals kept at preschools. In addition, ease of management should be taken into consideration.

#### 5.3.1 Types of housing

Guidelines for housing animals at schools are available for colder climates such as the United States and England (De Chiara & Callender, 1990; Fleming et al, 1977). The Matal programme gives guidelines which are used in Israel (Stachel, 1986). South African guidelines are not sufficiently specific or detailed on requirements and more research in this area is

needed (Austin, 1982; Hallett, 1985; Van der Merwe, 1988b). Figure 5.2 lists the requirements suggested for an outdoor pets enclosure (Hallett, 1985):

- A pet's corner should:
- be large enough for an adult to stand in
  - be surrounded by a diamond mesh fence
  - have a brick wall on one side for shelter
  - have a strong gate with a padlock
  - be roofed with diamond mesh
  - have a house with a removable roof to shelter the animals
  - be situated where there is drainage, sun, shade, and not too near the school buildings for hygienic reasons
  - contain rocks or grass behind which the animals can hide
  - have grass if it can be grown

**Fig 5.2: Characteristics of an outdoor pet's enclosure at a preschool (Hallett, 1985, p20-21)**

Pet shops will supply cages for keeping animals such as mice, rats, hamsters, fish and cage birds indoors. Prebuilt aviaries are also available, which could be used at preschools for housing birds and animals outdoors.

### 5.3.2 Cage size

Cage size has been conclusively shown to play an important part in environmental enrichment for rodents (Fox, 1986). The minimum floor space required for different species of animals has been laid down in guidelines issued for laboratory animals (De Chiara & Callender, 1990; De Klerk, 1990; United States Department of Health & Human Services, (USDHHS) 1985a). These guidelines have been summarised in Table 5.2.

When designing or selecting cages for use in the preschool, observing these minimum space requirements should prevent overcrowding. Overcrowding could be calculated in terms of animal density, which was defined by Davis (1976) as the number of animals per unit floor space.

**Table 5.2: Minimum space requirements for the housing of laboratory animals (modified from De Klerk, 1990, p13-16 and USDHHS, 1985b, p13-17)**

Animal	Type of housing	Floor area (cm <sup>2</sup> ) group*	Floor area (cm <sup>2</sup> ) single*	Height (cm)*
Mouse	Cage	39-78	200	12
Rat/Gerbil	Cage	110-389	500-700	18
Hamster	Cage	65-122	300	15
Guinea pig	Cage/hutch	387-650	900-1000	18
Rabbit	Cage/hutch	1400-4000	2000-6000	40
Cat	Cage	3000-5000	5000-7500	50-80
Dog	Pen/run	22500-40000	45000-80000	150-200
Pigeon	Aviary/cage	800	1225	35
Chicken/duck	Cage	250-1900	350-2800	30-75
Sheep/goat	Pen	1300-1900	20000-28000	120
Pig	Pen	10000-375000	20000-50000	100

\* Variation in floor size and height is directly proportional to the weight of the animals being housed

### 5.3.3 Temperature, humidity and ventilation

It is difficult to lay down precise temperature and ventilation parameters for outdoor cages, however, the general rule should be followed that suggests shelter from wind and rain and provision of shade as necessities for housing (Hallett, 1985). Du Preez (1994) suggested that, for South Africa, alignment of the long axis of the building in a north-south direction allowed animals to follow the shade but also allowed sunlight to dry out 35-50% of the area during both morning and afternoon hours.

With regard to facilities indoors, temperature and ventilation for small animal rooms have been specified by De Klerk (1990). He recommended that room temperatures should be maintained within a range of 4 degrees Centigrade within the optimal range shown in Table 5.3:

**Table 5.3: Optimal temperature specifications for laboratory animals (after De Klerk, 1990, p9-10)**

Animal species	Optimal range
Mouse, rat, hamster, gerbil	15-24°C
Guinea pig	19-23°C
Rabbit	16-20°C
Pigeon	15-24°C
Domestic fowl and duck	12-24°C
Cat, dog, pig	15-24°C
Goat, sheep, cattle, horse	10-24°C

These temperatures could also be used as a guideline if a veterinarian wished to check whether outdoor housing provided sufficient insulation against extremes of temperature.

Although extreme variations in humidity could have adverse effects on animals, this was not a problem generally seen in South Africa. The relative humidity varies from 30-70% over most of South Africa, with areas in the western part of the plateau which are below 30% (semi-arid) and only a small area along the coast where the humidity exceeds 70% (Walton, 1984). De Klerk (1990) suggested that for laboratory animals the relative humidity should be maintained at 55%, with a range of 10%. The USDHHS (1985b), on the other hand, regarded a relative humidity that varied between 30% and 70% as acceptable for the comfort of laboratory animals.

Ventilation rates suggested for small animal rooms were between 15-20 fresh air changes per hour (De Klerk, 1990). It was unlikely that this would be a problem in classrooms as the room would be designed for adequate ventilation so that children would get sufficient fresh air (De Chiara & Callender, 1990).

#### 5.3.4 Drainage

Adequate drainage is an important and often neglected part of

housing for animals. Drainage standards are usually laid down by municipal regulations. Unfortunately septic tanks are not permitted in certain municipal areas (Pretoria Municipal Bylaws, 1990).

Floor drains are essential and the floors must be sloped 2,1cm per metre to facilitate run-off. Drain pipes should be at least 10,2cm in diameter and a rim-flush drain in the floor is an effective aid for the disposal of solid waste (USDHHS, 1985b).

#### **5.3.5 Ethology and environmental enrichment**

Research in the field of environmental enrichment parallels the development of the field of cognitive ethology, which has studied the information processing behaviour of animals (Mench, 1994). Lynette Hart (1994), has suggested that environmental enrichment of the surroundings of laboratory animals should take cues from the zoo world as well as studies done on livestock and companion animals to promote their well-being. It has been established that zoo animals should have the opportunity to behave like their wild counterparts and that their housing should be constructed in such a way that such behaviour is possible (Hart, 1994). Deprivation of environmental stimulation could result in stereotypical movement as animals develop patterns which increase their sensory input and motor output (Fox, 1986).

Mench (1994) suggested that environmental enrichment should be linked to exploratory behaviour and that devices or "toys" should be designed after examination of behaviour in nature. Charmove (1989) found that cage design influenced the emotional behaviour of mice, and Bradshaw & Poling (1991) showed that rats preferred cages containing pipes, platforms and paper towels. Social and caging preferences as well as handling techniques all form part of environmental enrichment for animals (Arnold & Gillaspay, 1994; Arnold &

Estep, 1994). These authors felt, however, that more work should be done on other forms of enrichment. They also suggested that golden hamsters be housed in pairs as group housing resulted in fighting and obesity. Group housing of rabbits also provided social enrichment for this species (Hart, 1994). This could be explained in terms of the findings reported by Fox (1986), that physical contact and social grooming promoted a pleasurable, stress-relieving state in all animals. Social hierarchy (pecking order) played a role which could result in considerable stress if overcrowding prevented the animals' normal escape mechanisms operating (Davis, 1976; Fox 1986).

In the preschool, providing environmental enrichment for animals would not only improve the well-being of the animals, but also make the cage more appealing and interesting to children.

Odendaal (1994a) has published an ethological checklist for assessing animal welfare. Such a checklist could be used to assess whether the housing at the preschool meets the needs of the animals with regard to their well-being (see Chapter 7).

#### **5.3.6 Security**

Security should play a part in the design of animal housing at preschools. There should be an escape-free area for the animals. Doors to cages should be locked and the school itself should have a fence or wall to keep out predators and trespassers.

Locking the doors of cages also ensures that direct child-animal interactions are under the supervision of teachers, who could act as mediators encouraging empathy and humane treatment of animals. It would also protect the animals at school from marauding predators and thieves.



### **5.3.7 Ease of management**

In order to facilitate cleaning, walls and floors should be smooth and free from cracks or crevices. Surface materials should be capable of withstanding scrubbing and gnawing by animals (Ruitenbergh & Peters, 1986; UFAW, 1976; USDHHS, 1985a). Cages should be designed with a minimum of ledges, joints and corners where waste, water and detritus can accumulate (Arrington, 1978; De Klerk, 1990). Feeding and watering devices, should be easily accessible for changing and cleaning (Fox, 1986; Williams, 1976). Paying attention to these details during the design of animal facilities at pre-schools would decrease the work-load of staff who were expected to manage the animals.

## **5.4 Day to day management of animals kept at school**

The daily management or care of animals is also important to their health. This includes feeding and watering, bedding materials supplied as well as cleaning and disinfection.

### **5.4.1 Feeding and watering**

Animals should have access to clean potable water and watering devices, such as drinking tubes and automatic devices should be regularly checked to see that they function well. Automatic devices are considered to be preferable as open water pots easily become contaminated with faeces and urine (De Klerk, 1990; Porter & Lane-Petter, 1962).

Animals should be fed palatable, uncontaminated and nutritionally adequate food according to the requirements of the particular species (Porter & Lane-Petter, 1962).

Food should be stored in cool, dry, clean, vermin-free premises (Ruitenbergh & Peters, 1986; USDHHS, 1985b). Children should be encouraged to assist with the feeding of animals at

the school as this teaches responsibility and promotes nurturing behaviour (Flemming et al, 1977).

Nutritional requirements and types of food suitable for the various species which may be kept at preschools, are described in standard texts on the nutrition of laboratory animals (Arrington, 1978; Fraser, 1986; UFAW, 1976; Williams, 1976) as well as books for pet owners. It is important that feeding and watering of animals should be done regularly. The ideal is to feed the animals at the same time each day and so establish a routine (Porter & Lane-Petter, 1962).

#### 5.4.2 Bedding

Absorbent cage or pen litter and nesting material should be provided unless it is clearly not appropriate (Arnold & Gillaspay, 1994; De Klerk, 1990). The use of such materials not only reduces stress in animals, but also enhances hygiene because it absorbs moisture (Potgieter & Wilke, 1991).

Sawdust and wood shavings from certain types of trees could cause undesirable side-effects such as tumours and chemically treated wood could poison small mammals (De Klerk, 1990); Potgieter & Wilke, 1991; USDHHS, 1985a). Many different types of bedding and nesting materials have been used including paper products, peat moss, cotton, ground corncobs, peanut hay, attapulgate, clays and polythene granules (Kraft, 1980). According to Potgieter and Wilke (1991) vermiculite is still used in South Africa, although it has been shown to have long-term effects in mice, decreasing growth-rate and fertility.

Caging preference studies have highlighted that the preferences of laboratory animals for different types of bedding have been insufficiently studied (Arnold & Estep, 1994).

### 5.4.3 Cleaning and disinfecting

Hygiene plays an important part in the prevention of disease and is particularly important for the prevention of zoonoses. Cleaning of both indoor and outdoor accommodation for animals should therefore be done on a routine basis so that there is no build-up of waste material (USDHHS, 1985a). Bedding used in cages or pens should be changed as often as needed to keep the animals dry and clean and prevent offensive odours (Williams, 1976). A build-up of ammonia resulting from urine, could cause chronic respiratory diseases (Fox, 1986). For cages containing rats, mice, hamsters or budgies, one to three changes per week were suggested (Porter & Lane-Petter, 1962; USDHHS, 1985a). In the case of larger animals, waste should be removed daily and where this is done by hosing or flushing, care should be taken to keep the animals dry (USDHHS, 1985a).

Disinfection might be necessary when there has been an outbreak of disease or parasites, or where new animals are introduced to a cage (Stachel, 1986). Feeding and watering utensils should be cleaned and disinfected frequently using disinfectants registered as safe to use with animals (Linton et al, 1987). Utensils should be well-rinsed, free of chemicals prior to use (UFAW, 1976; USDHHS, 1985b).

## 5.5 Management and the child-animal interaction

The housing and management of animals in the preschool should be considered bearing in mind the aim of preschool education to develop the whole child (Grobler et al, 1990). Child-animal interactions should promote development of the affective, cognitive and psychomotor domain, as discussed in Chapter 2. Animals in the preschool should also form a part of environmental education for the preschool child (Calitz, 1993a and 1993b).

Direct contact between the children and animals should be supervised (Hallett, 1986; Kellert, 1984; VanLeeuwen, 1981). However, the aims of the discovery model, which suggests a minimal amount of structuring, could also be taken into consideration when designing housing. This could be done by positioning the housing strategically in the play area or putting cages indoors on or near the nature table.

Learning to accept and discharge responsibility could be coupled to children feeding animals (Blue, 1986; Levinson, 1975). This should therefore also be allowed for when designing the housing for animals at preschools and a double door put onto the cage so that children, who may be slow at entering the cage to feed the animals, do not let the animals or birds escape while feeding them.

## **5.6 The role of the veterinarian with regard to housing and management**

Veterinarians should perhaps be consulted with regard to the health status as well as the behaviour of animals selected for preschools as a study of animal diseases as well as the ethology of domesticated animals forms a part of their training in South Africa (Odendaal, 1988).

### **5.6.1 Housing and the health status of animals**

Although viruses, bacteria, protozoa and other infectious agents cause disease, the likelihood of disease occurring or being transmitted has been strongly related to management and nutrition of animals (Fig 5.3). Animal owners, however, constantly seek a magic elixir such as a single injection of antibiotic, to solve disease problems (Fraser, 1986). This tendency, in human medicine, is regarded as the curative approach and is considered to be more expensive and less effective than the preventative, or "primary health care" approach (Morley & Lovel, 1990).

- \* Adequate space per animal according to species and size
- \* Adequate ventilation: 4 air changes per hour in winter and 16 in summer
- \* Prevent exposure to temperature extremes
- \* Provide good sanitation with regular removal of excreta
- \* Provide adequate amounts of potable water at all times
- \* Provide diet containing adequate nutrients, including vitamins and minerals
- \* Prevent faecal contamination of feed and water
- \* Ascertain that newborn animals nurse soon after birth so as to receive colostrum
- \* Do not feed damaged or spoiled feed
- \* Separate age groups and species
- \* Do not breed until females are of sufficient size
- \* Immunise animals against diseases present in the environment
- \* Control internal and external parasites
- \* Keep animals under surveillance so signs of disease are picked up early
- \* Isolate and treat diseased animals as soon as signs of disease are seen

**Figure 5.3: General recommendations for the management of animals to prevent disease (Fraser, 1986, p1022-1023)**

Hygiene and adequate faecal disposal play an important role in the prevention of zoonotic diseases because of the risk of faecal contamination as a method of transmission. Vaccination might also prevent animals becoming infected with diseases which are dangerous to humans (Schwabe, 1984).

Veterinarians should be involved in evaluating the health status of the animals kept at preschools. The Federation of European Laboratory Animal Science Associations (FELASA) working group, has published recommendations for the health monitoring of mouse, rat, hamster, guinea pig and rabbit breeding colonies which may be applicable to animals at preschools (FELASA, 1994). This publication lists the serological and culture methods which may be employed by a veterinary pathologist to diagnose viral, bacterial, mycoplasmal and fungal infections in these rodents.

The diseases of domestic guinea pigs were described in detail in the book by Richardson (1992) and an excellent reference on poultry diseases has been written by Calnek et al (1991). Fish diseases and management of fish in South Africa have been well described by Huchzermeyer (1993).

Data on the normal physiological parameters of animals likely to be kept at preschools are available in the literature (Fraser, 1986; Ruitenberg & Peters, 1986) and are summarised below (Table 5.4). Fraser (1986) also discussed methods for the clinical examination of rodents, birds and reptiles and listed common diseases found in these animals.

**Table 5.4: Normal physiological parameters for animals**

Physiological parameter	Mice	Rats	Guinea pigs	Hamsters	Rabbits
Lifespan (years)	1-3	2-3	6-8	1-3	4-10
Mature weight (g)	20-30	200-300	400-500	85-110	3-5kg
Water consumption ml/day	4-7	30	150	30	300-700
Heart rate (beats/minute)	480-740	250-600	150-300	27-500	130-333
Respiration	84-230	66-210	69-150	33-127	32-85
Body temperature (°C)	36-39	36-39	37,4-39,4	36,1-38,9	37,2-39,3

These parameters could be used in clinical examination of newly introduced animals as well as the examination of diseased animals. All animals introduced to the preschool should be examined in advance, as it was easier to maintain health amongst the animals kept at school if no diseases were introduced from outside (Stachel, 1986).

Preventative medicine, such as vaccination and parasite control, could be performed at the same time and the animal kept briefly in quarantine before being put with the other animals. Sick or injured animals should be taken to a veterinarian for treatment and animals which die should always be submitted for necropsy and specimens taken if necessary (FELASA, 1994). A checklist for deciding on the health status of laboratory animals is given in Figure 5.4:

<b>CHECKLIST FOR HEALTH OF ANIMALS</b>	
<b>EARS:</b>	Free of debris and parasites
<b>EYES:</b>	No discharges
<b>SKIN:</b>	No bald patches, scales, abscesses
<b>NOSE:</b>	No sneezing or discharges
<b>FEET:</b>	No scaly, swollen areas, injuries, abscesses
<b>FAECES:</b>	No diarrhoea
<b>HAIRCOAT:</b>	Smooth, shiny and clean
<b>BEHAVIOUR:</b>	Alert, good appetite, moves around freely

**Figure 5.4: Checklist for the health status of laboratory animals (Gasdorf & Bockridge, 1985, p6)**

A similar checklist could be given to teachers at a preschool so as to enable them to evaluate the health of the animals at the school and call in the veterinarian when necessary.

Veterinarians are therefore in a position to advise preschools on the latest drugs and methods available for parasite control, as well as give advice on the other aspects of management of animals at preschools.

### **5.6.2 Housing and management in relation to veterinary ethology**

If positive, human-animal interaction is desirable in the preschool. Therefore the behaviour of the animal in relation to children is important. Both phenotype (which results from early conditioning and the environment) and genotype (which includes genetic variables and the sex of the animal) contribute to animal behaviour (Fox, 1986; Hart & Hart, 1985a; Odendaal, 1994b).

With regard to environmental influences, it is known that early imprinting of companion animals influences late socialisation (Neville, 1991). Following early socialisation, frequent human contact should be continued to maintain the human-animal bond (Fox, 1986). It has also been shown that regular handling of hamsters decreases their fear of handling and the

likelihood that they will bite (Arnold & Gillaspay, 1994). Animals to be selected for the preschool should therefore have a history of being handled from an early age.

The age of animal selected is also important because social and environmental experiences early in life can influence development and later behaviour, physiology and disease resistance in laboratory animals and birds (Fox, 1986). Changing the management and housing of adult animals can result in stress (Arnold & Estep, 1994; Davis, 1976). It could therefore be considered important to select young animals that would remain at the preschool for a long time. Adult animals which are already adapted to a different environment would therefore not be suitable for relocation to a preschool.

The sex of an animal could influence it's behaviour and this should therefore be taken into account when selecting animals for the preschool (Hart & Hart, 1985b; Hopkins et al, 1976). If breeding is desired, a veterinarian may be approached for advice on the gestation period and reproduction data for the animals concerned. These are summarised in Table 5.5 below.

**Table 5.5: Reproductive and gestation data for laboratory animals used in preschools (modified from Arrington, 1978, p42-45)**

	Mouse	Rat	Hamster	Rabbit	Guinea pig
Breeding age	6-7 weeks	6-14 weeks	4-8 weeks	6-7 months	8-12 weeks
Duration of oestrus	4-5 days	4-5 days	4 days	Prolonged (ovulation only after intro-mission)	16-19 days
Return to oestrus post-partum	24 hours	24 hours	1-8 days	35 days	6-8 hours
Gestation (days)	19-21	21-23	16-18	31-32	65-72
Litter size	10-12	9-11	5-6	7-9	3
Birth weight (g)	1,0-1,5	5-6	2	64	90-100
Lactation	16-21 days	21 days	20-24 days	6-8 weeks	14 days



Knowledge of the above data could influence which species of animals would be selected by the preschool for breeding.

In addition to disease control, veterinarians are involved in the welfare of animals and able to assess whether the management and housing system meets the criteria for animal well-being, based on the veterinary ethology of each species (Odendaal, 1994a).

## 5.7 Summation

The literature surveyed on the management of animals at preschools revealed a large amount of uncoordinated information. It justified teachers' requests for more specific information regarding the needs of preschools that keep animals on the premises (Godin et al, 1989). Most of the management, housing and feeding proposals discussed above are directed at the hobbyist, individual pet owner, research-laboratory or commercial producer rather than the preschool. An investigation into housing and management of animals at preschools was therefore undertaken so that evaluation criteria could be suggested. The results are reported in Chapter 11.

In the next chapter the role of animals in children's literature, games and toys will be reviewed, as this is also an important part of child-animal interactions within the preschool.

## CHAPTER 6

### CATALOGUING AND CLASSIFYING THE ANIMAL CONTENT OF LITERATURE, GAMES AND TOYS AT PRESCHOOL

#### 6.1 Introduction

Animal related topics are not confined to those disciplines dealing only with zoology, agriculture and veterinary science, but are found in children's recreational and educational media, such as books, television, films, puzzles and games. Children's literature should be considered as a tool of socialisation (Swanepoel, 1992). It is therefore possible that the way in which animal protagonists are presented in books could influence later attitudes.

In the opinion of Joan I Glazer, author of the book *Literature for young children*, the regular sharing of literature with children frequently led to vocabulary growth, increased reading comprehension, and concept development (Glazer, 1986). According to Le Roux et al (1989) it was this conceptual basis which necessitated factual presentation of animal topics.

Pienaar (1969) was of the opinion that there was no such thing as a "harmless book". There were only books that contributed to the development of a child's imagination, understanding, knowledge and sense of the aesthetic, and those that did not. If this is true, then it follows that those books which promote positive interactions between children and animals would be desirable.

In order to measure and evaluate the use of animal topics in books and toys, it was necessary to review the methods used by libraries to catalogue and classify books. Evaluation methods used by other authors and literature on the subject of animals in children's books were also reviewed.

## 6.2 Cataloguing children's books

Libraries refer to the index, description or list of materials in their collection as a catalogue. In a library, each entry in the catalogue is the representation of a bibliographic record (Fig 6.1) (Burger & Van der Merwe, 1990; Taylor, 1985).

RC 350.5	Wehrmacher, Suzanne L
W43	Case studies in neurological nursing Suzanne, L Wehrmacher; Joan, P Winter - 1st ed - Boston: Little, Brown, 1978 x, 304p:ill : 22cm - (series in continuing education for nurses). Bibliography: p291 ISBN 0-316-92800-3 1. Neurological nursing - cases, clinical reports I Winter, Joan P, joint author. II Title. III Series.
RC350.5.W43	610.73'68 78-61620
Library of congress	78

Figure 6.1: Example of a bibliographic record  
(Taylor, 1985, p25)

The Transvaal Educational Department publishes a media guide five times a year. This is a catalogue of books, periodicals and audiovisual software recommended for primary and high school media centres. Books and audiovisual materials suitable for preschools are indicated by the letters "p.p." preceding the catalogue number. Non-fiction is catalogued according to the Dewey Decimal system. Audiovisual aids are grouped according to format and subject and there is an alphabetical subject index linked to a computerised database (Transvaal Education Media Service, 1992).

Media, other than books, are also catalogued. The South African National film library issues an annual catalogue of videos that can be borrowed by schools. Items are catalogued according to subject, discipline, programme titles and target audience. Information is also provided on content in the form

of a synopsis (National Film Library, 1992). This is summarised in Table 6.1, which lists the films and videos on animal topics, suggested for preschools.

**Table 6.1: Summary of animal topics in videos supplied by the National Film Library Catalogue (1992) for use in preschools**

Titles	Languages	Animal content
The cat and the collector	English, Afrikaans	The collector makes a plan to save the birds from the cat
Preprimary programmes Vol 1	English, Afrikaans, Zulu, Sotho	Animal Land, The circus, The country vet, Animal homes, The ways animals move, The ways animals eat
The mole series (24 titles)	Non-verbal - suitable for all languages	Animated programmes with a mole as central character. These programmes illustrate simple social messages

### 6.3 Classifying children's books

Collections in libraries or media centres are arranged according to a system referred to as classification. This facilitates formal, orderly, access to the books, documents or films by the user (Burger & Van der Merwe, 1990; Maltby, 1978). One of the earliest systems was the one known as *Pinakes* (Greek for "tablets") compiled for the great Alexandrine library by the poet Callimachus in the third century BC. Although this catalogue did not survive, it is known that it classified the entries into at least ten (and possibly more) main classes, subdivided alphabetically by author (Taylor, 1985). A similar classification is broadly followed today in smaller libraries such as those found in preschools.

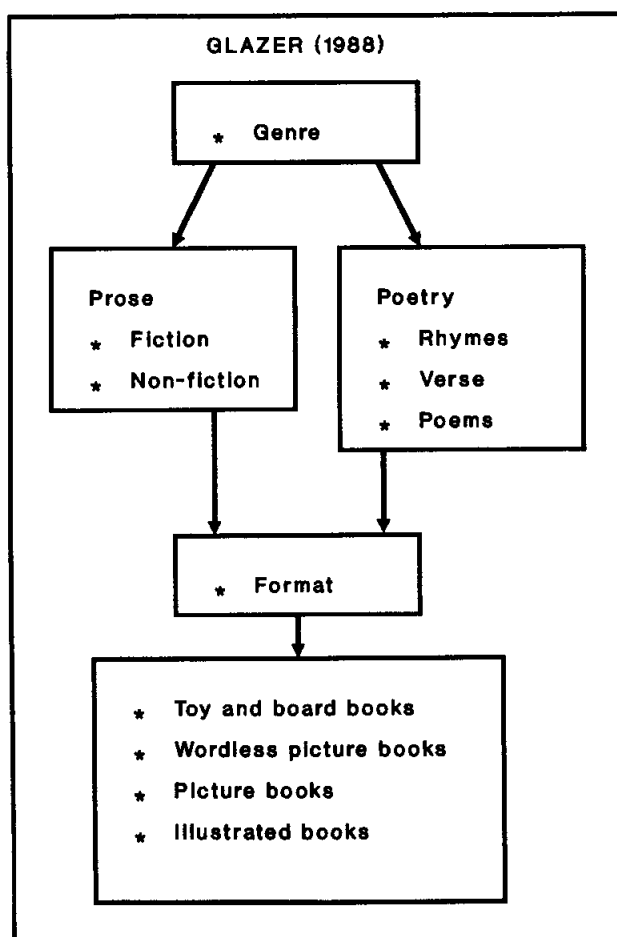
In larger libraries the Dewey decimal system is used for non-fiction, while fiction is usually grouped by author (Tiedt, 1979). It has no subdivision for children's literature and could not therefore be used for preschool children's books.

Form classes classify works according to their form of presentation eg Fiction, Drama, Poetry. The Library of

Congress (LC) utilises letter and number combinations for subject grouping, with classes and sub-classes. It issued a special service for children's cataloguers in 1965 (PZ). This, however, was subsequently abandoned (Taylor, 1985).

In South Africa the International Standard Book Number (ISBN) system, also a numerical classification system based on subject, is often used (Strydom, 1991).

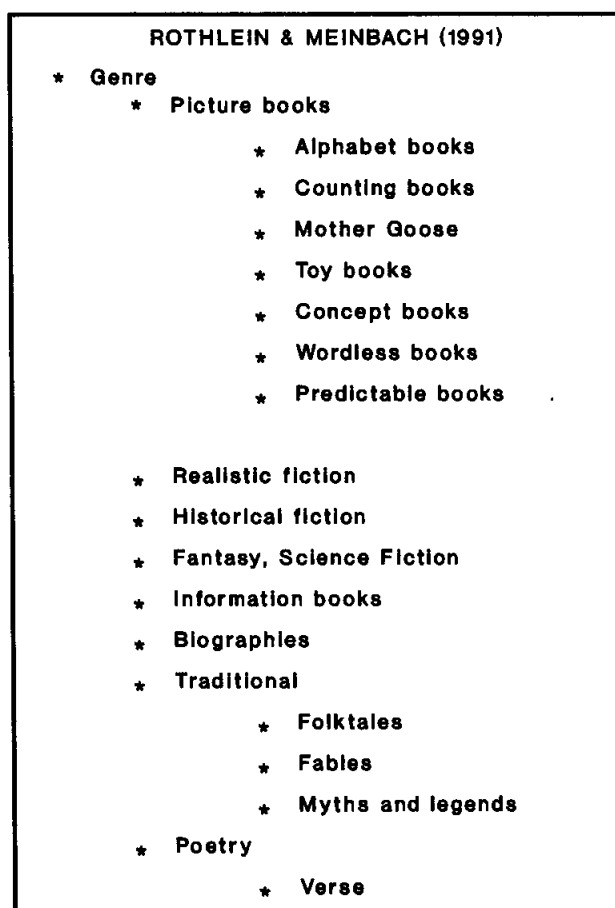
It might be seen from the above that there is no specific classification method used for books for young children. A visit to three public libraries in Pretoria confirmed this. The books for young children were haphazardly arranged on the shelves.



**Figure 6.2: Classification of children's books according to Glazer (1986)**

Glazer (1986) classified books for young children on the basis of format and genre and then subdivided them further (Fig 6.2). She defined format as the general make-up of a book - its size, shape, binding, illustrations, cover, paper, typography and spacing. While format referred basically to the physical qualities of a book, genre referred to the content. This was either poetry or prose. Prose was further divided into fiction and non-fiction, with subdivisions under each heading.

Rothlein and Meinbach (1991), in their classification of children's books, ignored the format of the book and classified directly into genre (Fig 6.3).



**Figure 6.3: Classification of children's books (Rothlein and Meinbach 1991)**

According to their classification, picture books were listed as a genre. So were fiction and fantasy. They specifically mentioned the difficulty this caused as a book could, for example, be a picture book and at the same time fantasy. Each genre was then subclassified.

This classification was considerably more confusing than that of Glazer (1986), as the subgroups overlapped. Books were further classified and simultaneously evaluated in terms of elements. Elements were defined by Rothlein and Meinbach (1991) as characterisation, plot, setting, theme and point of view.

The multiplicity of classification systems is confusing. Particularly if the aim is not to arrange books systematically on library shelves or computerised files, but to group books with similar content for further evaluation.

#### **6.4 Evaluating books in the preschool**

As mentioned previously there are various goals in the teaching of children and the holistic approach is important. Books may be an invaluable aid to the thematic approach to the curriculum and essential to promote reading (Rothlein & Meinbach, 1991). Glazer (1986) suggested that books should be used to support children's language, intellectual, personality, social, moral and creative development. Preschool teachers also need informational books that could be used as resource material (Van der Merwe, 1988c). Evaluation of books with regard to these goals would therefore be desirable.

It must be understood that in the preschool child, the positive effects of books requires the presence of a mediator as the child is preliterate (Tiedt, 1979). The mediator may be someone who reads to the child, or displays the pictures in a book to illustrate a theme or story (Glazer, 1986; Rothlein & Meinbach, 1991). This may be regarded as a form of MLE (Wiechers, 1991).

Tiedt (1979), Glazer (1986) as well as Rothlein and Meinbach (1991) have discussed in detail the criteria that should be used by the mediator (teacher or parent) in choosing "suitable" books for young children. These are summarised in Figure 6.4a, b and c.

Another method of evaluation is that for the elimination of racism and sexism. The Working Group Against Racism in Children's Resources (undated booklet) has listed the following guidelines for evaluating children's resources. The book, chart or toy is judged as follows:

- Does it make every child feel good about themselves, reinforcing self-esteem and identity?
- Does it extend the child's repertoire of experiences and knowledge of other cultures?
- Does it extend the child's emotional growth by challenging stereotypes and assumptions - racist, sexist, as well as related to gender and disability?
- Is it fun and inviting?
- Are representations of people accurate and realistic, so that children are able to explore differences and diversity in a positive way?
- Is the material safe, durable, easily cleaned and good value for money?



**TIEDT (1979)**

Selection criteria for books for young children:

- Illustrations: good art and must fit the story
- Size of book: suitable for child to hold
- Print: Easy to read and well placed on page
- Characters: must be believable and realistic
- Language: natural and interesting
- Story or information: must be worth reading
- Content must:
  - interest young children
  - present original ideas
  - be comprehensible
  - include appropriate emotions
  - not be sentimental
- Style: vivid imagery, exciting vocabulary/ appropriate idiom

**Figure 6.4a: Criteria for the evaluation of children's books according to Tiedt (1979)**

**GLAZER (1986)**

<p><b>Fiction:</b></p> <ul style="list-style-type: none"> <li>- Plot</li> <li>- Setting</li> <li>- Characterisation</li> <li>- Theme</li> <li>- Style</li> </ul> <p><b>Poetry:</b></p> <ul style="list-style-type: none"> <li>- Rhyme must make sense</li> <li>- Imagery must make sense</li> </ul>	<p><b>Non-fiction:</b></p> <ul style="list-style-type: none"> <li>- Factual accuracy</li> <li>- Much still to be learned</li> <li>- Differentiate facts from opinions</li> <li>- Not anthropomorphic</li> <li>- Not theological</li> </ul> <p><b>Illustrations:</b></p> <ul style="list-style-type: none"> <li>- Close to text they depict</li> <li>- Match action in text</li> <li>- Match text description</li> <li>- Appropriate to mood</li> <li>- Factual accuracy</li> </ul>
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**Figure 6.4b: Evaluation according to Glazer (1986)**

**ROTHLEIN & MENBACH (1991)**

Each Genre has its own set of criteria for evaluation. An example of criteria for non-fiction books for children is presented below.

**LITERARY LOG**

TITLE:  
AUTHOR:  
GENRE: Non-fiction  
CRITERIA:

<ul style="list-style-type: none"> <li>- Is accurate information presented?</li> <li>- Is information up to date?</li> <li>- Are the most relevant and significant facts being presented?</li> <li>- Does the book reflect the work of an author qualified to write on the subject being presented?</li> <li>- Is the book stereotypic of race, ethnicity or sex?</li> <li>- Does the book differentiate between fact and theory?</li> <li>- Are different points of view and controversial subjects presented?</li> <li>- Does the book encourage the reader to become involved by collecting data, observing and experimenting?</li> <li>- Are the illustrations accurate and useful?</li> <li>- Is the reader encouraged to pursue the idea further?</li> <li>- Is the text written in an interesting, straight-forward and compelling style?</li> </ul>	<p>SCORE</p> <div style="border: 1px solid black; width: 60px; height: 100px; margin: 0 auto;"></div>
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TOTAL:  
Scoring for each of these evaluation criteria are as follows:  
5 = Outstanding    4 = Good    3 = Fair    2 = Needs improvement    1 = Waste of time

**Figure 6.4c: Evaluation according to Rothlein & Meinbach (1991)**

Unfortunately, all the above evaluations were based quite extensively on the criteria for American or British children's books.

It was noticed that the principle of progressing from simple to complex, from present to the unfamiliar and from concrete to abstract, was not listed as a criterium by any of these authors, although Grobler et al (1992) regard it as a basic precept of preschool education.

In South Africa the preschool curriculum has both long and short term aims. The long term aim is the total development of the child in preparation for adulthood. The short term aims are the perceptual-motor, affective and cognitive development of the child (Grobler et al, 1990). These aims should be taken into account when setting criteria for the evaluation of books, puzzles, games or films suitable for the South African preschool child. The stage of development of the child is also crucial.

## 6.5 **Animals in literature and other media**

Books, toys, puzzles and charts depicting animals should be used at preschools as teaching aids (Flemming et al, 1977). Glazer (1986) found that primary school children enjoy stories about personified animals, nature, children their age or slightly older and about daily life and familiar experiences.

Cusack (1988) suggested that children identified with the animals they found in fairy tales and in this way worked out many of the psychological problems associated with growth and maturation. However preschool teachers often prefer not to use fairy tales, because of the adverse effects on young children (Pullin, 1993 - personal communication). Tanchel has mentioned a child afraid of melting in the sun after hearing the story of "Little Black Sambo", where the tiger melts into butter. The wolves mentioned in the stories *Little Red Riding*

*Hood* and *The three little pigs* also induced nightmares and fearfulness in certain children (Tanchel, 1993 - personal communication).

Van der Castle (1983) analyzed the dreams of 437 children and found that more than 60% of the dreams of four year olds involved animals, in contrast to only 9% of the dreams of teenagers. Pitcher and Prelinger (1963) asked 137 preschool children to tell a story. They found that 44,7% spoke about people, 34,3% spoke about animals and 20,93% about objects.

Rothlein and Meinbach (1991) explored the affective response to literature in terms of Bloom's taxonomy of educational objectives. An example involving animals was *Charlotte's web* (White, 1952). This is a story about a spider that did her utmost to save a pig from being slaughtered by spinning words into her web. The attitude or value being reflected was the triumph of selfless friendship. The unlikelihood of a spider ever communicating with a pig or being able to spin words into her web, was not germane to the purpose of the story.

A distinction has, however, to be drawn between reality and fantasy. Advantages in the affective domain should be weighed up against the disadvantage of people misunderstanding normal behaviour patterns of wild and domestic animals. Jane Tate (1983) ascribed problems in the interaction between people and wild bears in America to the image of bears as friendly, cuddly animals as a result of stories about teddy bears.

Le Roux et al (1989) postulated that misinformation about companion animal behaviour in Afrikaans children's books could be one cause of dog bites involving children. In conjunction with Odendaal and Steyn (1989), a thorough text analysis of 120 books for children aged 8-12 years was undertaken. Afrikaans books, in the subject category Animals,

were analyzed on the basis of whether animal behaviour was realistically and correctly described, or grossly idealised or humanised. It was found that in 46% of books about animals, the behaviour shown was normal, in 37% it was idealised and in 17% it was anthropomorphic.

Particularly in religious and traditional literature the animal takes on a symbolic meaning. In the Bible, for instance, we think of the animals that went two by two into the ark (Genesis 7: 8) and the wise ass of Balaam (Numbers 22: 28). Bible stories involving animals are found in books for young children (Flemming et al, 1977). Sometimes animals are even inserted into children's stories in situations where the Bible does not record the presence of animals, for instance, near the manger in Bethlehem (Luke 2: 16).

Aesop was, according to legend, a slave who lived in sixth century Greece. His fables are an example of traditional literature where animals were used in stories which had moral value for children (affective domain) (Rothlein & Meinbach, 1991). The tortoise, for example, in the story of the tortoise and the hare, is symbolic of the type of person who is persistent enough to triumph in the end, despite his shortcomings.

South Africa also has writers that focus on traditional stories from this sub-continent. Pieter W Grobbelaar, for example, has written several books on this theme. In the *Ou Mi'Kai vertel* series, he tells how Table Mountain's cloud cover is really a white "karos", and how the milky way got its fire (Pienaar, 1969).

## 6.6 Summation

It was found that the international classification systems (Dewey, LC and ISBN) based on subject and form, were too broad in scope and did not classify children's literature

separately. The classifications of Glazer (1986) as well as Rothlein and Meinbach (1991) overlapped to some extent and did not classify books according to subject, although they did mention this in the evaluation of books. The system followed by Le Roux et al (1989) was excellent, but concentrated more on the behavioural aspects of animals as subject matter. It did not sufficiently differentiate between animals which behaved naturally, but were endowed with human speech or feelings (eg "Woof, I like this bone", said the puppy to its mother) and those such as Mickey Mouse that are anthropomorphic creatures with entirely human characteristics.

A system for children's books would therefore have to be evolved that combined the best aspects of each classification system discussed in this chapter. No system could be found which classified toys and games and a system should therefore also be evolved for these.

The evaluation of children's books, as opposed to merely classifying them, has also been discussed. It was sometimes difficult to differentiate between what the authors regard as evaluation and censorship. The Working Group Against Racism in Children's Books (undated booklet), recommended "elimination" of certain kinds of literature. This is a rather extreme view. Le Roux et al (1989) were more democratic in their approach, but also suggested that books in which animal behaviour was not realistically portrayed were not suitable for young children. Both of these methods were very negative. The approach of Rothlein and Meinbach (1991) was more positive in that certain books were recommended.

It was strongly felt that the role of the veterinarian should not be a prescriptive one. That is, that certain books should be recommended for children rather than suggesting that other books were unsuitable. Books should be praised on the grounds that they promoted humane treatment of animals, informed children of animal behaviour and ecology, established

good human-animal interactions and prevented the negative effects of such interactions (eg dog bites or zoonotic diseases). Animal protagonists could also be used to attract a child's interest so that a particular point could be made which might have nothing to do with animals (as was described in regard to the book *Charlotte's Web*).

The literature pertaining to the overlap between the veterinarian, the preschool child and the animal has been reviewed in the previous chapters. The next chapter will deal with specific methods developed and used to further investigate and evaluate the problems identified during this literature review.

## **CHAPTER 7**

### **METHODS USED TO STUDY THE INTERFACES BETWEEN PRESCHOOL CHILDREN, ANIMALS AND VETERINARIANS**

#### **7.1 Introduction**

This study used observational research methods in order to fill the gaps in knowledge about the interfaces between the preschool child, animals and the veterinarian which had been identified. The findings were then analysed qualitatively or quantitatively, depending on the nature of the data obtained.

According to Williamson et al (1977), the process of discovery in observational research is an inductive process. That is, an approach in which the acquisition of knowledge or the process of research works outwards from the acquisition of data to the development of theoretical models. Both quantitative and qualitative observational methods were therefore used to suggest models which were then evaluated.

#### **7.2 Aim of the investigation**

The aim of this investigation was to obtain a holistic view of the role which could be played by the veterinarian in the education and health of the preschool child. In order to do this, comparisons were drawn between preschools in high and low income areas around Pretoria.

#### **7.3 Populations and samples**

Two populations were selected as representative of preschool education in South Africa. The populations were divided on the basis of geographic location into those catering for children from high income (advantaged) and low income

(disadvantaged) groups. This division between the two populations followed through to the resources available to preschools for the provision of teaching facilities and the type of animal contacts children were likely to encounter in the two different areas.

As the communication infrastructure (language and comprehension barriers, presence or absence of telephones, roads and transport) in these areas differed, different methods were used to obtain samples. These are given in more detail in each subsection discussed below.

#### **7.4 Procedures, methods and statistics**

There are several basic statistical methods and measures which can be used to display and summarise data. Which of them is used, depends on whether the data obtained is discrete (categorical) or continuous (numerical).

Discrete data are those that can be allocated to distinct categories. Continuous data consist primarily of measurements which have the theoretical possibility of being infinitely divisible. Both categorical and numerical data may be summarised using tables and graphs, or univariate statistical analyses. For categorical data the proportions belonging to each category are usually of interest and are depicted in the form of pie diagrams and bar charts. In the case of numerical data the use of means, frequency tables and histograms are preferable. It should be noted that the numerical data may also be categorised, either as a value or a class interval (Schoeman, 1991).

More statistical information may be gathered by investigating the scatter of values obtained. Ways to determine this scatter, or distribution, of values, include range and standard deviation which are calculated for a particular set of data (Bomstedt & Knoke, 1988).



Selection of data for a study is based on a technique known as sampling. The sample fraction is the number of units sampled. Ideally it should comprise the entire population, however, this is rarely feasible and therefore a random sample (using randomly generated numbers) is taken, which is representative of the population.

A statistical relationship between the occurrence (frequency) of two variables in a population can be shown as the probability that a difference (or lack of difference) between them was due only to chance. This is known as a level of significance. Conventionally, a statistical difference is represented by a probability of less than 5% ( $p < 0,05$ ) that the difference (or lack of difference) found were due to chance alone. If more certainty is required, a probability of 1% ( $p < 0,01$ ) or 0,1% ( $p < 0,001$ ) may be required. The choice of a suitable test for probability testing depends on the frequency distribution and sample size. In this study, two methods of probability testing were used. They were the students t-test and 2 x 2 contingency tables ( $X^2$ ) (Schoeman, 1991).

The students t-test was used to test two samples from different populations where there was a hypothesis that the data came from normal distributions with a known difference between population means and a common unknown variance. Two by two contingency tables were used where four possibilities resulted from an association between 2 variables. Proportions (percentages) or relative frequencies were used, as this is mathematically more correct than using actual numbers (absolute frequencies). All data processing was done with the assistance of a statistician, using a 286 computer and statistical software. Yates corrected and Fisher exact methods were used, depending on the type of data.

Qualitative research methodology does not use statistical data analysis. The techniques used in this study were participant

observation, where observations were recorded by teachers participating in the study and field observations including informal (unstructured) interviews. Ranking may be used to summarise and display the results of qualitative research. These methods are described by Marshall and Rossman (1989) and Walker (1988) and, although unusual in the veterinary sciences, are well-accepted methods of research used in the social sciences and humanities.

The methods used in the different sections (Chapters 8 to 14), have been given in further detail below.

#### **7.4.1 The opinion of teachers on the use of animals in preschool education**

Although the literature surveyed indicated that the presence of animals in schools was recommended and it has been established by other authors that child-animal interactions may be beneficial, the extent of this in preschools has not been described. In order for the role of the veterinarian in preschool education to be validated, the role played by animals in the preschool was investigated using three phases.

The first was a structured telephone interview carried out with preschools in advantaged areas ( $n = 50$ ). The second was a similar series of questions put to teachers from preschools in disadvantaged areas ( $n = 125$ ), and the third was a ten year retrospective study of the veterinary records of a private practice. The results are reported in Chapter 8.

##### **7.4.1.1 Survey of preschools in advantaged areas**

A questionnaire (Fig 7.1) was compiled in 1987 and an alphabetical list of all the preschools within the Pretoria Municipal Boundaries ( $n = 67$ ) was obtained from the vice-chairman of the South African Association for Early Childhood Educare (SAAECE). The questions were directed at preschool

teachers as the responsibility for feeding and caring for the animals at a preschool falls on the teaching staff. They were also in close daily contact with the children and animals and were therefore in a position to judge the value of interaction between these children and the animals at the school.

The most senior teacher on the staff was asked to answer on behalf of each school and time was permitted for consultation with other staff members in order to obtain consensus of the opinions at each particular school. These fifty schools constituted approximately 75% of preschools in Pretoria (n = 67).

1.	Name and location of preschool
2.	Name and position of respondent
3.	Number of pupils, language spoken
4.	Total number of teachers
5.	Number of qualified teachers (HED(Preprim) or similar)
6.	Do you use animals/insects for themes/projects?
7.	Does the preschool visit the zoo?
8.	Do you keep animals permanently on the premises at preschool?
9.	Would you like to keep animals permanently but are unable to?
10.	What are the reasons for not keeping animals at preschool?
11.	What type of animals do you keep at your school?
12.	Who looks after the animals at the preschool:
	- during the term?
13.	- during the holidays?
14.	Do you use a duty roster for this?
15.	Who pays for the animals' food, veterinary attention?
16.	In your opinion, contact with animals has:
	- social value for pupils (agree/disagree)
	- educational value for pupils (agree/disagree)
	- psychological value for pupils (agree/disagree)
17.	How many times, during the last five years, according to school records, has an animal:
	- caused allergy in a pupil?
	- caused disease in a pupil?
	- been injured or killed by a pupil?

**Figure 7.1: Questions for structured interviews with teachers at schools in advantaged areas**

#### **7.4.1.2 Preschools in disadvantaged areas**

SAAECE was involved in seminars for the training of qualified and unqualified teachers and educare workers at preschools for disadvantaged children outside the municipal boundaries of Pretoria. A questionnaire, using simplified language, was therefore used at a workshop held for these teachers in 1987. The language used was simplified as English was a second language for respondents. Questions used were questions 1 to 11 and 16, as the analysis of data indicated that the preschools in this group did not keep animals permanently at preschools and questions 12 to 15 were unanswered. Questionnaires were handed out to the participants prior to a lecture on the use of animals in the preschool. The questions were read out and time given for answers to be written in, as English was a second language for many of the participants. The questionnaires were then collected immediately before the lecture. Questionnaires were grouped according to school ( $n = 125$ ), as there was in some cases more than one teacher present from each.

As they were incorrectly filled in, 19 questionnaires were discarded. Further analysis was performed on data from teachers from preschools and creches in Mamelodi, Soshanguve, Atteridgeville, Mabopane, Hammanskraal, Ga-Rankuwa, Temba, Pankop, Daspoort, De Wildt, Laudium and Eersterust ( $n = 106$ ). The participants represented all the schools which were then in existence in the area, to the knowledge of SAAECE.

#### **7.4.1.3 Retrospective study of practice records**

Eastern Suburbs Nursery School (ESNS) and Brooklyn Park Nursery School (BPNS), two of the preschools in the advantaged group, made exclusive use of the services of a veterinary practice in the eastern suburbs of Pretoria. Both

preschools kept animals permanently on the premises. Brooklyn Veterinary Clinic is located in the Eastern Suburbs of Pretoria, close to two of the preschools documented during the survey. In 1980 the practice used record cards for all clients, including both preschools. In 1982 the records were computerised, using a data-base programme (VET-DOC) which allowed the recording of diagnoses and treatments. In 1990 the cards and computer records of the practice were retrospectively examined for diagnoses and treatment of animals kept at the two preschools during this period. The results of this retrospective survey (Thrusfield, 1988) of practice records are presented in Chapter 8, Table 8.6.

#### **7.4.2 Survey of the paediatric disease profiles in two communities at different socio-economic levels**

Zoonotic diseases may be one of the negative effects of interactions between preschool children and animals. The prevalence of zoonotic disease and the likelihood that it would affect preschool children could not be deduced from the survey of the literature reported in Chapters 3 and 4.

The two populations mentioned in Section 7.2 were therefore surveyed for evidence of zoonotic diseases by examining available paediatric disease profiles. This was, therefore, a retrospective survey.

Retrospective surveys have the advantage of a higher sensitivity than more specific methods such as isolation and typing of disease organisms, as there are far fewer false negative diagnoses (Kustner, 1980). According to Venter (1992), a descriptive study of retrospective data on disease is one method which may be used to estimate the frequency of occurrence of disease in a population. It is known as proportional morbidity and is measured as the number of cases of the specified disease as a proportion of the total number of diseased persons in a particular population.

Proportional morbidity was calculated as:

$$\textit{Proportional morbidity} = \frac{\textit{Number of cases of specified disease}}{\textit{Total number of diseased persons}}$$

#### **7.4.2.1 Patients from high income communities**

High income medical patients in South Africa were encouraged to visit private practices rather than state-subsidised hospitals. The records of a private practice in the eastern suburbs of Pretoria (a high income area in which several of the preschools surveyed were situated) were therefore selected for retrospective analysis over a six month period. This practice served a portion of the community described under Section 7.1.1. The survey included 2386 patients, of whom 1192 were children. As no computerised data-base was available, diagnoses were recorded from the day-book of the practice. Further records were unavailable due to the confidentiality required of medical practitioners and the ages of the patients could therefore not be recorded.

#### **7.4.2.2 Patients from low-income communities**

The low income areas described in Section 7.4.1 included Mamelodi, Soshanguve, Atteridgeville, Mabopane, Hammanskraal, Ga-Rankuwa, Pankop, Daspoort, De Wildt, Laudium and Eersterust. A majority of these areas were served by the hospital at Ga-Rankuwa.

**Table 7.1: Zoonoses and possible zoonoses for which there are codes in the British Paediatric Association Classification of Diseases (1979)**

Abnormal Tuberculin test	Histoplasmosis
Acariasis	Infection:
Anchylostomiasis	Actinomycotic
Arthropathy in helminthiasis	Listeria
Arthropathy in mycosis	Tetanus
Arthropathy in Salmonellosis	Nocardia
Arthropathy in Brucellosis	Scabies
Aspergillosis	Staphylococcal
	Streptococcal
Bacteraemia	Yersinia pestis
Bite flea	Infestation:
Bite dog	Flea
Botulism	Toxocara
Brucellosis	
Bubonocoele	Larva migrans:
	Visceral
Canicola fever	Cutaneous
Cestodiasis	Leptospirosis
Cysticercosis	
Chaga's disease	Maduro foot
Coccidiomycosis	Meningoencephalitis (Toxoplasma)
Coccidiosis	Mycobacterium (atypical)
Cryptococcosis	Myiasis
Cyst hydatid	Myositis: clostridial
Dermatomycosis	NAD (no abnormality seen)
Dermatophytosis	
Diarrhoea:	Oesophogostomiasis
E coli	Ornithosis
Salmonella	
Staphylococcal	Pigeon fanciers disease
	Pneumonia in:
Disease foot and mouth	Anthrax
Disease rickettsial	Aspergillosis
Disease Weil's	Tularaemia
Echinococcosis	Q fever
Encephalitis equine	
Encephalitis rabies	Rabies
Erysipelas	Ringworm
	Salmonellosis
Farmer's lung	Shigellosis specified
Fascioliasis	Sporotrichosis
Fever:	
Cat scratch	Taeniasis
Congo haemorrhagic	Toxocariasis
Lassa	Toxoplasmosis:
Monkey B	Acquired
Rift Valley	Congenital
Undulant	

The Department of Paediatrics and Child Health at the Medical University of Southern Africa (Medunsa) kept a computerised data-base of children brought to the Ga-Rankuwa hospital for treatment. Cases were referred to the hospital from outlying clinics as well as being admitted from the casualty and outpatients section of the hospital.

The British Paediatric Association (1979) codes were used in the data-base in an attempt to ascertain the relative morbidity of zoonoses diagnosed during the two twelve month periods from 1989.01.01 to 1989.12.31 and 1990.05.08 to 1991.05.08. The British Paediatric Association Code (1979) did not list zoonotic diseases separately. Those diseases which could be zoonoses were therefore listed in Table 7.1.

Disease profiles from 4536 patients aged between 0 and 144 months, were analysed. The results are reported in Chapter 9 in Table 9.1.

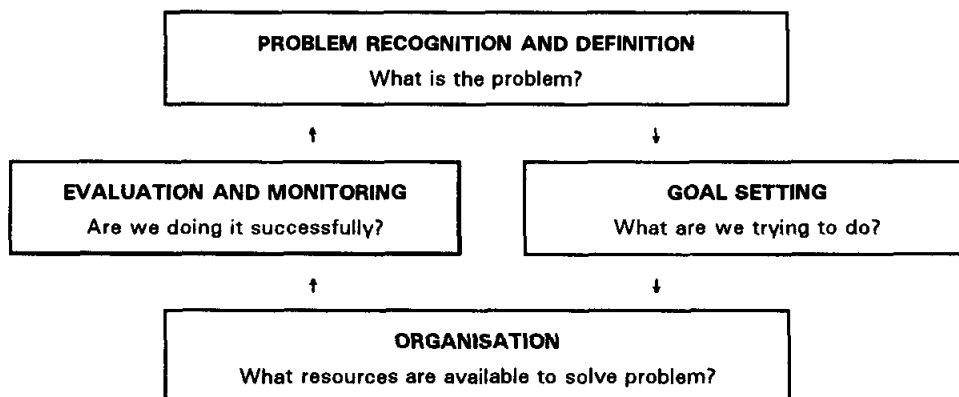
#### **7.4.3 The primary health care approach to an outbreak of zoonotic disease (cutaneous larva migrans) in a preschool**

Cooper (1985) stressed that there was a need for close cooperation between the medical and veterinary professions, particularly in tropical countries, to address the problems of public health, nutrition and disease prevention in developing communities.

During the survey of paediatric patients at Ga-Rankuwa hospital, medical students working in the community of Pieterskraal reported seeing 8 cases of cutaneous larva migrans, during April 1991, in children attending a preschool in this area. Pieterskraal is a small rural community, approximately 120km north-west of Medunsa. The inhabitants speak mainly Ndebele. It was felt that primary health care principles, as described by Morley and Lovel (1986) could be used effectively for preventing and controlling zoonotic diseases in



preschools, particularly those in low-income or disadvantaged areas (Fig 7.2).



**Figure 7.2: Using primary health care principles (from Morley & Lovel, 1986, p3)**

The methodology for interventions at primary health care level is problem-based. Resources are limited at primary level, cases which need treatment are referred to clinics (secondary health care) and hospitals (tertiary health care) where resources are centred. It is necessary, therefore, to include goal-setting and organisation as a part of primary health care. The success of the intervention or prevention which is aimed at decreasing the level of disease, must also be monitored, and this leads to the third phase of the cycle. The approach is shown in graphic form in Figure 7.2. The headings in this figure will be used to report the findings (Chapter 10) of the case report.

#### **7.4.4 An evaluation of the management of animals in five pre-schools**

Most of the information available on the care, management and housing of animals is directed at the health professional or hobbyist. Before information suitable for use in the pre-school could be developed, more data was needed on the

choice of species and actual management and housing needs for animals kept at preschool.

The choice of animal species and management system for a preschool involves both staff and the management committee in decision-making. In order to discover which factors were important to the decisions, the reasons for species selection and the perceptions regarding cost, were examined. Preschool teachers (n = 100) were therefore informally interviewed using open ended questions, in order to list the reasons for choosing or not choosing a particular species of animal for a preschool.

The qualitative method of participant observation, as described by Marshall and Rossman (1989) and Walker (1988), was used to evaluate the design of animal housing by visiting preschools (n = 5).

* Overcrowding coefficient > 1	
* Adequate shelter from heat and cold	
* Adequate ventilation	
* Adequate drainage	
* Environmental enrichment present	
* Ethology considered	
* Security sufficient	
* Easily managed	
* Impervious floors and walls	
* Adequate nutrition for species	
* Regular feeding and watering schedule	
* Feed and water easily accessible to animals and staff	
* Adequate bedding/nesting materials	
* Adequate hygiene/disease prevention present	
* Strategic location in play area	
* Child-animal interaction under supervision	
* Veterinary care available	

**Figure 7.3: Checklist for evaluating the housing and management of animals at preschools**

From the review of the literature regarding the aims of preschool education, the prevention of zoonotic diseases and the requirements for care and housing of animals, a checklist was drawn up (Fig 7.3). The observed caging and management systems at the preschools were scored against those suggested by a review of the literature by using the checklist shown in Figure 7.3.

Evaluation of whether the ethology and well-being of the animals was considered by the preschools was decided on the basis of the checklist suggested by Odendaal (1994) (Fig 7.4).

The results of this evaluation of the housing and management of animals kept at preschools are reported in Chapter 11.

<b>1.</b>	<b>Are the basic animal needs addressed? (where applicable)</b>
1.1	Epimeletic behaviour
1.2	Etepimeletic behaviour
1.3	Ingestion behaviour
1.4	Excretory behaviour
1.5	Comfort-seeking behaviour
1.6	Investigatory behaviour
1.7	Relaxational behaviour
1.8	Allelomimetic behaviour
1.9	Sexual behaviour
1.10	Agnostic behaviour
1.11	Developmental needs
1.12	Social needs
1.13	Specific physiological needs
<b>2.</b>	<b>Are the adaptation capabilities considered?</b>
2.1	Absence of disease and trauma
2.2	Absence of abnormal behavioural patterns
2.3	Absence of unacceptable stress levels
2.4	Optimum performance, production, reproduction
<b>3</b>	<b>Are the environmental factors evaluated?</b>
3.1	Housing and other keeping spaces
3.2	Nutrition
3.3	Handling facilities
<b>4.</b>	<b>Are humans consulted about their influences?</b>
4.1	Breeding programs
4.2	Training and learning processes
4.3	Management and general care
4.4	Responsible animal ownership

**Figure 7.4: Ethological checklist for assessing animal welfare (Odendaal, 1994a, p273)**

In order to calculate whether overcrowding was present, an equation was developed using the recommended minimum floor area requirements listed in Table 5.2. The equation for minimum floor area is:

$$\frac{\sum_{j=1}^k n_j m_j}{A} \times \frac{100}{1}$$

where:

n = number of animals of a specified species and size

m = minimum specified floor area for that species and size  
in square centimetres

A = total floor area of cage in square centimetre

k = number of different groups in the cage

[Equation 7.1]

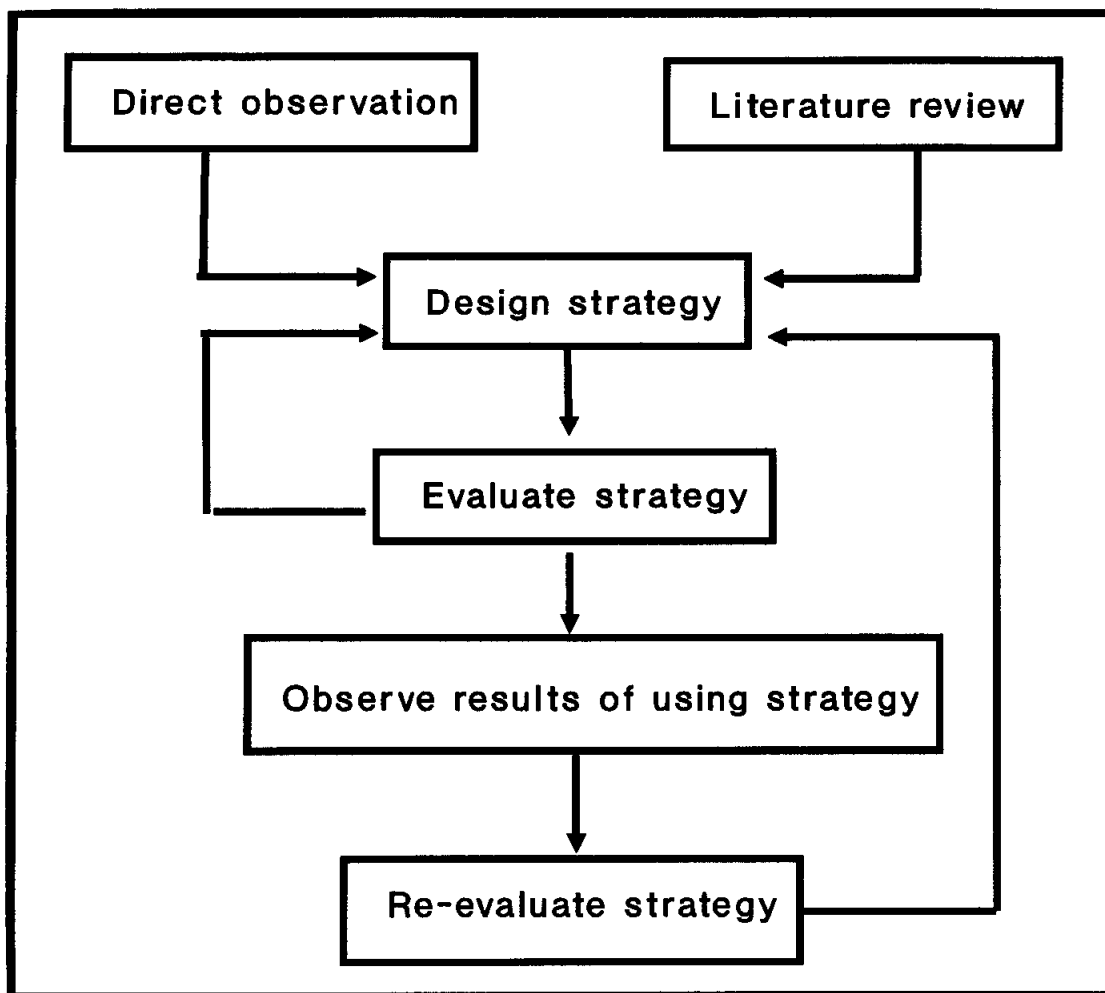
Teachers were questioned on their estimations of the cost of keeping different species and an average ranking score for each species was calculated (Schoeman, 1991). Ranking is a method used when categorical (discrete) data is tabulated in a frequency table. A discrete variable may be given a score which is equivalent to the perception of the respondent as to its importance. Teachers were asked to estimate the cost of keeping different species at school by scoring on a scale of 1-5, where 1 was very inexpensive and 5, expensive. The scores were averaged by adding all scores obtained and dividing by the number of participants. The average scores were then ranked from lowest to highest. This gave an indication of the perceptions of teachers with regard to which species were most and least expensive to keep permanently at preschools. The results are presented in Table 11.2.

#### 7.4.5

**An investigation of teacher attitudes and teaching strategies following the death and euthanasia of animals kept at preschool**

Teaching strategies suggested by teachers, for use in cases where animals at the preschool died or were euthanased, were

evaluated using participant observation (Marshall & Rossman, 1989). The teachers (n = 5) participating in the trial recorded their observations while teaching the children (n = 101) about life, death and grief following the euthanasia of a rabbit kept previously at the preschool. A diagram of the steps in the qualitative method of research used is given in Figure 7.5.



**Figure 7.5:** Diagram illustrating the proposed qualitative method of research used for the development and evaluation of a teaching strategy

After a review of the literature and direct observation (including structured interviews) of the effect of the death of a rabbit kept at each of two schools, a teaching strategy was designed. This was evaluated after the euthanasia of a rabbit at one of the schools. The two schools involved in this part of the study were drawn from the high income group described

in section 7.4.1. The results are reported in Chapter 12. The headings in this chapter follow those suggested in Figure 7.5. For comparison, drawings made by two children of preschool age following the euthanasia of a pet kept at home will be presented.

#### **7.4.6 A survey of animal topics in children's literature, games and toys at the preschool**

It was shown during the literature survey reported in Chapter 6 that the classification and evaluation systems for preschool literature were inadequate for the evaluation of animal topics. An analytical system was therefore developed in order to adequately reflect the presence and nature of animals in books and toys used at preschools. Using this system, a survey was conducted to discover to what extent animal topics were involved in books and toys used at three preschools in Pretoria. A comparison was drawn between preschools catering for children at a high socio-economic level (parents paying full fees, schools in a wealthy area) or those at a lower level (subsidised schools or day-care centres in developing areas). These areas corresponded to the high and low-income areas described in Section 7.4.1.

The type of books that preschool children preferred were investigated as teachers and parents chose the books that were in the libraries. The types of books chosen by adults as opposed to preschool children was contrasted so that the relative amount of books involving animals could be described for each group. The data obtained after surveying and evaluating books using the analysis system, were summarised and quantified. The unit of measurement was a single book, game or toy and statistical inferences were made according to the number (frequency) of books, games or toys in each category. The absolute and relative frequencies were recorded. Relative frequencies of books in each category were statistically compared for significance using probability testing.

For this the students t-test and 2 x 2 contingency tables were employed. The Fischer-exact and Yates corrected methods were used, depending on the type of data examined. The choice of which test to use was done with the assistance of a statistician from the HSRC (Human Sciences Research Council), subcontracted to the Medical University of Southern Africa.

Methods used to conduct the survey are discussed further below.

#### **7.4.6.1 High income group**

A purposive selection was made for an in-depth survey. Two preschools from the group described under Section 7.4.1 were selected. These were Eastern Suburbs and Brooklyn Park Nursery Schools, in the eastern suburbs of Pretoria (a high income community). They were chosen for the following reasons:

- both preschools employed only qualified teachers and had a reputation for a very high standard of preschool teaching;
- both preschools had been in existence for a considerable time (Eastern Suburbs was established in 1937 and Brooklyn Park in 1973) and so had amassed considerable libraries. Smaller and newer schools did not have sufficient books for statistical analysis;
- the staff at both preschools were actively involved in teaching associations and were up to date with their teaching methods; and
- both preschools followed the traditional (see Fig 1.5) preschool curriculum which predominates in South African preschools.

From the above it could be assumed that the libraries at these two schools were representative of the "ideal" preschool library for schools according to the following criteria:

- sufficient books to meet all the needs of staff and children;
- books chosen by qualified staff to meet the perceived needs, according to current educational theory, of preschool children and teachers; and
- finance was not a limiting factor.

#### **7.4.6.2 Low income group**

The low income preschools described under Section 7.4.2 did not have libraries of books. For purposes of comparison, therefore, the Resource Centre (renamed the Boitumelo Early Learning Centre in 1994 and affiliated to the South African Congress of Early Learning Centres) was chosen as representing preschools serving low income communities. This was a centre established in 1989 by the Northern Transvaal Association for Early Childhood Educare. It was designed to fill a perceived need for teacher training in the non-formal sector for creches and preschools in developing areas and was available to the low-income preschools surveyed. The Resource Centre organised courses and workshops for teachers and also provided resources in the way of materials, picture, toys and books for preschools which did not have the financial resources to provide their own. It was selected for the following reasons:

- not more than one or two books per preschool were found at preschools and day care centres in low-income areas. This was insufficient for analysis



- the Resource Centre provided eight different "book bags", each containing between 16 and 20 books, to preschools in low income areas on a loan basis
- the books were donated by various charitable organisations for this purpose.

Creches Care, which was involved in visiting preschools in low income areas, including some of those surveyed, was also investigated. It was initiated in 1988 in Botshabelo, in the Orange Free State, and at the time of investigation, comprised six buses which were rebuilt as mobile creches. These mobile units visited 180 preschools in low socio-economic areas throughout South Africa. Each of these buses incorporated two bookshelves. The use of these books by teachers and children at the preschools was investigated.

Five preschools in low income semi-rural areas of the Odi District in Bophuthatswana (made part of the North-West Province in 1994) were specifically investigated with reference to the types and numbers of books used by teachers and pupils.

The results of the comparison and the types of books chosen by children are presented in Chapter 13.

#### **7.4.7 Teacher mediated learning and an evaluation of preschool excursions which involved child-animal interactions**

Teacher mediated learning was described in the literature review presented in Chapter 2. After investigating the nature of the human-animal interactions which could contribute to preschool education, it is suggested that this could be applied to animal facilities visited during preschool excursions. During the survey reported in Chapter 8 it was recorded that a majority of schools in both high and low income areas visited the zoo. It was also found that preschool excursions were

made to urban farms and the Society for the Prevention of Cruelty to Animals in Pretoria. Positive child-animal interactions will not, however occur if the facility visited is not ideal.

Two methods were therefore employed in order to study this situation. Firstly, the teaching strategy was suggested and evaluated using the method described in Figure 7.5. Secondly, the facilities were visited and evaluated in the same way as animal housing and management were observed and evaluated (see section 7.4.4) using participant observation (Marshall & Rossman, 1989; Walker, 1988). In order to do this a checklist was developed.

The results are reported in Chapter 14.

## CHAPTER 8

### SURVEY OF CHILD-ANIMAL INTERACTIONS IN PRESCHOOLS

#### 8.1 Introduction

It may be seen from the previous chapters that, although much has been written on child-animal interactions, there is little quantifiable knowledge with regard to the use of animals in preschools and the role of the veterinarian.

#### 8.2 Results

Following the use of a questionnaire used with teachers from preschools located in high-income (advantaged) and low-income (disadvantaged) areas (Fig 7), the data were analyzed and tabulated.

For the purposes of comparison, the results from the preschools in advantaged areas and those in disadvantaged areas have been combined where they overlapped.

##### 8.2.1 Human-animal interaction in the preschools investigated

The total number of respondents from schools in advantaged and disadvantaged areas was 156. The number of teachers and children involved in schools where animals are kept permanently, occasionally or not at all may be seen in Table 8.1.

No correlation could be found between animals kept permanently on the premises and any of the variables: location, language spoken or type of preschool (Fig 7.1, Questions 1, 2, 3 and 6). There was, however, a positive correlation with the relative frequency of qualified teachers at a preschool (Fig 7.1, Question 4). All schools in both groups (n = 156) used animals for themes and projects (Fig 7.1, Question 7).

**Table 8.1: Child-teacher ratios and percentage of qualified\* teachers at preschools in Pretoria where animals were kept on the premises permanently, occasionally or not at all**

Category	Animals kept permanently	Animals kept occasionally	No animals kept
Total number of children	1493	497	2147
Average number of children/school	78,6	62,1	102,2
Total number of teachers	85	32	120
% qualified* teachers ( $p < 0,05$ )**	82,35	56,25	60

\* Higher Education Diploma (preprimary)(HED(preprim) or similar

\*\* The percentage of qualified teachers was significantly higher at schools where animals were kept permanently than those that did not or only occasionally kept animals. The Chi-squared test was used to determine this significance at a level of probability exceeding 0,05

Table 8.2 shows the frequency and relative frequency of the different ways in which schools used animals (Questions 7, 8 and 9, Fig 7.1). Included in the table is the frequency of schools that did not keep animals permanently on the premises, but would have liked to keep animals (Question 10, Fig 7.1).

**Table 8.2: Frequency and relative frequency of schools where animals were used for themes and kept permanently, temporarily or not at all, or that visited the zoo**

Preschools	Advantaged	Disadvantaged
Total (n = 156)	50	106
Animals used as themes/projects	50 (1,0)	106 (1,0)
Animals permanently at preschool	19 (0,38)	3 (0,03)
Animals occasionally at preschool	9 (0,18)	7 (0,07)
No animals kept at preschool	22 (0,44)	96 (0,91)
Would have liked to keep animals permanently (n = 3; n = 99)*	23 (0,74)	69 (0,65)
Visited the zoo	50 (1,0)	77 (0,73)

\* This question was only put to those schools who did not keep animals permanently on the premises

All schools, whether or not they kept animals, used animals in themes and projects at the school (Question 7, Fig 7.1) and most of them (Table 8.2) visited the zoo (Question 8, Fig 7.1).

The types of animals kept permanently on the premises at preschools are shown in Fig 8.1. This reflects the answers obtained from Question 12 (Fig 7.1).

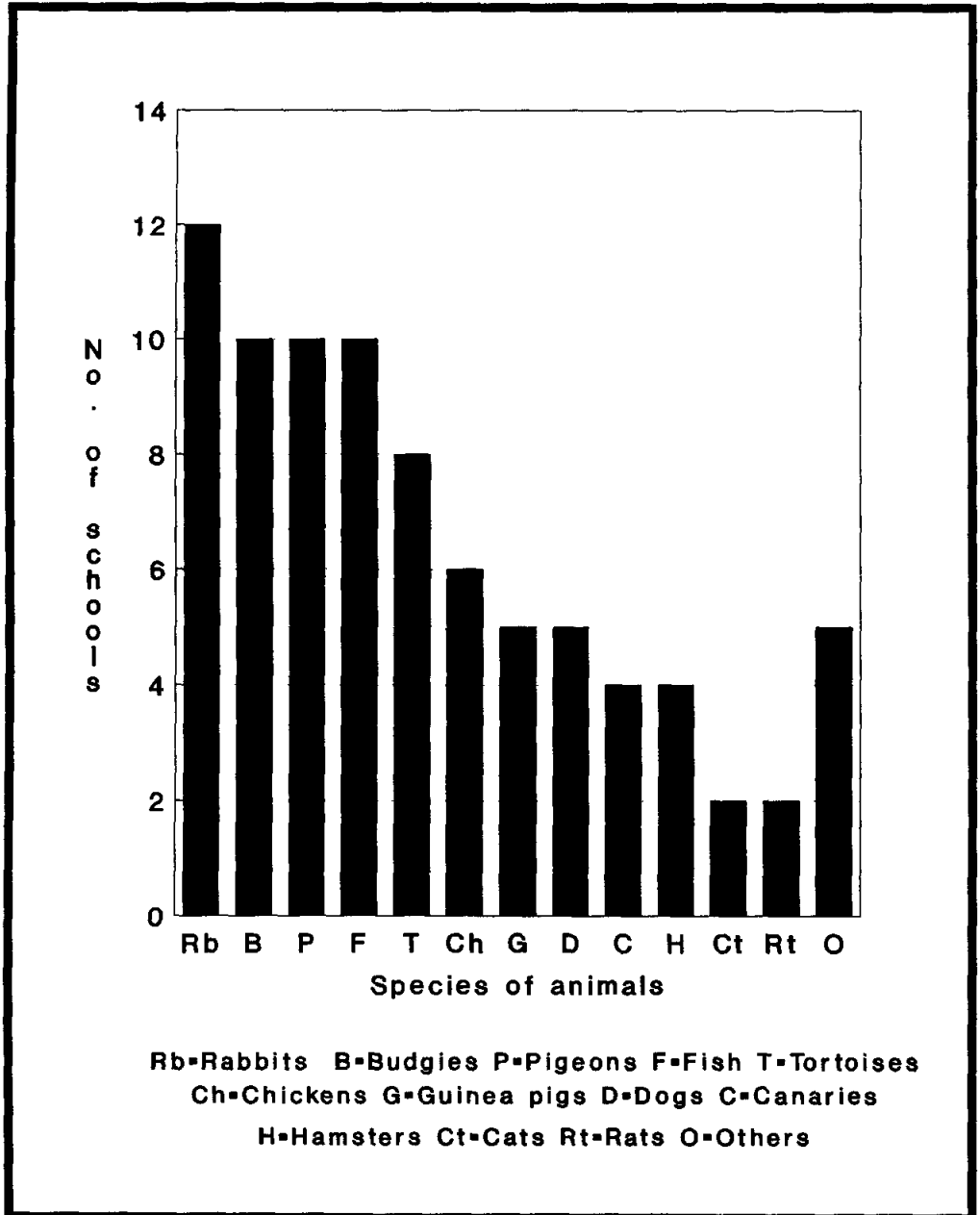


Figure 8.1: Type of animals kept permanently on the premises at preschools

The constraints that prevented schools from keeping animals permanently or temporarily on the premises were also examined (Fig 7.1, Question 11). A list of the reasons given by teachers for not keeping animals is shown in Table 8.3.

**Table 8.3: Reasons given for not keeping animals permanently on preschool premises (n = 137)**

Reasons	Advantaged* (n = 31)	Disadvantaged** (n = 106)
Too much extra work	13	52
Animals carry disease	14	55
Animals are unhygienic	11	50
Too expensive to feed and care for	7	65
Animals cause allergies	17	60
Children may be bitten or scratched	10	61
Children may injure animals	12	56
Just as much may be learned from books and charts	7	51
The environment at the school is adequate without animal contact	9	45
Pets at home are enough, do not need them at school	14	34
Children should not keep pets at all as they are a health hazard	0	28
Lack of facilities	6	78
Pretoria municipal or other health regulations	10	48
Parents object	1	31
Owners of land/nursery school object	3	50
Not answered	0	3

\* Preschools in advantaged areas

\*\* Preschools in disadvantaged areas

In addition to the reasons listed above, two preschools in the advantaged group mentioned that they had kept animals in the past, but that older children and vagrants had broken in and killed them. In the case of the vagrants, rabbits had been

killed, presumably for food. Older children had killed and stolen guinea pigs, hamsters and budgerigars.

In the case of the disadvantaged group, a few examples are cited of the reasons given for not keeping animals. These are quoted in the original English used as this reflects the emotions, socio-economic constraints and grammatical limitations of preschool teachers from disadvantaged areas (Fig 8.2).

"We don't have money to care for animals"  
 "Children should not eat while animals"  
 "There is no security at our school like yards"  
 "There are no other objects in our school, there are no pets"  
 "Unhygienic if we don't look after them"  
 "Objections by the inspector"  
 "Pets are of important value as long as you care for them and treat them with disinfectant"

**Figure 8.2: Examples of answers received from teachers at preschools in disadvantaged areas**

One of the constraints anticipated in those schools where animals were kept, was the care of animals. Questions 13, 14 and 15 (Fig 7.1) were posed in order to further elucidate who cared for the animals and paid for food and veterinary expenses. The results are shown in Table 8.4.

**Table 8.4: Parties responsible for care-giving and the costs involved in keeping animals permanently at preschools in advantaged areas**

Activity	Responsible party	Schools (n = 22)
Care and feeding during term	Staff member	9
	Labourer	2
	Staff member and children	11
Care and feeding, holidays	Staff member	10
	Labourer	2
	Parents and children	10
Expenses paid by	School	20
	Staff member	3
Schools using a duty roster		3

Teachers opinions on the value of the human-animal interaction for children at preschool were evaluated in terms of questions 16a, 16b and 16c (Fig 7.1). It was found that the majority of teachers that answered these questions felt that animal-interaction was valuable to preschool children (Table 8.5).

**Table 8.5: Teachers' opinions on the educational, psychological and social value of animal interaction for preschool children**

Value of animals	Type of school	Yes	No	Not answered
Educational	Advantaged (n = 50)	46	3	1
	Disadvantaged (n = 106)	36	4	67
Psychological	Advantaged (n = 50)	42	7	1
	Disadvantaged (n = 106)	30	7	70
Social	Advantaged (n = 50)	43	6	1
	Disadvantaged (n = 106)	32	7	68

Questions 17a, 17b and 17c (Fig 7.1) brought forward the problems of allergies as well as injuries to the children or animals kept permanently or occasionally at the preschools. The questions were only answered by those preschools in advantaged areas (n = 50). Within the previous five years, no schools reported disease in children as a result of contact with animals. Only three cases of allergy were reported. One was an allergy to rabbit fur, one to cat hair and one to budgie feathers. The affected children were subsequently kept away from the animals concerned. The rabbit was moved to an outside hutch, the cat was re-homed and the budgie moved to a different classroom.

With regard to injuries, no children had needed treatment by a doctor as a result of injuries sustained from handling animals, although four schools mentioned that children had been nipped by hamsters. Three schools described injuries to animals. These were: a child that poured blue paint into the fish tank, a child who had broken open hatching eggs and pulled out the ducklings, and a child that pulled the legs and wings off grasshoppers.



### 8.2.2 Clinical cases seen by veterinarian

Two of the preschools in the advantaged group kept animals permanently on the premises. Over a period of ten years all diseased and injured animals at these two preschools were sent to Brooklyn Veterinary Clinic (Table 8.6).

**Table 8.6: Diagnoses made on cases seen between 79.07.01 and 89.07.01 by a private practice serving two preschools in the advantaged group**

Diagnosis	Number of cases seen					
	Rabbits	G pigs	Rats	Hamsters	Pigeons	Fish
Scaly ear ( <i>Psoroptes cuniculi</i> )	15					
Malnutrition due to overcrowding	2	2				
Drowned after rain	1					
Fight wounds	1			1		
Neuter	10		3			
Fracture					1	
Tumour				1		
Overfeeding						2

The high number of neuters done on male rabbits and rats was as a result of the finding that the males of these two species were very aggressive and inclined to fight with each other. Methods of treatment, surgery and doses used were similar to those suggested in the literature (Fraser, 1986; UFAW, 1976).

Ear-mites in rabbits were a common cause for complaint, fortunately they were easily treated. The organism which caused the disease was *Psoroptes cuniculi*. This mite could also cause a dermatitis in guinea pigs kept in the same enclosure as affected rabbits (Yeatts, 1994).

### 8.3 Discussion

The responsibility for feeding and caring for animals fell mainly on the teaching staff at preschool (Table 8.4). They were also in close daily contact with the children and animals and therefore in a position to judge the value of interaction between these children and the animals. For this and ethical reasons, the questions were therefore structured to gain the opinions of teachers rather than children.

The preschools in disadvantaged areas were devoid of fences, grass, trees, climbing apparatus, books, toys - even paper and crayons. For amusement, the teachers sat the children in circles and they sang and clapped hands.

Under such circumstances the keeping of animals must have seemed unimaginable. Most ( $n = 69$ ) of these schools would, however, have liked to keep animals. Trips to the zoo were subsidised and therefore within the reach of even the most disadvantaged (Table 8.1). A total of 127 of the preschools visited the zoo. This leads directly to the possibility of zoo visits contributing meaningfully to the amount of animal-interaction experienced by children at preschools. Zoo Programmes were therefore developed which could be used specifically for the preschool child during excursions (see Chapter 14 and Appendix).

It might have been expected that teachers with larger classes would have had less time to cope with animals at school. This, however, was not the case. At preschools in advantaged areas, the number of children per class did not play a significant role in whether or not animals were kept permanently on the premises. Preschools with a higher percentage of qualified teachers were statistically more likely ( $p > 0,05$ ) to keep animals permanently on the premises (Table 8.1). This was possibly because qualified teachers, as a result of their training, were better able to evaluate the needs of the preschool child (Stachel, 1986).

All preschools used animals in themes and topics. Certain animal species were found to be present at those preschools where live animals were kept permanently on the premises. The preschools in this survey were found to have kept rodents, fish and birds in preference to carnivores (Fig 8.1).

This observed distribution is different to that described in households, where dogs and cats are mainly kept as pets (Anderson et al, 1984; Godin & Lemaire, 1987; Serpell, 1986b).

The possible reasons are that rodents, birds and fish are easier and cheaper to keep at a preschool. Faecal disposal is simpler than in the case of carnivores, and these animals are more gregarious than cats and dogs (United States Department of Health and Human Services, 1985a). There is also less physical danger attached to bites by these animals. The actual reasons were investigated further during interviews with teachers (see Chapter 10).

Plate 8.1 shows preschool children interacting with some of the different types of animals kept at the preschools investigated.

An anticipated drawback is that the veterinarian in companion animal practice is possibly more used to treating cats and dogs than rabbits, guinea pigs, bantams, pigeons and fish. The requirements of the preschool are also different to those of the pet owner. The number of cases is, however, relatively low (Table 8.6) and cost may be a limiting factor in deciding the treatment regimen. Animals not easily cured or found to be suffering from zoonotic diseases cannot be returned to the preschool. The former because animals that appear to be suffering lay the school open to complaints by parents concerned about animal welfare, and the latter because of the danger to the children.





Plate 8.1: Children interacting with the different types of animals kept at preschools: (a) dog (b) chicken (c) rabbit (d) hamster



The low relative frequency of response (36%) to the subsections of Question 16 (Fig 7.1) by preschools in disadvantaged areas reflects a possible lack of understanding of the concepts. For most of the teachers at these schools English was a second language (Fig 8.2). However, it was notable that a majority of the respondents from preschools in both advantaged and disadvantaged areas, felt that human-animal interaction in the preschool had educational, social and psychological value for preschool children (Table 8.5).

During a survey of pre- and primary schools in France, Godin et al (1989) found no evidence that children suffered from zoonoses as a result of animals kept at schools. This they felt, may have been due to the fact that teachers would not recognise zoonotic diseases, or may have truly reflected the case that zoonotic diseases are not a problem when animals are kept at school. The answers received from preschools in South Africa (Question 17, Fig 7.1) confirmed this finding. Despite the fears of teachers at preschools that did not keep animals (Table 8.5), no zoonoses were described. There was also a low incidence of allergy and no cases of serious injury to children caused by animals kept at the preschool.

It cannot be assumed from this that there is no possibility of zoonotic diseases occurring at preschools. Zoonotic diseases have become increasingly important in the past few years as the cause of public health problems throughout the world (German Federal Health Office, 1993). The topic will be discussed in detail in Chapters 9 and 10.

It is suggested that, as disease prevention and animal management fall within the sphere of the veterinarian, veterinary advice should be of value to preschool teachers. Preschool education should be pleasant and meaningful (Atmore, 1991; Blue, 1986; Hildebrand, 1991; Penning, 1990; Wiechers, 1991). This will not be so if the children are exposed to animal suffering. Veterinary input in management and disease

prevention in animals at the preschool should contribute to the well-being of the animals, as well as limiting the possibilities for zoonoses. This will be discussed further in Chapter 12.

Because communication with the parents was such an important part of educare, there was also the possibility that, in the field of health education, the state veterinarian could, through preschools, make contact with communities and alert them to prevention of disease in order to promote public health.

Animal and veterinary-related topics which have been brought to light by the survey and which needed further elucidation include the danger of zoonoses for the preschool child, management of animals at preschools, death and euthanasia of animals kept at school, environmental education and the role of the excursions, animal welfare, agriculture and, finally, the role of animals in preschool literature and toys. These will be discussed in the following chapters.

## CHAPTER 9

### RELATIVE MORBIDITY OF ZONOSSES IN TWO POPULATIONS

#### 9.1 Introduction

A literature review of zoonotic diseases (Chapter 4) indicated that it was difficult to judge the relative importance of zoonoses in a population by using incidence or prevalence. This was because these figures were not available for all the zoonoses which could occur in preschool children and also because the data which were available were not comparative.

In order, therefore, to investigate the relative importance of zoonoses as a cause of disease in children, it was decided to calculate relative morbidities using available medical records from Ga-Rankuwa Hospital Paediatric Department (which served the low income areas surveyed) and a private practice in the eastern suburbs of Pretoria (which drew patients from a high income area surveyed).

According to Kustner (1980), surveillance of disease using data collected for some other purpose is known as passive surveillance. One of the advantages of passive surveillance, as was performed in this survey, is that large numbers of cases may be screened and sufficient data are available for statistical deductions to be made. There is, however, the disadvantage that specificity is lost. As highly specific diagnosis, such as the isolation and typing of the causative organism, is frequently time-consuming and expensive, it is not done in practice. Another disadvantage of highly specific methods is that they also lack sensitivity because there are a high number of false negatives. In other words, if, for example *Mycobacterium bovis* is isolated from a child showing

miliary tuberculosis, there is almost 100% certainty that this is the causal organism. If, however, no growth was obtained on culture, this may be because of prior antibiotic treatment, delay in submitting samples or any number of other factors, leading to a false negative diagnosis, or low sensitivity.

It is accepted therefore, that retrospective surveys, have the advantage of a higher sensitivity than more specific methods (Kustner, 1980; Venter, 1992).

The aim of this investigation was to discover the relative importance of zoonoses as a cause of disease in children of preschool age in the low and high income areas surveyed in Chapter 8. The results could indicate whether the fears about zoonoses evidenced by teachers were justified. The relative morbidities of zoonoses in the two areas were assessed and the results discussed with respect to the different socio-economic circumstances.

## 9.2 Results

In the case of both practices, the proportional morbidity of zoonoses was found to be very low.

An analysis of the paediatric disease profile from January 1, 1989 to December 31, 1989 and May 8, 1990 to May 8, 1991 showed that none of the diseases listed in Table 7.2, except tetanus ( $n = 5$ ), were diagnosed. For tetanus the proportional morbidity in 1989 was 0,0005 and in 1990 0,0005.

Further perusal showed that, under poisoning, food-poisoning was described as Poisoning - other specified foods ( $n = 46$ ). The motivation for including food poisoning under zoonoses is given in Chapter 4, Section 4.3.4. For food poisoning the proportional morbidity was 0,0050 in 1989 and 0,0041 in 1990.



At the private practice, 3 possible zoonoses were diagnosed. These were *Tinea capitis* (n = 3, proportional morbidity 0,0013), tick fever (n = 4, proportional morbidity 0,0017), and sandworm, or cutaneous larva migrans (n = 1, proportional morbidity 0,0004). Injuries due to dog bites were also diagnosed (n = 2, proportional morbidity 0,0008). Total zoonoses diagnosed had a proportional morbidity of 0,0042.

It was, however, also noted from both the hospital and practice records that a large proportion of diagnoses made were merely descriptions of symptoms (Table 9.1). This was the case both at Ga-Rankuwa hospital and the private practice.

**Table 9.1: A comparison of the proportions of aetiological diagnoses and symptomatic descriptions found in the data bases obtained from Ga-Rankuwa Paediatric Department and a private practice in Pretoria**

Location	Private practice (n = 2386)	Ga-Rankuwa hospital (n = 4536)
Aetiological diagnoses (number of cases)	563	1445
Aetiological diagnoses (proportion of cases)	0,24	0,37
Symptomatic descriptions (number of cases)	1674	2895
Symptomatic descriptions (proportion of cases)	0,70	0,64
Other diagnosis* (number of cases)	149	196

\* Routine procedures, follow-up treatments, minor surgery

Several of the symptomatic descriptions could have fitted the symptoms described for zoonoses discussed in Chapter 4. These are listed in Table 9.2.

**Table 9.2: Symptomatic diagnoses made at Ga-Rankuwa hospital, which could have had a zoonotic aetiology**

Symptomatic diagnosis	Number of cases (f)	Zoonoses with these symptoms
TB meningitis	14	<i>Mycobacterium bovis</i>
TB abdomen	1	
TB neck glands	2	
TB miliary (unspecified)	1	
Septicaemia non-specific)	38	Streptococcus Salmonellosis Colibacillosis Listeriosis
Hepatitis (unspecified)	8	Leptospirosis
Hepatosplenomegaly	6	
Jaundice (unspecified)	17	
Meningitis (unspecified)	42	Toxocarosis
Meningitis (bacterial)	12	Listeriosis
Epilepsy	66	Cysticercosis
Broncho-pneumonia (unspecified)	579	Ornithosis
Pneumonia	136	Psittacosis
Pneumonia (lobar)	65	Streptococcus
Febrile convulsions	42	Colibacillosis Listeriosis Cat-scratch fever
Gastroenteritis	791	Salmonella
Diarrhoea	2	Campylobacter Colibacillosis Cryptosporidium
Tonsillitis (acute)	31	Streptococcus

The objective of this phase of the investigation was to attempt to discover the relative importance of zoonoses as a cause of disease in children. Not only those diseases diagnosed as zoonoses, but also symptomatic diagnoses of diseases which might be zoonotic, were considered. To put the findings reported in Table 9.2 into better perspective, therefore, the frequency of the ten most commonly found diagnoses were listed in Table 9.3. The diseases in this table have also been ranked according to their relative frequency.

**Table 9.3: The frequency of the ten most commonly made diagnoses taken from the paediatric disease profile at Ga-Rankuwa Hospital**

<b>Diagnoses</b>	<b>Number of patients (f)</b>	<b>Relative frequency (n = 4536)</b>
Gastroenteritis/diarrhoea	793	17,48%
Pneumonia/bronchopneumonia	781	17,21%
Poisoning paraffin	421	9,28%
Malnutrition	300	6,61%
Poisoning (other)	217	4,78%
Febrile convulsions	192	4,23%
Congenital cardiac disorders	174	3,83%
Asthma	158	3,48%
Upper respiratory tract infection	126	2,77%
Neoplasia	99	2,18%

The age group of children attending preschool was 36 to 84 months. In order to discover whether age had an influence of the susceptibility of children to the different types of disease, data were analyzed according to the age group of patients. Unfortunately these data were not available from the private practice records for reasons of confidentiality. As zoonotic diseases were of importance to this study, the age distribution of tetanus and food poisoning cases diagnosed have been included (Table 9.4).

**Table 9.4: Paediatric disease profile at Ga-Rankuwa hospital  
90.05.08-91.05.08 according to age group of patients**

Diagnosis (n = 5506)	No	1-35m	36-84m	>85	Total
Gastroenteritis	9	854	57	18	938
Malnutrition	0	370	20	3	395
Upper respiratory tract infections	0	240	26	11	278
Pneumonia/Broncho-pneumonia	1	715	112	45	891
Asthma	0	78	63	23	164
Congenital heart defects	0	112	67	40	219
Febrile convulsions	4	126	59	19	208
Poisoning paraffin	7	376	52	2	437
Poisoning (other)	2	143	68	27	261
Neoplasia	0	32	38	70	140
Tetanus	0	2	1	0	3
Poisoning: specified foods	0	3	14	6	23

A comparison was also drawn up between the disease profiles and the clinic or area from which the Ga-Rankuwa patient originated. No statistical correlations could, however, be discovered between the origin of the patient and the diagnosis made ( $p > 0,05$ ).

### 9.3 Discussion

Although it may be assumed superficially that zoonotic diseases are a very small fraction of the paediatric disease profiles investigated (eg the proportional morbidity of tetanus was only 0,0005), the problem could be masked by the low specificity and sensitivity of the symptomatic descriptions listed in Table 9.2.

Aside from the reduced specificity resulting from the cost and availability of laboratory diagnosis of disease, the problem of discovering the cause or causes of disease and using this to design preventive measures, is made more difficult by the tendency by clinicians to use symptomatic rather than aetiological diagnoses (Table 9.2). A symptom is only an observation, a diagnosis involves interpretation of a group of symptoms. An aetiological diagnosis means a causal relationship has been established (Thrusfield, 1988).

The prevention, for example of streptococcal pneumonia, is vastly different from the prevention of *Haemophilus influenza* type B infections in children, yet both would have been diagnosed as pneumonia. The constraints involved in diagnosing *H influenza* type B infections at Ga-Rankuwa Hospital have been mentioned by Mokgabudi et al (1994), who have motivated for early vaccination of the community with HbTITER vaccine. Out of 30 CSF specimens found positive for *H influenza* type B by using the slide agglutination test, only 19 were culture positive. This highlights the problem that the recorded prevalence or incidence of a disease can vary considerably depending on the test chosen to show the presence or absence of disease. As regards zoonoses, a portion of the bronchopneumonia cases diagnosed could conceivably have been caused by streptococcal infections resulting from children drinking unpasteurised milk.

Different zoonotic diseases were found in the high and low income populations; ringworm and tick fever rather than tetanus and food poisoning. This may be readily explained in terms of the different socio-economic level of the two populations. In the low income population the children, particularly in the more rural areas, were not vaccinated against tetanus as many did not visit clinics or see a clinic sister until they went to school (unpublished data: McCrindle, 1994). In the high income areas children were vaccinated for the first time shortly after birth and regularly thereafter clinic sisters visited pre- and primary schools to update the vaccinations.

Food poisoning in low income and developing areas could be explained in terms of children drinking unpasteurised milk and eating meat from animals which might not be hygienically slaughtered. Storage of food products of animal origin could also cause problems due to the lack of electricity in these areas (McCrinkle et al, 1994b). The incidence could be far higher than actually reported as many of the cases could have merely been diagnosed as gastroenteritis. In the high income areas, electricity was present and every home owned a refrigerator for food storage. Meat and milk products were brought mainly from supermarkets where only products which originated from registered abattoirs and dairies are allowed to be sold. Standards were maintained through regular visits by health inspectors from local government. Purified water was supplied to every home by the municipality in the high income areas. This was not the case in the developing areas, where water came from boreholes or was bought in drums from water sellers (McCrinkle et al, 1994b).

Ringworm is a disease transmitted to humans by household pets. The preponderance of this disease in the high income area could be explained in two different ways. The first concerned the method of transmission. It has been mentioned that the disease is mainly carried by long-haired cats and dogs which are in close daily contact with their owners (Van Cutsem & Rochette, 1991).

It has also been noted that the disease can remain subclinical for a number of years and children may become infected from an apparently healthy carrier (Jungerman & Schwartzman, 1972; Merchant, 1990a). In developing areas few purebred dogs or cats are found (McCrinkle et al, 1994a; Rautenbach et al, 1991), whereas long-haired dogs and cats are seen frequently as children's pets in high income areas (Eckersley et al, 1993).

The second explanation of the low incidence of ringworm in the low income groups is that it could be the result of the relatively minor nature of the disease which would have been treated at village level by a visiting clinic sister without referral to a doctor.

Tick fever is a particularly interesting problem. Ticks are frequently found in the rural developing areas, and *Ehrlichia canis* is a serious problem in dogs (Eckersley et al, 1993). Kelly and Mason (1991b) implicate *Amblyomma hebraeum* as a vector of human tick bite fever. These ticks are also a problem as vectors of rickettsial cattle disease in the areas covered by the Ga-Rankuwa survey (Kiwanuka et al, 1994). In spite of this, tick-fever is not diagnosed at Ga-Rankuwa hospital, either in adults or children. It is not known whether this is due to the population being infected at a very early age and becoming immune or whether the diagnosis is overlooked. No blood-tests for titres against the disease have been done in persons living in the low-income areas investigated, however, in Zimbabwe it has been shown that antibodies to *R conorii* were present in 82% of dog sera and 100% of human sera originating from rural areas (Kelly & Mason, 1991a).

Dog bites are one of the negative results of human-animal interaction and not a zoonotic disease. They have, however, been included here for the sake of completeness. The fact that dog bites did not form part of the proportional morbidity in the paediatric profile at Ga-Rankuwa hospital is because they were referred to the department of paediatric surgery under Professor C Grant. Two cases of dog bites in children seen at Ga-Rankuwa hospital during this period were discussed by McCrindle et al (1994a) and it was mentioned that the more serious of the two happened when a child from Ga-Rankuwa visited a relative working in a high income area and was severely bitten. The proportional morbidity of dog bites in children seen at the private practice in Pretoria is surprising-

ly low in comparison to the figures quoted in the literature (Jones & Beck, 1984; Podberscek & Blackshaw, 1990). This could be because seriously bitten children would have been rushed to hospital rather than being taken to a private practitioner.

Sandworm (cutaneous larva migrans) was certainly not found only in high-income areas. An outbreak of this disease occurred amongst preschool children living at Pieterskraal. This outbreak will be discussed in detail in Chapter 10.

A retrospective survey of the most common causes of disease in children, which was undertaken at Baragwanath hospital in 1992, showed a similar distribution to that of Table 9.3. This publication suggested that, in developing areas, the diseases which need to be addressed urgently were pneumonia, diarrhoea and malnutrition (Friedland & Pettifor, 1994). These diseases were also top of the list in the paediatric disease profiles reported from Ga-Rankuwa (Table 9.4).

The significance of this finding, from the point of view of the veterinarian, is that a certain percentage of the pneumonia and gastroenteritis reported could be due to zoonotic disease, particularly because children in developing areas drank milk which was unpasteurised and ate meat which had not been inspected after slaughter (McCrindle et al, 1994b). Addressing malnutrition by provision of safe foodstuffs of animal origin could also lead to a change in the disease profile of these children.

In the Ga-Rankuwa survey, accidental poisoning was considerably higher than in the Baragwanath survey, where it was placed sixth, below congenital heart disease and sepsis. HIV infection also appears on the Baragwanath list in seventh position (Friedland & Pettifor, 1994). Its absence from the surveys done in Ga-Rankuwa in 1989 and 1990 (Table 9.3) was interesting in that it highlighted the major effect an



epidemic could have on a disease profile in a relatively short time. It must be remembered that zoonoses are also infectious diseases which have, in the past, reached epidemic proportions, particularly in developing areas when control measures were absent (Schwabe, 1984). From this it may be argued that provided that veterinary control is maintained, the risk of zoonotic disease is low. If, however, such control fails, the level of zoonoses could rise and the risk of an epidemic would increase.

The low proportion morbidity of zoonoses in the populations studied, gives rise to the possibility of a relatively large margin of error, as an outbreak of disease at a particular location could result in a relatively large increase in the figure obtained.

An analysis of the age group of patients at Ga-Rankuwa hospital (Table 9.4) showed that the majority of cases occurred in children below preschool age. This was to be expected, as children become immune to disease with which they come into contact. With age, therefore, they became more resistant to infections. It is interesting that food poisoning reached a peak in this age group. The low numbers of children affected ( $n = 14$ ), did not, however, allow any conclusions to be drawn.

When designing preventive health care, it is important to discover the cause of disease. It is also important to realise that the cause may be multifactorial, that is, the organism must be present and the environmental conditions must be present which allow the child to become infected. For example, *Salmonella enteridis* may be a cause of disease in humans, but the person will have to eat a raw egg from a bird carrying the disease before they are affected. Even then, the severity of symptoms produced is dose-related, that is to say, the more *Salmonella* organisms the person manages to swallow, the more severe the disease will be (Mintz et al, 1994; Threlfall et al, 1994). This is important in preventing the disease as several factors will influence the incidence in

humans. The first would obviously be to control the disease in chickens. This is the role of the veterinarian. The other is not to eat raw eggs - several outbreaks of this disease have been linked to the use of raw eggs in certain sauces (eg Hollandaise sauce). As Salmonella organisms may multiply in food prepared from infected eggs, it is advisable to refrigerate any food which is not destined for immediate consumption (Wray, 1985).

The second two methods of prevention fall within the scope of the preschool and the parents of a preschool child. In Britain, another method of prevention was adopted by a terrified public after the Minister of Health announced that this organism had been found in eggs, they stopped buying and eating eggs. This reaction denied people access to a cheap and effective source of protein and was an over-reaction to a problem which could have been solved by a more common-sense approach (Editorial, *Veterinary Record*, 1991b; Mason & Vines, 1986).

From the above it is suggested that the fears of preschool teachers and educare workers could be justified to some extent with regard to the dangers of zoonotic disease in that reasonable precautions should be taken to prevent outbreaks at preschools. The use, by preschools, of the routine precautions suggested in Table 4.10 is therefore strongly recommended.

These measures should not, however, deny children the opportunity to interact with animals. The proportional morbidity (relative importance) of zoonoses in the two populations studied, was found to be very low and the possibility of disease resulting from human contact is much greater. In this regard the words of John A Lynch, who is a veterinary microbiologist, are appropriate:

*"All activities in life involve risk. All interactions of man with other animals pose a threat of infectious disease transmission, but how great a risk? The risk from contact with another human certainly presents far greater risks"* (Lynch, 1990, p931).

This does not mean, however, that the prevention and control of zoonotic disease should be ignored, as it represents a potential threat to the health of preschool children, particularly in developing areas, unless veterinary control of zoonotic diseases is maintained.

From the point of view of estimating the actual incidence or prevalence of zoonotic disease in a given population, the two surveys of proportional morbidities that were undertaken have highlighted certain constraints. The chief constraint, it appeared, was not the lack of specificity of retrospective surveys, but the tendency towards symptomatic rather than aetiological diagnoses. This tendency probably leads to considerable under-reporting of many notifiable infectious diseases other than zoonoses.

It is probably to be expected that clinicians, whose chief aim is curative medicine or surgery, would be more interested in the symptoms than the cause of disease. Epidemiologists, on the other hand, are more interested in disease causation. The significance of these two different approaches is one of the factors which bedevils the concept of primary health care and low-cost preventive medicine. In order to understand this, it is necessary to understand the differences between preventative primary health care (for example, preventing lung cancer by warning people not to smoke) and specialised curative health care (for example, surgical and medical treatment of lung cancer). This will be discussed further in Chapter 10.

## CHAPTER 10

### USING A PRIMARY HEALTH CARE APPROACH DURING AN OUTBREAK OF ZONOTIC DISEASE IN CHILDREN OF PRESCHOOL AGE

#### 10.1 Introduction

It was previously mentioned that a single outbreak of zoonotic disease could result in several children being infected. Primary health care (PHC) has been advocated as a method for the prevention and control of disease, however, there is little documentary evidence of its advantages and constraints (Morley & Lovel, 1986). PHC may be considered as essential health care made universally accessible to community members, with their full participation, at a cost affordable to the community (WHO, 1981).

The difference between primary health care and specialised health care is summarised in Table 10.1.

**Table 10.1: The difference between primary and specialised health care  
(after Morley & Lovel, 1990: 144-178)**

Primary versus specialised health care	
<p><b>Primary</b></p> <ul style="list-style-type: none"> <li>- Low cost</li> <li>- Community partnership</li> <li>- Effective for common health problems</li> <li>- Epidemiology important for prevention</li> </ul>	<p><b>Specialised</b></p> <ul style="list-style-type: none"> <li>- Expensive</li> <li>- Dictatorial</li> <li>- Prestigious</li> <li>- Good for rare diseases and conditions</li> <li>- Mainly symptomatic</li> </ul>

This chapter discusses an outbreak caused by a zoonotic disease and the primary health care measures taken to control it. The headings follow those suggested in Chapter 7.

## 10.2 Problem recognition and definition

Cutaneous larva migrans, as discussed earlier, is a skin lesion caused by the percutaneous infestation of man by a variety of hookworm larvae. The life-cycle is illustrated in Figure 4.2. In this case the hookworm involved was presumed to be *Ancylostomum caninum* and the suspected vector was the domestic dog, as dogs were more numerous in the area than other domestic animals. The clinic sister was interviewed and the following points were determined:

- The number of patients seen per month with this disease varied between 10 and 15
- The incidence of disease did not follow a seasonal pattern
- The patients presenting with the condition did not appear to be associated with any one area in the community
- All patients presenting with the condition were under 7 years of age
- The water for public consumption was supplied by taps on street corners and that no communal water points existed in the community.

Free living hookworm larvae are very sensitive to desiccation, heat and cold, dying within days of frozen or if temperatures exceed 30°C. Moist, warm conditions promote the disease. However, female worms lay up to 16 000 eggs per day and poor hygiene, particularly if faeces are not removed regularly, would be a source of continuing and heavy reinfestation (Reinecke, 1989).

For the above reasons it was evident that clinical cases of cutaneous larvae migrans in children would depend on several specific conditions:

- A high level of hookworm infestation in the local dog population
- An appropriate micro-environment for the optimal survival of free-living larvae
- Children would have to be exposed to the micro-environment suitable for the survival of larvae
- Such micro-environments would have to be infected with sufficient larvae to make the risk of infection to children high.

The problem statement was then, briefly, threefold. Firstly, it was important to identify the causative organism and micro-environment which predisposed to the disease; secondly, to establish a method for the prevention and cost-effective treatment of the disease; and thirdly, to prevent reoccurrence by informing the susceptible population about prevention methods. This leads to the second phase of the primary health care cycle, goal setting.

### 10.3 Goal setting

The first step in this phase of the undertaking was to identify the helminth parasites infesting the local domestic canine population and to discover whether *A caninum* was predominant.

At the request of the medical practitioner responsible for the community, the chief arranged that all dogs be presented at a central site for examination by a veterinarian from the Companion Animal Medicine and Surgery Department at

Medunsa in May 1991. All dogs presented (n = 80) underwent a rectal examination to secure sufficient faeces for faecal worm-egg counts. The results are shown in Table 10.2 a and b.

**Table 10.2a: Qualitative analysis of the prevalence (%) of helminth parasites in the faeces of dogs examined at Pieterskraal**

Parasite	Prevalence (%)
<b>Nematodes</b>	
<i>Ancylostomum caninum</i>	55,4
<i>Toxocara canis</i>	2,1
<i>Toxocara leonina</i>	8,6
<b>Cestodes</b>	
<i>Dipilidium caninum</i>	2,1
<b>Coccidia</b>	
Not identified	2,1

**Table 10.2b: Quantitative analysis of the number of nematode eggs per gram (EPG) found in the faeces of the dogs at Pieterskraal**

Nematode species	Average EPG	Maximum EPG
<i>A caninum</i>	840	3800
<i>T canis</i>	700	700
<i>T leonina</i>	700	1800

From the above it may be noted that the prevalence of *A caninum* (55%) was far in excess of the other nematode and cestode eggs identified. This indicated that there was probably some important source of infection for both humans and animals in the community.

Random sites were therefore selected within the community which would have conformed to the type of micro-climate which might have promoted the survival of free-living hook-worm larvae. These included the sandy banks of the local dam, seepage around leaking taps, damp areas around the

local shopping centre and soil samples from the primary school and its associated crèche. All these soil samples proved negative for free-living hookworm larvae.

It was therefore established that the parasite which caused the problem was present in the dogs in the community. In the meantime, clinic sisters were informed of low-cost treatment for cutaneous larva migrans in children. This was the topical application of *Thiabendazole* (1g) in *oleum petrolatum* (5g), 3 times daily for 3-4 days. As the actual source of free-living larvae could not be established, the goal that was set was to reduce the level of parasites in the dogs in the community and to inform the community leaders and those associated with children under the age of 7 years about prevention of the disease. The next phase was to investigate what community resources could be harnessed in order to carry out these aims.

#### 10.4 Organisation

The goal of reducing the level of parasites in the dogs was beset by two constraints. The first of these was the cost of deworming medicines to a very low-income community and the second was the manpower needed to deworm the dogs. Fortunately, representations to the government resulted in an agreement to use the services of state veterinary personnel to deworm the dogs and pay for a single dose of anthelmintic, provided it was understood that the community itself would be responsible for deworming their own dogs in the future. This was done in June 1991.

Once the dogs were dewormed, the problem of informing the community could be addressed. An information day was sponsored by Janssen Pharmaceuticals at the local primary school and the State veterinarian cooperated with the Department of Health in informing the local community structures, government health officials, tribal leaders and school teachers about the day. In October 1991, a workshop was held on



helminth infestations of man and animals and Janssen Pharmaceuticals donated free samples of Telmin K H (R) (Mebendazole) to members of the audience and the state veterinary office. At the conclusion of the information day, during a lunch prepared by the community members, a random selection of community members ( $n = 20$ ) were interviewed regarding their comprehension of the subject. The results are presented in Table 10.3.

**Table 10.3: Survey of the comprehension of community members of information presented during an information day on helminth infestations of man and animals**

Question asked	Correct answer *	Wrong answer **
What is the cause of cutaneous larvae migrans?	20	0
Can you prevent the disease by deworming dogs?	19	1
Can you prevent the disease by deworming people?	16	4
Can you prevent the disease by removing dog faeces?	20	0
Can you make your dog fatter by deworming him?	20	0
Percentage of correct answers	95%	

\* Number of people ( $n = 20$ ) who answered the question correctly

\*\* Number of people ( $n = 20$ ) who answered the question incorrectly

From the above results it is apparent that the information day resulted in a majority of the people understanding the message that was conveyed. This is an important facet of extension that is often ignored. Not only must the message presented to a community be factually correct, but it must be tailored to meet the needs of the target audience (Bembridge, 1992).

In this case, the effects of deworming the dogs were two-fold. It prevented cutaneous larvae migrans (as well as preventing the risk of visceral larvae migrans from the *Toxocara spp* discovered to be present), and it resulted in the dogs becoming healthy or free from parasites. This advantage was already apparent to the community by the time the information day was held.

## 10.5 **Evaluation and monitoring**

From a level of 15 cases per month the cases of cutaneous larvae migrans in children fell to zero and had not again increased to date (1994). This was despite the fact that there was a good rainy season in this area in 1993, which should have provided an ideal micro-climate of the parasite larvae. It is therefore presumed that the community now understand how to prevent the disease and are doing so by removing dog faeces and deworming dogs.

## 10.6 **Discussion**

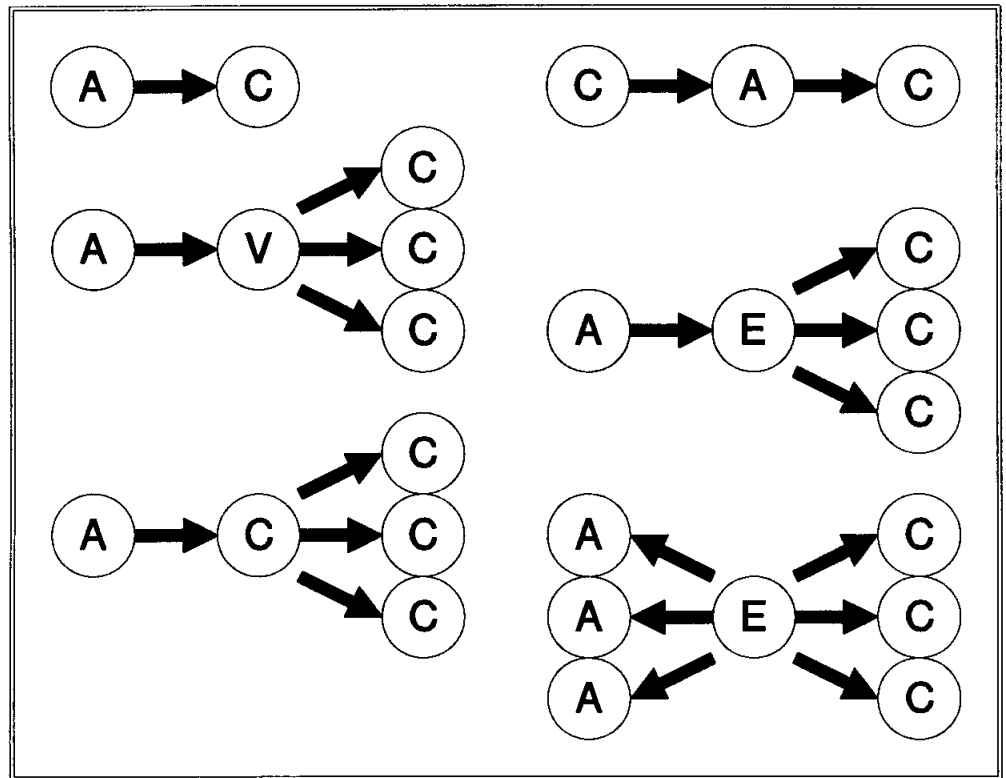
One of the main constraints to carrying out this programme was the resistance from health professionals to primary health care principles. It took some discussion before liaison between the government departments of Health (who were in charge of medical services) and Agriculture (who were in charge of veterinary services) could be motivated to cooperate with each other.

Another constraint was financial. The examination of faecal samples was not budgeted for by either the governmental or tertiary institution, as the reason for doing the survey had not been timeously anticipated. It was not considered germane that it is not always possible to predict outbreaks of disease. A large amount of correspondence and interviews with senior personnel were therefore required before the financial constraints could be addressed.

A third constraint was diagnostic. Until the disease was recognised by the medical students and the veterinarians consulted about the aetiology, the approach to disease had been at the symptomatic level. As no definite diagnosis had been made, the clinic sisters had treated children unsuccessfully for a type of eczema. This is probably linked to the tendency, discussed in Chapter 9, to make symptomatic

rather than aetiological diagnoses. Once an aetiological diagnosis has been made, preventive measures can be undertaken. If, however, the dogs had merely been dewormed and no attempt made to inform the community, the disease would in all likelihood have recurred.

A fourth constraint was knowledge of the epidemiology of the disease. The interaction between the environment, zoonotic diseases, animals and children is illustrated in Figure 10.1:



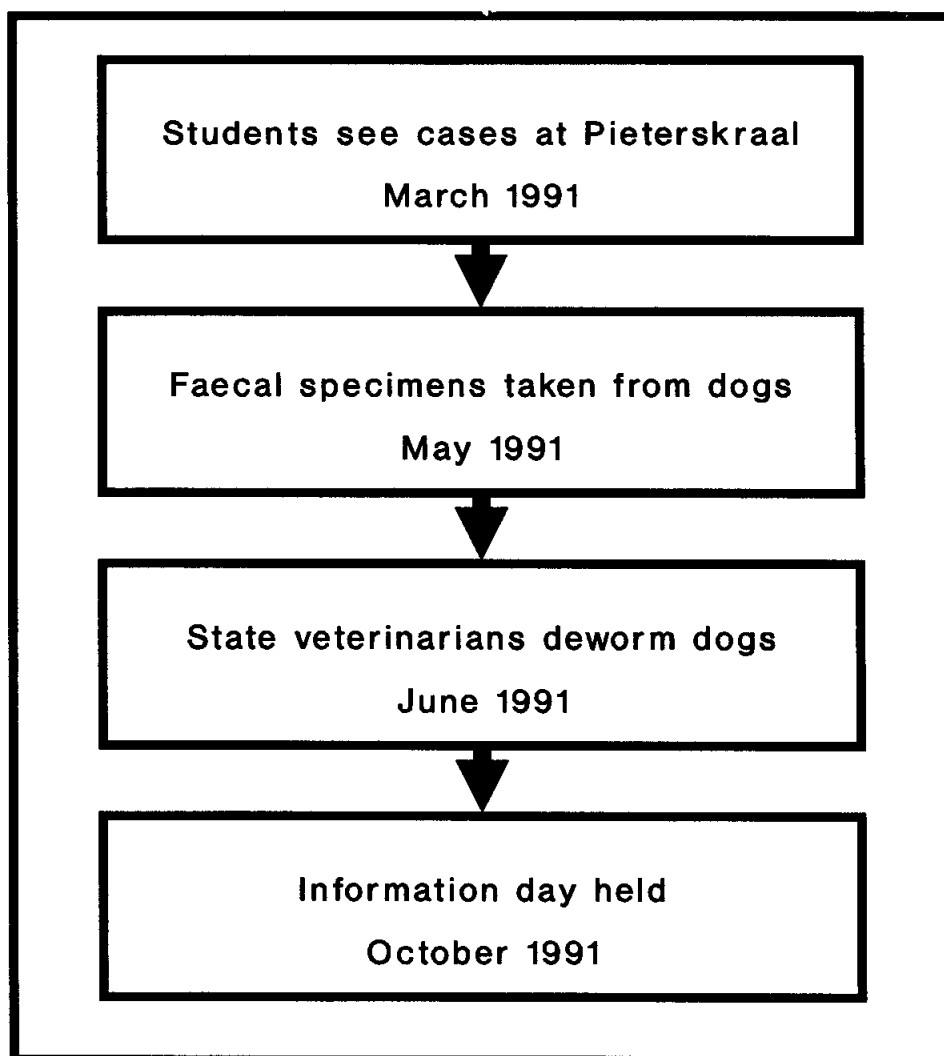
KEY:

A = Animal C = Child

E = Environment V = Vector

Figure 10.1: Interactions between the environment, zoonotic diseases, animals and children

These are typical and major constraints to the success of primary health care projects. As a result of these constraints the time it took from initial diagnosis to information day was extended (Fig 10.2).



**Fig 10.2: Time frame between initial diagnosis and intervention at primary health care level**

Fortunately, the persons at grass-roots level, the health personnel and veterinary personnel working in the area, were highly motivated towards the success of the project, and the reason it worked so well can be partly attributed to this factor.

A second factor which contributed to the success of the project was the interdisciplinary cooperation between the veterinary and medical faculties at a tertiary institution (Medunsa). This allowed for the harnessing of expertise in a variety of different fields, from paediatrics and community health, to companion animal medicine and veterinary extension.

The inference that can be made from the results of the Pieterskraal project are that success could be achieved in the prevention and control of zoonotic diseases in low income communities using the primary health care method proposed by Morley and Lovel (1990), provided that an aetiological diagnosis is made and that all relevant players cooperate. The results also point to the importance of the veterinarian as a role-player in the control of zoonotic diseases and public health.

In the next chapter, the information gained on prevention and control of zoonotic diseases will be incorporated into the criteria for selection, housing and caring for animals kept permanently at preschools.

## **CHAPTER 11**

### **11. AN EVALUATION OF THE MANAGEMENT OF ANIMALS IN FIVE PRESCHOOLS**

#### **11.1 Introduction**

Following the survey described in Chapter 8, it was seen that more information should be obtained on the reasons why certain animals were chosen for preschools as the species listed (Fig 8.2) did not coincide with those recommended in the literature reviewed. As Godin et al (1987) had suggested that there was a lack of knowledge regarding the management of animals, observations of the management systems at five preschools were made over a period of five years.

The objective of this investigation was to formulate guidelines for housing and management specific to preschools, by appraising the choice of species and the type of management of animals in preschools which kept animals permanently on the premises. These then were evaluated in terms of the information on management and ethology of animals obtained from the literature review (Chapter 5).

#### **11.2 Results**

The results obtained have been recorded under the headings of species selection and evaluation of existing facilities at preschools.

##### **11.2.1 Species selection**

Rabbits were the most popular choice at preschools surveyed, followed by budgies, pigeons and fish. Tortoises, chickens and guinea pigs were also relatively popular, while cats,

hamsters, canaries and rats were less popular (Fig 8.2). The reasons for the choice of these animals, which were investigated by interviewing teachers, are shown in Table 11.1:

**Table 11.1: Reasons given by preschool teachers (n = 100) for choosing or not choosing certain animals for preschools**

Species	Reason for not keeping	Reasons for keeping
Rabbits	Males fight Dig holes and burrows Can scratch children	Easy and cheap to feed Appeal to children (cute and fluffy) Children can bring food Easy to keep cage clean Adapt well to lots of children Active during the day Can be kept outside
Budgies	Escape easily	Easy and cheap to feed Easy and cheap to buy Appeal to children (colourful, active) Easy to keep cage clean Can be kept in classroom
Pigeons	Multiply too fast Faeces messy	Easy and cheap to feed Look after themselves Appeal to children (can feed them)
Fish	Water goes murky Fish dies easily	Easy and cheap to keep Can be kept in classroom Easy and cheap to buy Appeal to children (colour, movement)
Tortoises	Permit needed Disappear easily	Easy to feed and keep Children love them Look after themselves
Chickens	Come into classrooms Faeces very messy Eat all the plants Roosters crow	Easy and cheap to keep Very tame if hand-raised Can be kept outside Interact with children
Guinea pigs	Males fight	Easy and cheap to keep Can be kept outside
Dogs and cats	Do not adjust to lots of children Faeces where children play Danger of bites	Friendly Fun to play with Usually owned by teacher
Canaries	Die easily Escape easily	Can be kept in the classroom
Rats and mice	Fear/disgust by teacher	Easy to feed and keep
Hamsters	Nocturnal Do not live very long	Can be kept in classroom Easy to feed and clean

It can be seen from the above table that species selection also depended to some extent on whether the school had facilities to keep the animal outdoors. Certain species were selected

specifically because they could be kept inside the classroom. This is an important consideration where there is a danger of the animals kept in the grounds being injured or stolen (Chapter 8).

The cost of keeping different species was also a consideration in the choice of species for a preschool. Teachers found it difficult to estimate the actual costs involved in keeping animals at preschools because of the indirect costs of management of the animals and maintenance of the buildings.

Cost was therefore estimated by teachers on a scale of 1 to 5, where 1 was considered to be reasonably cheap to keep and 5 was reasonably expensive. Teachers were asked to include housing, maintenance, feed and labour in their estimates of relative cost of different species. In order to summarise the ranking order of the costs of keeping the different species listed, the average score was calculated for each species (Table 11.2).

**Table 11.2: Average ranking score of each species with regard to cost as estimated by preschool teachers (n = 100)**

Species	Average ranking score	Rank
Pigeons	1,18	1
Small rodents	1,87	2
Tropical fish	1,60	3
Cage birds	2,76	4
Rabbits	3,15	5
Dogs and cats	4,32	6

Informal interviews were conducted with teachers and observations made at the schools. The following points were made during these informal interviews and visits to preschools.



Firstly, pigeons were considered to be the most cost-effective as the only cost involved was the erection of a pigeon-cote and the purchase of food (Plate 11.1a and b).



Plate 11.1a: Pigeon-cote in playground at a preschool



Plate 11.1b: Children interacting with pigeons at tea-time



In addition, according to teachers and observations made at preschools, rabbits and guinea pigs were seldom fed on purchased food and the main cost, other than the erection of the housing, was the salary of a gardener to clean and maintain the cages.

Budgies and chickens were fed purchased food. Budgies were sometimes kept individually in the classroom and chickens were sometimes left to roam in the school yard; in other cases both were kept in aviaries.

Mice, rats, hamsters and fish were cheap to feed, but the housing varied considerably in price. Cats and dogs were relatively expensive to feed, but did not generally need to be housed as they were usually taken home at night unless the staff lived on the premises.

### 11.2.2 Evaluation of housing and management systems

Observations were made at five preschools and the outdoor housing evaluated. Table 11.3 shows the species of animals kept in the outdoor housing by the different schools.

**Table 11.3: Species of animals kept in outdoor housing systems at preschools (n = 5)**

School	Housing system	Species kept
1	Cage Free	Rabbits, guinea pigs, budgies Pigeons
2	Cage Free	Rabbits Pigeons, chickens
3	Enclosure	Rabbits, ducks, guinea pigs
4	Cage	Pigeons, rabbits
5	Enclosure Free	Ducks Chickens

The housing systems were evaluated using the checklist described under methods (Fig 7.3). Results are summarised in Table 11.4.

**Table 11.4: Evaluation of the management and housing of animals kept at pre-schools (n = 5)**

Evaluation criteria for housing	School 1	School 2	School 3	School 4	School 5
Overcrowding present	Yes	No	Yes	No	No
Adequate shelter from heat and cold	Yes	Yes	Yes	No	Yes
Adequate ventilation	Yes	Yes	Yes	Yes	Yes
Adequate drainage	No	No	No	No	No
Environmental enrichment present	No	No	Yes	No	Yes
Ethology considered	No	No	No	No	No
Security sufficient	Yes	Yes	No	Yes	No
Easy to clean and maintain	No	No	No	No	No
Concrete or impervious walls/floors	No	Yes	No	No	No
Adequate nutrition	Yes	Yes	Yes	Yes	Yes
Regular feeding/watering schedule	Yes	Yes	Yes	Yes	Yes
Feed and water easily accessible	No	No	Yes	No	Yes
Adequate bedding/nesting materials	Yes	Yes	Yes	No	Yes
Adequate hygiene/disease prevention	Yes	Yes	Yes	Yes	Yes
Strategically located in play area	No	No	Yes	No	Yes
Child-animal interaction supervised	Yes	Yes	No	Yes	No
Children able to feed animals under supervision	Yes	No	Yes	No	Yes
Veterinary care available	Yes	Yes	Yes	No	No

As the initial observations were done in 1988, information was available on the consequences of deficiencies in the housing and management systems. These are presented in Table 11.5:

**Table 11.5: Consequences of deficiencies in housing systems observed at the preschools (n = 5) during the period 1988-1993**

School number	Consequences observed
1	<p>Overcrowding led to fighting, ectoparasitism.</p> <p>Lack of drainage led to small rabbits drowning after a storm.</p> <p>Lack of concrete floors resulted in rabbits burrowing, floors were hard to keep clean.</p> <p>As it was not strategically located in the play area, child-animal interaction was limited.</p> <p>Food and water containers were removable but had to be collected inside the cage. Budgies were attacked by rabbits when they tried to drink from water bowls.</p> <p>As ethology was not considered in selection, male rabbits and guinea pigs fought with each other.</p>
2	<p>Lack of drainage resulted in pools of faeces contaminated water around cage after cleaning.</p> <p>The cage was located under a mulberry tree and leaves and fruit made a mess inside the cage.</p> <p>The cage was not high enough to stand up in and this made cleaning it difficult.</p> <p>The cage was constructed of diamond mesh and the door did not open properly. Teachers found it too much trouble to supervise the feeding of animals.</p> <p>Food and water containers were also inaccessible for the above reasons, so water dishes were filled by hosepipe and food was pushed through the mesh. Male rabbits fought and were eventually neutered.</p>
3	<p>Overcrowding and lack of concrete floors led to an overpopulation of rabbits and very high food costs. When the structure was dismantled, 73 rabbits were found burrows under the enclosure.</p> <p>Lack of drainage resulted in a permanent marsh on the one side of the enclosure.</p> <p>Lack of security resulted in stray dogs getting in and killing a number of animals.</p> <p>Children could climb in and out of the enclosure at any time. Baby rabbits were drowned in the duck pond by children teaching them to swim.</p> <p>The ethology of rabbits was not considered. This led to a huge burrow, which collapsed after a rainstorm.</p>
4	<p>Lack of environmental enrichment and protection from cold in winter resulted in the school complaining that all the pigeons and animals kept in the cage died. None of the animals and birds that died were submitted to a veterinarian for necropsy.</p> <p>It was placed away from the play area and no child-animal interaction occurred unless the class was taken to the area by the teachers.</p>
5	<p>When the duck's pond was washed out, the playground around it became very wet and muddy due to lack of drainage.</p> <p>Because the children had free access to the ducks, the eggs in the nest were destroyed by a child.</p>



As a result of the deficiencies listed in table 11.5, changes were made at four of the five preschools described above. Preschools number 1, 2 and 3 restructured their animal housing and management systems under veterinary supervision and preschool number 4 no longer keeps animals. An example of the cage now used at school 2 is shown in Plate 11.3:



**Plate 11.2:** Cage for housing rabbits and budgies at a nursery school. Features of the cage include correct animal density for cage size, drainage into a septic tank, concrete walls and floors, some environmental enrichment for budgies and rabbits and strategic location in the centre of the playground. The height of the floor has been raised so children can see more easily what the rabbits are doing

The cage at school number 2 has been in use for three years. The teacher's evaluation of this cage showed that the following problems remain:



- The design of the cage had to be submitted to the school management committee for ratification. This consisted of persons who were not teachers or veterinarians. They did, however, have the authority to overrule the teachers and certain design features were therefore not adhered to. One result was that the cage was too small to house more than two rabbits and another that environmental enrichment features were omitted as unnecessary.
- The drain became blocked with faeces due to the cleaner not having been instructed to sweep up the rabbit faeces before hosing down the enclosure.

### 11.3 Discussion

In order to formulate guidelines for the selection, management and housing of animals at preschools, constraints and objectives deduced from the literature review and observed results should be taken into consideration.

Informal interviews with teachers showed that certain factors influenced the choice of animals at schools (Table 11.1). Ease of management and low cost were mentioned for the most popular species (Table 11.3). Appeal to children was also highlighted. The species selected for a particular school also depended, to some extent, on whether the school had facilities for keeping that species. Certain animals were selected because they could be kept inside the classroom. On the negative side, undesirable behaviour patterns, such as fighting between males, were considered important. The amount of mess made and a tendency to die or escape were also mentioned.

Several of these could be addressed with veterinary assistance. Undesirable behaviour patterns in animals could be

changed by the right approach, after advice by a veterinary ethologist. Handling, for example, would make animals less aggressive. It was therefore suggested that animals to be used in preschools should be handled from an early age and be handled regularly by the care-giver. The sex of the animals selected also had an influence on behaviour, because males of the same species showed aggression to each other and there was also the question of whether breeding was desirable. Surgical sterilisation of male rabbits, rats, mice and guinea pigs would reduce fighting and prevent breeding.

The behaviour of animals could also be utilised to stimulate child-animal interaction. An example was the feeding of pigeons during the time the children have their free-play session in the play area. The pigeons would get used to the routine and appear in the playground at the same time as the children. Children could also then easily be involved in throwing out grain to the birds (Plate 11.1b). It was found, however, that there was a direct correlation between the number of birds and the amount of grain supplied. In order to prevent overpopulation, the amount of grain should therefore be restricted.

Veterinary advice which simplified the care and management of animals at preschool would also be valuable. Labour-saving housing design, automatic feeding and watering and assistance in choosing species where management is simple, would be examples.

Cost could be reduced by choosing low-cost systems such as a pigeon-cote in the playground. Keeping fewer animals would also be cost-effective as the feed costs, labour costs and housing costs would be reduced. When teachers ranked the cost of keeping animals, it was seen that the rank order was not the same as that found when the species were ranked according to preference. Rabbits, which were the most popular animals kept at preschools, were only ranked

fifth on the scale of cost. Although cost of keeping the animals was mentioned as important by teachers during informal interviews, it may therefore be concluded that ease of management and appeal to children were factors which were also considered important.

The evaluation of housing systems indicated that certain deficiencies needed to be addressed in order to fulfil the objectives of an ideal housing and management system and yet work within the limits set by the constraints listed above.

It should be noted that, during the evaluation of the housing systems at preschools reported in Table 11.4, those criteria dealing with the well-being of the animals were generally met. The exception being that the ethology of the animals, which has a strong influence on the occurrence of zoonotic disease (eg the elimination behaviour of cats), the child-animal interaction (eg hamsters that are regularly handled are less liable to bite) and animal well-being (Odendaal, 1994a) was not considered by any of the preschools. Surprisingly, only two of the schools had located the animal cages strategically in the playground.

Housing systems should be structured to maintain the physical homeostasis of animals in order to minimise stress and promote well-being. Environmental enrichment within the cage was not only to the benefit of the animals, but would also provide a variety of situations and play-behaviour, which could stimulate cognitive and affective reactions in children. Observation of the animals and their response to the presence of children in the playground could be enhanced by the strategic placing of the cage and a structure which allowed observation of the animals' behaviour.

In practice, at preschool 2, it was found that the school committee, who had no qualifications in teaching or animal management, could unfortunately overrule advice given.



**Table 11.6: Guidelines for housing and management of animals at preschools in terms of meeting objectives for well-being of the animals, needs of children and prevention of zoonotic diseases**

Criteria	Zoonosis prevention	Meets needs of child and teacher	Meets needs for well-being of animals
Low animal density	Yes	Yes	Yes
Adequate shelter from heat and cold	No	No	Yes
Adequate ventilation	Yes	No	Yes
Adequate drainage	Yes	No	Yes
Environmental enrichment present	No	Yes	Yes
Ethology considered	Yes	Yes	Yes
Security sufficient	No	No	Yes
Easy to clean and maintain	Yes	Yes	No
Concrete or impervious walls/floors	Yes	Yes	Yes
Adequate nutrition	Yes	No	Yes
Regular feeding/watering schedule	No	Yes	Yes
Feed and water easily accessible	No	Yes	Yes
Adequate bedding/nesting materials	No	No	Yes
Adequate hygiene/disease prevention	Yes	No	Yes
Strategically located in play area	No	Yes	No
Child-animal interaction supervised	Yes	Yes	Yes
Children able to feed animals under supervision	No	Yes	Yes
Veterinary care available	Yes	No	Yes

Veterinarians and preschool staff should therefore consider three main objectives when selecting species and designing housing and management systems for animals kept permanently at preschools. These are:

- the well-being of the animals
- meeting the needs of the preschool child and teacher
- prevention of zoonotic disease.

It is difficult to say that any one of these is more important than another and they should all be considered simultaneously. Selection of animal species to be kept, the type and location of the animal housing and the management system to be followed, would all have to be decided while weighing up these three objectives.

The interaction of these objectives with the checklist for evaluating animal housing and management is illustrated in Table 11.6, and this may be regarded, therefore, as a set of guidelines for animal housing and management at the preschool.

The consequences of inadequate housing and management, reflected in Table 11.5, underline the usefulness of the guidelines suggested above, for the evaluation of animal housing systems designed for preschools.

In the next chapter, teacher attitudes and teaching strategies following the death or euthanasia of animals kept at preschools will be examined.

## CHAPTER 12

### TEACHING STRATEGIES FOLLOWING THE DEATH OR EUTHANASIA OF ANIMALS AT PRESCHOOL

#### 12.1 Introduction

Animals kept at preschools may die or be euthanased as a result of old age, injury or disease. Experience of life, death and grief is one of the advantages of interaction between preschool children and animals (Blue, 1986). It presents a learning experience which leads to understanding of the abstract concepts involved and helps them to deal with loss of family members and friends later in life (Levinson, 1967).

Death and euthanasia of companion animals forms part of the human-animal interaction and the effects of the loss of a companion animal have been well studied (Kay et al, 1984; Odendaal, 1986). Many researchers have observed that there are stages in pet-loss that are similar to those described for the loss of a human friend or family member (Hopkins, 1984; Rajaram et al, 1993). The stages are denial, depression, anger, guilt, and eventual acceptance (Odendaal, 1986). Katcher and Rosenberg (1979) noted that these stages could last 10 months or longer, while Harris (1984a & b) stated that they lasted 6-8 weeks, and Beck and Katcher (1983) suggested that the grief was intense but brief, and that all the stages could be completed in a few days. Variations in the intensity and duration of grief described by these authors could be due to the level of attachment between the person and animal involved (Cusack, 1988; Gosse & Barnes, 1994).

The stages of grief lead to the tasks of mourning, which have been described by Feigelbaum (1991) as:

- accepting the reality of the loss
- experiencing the depression
- adjusting to life without that being
- reinvesting in a new relationship.

In the case of human loss, friends and family members provide the support needed during this process (Beck & Katcher, 1983). Psychological support for bereaved pet owners may be achieved by initiating a pet-loss support group (Hart & Hart, 1987). Cusack (1988) suggests that investing in a new relationship involves the decision to get a new puppy or kitten, although this may not be the end of the mourning process as a favourite pet may be remembered for years afterwards with sorrow.

According to Harris (1984b), anger at the loss of a pet may be directed at the veterinarian or the parents of a child. Cusack (1988) therefore suggests that a veterinarian euthanasing an animal, should stress that the act was one of kindness and compassion. This should be done sympathetically and by using simple language that the child can understand. Although parents often ask the veterinarian to lie to children about the animal's death, this is not only ethically wrong, but may also lead to a loss of trust in the veterinarian (Odendaal, 1986). Levinson (1972), however, suggests that if the facts of the death are too unpleasant, these should be glossed over when explaining the matter to the child.

Time to say goodbye to the pet after death is preferable to children being present during euthanasia. Thereafter a simple ceremony, such as burial or planting a tree in memory of the pet, is suggested (Harris, 1984b).

Whether this advice applied to the loss of an animal kept permanently at a preschool, was unknown. It was therefore difficult to advise teachers on the approach to use when they were faced with the death or euthanasia of animals at school.

The objective of this investigation was to observe and evaluate childrens' and teachers' responses to euthanasia or death of an animal kept permanently at a preschool in order to formulate a teaching strategy which would lead children towards an understanding of the abstract concepts involved.

## 12.2 Results

The method described in Figure 7.5 suggests that a teaching strategy should be developed following a literature review and direct observation and then used and evaluated. Headings in the figure will be used below.

### 12.2.1 Direct observation

The direct observation on which the teaching strategy was based, was of the natural deaths of two rabbits kept permanently at each of two preschools.

Teachers were interviewed a week after the natural death of a rabbit at a preschool in the eastern suburbs of Pretoria. Observations were made and photographs taken of the course of events following the death of a baby rabbit at a second preschool. Questions were in both cases in the form of a structured interview (Figure 12.1).

1. Did you know the rabbit had died?
2. Did you explain the concept of death to the children?
3. How did you dispose of the rabbit?
4. What sort of reaction did you get from the children?

**Figure 12.1: Questions asked during a structured interview with teachers at two preschools following the natural death of two rabbits, one at each school**

The answers from the teachers (n = 9) who were interviewed are shown in Table 12.1.



**Table 12.1: Results of structured interviews with teachers at two preschools following the death of two rabbits, one at each school**

Question	School 1	School 2
1	Yes (3) No (2)	Yes (4)
2	Yes (2) No (3)	Yes (4)
3	Took it to the vet (1) Don't know (4)	Had a ceremony, then after children had gone, took it to the vet (4)
4	Some reaction (no specific answers were received) (3) No reaction (2)	Very positive reaction (4)

As well as the structured interviews, photographs were taken of the baby rabbit that died at preschool 2. This rabbit was shown to the children, who picked flowers to put on it's body and also had a small ceremony to say goodbye to the rabbit. Photographs of the dead rabbit are shown in Plate 12.1 .



**Plate 12.1: Carcass of baby rabbit that died at a preschool, covered with flowers by children during a farewell ceremony.**

### 12.2.2 Designing the teaching strategy

Following this, a teaching strategy was suggested, based on the above observations and the recommendations of Cusack (1988), Harris (1984b) and Odendaal (1986), which teachers could use to approach the subject of death or euthanasia of animals kept at school (Fig 12.2).

- \* Children should be prepared for the event, if possible, by having the disease or condition pointed out to them
- \* Children should not be present when the animal is euthanased or removed from the school to be euthanased
- \* The carcase of the animal, after death or euthanasia, should be shown to the children in an acceptable manner (eg arranged tastefully in a natural position in a box)
- \* Children should be encouraged to talk freely about their feelings and ask questions
- \* The teacher should act as mediator and emphasise the finality of death in a sympathetic way
- \* A ceremony should be planned that finalises the process for the children
- \* The animal should be hygienically disposed of afterwards

**Figure 12.2: Suggested teaching strategy for approaching the subject of death or euthanasia of an animal at preschool**

### 12.2.3 Evaluating the teaching strategy

Preschool 1 had a rabbit that had been at the school for 11 years and was due to be euthanased as it had developed an inoperable tumour. The rabbit was removed from the school in the late afternoon when all the children had gone home. It was euthanased at the veterinary clinic.

The carcase was arranged neatly in a box and refrigerated overnight. It was returned to the school early the next morning so that it could be shown to the children, and collected two hours later for disposal by cremation. Photographs were taken by teachers of the children looking at the rabbit (Plate 12.2).





**Plate 12.2: Children at preschool and the dead rabbit which was euthanased by a veterinarian**

The age of the group is important to the method of teaching in each class at a preschool (Grobler et al, 1990). The number of children and the age group of the children in each class at preschool 1, during the time the observations were made, is therefore shown in Table 12.2:

**Table 12.2: Number of children in each class and age group of each class (n = 5) at preschool 1**

Teacher	Number of children in the class	Age group of the children (years)
1	17	3 - 4
2	22	4 - 4,5
3	19	5 - 5,5
4	23	5 - 6
5	20	6 - 7



Because the age groups differed from class to class, each teacher was encouraged to modify the teaching strategy in the way she thought best for her class. Prior to euthanasia of the rabbit, teachers were asked to give details about the way in which they planned to prepare children for the euthanasia of the rabbit. The results are shown in Table 12.3

**Table 12.3: Ways in which the teachers (n = 5) planned to prepare the children (n = 101) for the euthanasia of the rabbit**

Teacher	Teacher's comments on preparation of the children for the euthanasia of the rabbit
1	<p>Hopefully someone will ask where the bunny has gone. Otherwise the morning ring will provide an opportunity to say "Something very sad has happened, did you notice something in the garden this morning?"</p> <p>"The bunny has been looking miserable"</p> <p>"The bunny was very old and the vet said he would not get better"</p> <p>"The bunny could not drink medicine like you to make it feel better"</p> <p>"The vet will give it an injection instead and the bunny will go to sleep and not wake up again, so it won't hurt any more"</p> <p>"We will see the bunny later, he will look like he is sleeping, but he is actually dead"</p>
2	<p>"Have you noticed anything peculiar about the bunny lately?"</p> <p>"Have you seen the lump on it's neck?"</p> <p>"He is very sick and lonely since his friend has died"</p> <p>Discuss children's suggestions. Mention that the veterinarian has an injection to give an animal which is sick and in pain and will not come right. The injection will let the bunny die peacefully and without pain. When he is dead we will bury him, but we will first bring him he so you can say goodbye after he is dead.</p>
3	<p>I will tell the children that the vet has taken the bunny to have a look at him (show a picture of the vet examining an animal). The vet has found that the bunny is very sick and old. Remind the children about the big lump on the bunny's neck. Tell the children the vet has given the bunny an injection so he can die quickly and quietly without any pain. The vet will bring the dead bunny back so we can say goodbye to him. The vet will take him away to be cremated (briefly explain this).</p>
4	<p>Take the children to see the bunny. Point out the lump on its neck. Explain about tumours and how it will never get better. Ask if it is nice for an animal to be sick and in pain. Tell them that the vet loves animals and will come and fetch the bunny. She has said that it would be best for the bunny if it were put to sleep. Then, after that, she will put him in a nice box and bring him back to show how peaceful he is.</p>
5	<p>Be completely honest with the children. "Our bunny is sick and the vet has come to fetch him". "He was sick and in pain, it was better to euthanase him". Talk naturally about it and answer all questions put by children. Let the children show their feelings. Do not replace the rabbit too soon, because the children should work through their feelings of loss (you cannot replace one life with another).</p>

#### 12.2.4 Observed results of using the strategy

A questionnaire was developed to be used by teachers for a series of observations on all the children ( $n = 101$ ), in all the classes ( $n = 5$ ) at the preschool 1 (Fig 12.3).

One form to be filled in every day from 1990.07.02 to 1990.07.06

All findings to be confidential. Please do not discuss with other members of staff before the trial is finished

Date: \_\_\_\_\_

1. Details of teacher and class:
  - 1.1 Name of teacher
  - 1.2 Number of children in class
  - 1.3 Age group of children in class
2. Please describe in detail the method you used to prepare the children for the euthanasia of the rabbit
3. Number of children asking questions repeatedly ( $> 2$  x in a day)
4. Types of questions asked by children:
  - 4.1 Callous
  - 4.2 Curiosity
  - 4.3 Denial
  - 4.4 Blame/aggression
  - 4.5 Guilt/depression
  - 4.6 Acceptance/asking for another animal
5. Examples of questions asked/further comments on behaviour of children, teacher's impressions
6. Please describe in detail your impressions and comments on the methodology you used. In retrospect: what way would you have approached the subject differently?

**Figure 12.3: Questionnaire for the observation of the effect of the teaching strategy used after euthanasia of an animal at preschool**

Questions and comments by the children were recorded by the class teachers. Direct questioning of children was not used, as this would have had ethical implications.

The number of questions asked by the children about the death of the rabbit were recorded and are listed in Table 12.4.

**Table 12.4: Number of questions about the euthanasia of the rabbit asked over a five day period by children at preschool 1**

Teacher	Day 1	Day 2	Day 3	Day 4 and 5
1	13	0	0	0
2	6	4	1	0
3	3	2	0	0
4	3	1	0	0
5	6	3	0	0

Day 1 was taken as the day on which the dead rabbit was taken to the school for the children to see. It should be noted that the children did not ask questions after the second day, except for one child who had been absent for two days and asked her classmates what had happened to the rabbit. When she was told it had been euthanased, she did not believe them and asked the teacher for confirmation.

**Table 12.5: Type of questions about death and euthanasia asked over a five day period, by children at preschool 1**

Class	Number of children asking repeated questions	Number of questions due to curiosity	Number of questions asking for a new animal	Other questions
1	3	4	1	0
2	2	3	3	0
3	0	5	1	0
4	1	6	0	0
5	0	6	3	0

Although the questionnaire had made allowance for questions in all the categories described in the literature (Fig 12.3), it was noted that all the questions asked by children were classified by the teachers as either curiosity or acceptance, asking for a new animal (Table 12.5).

No questions or comments which reflected denial, aggression, guilt or depression, were recorded. A few children ( $n = 6$ )

asked the same question repeatedly. This could have been a sign of some anxiety, however, children of preschool age may ask a question repeatedly in order to make cognitive sense out of new experiences. Examples of the comments and questions from the children are recorded in Table 12.6. Teachers did not record all the comments made, as the recording had to be fitted into the other activities of the day.

**Table 12.6: Details of questions asked by the children and further observations by the teachers**

Teacher	Questions and observations
1	<p>Only one child went to check the rabbit's cage.</p> <p>Three conversations about death were overheard, eg "When I was little I was dead".</p> <p>One mother reported that her child repeatedly said that the bunny was very lucky to go to the vet when it was sick.</p>
2	<p><b>Day 1:</b> "When will he get alive?" "His eye is open". "When will he come back?" "Where is he now?"</p> <p><b>Day 2:</b> "My daddy will buy us a new bunny for school".</p> <p>One mother reported her child said that the bunny had sores on its neck and now it was in heaven".</p> <p>Another mother reported that she could not understand what her child was talking about.</p>
3	<p><b>Day 1:</b> 'Can't we keep the bunny so that we can look at him every day?' "The bunny died but when we have a jumble sale we can buy five more".</p> <p><b>Day 2:</b> "When will we have a new bunny?"</p>
4	<p><b>Day 1:</b> "I am so sorry for the bunny because it is dead". "Is the bunny dead?"</p> <p><b>Day 2:</b> "When are we going to bury the bunny?"</p>
5	<p><b>Day 1:</b> "Will it be nice in heaven?" "How did the doctor kill the rabbit?" "We were lucky when the other rabbit died because we still had one rabbit left". "Bunny is happy with Jesus".</p> <p><b>Day 2:</b> Child suggested that the new bunny should be called Linda. One mother reported that her child was heartbroken about the death of the bunny.</p>

### 12.2:5 Re-evaluation of teaching strategy

The last question (question 6) in Figure 12.3 was used for the reevaluation of the teaching strategy suggested in Figure 12.2 and modified by teachers to suit the age-group of their classes (Table 12.3). The retrospective evaluation by the teachers of the approach each of them used, is shown in Table 12.7.

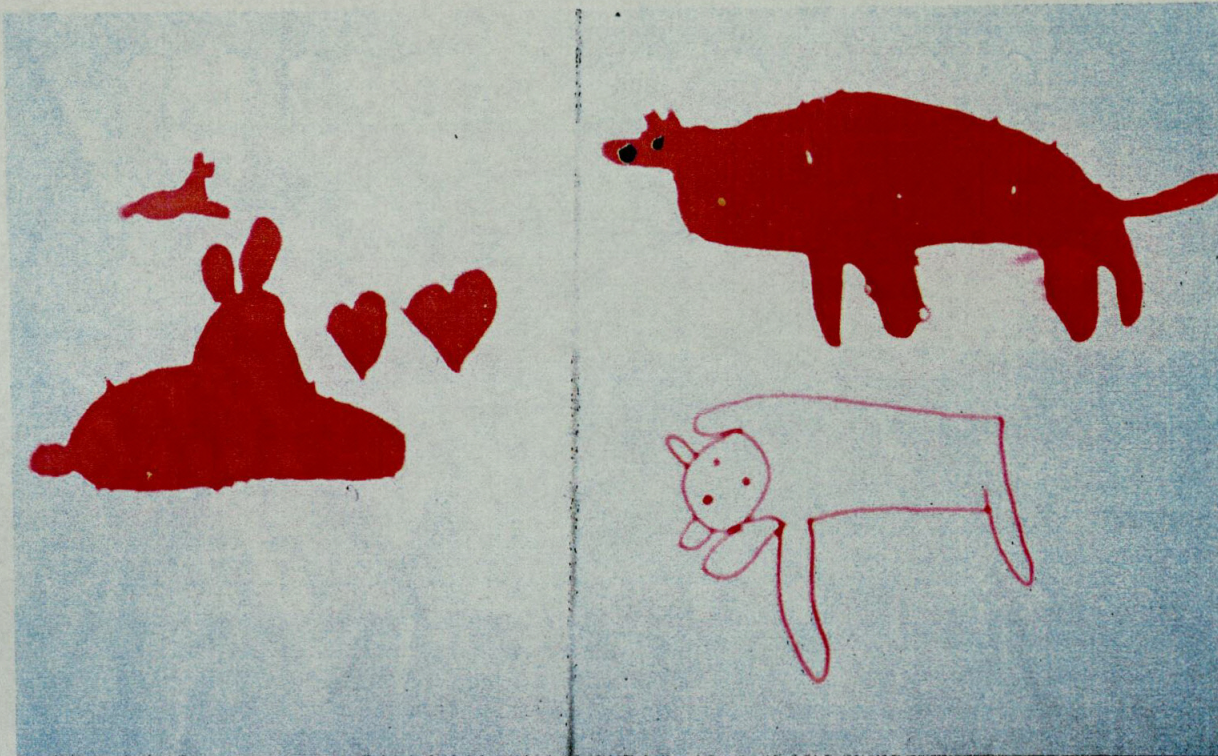
**Table 12.7: Retrospective evaluation by teachers (n = 5) of the approach used to inform the children about the euthanasia of the rabbit**

Teacher	Comments in retrospect about method used
1	The children in this age group (3-4 years) have very little concept of death. The dead bunny looked as though it was sleeping and only one child was a little upset. I am not sure that they understood that the vet put the rabbit down, I got the impression that some of the children thought that the bunny died in spite of the injection instead of because of it. I feel that my presentation was adequate, but I was definitely the one most upset and uncomfortable about the whole situation. The rabbit lay uncovered for about 10 minutes and the only problem I had was to prevent the children from touching it. I would have preferred to just tell the children that the bunny had died. The children had little concept of euthanasia and I do not know any other way of explaining it to them, except to say that the vet killed the bunny, which was too harsh. The children did not associate the new bunnies with the old one.
2	The children accepted the death of the bunny without anyone being upset. In general they all told their parents that the bunny had a sick neck and was old and that they were going to get a new bunny. In retrospect I cannot think of anything I should have done or handled differently except to have paid more attention to it when it was alive. I also think that if the children had been more involved in caring for the bunny, they would have reacted worse to the whole thing. They are very interested in the new bunnies and quite upset when we thought one had gone missing.
3	I was satisfied with the way I explained euthanasia to the children, they seemed to understand it all as there were hardly any questions. The children all had a great urge to stroke the bunny and I let them. They willingly washed their hands afterwards. Only one child spoke about the bunny during the holiday and was eager to see the new bunnies. No questions were asked about the dead bunny on the first day of the new term. There was great excitement about the cute little new bunnies. They watched with interest while the cage was cleaned and prepared and everyone wanted to help in some way.
4	Was satisfied with the way it was handled. The children were very happy to see the new bunnies when they came.
5	I would not have handled the situation differently. The children were very curious and wanted honest answers to their questions. Several of the children had already experienced a similar situation and were reminded of their own pets. They were very worried whether the bunny was in heaven and whether it was nice there. When the new rabbits had been at the school two days, I took the children to help clean the cage. When we went in the rabbits escaped and ran behind the bushes. One of the children said "They are afraid that we are going to kill them like the old rabbit". In retrospect I think it is a good thing that we got new rabbits for the children.

Although the above results indicated that the children were not greatly affected by the loss of the rabbit, this was not the case for the staff. The gardener who had fed and cared for the rabbit was observed to be very upset about its' death, as was one of the teachers and the head mistress of the school. In all three cases considerable re-assurance was needed from the veterinarian that euthanasia had to take place and that the condition from which the rabbit was suffering, was incurable.

In addition to the data obtained during this episode, teacher 3 supplied drawings made by her own children, aged 4 and 6, after the euthanasia of the household pet, a collie, who had been badly injured after being hit by a car (Plate 12.3)





**Plate 12.3:** Drawings made by two children of preschool age following the euthanasia of their pet dog after a road accident

According to an in-depth interview conducted with the teacher, these two children were tearful and mentioned their pet and its death for several weeks after euthanasia. Both children still had clear memories of the occasion which had taken place in 1984, seven years prior to the interview.

### 12.3

#### **Discussion**

The initial observations made at preschool 1 and 2 following the natural death of two rabbits indicated a positive response



to the teaching strategy used at preschool 2. In this case the technique of teacher mediated learning experience (MLE), as described by Wiechers (1991), was used to bring across the abstract concepts associated with death in a natural way. A simple ceremony, initiated by the children, concluded the episode and the rabbit was disposed of in a hygienic fashion after the children had gone home.

In contrast to this, the loss of the rabbit at preschool 1 was not even noticed by two of the three teachers and the opportunity for MLE was not utilised by 3 of the 5 teachers. The reaction by the children to the death of the rabbits was not specifically recorded at either preschool.

The teachers had not had previous experience of explaining the concept of euthanasia to preschool children, except in the case of teacher 3, who had to have her own dog euthanased after a road accident, when both her children were of preschool age.

Table 12.3 showed the different ways in which the teachers planned to prepare the children for the death of the rabbit. Teacher 1 was less comfortable with the concept than the other teachers. This is in accordance with the observations of Levinson (1967), who said that even professionals in mental hygiene may shy away from discussing death.

Teacher 4 discussed euthanasia and showed the children the lump on the rabbit's neck on the previous day, whereas the other teachers only discussed euthanasia of the rabbit in the morning, just before the children were shown the body. This may perhaps be a better approach as too much warning about incipient death may give rise to anxiety (anticipatory grief) in the owners of pet animals (Kay et al, 1984). The majority of questions and comments by the children occurred on the day that the body of the rabbit was brought to the preschool. It was interesting to note that most of the questions and comments had to do with curiosity about the concepts

involved, rather than the stages of grief described for adult pet owners. This might have had more to do with the relatively superficial and transient relationship between the children and an animal kept at school, than the age group of the children. Levinson (1972) suggests that a child who experiences the death of an animal as part of a group of children may more easily accept it in a matter of fact way as part of nature, provided that he was not personally involved with the animal.

This contention was supported by the observed behaviour of those members of staff who had long-standing contact with the rabbit. The person closest to the rabbit was the gardener, who had fed and looked after it and its brother (the rabbit that died earlier) since they first came to the school, and he was very sad about the death of both rabbits. This is also in accordance with the suggestion by Gosse and Barnes (1994) that the severity of mourning is increased by close attachment to the animal.

The retrospective evaluation by teachers of the teaching strategy used was positive for four out of the five teachers. Teacher 1 was uncomfortable with the situation and would have preferred to merely tell the children that the rabbit was dead. Although this approach is possibly easier for the teacher, it could result in a missed opportunity. Kay et al (1984) felt that, for children, the death of a pet could provide an important life experience.

The drawings made by the children whose pet dog was euthanased, revealed a great deal more stress and emotional trauma than was recorded for the children at school whose rabbit was euthanased. The fact that they also remembered the experience after seven years and were visibly emotionally affected at the time, underscores this. The more severe reaction was possibly because of the much more intense attachment of the children to a household pet, with which they were in close daily contact. In contrast, the rabbits at



the preschool were shared by all the children. Contact was limited to certain times of the day when children were outdoors and they left the school after lunch to go home. Preschool children also spend only three to four years at the school, moving from one class to the next each year. Because of this, the children could probably approach the death of an animal kept at school, with some detachment, and there was therefore less risk of psychological trauma.

It was reported by Cusack (1988) that children of preschool age might perceive death merely as a temporary absence. Because death was regarded as impermanent, death wishes towards pets or human beings could occur. If the death actually happened, however, the child could suffer a deep feeling of guilt. Death could also be viewed as a form of punishment by the child. Teachers should therefore use the death or euthanasia of an animal kept at the school as an opportunity to explain the finality of death and to work through any misconceptions using MLE.

*"As death becomes less mysterious, more understandable and in a sense, palable, the associated emotions of fear become more manageable. Fantasies are cut to size by intruding reality factors and the child is able to cope with grief more adequately" (Levinson, 1972, p128).*

In terms of the suggestion by Blue (1986) that the child-animal interaction helped children to understand life, death and grief, it is suggested that children could experience these at the level of the natural curiosity shown in Piaget's (1970) pre-operative phase. In such a case, experiencing the concepts involved with death of an animal kept at the school did not seem to have the emotional risks associated with the death of a beloved pet.

## **CHAPTER 13**

### **ANIMALS IN LITERATURE, GAMES AND TOYS AT PRESCHOOL**

#### **13.1 Introduction**

During the survey described in Chapter 8, it was noticed that a large proportion of the books and toys at preschools had animal protagonists, yet the extent of this was not well described in the literature.

In Chapter 2 it was shown that animals could have a positive role to play in the development of the preschool child. It was also found that animal topics were used in media available to young children. However, a quantitative and qualitative evaluation needed to be done in order to investigate how animals appeared in books used at preschools, so as to fully understand the extent of this type of child-animal interaction.

Whether the presence of animal protagonists or topics in books contributed to the aims of preschool education as described by Grobler et al (1990), could also possibly be extrapolated from an evaluation of the books in which animals appeared as subjects or protagonists.

The veterinary perspective would be to evaluate the accuracy of factual presentation of animal behaviour and how this could influence the behaviour of the child in relation to animals. None of the methods described for the classification and evaluation of books were wholly suitable for these purposes.

Using the findings of the literature review, a method was developed for the classification and evaluation of the animal content of books and toys. This was used to survey and evaluate books and toys at preschools. Criteria for the evaluation of individual books by veterinarians, parents and teachers, were then formulated.

The objective of this section of the study was to investigate the true level of animals and animal topics in preschool literature, games and toys and make recommendations for their evaluation with regard to positive child-animal interactions.

## **13.2 Results**

Results will be presented in different sections below and preschools in high and low income areas compared. The classification and cataloging of books observed, the evaluation of the use of animal topics and protagonists in children's literature, a comparison of children's with adult's books at preschools, books chosen by children themselves and animal themes in toys and games will be examined.

### **13.2.1 Classification and cataloguing systems found at the pre-schools**

Eastern Suburbs Nursery School had 1029 and Brooklyn Park Nursery School had 1026 books. These books were set out in different sections (Table 13.1).

**Brooklyn Park:** All the books were kept in one classroom. The children were not allowed to touch any of the books on the shelves. The shelves were different heights, so the books were classified primarily on size.

Teachers took out books on the particular "theme" they were

exploring and these were used on the interest table in each classroom. There was also a place in each classroom where other books were kept for children to look at. The books were taken from and returned to the main bookshelf.

**Table 13.1: Classification and cataloguing systems used for the libraries at Eastern Suburbs and Brooklyn Park Nursery Schools and the Resource Centre**

<p><b>BROOKLYN PARK</b> (Shelves are different sizes so books are arranged by size)</p> <p><b>Teachers' books</b> Themes (small) Themes (medium) Themes (large) Teaching methods Activities</p> <p><b>Children's books</b> Ladybird series Small books Golden series Medium sized books Bible stories Large story books Soft cover story books Hard cover story books Richard Scarry and dr Suess books Library books</p>	<p><b>EASTERN SUBURBS</b></p> <p><b>Teachers' books</b> First aid Teaching resources Stories to tell or read Science Themes Religion Child development General</p> <p><b>Children's books</b> Clothes and good habits Senses and the body Medical Religious and Christmas Science Concepts Night Foods and shopping Sea and Water Music and Sound Occupations Birds Insects Rodents Garden, Nature and Plants School Time, Seasons and Weather Transport Houses and Building Family Pets Wild Animals Farm Animals General Fantasy Richard Scarry &amp; Dr Suess books Library books</p>
<p><b>RESOURCE CENTRE</b></p> <p><b>Teachers' books</b> Random order on shelves</p> <p><b>Children's books</b> Book bags each with 16-20 books</p>	

The preschool was also used as a Sunday School by the Methodist Church next door, so the Sunday School books were also kept on a shelf. These books were not used by the preschool and were therefore not enumerated or analysed.

Library books that children could take home were kept on separate shelves. No card system was used, the books were merely written up in an exercise books kept by the class teacher.

**Eastern Suburbs Nursery School:** Books were kept on shelves in the school office and on another series of shelves in the school reception area. The former were the books used by teachers in the classroom, either to coincide with particular "themes" or, as in the case with Brooklyn Park, as books for children to look at. They were classified into two main groups: adults' reference books and children's books. The children's books were further classified according to the "theme" for which that particular book was to be used. The books kept in the reception area were library books for the children to borrow and take home. A card system and date stamp were used to keep records of these books.

**The Resource Centre:** This centre kept its books for children in book bags. There were eight bags each containing between 16 and 20 books. The bags were sent out to schools in low-income areas. Books for adults were kept on the shelves of an office and were used by students during workshops and courses.

In order to interpret the role of animal topics and animal protagonists in children's books at these schools, an analysis system was developed.

### 13.2.2 **Developing a system to analyse animal content**

This system was designed to analyse books with regard to the way in which a specific subject (the animal) was involved, and therefore could not be labelled as a method for evaluation, classification or cataloguing. The term analysis system was proposed instead (Table 13.2).

**Table 13.2: System for the analysis of format, genre and subject of books used in the preschool (corresponding variable symbols in brackets)**

Format	Genre	Subject
<b>Adult's book (A)</b>  <b>Children's book (C)</b> Toy/Board (FTB) Wordless (FW) Picture (FP) Illustrated (FI) Concept (FC) Short Stories (FSS)	<b>Poetry (P)</b> Rhymes (GPR) Verse (GPV) Poems (GPP)  <b>Prose</b> <b>Fiction (GF)</b> Realistic (GFR) Historical (GFH) Fantasy (GFF) Traditional (GFT)  <b>Non-fiction (GN)</b> Information (GNI) Biographic (GNB)  <b>Religion (GR)</b> Christian (GRC) Other (GRO)	<b>No Animals (NA)</b>  <b>Animals (A)</b>  <b>Central (AC)</b> Realistic (ACR) Humanised (ACH) Anthropomorphic and Fantasy (ACA)  <b>Incidental (AI)</b> Realistic (AIR) Humanised (AIH) Anthropomorphic and Fantasy (AIA)

The above table is divided into three columns representing the variables format, genre and subject. Genre is subdivided on whether the book was in poetry or prose and then further subdivided into categories and subcategories. This corresponds partly to the classification of Glazer (1986) and partly to the form classes of the Dewey decimal system. Religion was brought in on a separate category, unlike any of the American systems which merely classify it as a form of Traditional Literature.

Subject was considered only in regard to the animal content of the books. If no animals were present, the content was not further analysed. If animals were present, their role was defined as central (C) to the story (the animal as one of the main characters of the plot) or incidental (I) to the story (animals appear in the story, but not as main characters).

The behaviour or type of animals was further analysed in terms of realistic (for example a dog that fetches a ball),

humanised a dog to which human speech or feelings are ascribed, but that behaves in essence normally (eg Fred Basset in the cartoon strip of that name), anthropomorphic (cartoon animals which wear clothes or behave entirely like humans, eg Mickey Mouse) and fantasy animals (eg unicorns, monsters and dragons). Examples are given in Figure 13.1.

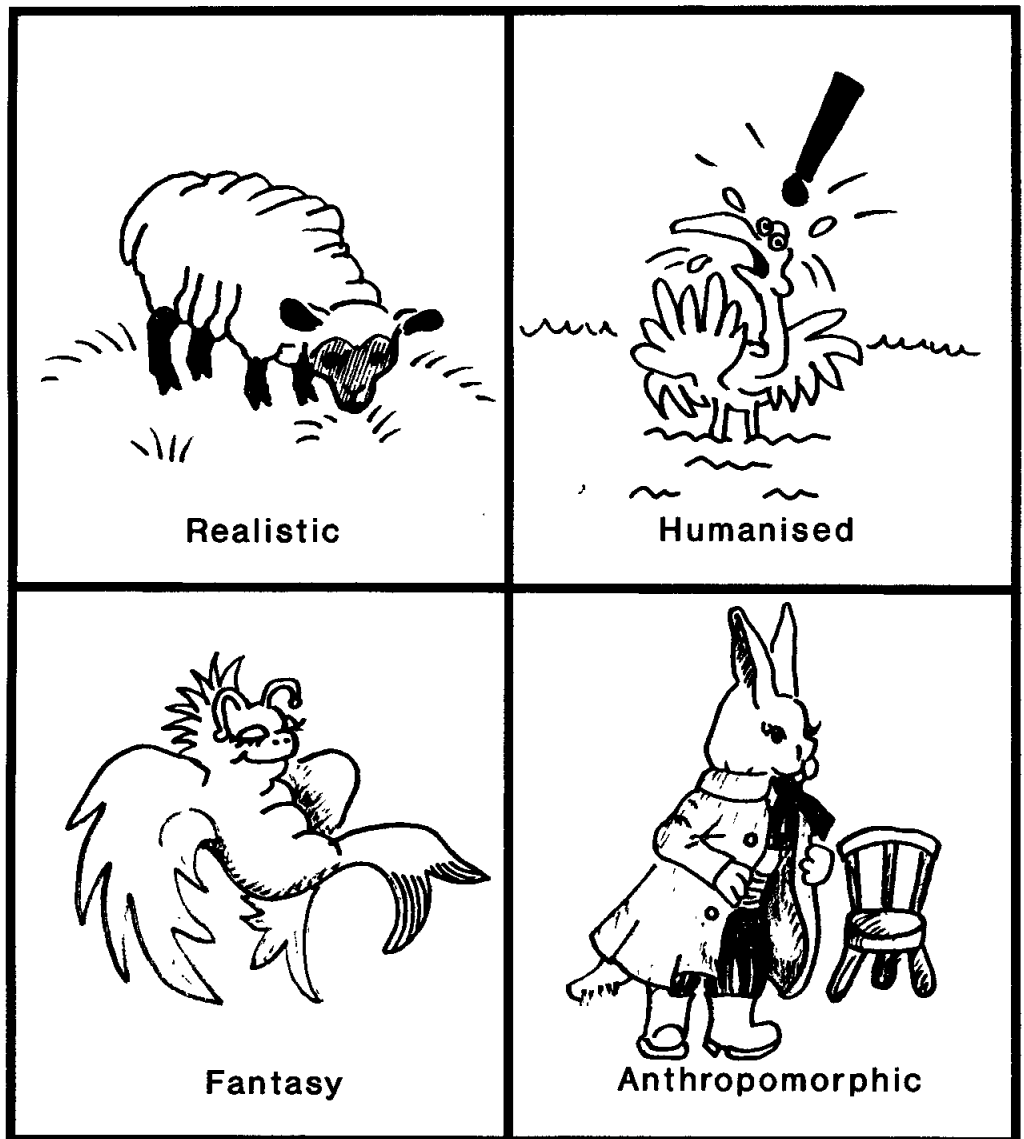


Figure 13.1: Drawings of animals in different subject groups

One of the difficulties was with toy animals. Could you regard a teddy bear that talked (eg Pooh Bear) as an anthropomorphic animal or was it an anthropomorphised inanimate object? A train that talked, thought and wore a scarf (eg the Little Engine That Could) was obviously an anthropomorphic inanimate object. However, in the light of the findings of Tate (1983) in regard to human perceptions of bears being based on experience with teddy bears, it was decided to classify toy animals in books as anthropomorphised animals.

The books at all three schools were read and enumerated according to the category into which they fell. The subject categories of "fantasy" and "anthropomorphic" were combined as it was found that in many cases real and fantasy animals were found in the same story (eg Richard Scarry and Walt Disney picture books).

The system for the analysis of the format, genre and subject of books at preschools, as shown in Table 13.1 was found to be relatively simple to use. Results obtained from applying this analysis system to the books at the three schools were comparable. This may be seen from the relative and absolute frequencies of Format, Genre and Subject classes for each preschool as set out in Tables 13.3, 13.4 and 13.5.

The most commonly encountered format was that of picture books (FP). The mean relative frequency of FP books for the three preschools was 77,33% (n = 1747).

Although certain publishers, for example *Ladybird Books*, differentiated picture books according to age groups, this was ignored in analysing the books as there was no consistency between different publishers.



**Table 13.3: Relative frequency distribution (%) of books in each format category for the three preschools**

Format	School 1		School 2		School 3		Total	
	F	%	F	%	F	%	F	%
A	83	8,0	147	14,3	55	26,9	285	12,6
FI	98	9,5	45	4,3	2	1,0	145	6,4
FI/SS	8	0,8	22	2,1	0	0	30	1,3
FP	805	78,2	801	78,7	141	69,1	1747	77,3
FP/SS	17	1,6	0	0	1	0,2	18	8,0
FTB	17	1,6	9	0,9	4	2,0	30	1,3
FW	1	0,1	2	0,2	1	0,5	4	0,2
Total	1029	100	1026	100	204	100	2259	100

**Key**

A: Books for adults

FI: Illustrated books

FI/SS: Illustrated short stories

FP: Picture books

FP/SS: Short stories, picture book format

FTB: Toy and board books

FW: Wordless picture books

The illustrations in picture books were varied. Two and three dimensional line-drawings were popular, paintings were used in some books and photographs were used occasionally. The colours were bright and primary colours were preferred. Animal drawings varied from entirely realistic to cartoon-like representations.

In many cases, even when the story did not involve animals, animals were included in the pictures. For example, a story might revolve around a birthday party and the pictures of children celebrating would include the pet dog, cat or bird, however, the animals would not be mentioned in the text, even if they were very central to the picture.

**Table 13.4: Relative frequency distribution of books in each genre category for all three preschools, standardised by conversion to percentage**

Genre	School 1		School 2		School 3		Total	
	F	%	F	%	F	%	F	%
GPR	31	3,0	33	3,2	2	1,0	66	2,9
GPV	33	3,2	17	1,7	0	0,0	50	2,2
GFF	194	18,9	73	7,1	31	15,3	298	13,2
GFR	390	37,9	475	46,3	91	44,8	956	42,3
GFT	88	8,6	65	6,3	4	2,0	157	30,0
GNI	253	24,6	355	34,6	70	34,0	678	30,0
GRC	40	3,9	8	0,8	6	3,0	54	2,4
Total*	1029	100	1026	100	204	100	2259	100

**Key**

GPR: Poetry (Rhymes)

GPV: Poetry (Verse)

GFF: Fiction (Fantasy)

GFR: Fiction (Realistic)

GFT: Fiction (Traditional: fair tales, legends and fables)

GNI: Non-fiction (Information)

GRC: Religion (Christian)

\* No books were found in the following genre categories: GPP, GFH, GRO

The genre of books most frequently encountered was realistic fiction (GFR) and non-fiction information (GNI). The relative frequency of GFR books was found to be 42,3% (n = 956) and of GNI books 30% (n = 678).

Realistic fiction (GFR) could be used in relating all facets of preschool education to the child's life-world. The principle of working from simple to complex, from present to the unfamiliar and from concrete to abstract could also be promoted through this genre. This was because the realistic fiction in books for preschool children often involved routine everyday activities such as eating breakfast, going to bed, shopping, going for walks, birthday parties and visiting the seaside,

circus or zoo. According to Tiedt (1979), children need books that present reality, stories about children like themselves and the interactions that comprised human relationships.

It was also found that this genre (GFR), could be used in the cognitive sphere to give information about animals. For example, the book "*Setswerere setshwakga le Mmabatho Kgang ka ga ditshoswane*" by Katherine Morris, told the story of how an ant grows up. The ant conversed with other ants and has adventures such as carrying a dead bee back to the ant nest. The book is published in ten South African languages by Librarius Felicitas and forms part of a series on the ethology of insects.

In certain books classified as GFR. anthropomorphized animals were the protagonists. For example, in the book "*The Foxwood Surprise*" (written by Cynthia and Brian Patterson and published by Andre Deutsch Ltd), a small grey rabbit dressed in winter clothes helps a coachman (a badger in a greatcoat and top-hat) get his coach out of a snowdrift. While this may not reflect the life-world of children in South Africa, it does reflect that of children in colder climates

Books classified as non-fiction information books (Genre = GNI), were those where information was presented without a story or plot. Books about garden birds, for example, or steam shovels. These books showed pictures of the different kinds of birds or the parts of a steam shovel, and explained simply, in a few sentences, the particular information about the subject. In books for very young children the information consisted merely of a picture, for example a kitten, with the word "kitten" in large letters beneath it. Such books related directly to the cognitive domain and could promote discovery learning by stimulating and satisfying the intellectual curiosity of the child.

With regard to animal ethology, the World Wildlife Fund has published a series of books of this genre (GNI), relating facts about endangered species such as the snow leopard. The books show accurate pictures and tell a simple story about the normal behaviour of different endangered species. Such books directly promote one of the advantages of child-animal interaction mentioned by Blue (1986), that is, "nurturing humaneness, ecological awareness and ethical responsibility". Examples of this series were found in the library at Eastern Suburbs and at the Resource Centre.

**Table 13.5: Relative frequency distribution of Subject groups for all three preschools, standardised by conversion to percentages**

Subject	School 1		School 2		School 3		Total	
	F	%	F	%	F	%	F	%
ACH	135	13,1	159	15,5	11	5,4	305	3,5
ACA	206	20,0	154	15,0	28	13,8	388	17,2
ACR	148	14,4	136	13,3	30	15,3	314	13,9
AIH	16	1,6	31	3,0	1	0,5	48	2,1
AIA	58	5,6	14	1,4	3	1,5	75	3,3
AIR	117	11,4	94	9,2	53	26,1	264	11,7
NA	349	33,9	438	42,7	78	37,9	865	38,3
Total	1029	100	1026	100	204	100	2259	100

**Key**

ACH: Animals central to story, humanised

ACA: Animals central to story, fantasy or anthropomorphic

ACR: Animal central to story, realistic

AIH: Animals incidental to story, humanised

AIA: Animals incidental to story, fantasy or anthropomorphic

AIR: Animals incidental to story, realistic

NA: No animals

The frequency and relative frequency distribution of books according to subject matter is shown above in Table 13.5. The mean relative frequency of books where animals were central to the plot was 44,6% (n = 1007); animals incidental to the plot was 17,1% (n = 287) and no animals were present was 38,3% (n = 865). That is to say, approximately two-thirds of children's books at the three preschools involved animals either central or incidental to the plot.

There was no significant difference ( $p > 0,05$ ) in frequency between the preschools with regard to whether the animals were portrayed as realistic (ACR), humanised (ACH) or anthropomorphic (ACA) in the children's books where animals were central to the plot.

An example of a book where a realistic animal was central to the plot, was the book "*Ping*" by Majorie Flack. This book was found at all three schools investigated. Ping was a duck belonging to a chinese boat family. He did not come home to get his food on time and was lost. He eventually found his way back to his own home boat.

The duck was portrayed using two dimensional line-drawings but was unmistakably a white domestic duck. Examining the story from the point of view of animal ethology showed that the duck's behaviour was normal for that species. Ducks are known to come when called for food. They would be penned at night by their owners and allowed on the water by day. A duck separated from the flock would become panic-stricken and swim around, looking for the rest. He would show relief and pleasure on being re-united with the other ducks. All these things were done by Ping in the course of the story. Ping did not speak to either the ducks or to people - the bird was, therefore, neither humanised nor anthropomorphised.

Bambi, the deer in the story "*Bambi grows up*" by Walt Disney, was an example of a humanised animal. He talked to

Thumper, the rabbit, and to the other animals. However, he ate grass, grew antlers and was shot at by hunters, like any normal deer. Neither he nor any of the other animals in the story wore clothes or lived in houses. The behaviour, therefore was that of a normal deer, with the exception of speech and thoughts which were those of humans.

Where anthropomorphic animals were used in a story, other realistic animals might also be included. In the Richard Scarry word book *"On the farm"*, for example, the farmer was a bear who drove a tractor. The wording read:

*"Mr Bear is a farmer. He lives on this farm. Can you see him? Farmer Bear has lots of animals."*

One of his friends was a fox who wore a jersey and could use a saw to cut wood. These were both anthropomorphic animals who behaved and spoke entirely like human beings. Yet the other animals on the farm, a cock and a hen, a goat, a horse and a cow, were all realistically portrayed. The cow gave milk and wore a cowbell, the horse wore a harness and pulled a cart. None of them could talk. This inconsistency did not seem to bother either the children or the adults that read the story to them. As the main protagonists were the bear and fox, the book was classified as ACA.

### 13.2.3 Comparison of children's and adults' books

It was assumed that all the books found in the preschools, other than books with adult format, were books with a format suitable for children. Therefore, the formats picture books (FP), illustrated books (FI), toy and board books (FTB) and wordless picture books (FW) were combined into one grouping as children's books as opposed to adults' books. The data from all three schools were also combined (Table 13.6) so as to compare the relative frequency of animals as subject matter in children's and adults' books.

**Table 13.6: Relative frequency distribution by subject of books with adult format compared to the other formats**

Subject	Adult's books*		Children's books**	
	F	%	F	%
ACH	0	0	305	15,4
ACA	0	0	288	19,6
ACR	13	4,6	302	15,2
AIH	0	0	48	2,4
AIA	2	0,7	73	3,7
AIR	28	9,9	236	11,9
NA	240	84,8	625	38,3
Total	283	100	1976	100

**Key**

\* Books where FORMAT = "A"

\*\* Books where FORMAT < > "A". That is, books where the format is "FP", "FI", "FW" or "FTB"

ACH: Animals central to story, humanised

ACA: Animals central to story, fantasy or anthropomorphic

ACR: Animal central to story, realistic

AIH: Animals incidental to story, humanised

AIA: Animals incidental to story, fantasy or anthropomorphic

AIR: Animals incidental to story, realistic

NA: No animals

The distribution by subject varied considerably between adults' and children's books. Books for adults (Format = A) comprised a mean relative frequency of 12,6% (n = 283). No books for adults had humanised, anthropomorphic or fantasy animals as central theme.

It was found that 240 (84,4%) of books for adults and 625 (38,3%) of books for children did not feature animals (NA). This difference was significant ( $p < 0,05$ ) as calculated using the Yates-corrected 2X2 contingency table.

Figure 13.2a shows the difference in subject matter between books for adults and those for preschool children in the form of a bar chart. If these are combined into groups (C: animals central to theme, I: animals incidental to theme, N: no animals) the differences in animal content of children's and adults books may be even more clearly seen (Fig 13.2b)

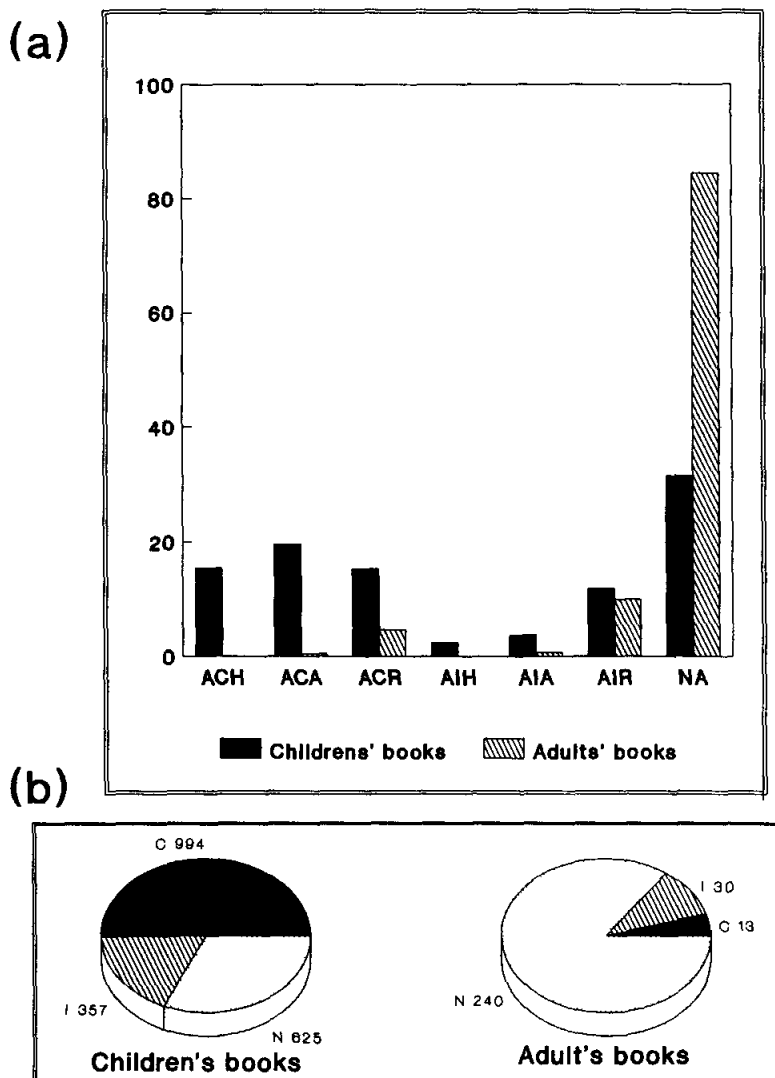


Figure 13.2: (a) Bar diagram and (b) Pie diagram showing relative frequency of animals as subject matter in books for preschool children compared to books for adults



If the books intended solely for adults (Format = A) were disregarded, the relative frequency distribution of format, genre and subject matter in books for children could be explored. The considerable similarity between the three preschools in regard to the relative frequency distribution may be seen from the above data rendered graphically in the form of comparative bar graphs in Figures 13.3a, 13.3b and 13.3c.

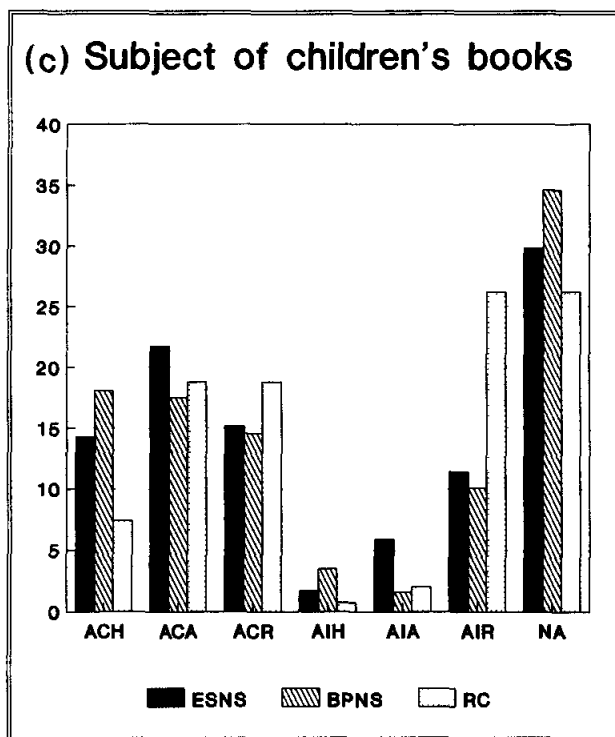
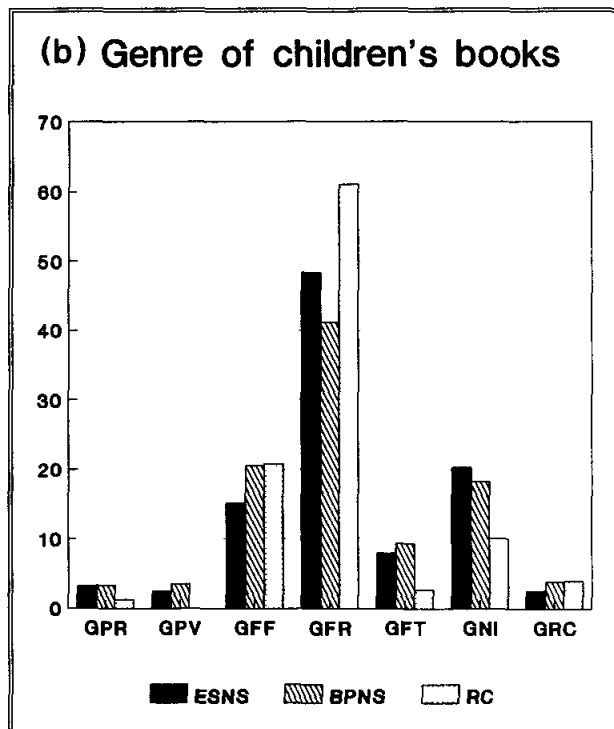
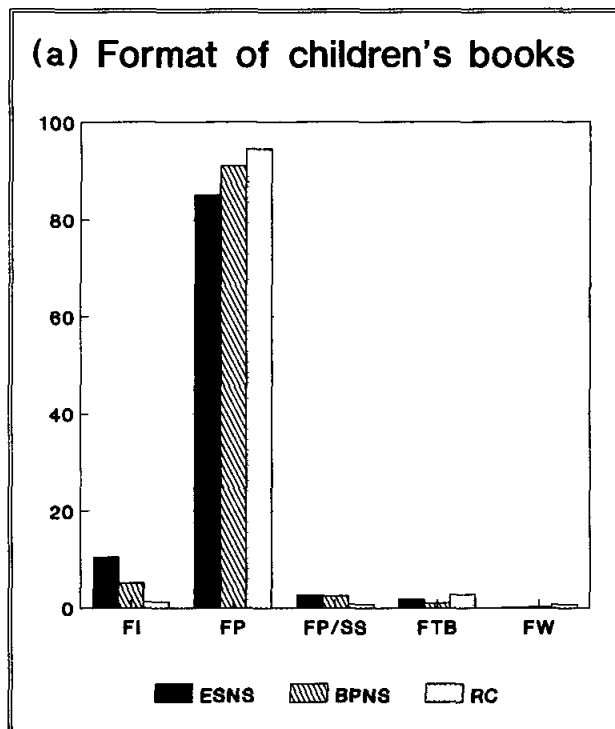
The distribution of format, genre and subject of children's books was very similar for all 3 preschools (Figures 13.3a,b and c). Socio-economic status did not appear to play a role in the type of books used by preschools, as there was no difference in distribution between the high and low income preschools surveyed. This amplified the aims of both Tiedt (1979) and Rothlein and Meinbach (1990) that preschool books should not be stereotypic, by including socio-economic status.

#### **13.2.4 Books that preschool children chose**

Books used at preschools were selected and bought by adults. These adults were trained preschool teachers and could therefore be presumed to understand the educational needs and preferences of preschool children. The choice of books at preschool in high and low income areas has been discussed separately below, as different methods were used for evaluation.

##### **13.2.4.1 Preschools in high income areas**

A list was made of the ten books most frequently taken home by children at Eastern Suburbs and Brooklyn Park preschools, in order to investigate which type of books were preferred by the children. Each preschool taught approximately 120 children and had a lending library system.



**KEY:**

- ESNS : Eastern Suburbs Nursery school
- BPNS : Brooklyn Park Nursery School
- RC : Resource Centre
- FI : Format illustrated book
- FP : Format Picture book
- FP/SS: Format short stories
- FTB : Format toy or board book
- FW : Format wordless picture book
- GPR : Genre poetry, rhymes
- GPV : Genre poetry, verses
- GFF : Genre fiction, fantasy
- GFR : Genre fiction, realistic
- GFT : Genre fiction, traditional
- GNI : Genre non-fiction, information
- GRC : Genre religion, christian
- ACH : Subject, humanised animals central
- ACA : Subject, anthropomorphic animals, central
- ACR : Subject, realistic animals central
- AIH : Subject, humanised animals incidental
- AIA : Subject, anthropomorphic animals, incidental
- AIR : Subject, realistic animals incidental
- NA : Subject, no animals

Figure 13.3: Bar charts showing the relative frequency of (a) format, (b) genre and (c) subject of children's books.

At Eastern Suburbs a card system was used and at Brooklyn Park the class teachers listed the books in an exercise book. The frequency with which each book was taken out in 1992 was taken as a measure of the popularity of the books. Preschool children did not allow adults to choose these books for them, so that the book choice was a good reflection of the type of books enjoyed by the children.

It was interesting to note that books supplied for the children themselves to take out, that is the lending library (LL) books, at Brooklyn park and Eastern Suburbs preschools, had a different distribution to the books used in the classroom (Table 13.7a and b).

**Table 13.7a: Relative frequency of genre in lending library books for children (LIBRARY = "Y", FORMAT < > "A") compared to other books for children (LIBRARY = "N", FORMAT < > "A")**

Genre	Library books		Not Library books	
	F	%	F	%
GPR	4	0,7	60	4,3
GPV	19	3,2	31	2,2
GFF	108	18,2	190	13,7
GFR	345	58,3	608	43,9
GFT	71	12,0	86	6,2
FNI	37	6,3	366	26,4
GRC	8	1,4	43	3,1
Total	592	100	1382	100

**Key**

GPR: Poetry (Rhymes)    GPV: Poetry (Verse)  
 GFF: Fiction (Fantasy)    GFR: Fiction (Realistic)  
 GFT: Fiction (Traditional)    GNI: Non-fiction (Information)  
 GRC: Religion (Christian)

The differences were not, however, significant, except in the case of Genre = GNI (LL = 6,3% and not LL = 26,4%), Subject = ACA (LL = 33,1% and not LL = 13,9%) and Subject = ICR (LL = 4,5% and not LL = 15,1%). These three categories showed a highly significant ( $p < 0,0001$ ) difference.

**Table 13.7b: Relative frequency of subject in lending library books for children (LIBRARY = "Y", FORMAT <> "A") compared to other books for children (LIBRARY = "N", FORMAT <> "A")**

Subject	Library books		Not Library books	
	F	%	F	%
ACH	108	18,2	197	14,2
ACA	196	33,1	192	13,9
ACR	59	10,0	242	17,5
AIH	21	3,5	27	2,0
AIA	21	3,5	52	3,8
AIR	27	4,6	209	15,1
NA	160	27,0	465	33,6
Total	592	100	1382	100

**Key**

ACH: Animals central to story, humanised

ACA: Animals central to story, fantasy or anthropomorphic

ACR: Animal central to story, realistic

AIH: Animals incidental to story, humanised

AIA: Animals incidental to story, fantasy or anthropomorphic

AIR: Animals incidental to story, realistic

NA: No animals

In other words, lending library books had a significantly higher proportion of anthropomorphic or fantasy animals as protagonists or themes and a significantly lower proportion of non-fiction information books and books where realistic animals were only incidental to the story. Books with animals incidental to the plot were found three times more frequently in the school books than in the lending library books and non-fiction information books were found approximately four times more frequently.

The ten most popular lending library books at each preschool were ranked in order of popularity and analysed with regard to format, genre and subject. The results are shown in Table 13.8.

**Table 13.8: Ten favourite library books at Eastern Suburbs and Brooklyn Park Nursery Schools**

Rank	Title of book (ESNS)	FGS (ESNS)	Title of book (BPNS)	FGS (BPNS)
1	Puddle Penguin	FP GFR ACA	Winnie the Pooh	FP GFR ACA
2	Koot se koek-koekhorlosie	FP GFR ACA	Go away crows	FP GFR ACH
3	I can read by myself	FP GFR ACA	Coudleroy	FP GFR ACA
4	Teddy and the birthday party	FP GFR ACA	Alligators are awful	FP GFR ACA
5	The Chatty Parrot	FP GFR ACH	Don't forget the bacon	FP GFR NA
6	Winnie the Pooh and Tigger too	FP GFR ACA	Five minutes peace	FP GFR ACA
7	Bambi grows up	FP GFR ACH	Good dog Rover	FP GFR ACH
8	Problem puppies	FP GFR ACA	Crocodiles out shopping	FP GFR ACA
9	Mickey's day at the Circus	FP GFR ACA	Owl at night	FP GFR ACH
10	Die skaam volstruis	FP GFR ACA	Angus and the ducks	FP GFR ACR

**Key**

Rank: Books were ranked in order according to the number of times they were selected over a period of 12 months

FP: Picture book format

GFR: Realistic fiction genre

ACA: Fantasy or anthropomorphic animals central to the story

ACH: Humanised animals central to the story

ACR: Realistic animals central to the story

It can be seen that all ten of the favourite lending library books at Eastern Suburbs Nursery School had animals as the central theme (Subject = AC\*). The children at Brooklyn Park Nursery School also preferred this type of book. Nine of the ten books analysed had animals as central theme (Subject = AC\*). This was significantly higher ( $p < 0,01$ ) than the mean proportion for lending library books at the two schools (61,3%).

Thirteen of the twenty books chosen by pupils at these two schools had the configuration FP GFR ACA. In order to determine whether this was representative of the books in the lending libraries, the frequency distribution of format, genre and subject of lending library books, was calculated. The most frequently found configurations have been ranked in Table 13.9.

**Table 13.9: Frequency, relative frequency and ranking of library book configuration found in the children's lending library a Eastern Suburbs and Brooklyn Park Nursery Schools**

Configuration of book	ESNS			BPNS		
	F	%	Rank	f	%	Rank
FP GFR ACA	53	18,53	1	69	21,97	1
FP GFF ACA	40	13,99	2	14	4,46	5
FP GFR NA	24	8,39	3	68	21,66	2
FP GFR ACH	24	8,39	3	42	13,34	3
FP GFT ACH	20	6,99	4	10	3,18	6
FP GFF NA	18	6,29	5	14	4,46	5
FP GFT NA	12	4,20	6	6	1,91	8
FP GNI ACR	12	4,20	7	5	1,59	9
FP GFR AIR	7	2,25	8	14	4,46	5
FP GNI NA	6	2,10	10	4	1,27	10
FP GFR ACR	2	0,69	11	27	8,59	4
FP GPV AIH	5	1,74	9	9	2,86	7
Others (Both 5)	65	22,72		30	9,55	
<b>Total</b>	<b>286</b>	<b>100,0</b>		<b>314</b>	<b>100,0</b>	

**Key**

- FP: Format picture book
- GFR: Genre realistic fiction
- GFF: Genre fiction/fantasy
- GNI: Genre non-fiction information
- GFT: Genre traditional stories
- GPV: Genre verse
- ACA: Subject - animals central, anthropomorphic or fantasy
- ACH: Subject - animals central, humanised
- ACR: Subject - animals incidental, realistic
- ICR: Subject - animals incidental, realistic
- ICH: Subject - animals incidental, humanised
- NA: Subject - no animals

It can be seen from Table 13.9 that eight of the ten books chosen by children at Eastern Suburbs Nursery School were realistic fiction picture books with anthropomorphic animals as protagonists (FP GFR ACA). The Fisher-exact test was used to compare this frequency with that of books with the same

configuration in the lending library (Table 13.9). The p-value was calculated as 0,000291 ( $p < 0,0001$ ). This indicated that the bias in favour of this kind of book (FP GFR ACA) by preschool children was highly significant ( $p < 0,001$ ).

With regard to Brooklyn Park Nursery School, five of the ten books selected by children (Table 13.8) had the configuration FP GFR ACA. This was also a higher proportion (Table 13.9) than was found in the school lending library. Using the Fisher exact test the bias was also seen to be significant ( $p = 0,0000151$ ).

The proportion of books with configuration FP GFR ACA was also progressively higher in the school library, the lending library and the books chosen by the children. This is illustrated graphically in Figure 13.4.

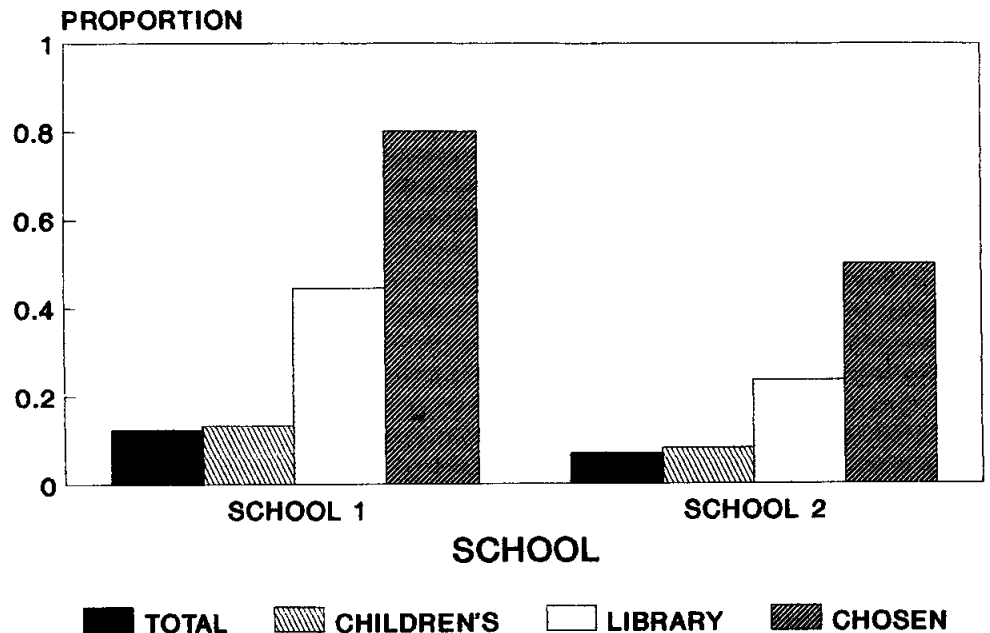


Figure 13.4: Frequency of FP GFR ACA books in each school (ESNS = Eastern Suburbs Nursery)

Interviews with teachers indicated that the lending library had a higher proportion of FP GFR ACA books, because the books that children could take out were there for the children to enjoy. Stories featuring anthropomorphic or fantasy animals were seen by the teachers as enjoyable for the children. Information books, however, were perceived as school books for use in informing the teachers as well as pupils. According to the teachers, this was in contrast to the policy of school inspectors, who had suggested that all books with anthropomorphic or fantasy animals at protagonists should be removed from the library.

#### **13.2.4.2 Preschools in low-income areas**

No comparison could be made at the Resource centre as the book bags were all used equally and relatively infrequently. There are only 52 weeks in a year and each bag was taken out for between two and four weeks. As the children had no input regarding the type of books chosen, it could not be included in the analysis of the types of books chosen by children. Information on the use of books by children was instead obtained from Creches Care. Five preschools in a semi-rural, low income area of Bophuthatswana were similarly investigated.

In the case of Creches Care, it was found that there was no interest by either teachers or children in taking out or looking at the books in the mobile unit. The driver of the unit took out books of his own choice and read them to the children at the schools.

The preschools in the rural areas in North West Province (formerly Bophuthatswana), had very few books (Table 13.10). Two of the schools made use of discarded adults magazines in order to be able to show pictures to the children. In all five schools charts on the walls reflected animal themes (for instance C for cat and K for kangaroo).



**Table 13.10: Books in five low-income, semi-rural preschools in North-West Province (formerly Bophuthatswana)**

School	No of books	AC*	Magazines	Charts
1	4	3	Yes	Yes
2	2	1	Yes	Yes
3	0	0	No	Yes
4	1	1	No	Yes
5	3	2	No	Yes
Totals	10	7	2/5	5/5

**Key**

**School:** Number of schools investigated. Most of the schools did not have names.

**No of books:** Number of books found in the school.

**AC\*:** Number of books with animals central to the theme.

**Magazines:** Does the school use magazines as a source of pictures for the children (Yes or No).

**Charts:** Do the wall-charts used in the classroom feature animals? (Yes or No).

According to the findings recorded in the above table, the children from low income areas did not make much use of books and it was therefore difficult to establish which books would interest them. Wall charts in all five schools examined, showed the presence of animals. Teachers also indicated that animal themes and stories told about animals appealed to the children. In every preschool examined, the teacher, when asked about the children's favourite animal story, invariably mentioned the three little pigs. Although traditional stories involving animals are known to exist among Tswana speaking people, none of these were used at the preschools investigated.

### 13.2.5 An evaluation system for preschool books

From the veterinary point of view, books for the preschool child should promote sound and positive human-animal interactions. The following are interactions which might be influenced by stories in books (Table 13.11).

There are also negative interactions which could be prevented by the correct facts being presented in books. Examples are as follows:

- zoonotic diseases affecting young children (eg a story which encouraged a child to adopt a stray dog or make a pet of a mongoose would be very dangerous in an area where rabies was a problem)
- bites by dogs and other animals (eg a story in which a child went into a lion's cage to talk to the lion might encourage a child to try the same thing at the zoo)
- cruelty to animals (eg a story which has a boy attaching a firecracker to a cat's tail might encourage another child to do likewise).

**Table 13.11: Interactions of significance to veterinarians, classified in terms of educational objectives, which could be influenced by stories in children's books**

Interaction	Educational objective
The child's image of the veterinarian	Emotive and cognitive
Caring for animals	Emotive
Management of pet animals	Cognitive
Empathy with animals	Emotive
Interest in nature and conservation	Emotive
Knowledge of animal behaviour and ethology	Cognitive
Knowledge of animal biology or zoology	Cognitive
Nutritional value of animal products	Cognitive

This evaluation system was used for three books in order to demonstrate its use.

The first book evaluated was *Puddle Penguin* by Lief Erickson. This was a story about a penguin swept into the air by a gust of wind because he was holding an umbrella. He was blown

to a city and was taken home by a man with a red coat who let him stay in his bathroom and bought him fish to eat. Puddle eventually went home in an aeroplane to join his friends at the South Pole.

<b>EVALUATION CRITERIA:</b>		
<b>TITLE</b>		
<b>AUTHOR:</b>		
<b>PUBLISHER:</b>		
<b>EDITION:</b>	<b>DATE OF PUBLICATION:</b>	
<b>FORMAT:</b>	<b>GENRE:</b>	<b>SUBJECT:</b>
<b>CRITERIA:</b>	<b>SCORE:</b>	
* Is the ethology of humanised or realistic animals accurate?		
* Is information up to date and accurate?		
* Do characters behave in a way that promotes positive human-animal interactions?		
* Is the book stereotypic of race, ethnicity or gender?		
* Does the book stimulate curiosity and interest?		
* Is the book amusing, enjoyable or humorous?		
* Are the illustrations pertinent to the subject covered?		
* Would the illustrations appeal to the preschool child?		
* Does the story relate to the child's life-world?		
* Does the information presented work from the simple to the complex, from familiar to unfamiliar and concrete to abstract?		
<b>TOTAL SCORE:</b>		
Scoring for each criteria is as follows:		
5 = outstanding 4 = good 3 = fair 2 = needs improvement 1 = poor 0 = no		
<b>NEGATIVE ASPECTS:</b>		
Do not recommend the book, even if the score is good, if any of the following appear:		
* Cruelty to animals		
* Injury to children		
* Zoonotic diseases		

**Fig 13.5: Suggested evaluation criteria for books intended for preschool children, where animals are central to the plot or theme**

Criteria for books involving animals should not concentrate on the above to the exclusion of other factors. The book must appeal to children, it should not be stereotypic and the format, language and illustrations should all be suitable for the age of child expected to read the book. Suggested evaluation criteria are set out in Figure 13.5.

The ethology of elephants and a dog, the only animals other than penguins seen in the story, was accurate. Information about penguin ethology - that is that they eat fish, like swimming and live at the South Pole which is cold - was accurate. However, Puddle also behaved like a human - he wore a hat and scarf, carried an umbrella and worked in a restaurant. The man cared about this strange bird and helped him to get home. Information was referred to the child's own life-world. Penguins swim. Puddle swam in the bath - so there was a reference point for the child. Penguins live where it was cold - Puddle tried to sleep in the refrigerator, the only place in the child's life-world that approximates the cold at the South Pole. The story works from the familiar (the fish shop on the corner) to the unfamiliar (penguins eat lots of fish). The book was amusing - children found the scene where Puddle sat on the toilet seat, hilarious. The illustrations were in bright primary colours and two-dimensional. They were uncomplicated with very little background detail.

The second book analysed was the Walt Disney adaptation of A A Milne's book *Winnie the Pooh and Tigger too*. In this book Rabbit tried to "unbounce" Tigger but discovered that he liked a bouncy Tigger after all. During the story Rabbit gets lost in the woods and is frightened by all the animal noises and Tigger and Roo get stuck up a tree. Like the first book evaluated, the pictures were in bright colours and two-dimensional. The backgrounds were also simplified. The birds, animals and insects heard by rabbit in the woods, behaved realistically. Children's interest could be stimulated further by the map of where everything took place. The book was

slightly stereotypic ethnically - Christopher Robin was a very British little boy. Positive human-animal relationships were promoted by the caring attitude Christopher showed to the animals.

The third book, *The Chatty Parrot*, was not as highly recommended. The animals that lived in the jungle together included a lion, an elephant, an alligator and a kangaroo. All these species come from different areas of the world - therefore their association provides no relevant learning opportunity for children with regard to ecology. They were drawn realistically, but talked to each other and behaved more like humans than animals. The chatty parrot gets on everyone's nerves, but when his voice was gone, the animals discovered that it was very useful to them and fed him lemon and honey so that he would get it back. This was once again a moral or cautionary tale where the message transferred is that of friendship and caring for one another. The pictures were two-dimensional and very brightly coloured, but the backgrounds were very complex.

The information given was clichéd - a beehive was beehive shaped and hung from a branch. The monkey dipped his hands into the hive to get honey - this could be a dangerous thing for a child to attempt in South Africa, where bees are aggressive and stings could cause a fatal allergic reaction. There was no real point of reference to the child's life-world other than the moral of the story that talking too much may not be a bad thing and lemon and honey may be used for a sore throat. The story itself, however, was quite amusing and the illustrations were attractive. The animals looked friendly and cute and could possibly promote the child's liking for the animal world and superficial knowledge about the appearance of certain animals (eg the parrot has coloured feathers and the giraffe has spots).

It was obvious from the above that the scoring system provided a comparatively simple guide. It is suggested that such an evaluation be done jointly by a preschool teacher or educator and a veterinarian. The first three questions referred directly to the animal content of the book and could lie within the sphere of interest of a veterinarian, whereas the other eight questions could be answered more easily by someone with a background in childhood education.

### 13.2.6 Animal themes in regard to toys and games

Toys were classified according to type (eg puppets, jigsaw puzzles, construction toys) and then analysed according to whether animals were central to the theme, incidental or not used at all.

In order to discover what part animal themes played in regard to toys, the types of toys used at the preschools were enumerated. In each case the total number in which animals were the central theme (eg an animal puppet), incidental (eg pets showed in a family scene on a jigsaw puzzle) or not present at all (eg construction toys) were noted. The results may be seen in Table 13.12.

**Table 13.12: Classification of toys according to animal themes**

Type of toy	AC	AI	NA	Total
Puzzles	104	56	115	275
Construction toys	5	0	20	25
Puppets	25	0	20	45
Finger puppets	11	0	10	21
Games	48	23	55	126
Other	19	8	55	76
<b>Total</b>	<b>212</b>	<b>87</b>	<b>273</b>	<b>568</b>

**Key**

AC: Animals central to theme of toy

AI: Animals incidental

NA: No animals

It was found that in 37,3% (n = 212) of toys, animals were central to the theme; in 15,3% (n = 87), animals were incidental to the theme; and in 48,4% (n = 275), animals were not used as the theme. In other words, animal themes were used either centrally or incidentally in approximately half of the toys at preschools.

### 13.3 Discussion

In the light of the above results, the extent and way in which animal themes were used in books and toys at preschools will be discussed.

#### 13.3.1 Classification and cataloguing of books

As mentioned previously, the classification and cataloguing systems used by libraries were not only confusing for the non-librarian but did not specifically include books for preschool children. These could, however, be classified under subject headings.

Using subject based classification systems, as was done by Le Roux et al (1989), many of the books analysed (Tables 13.3, 13.4 and 13.5) would not have been included. Libraries classified as animal books only those where the chief protagonist was a realistic or humanised animal. A book such as Beatrix Potter's *The Story of Peter Rabbit*, for example, would have been classified as a fantasy book and not an animal book, because the animals, including the chief protagonist, Peter, were anthropomorphic. Non-fiction information books about animals, such as those produced by the Wildlife Society, would have probably been classified under an entirely different subheading such as biology.

Analysis, therefore, on the basis of current library classification systems, would considerably underestimate the number of books where animals were central to the plot or theme of

the book. The system used in this work gave a more accurate estimate of the role of animals in preschool children's literature and therefore allowed for interpretation on the basis of human-animal interactions.

No system has been suggested for the cataloguing of books and their arrangement on shelves at a preschool. Preschool teachers are not librarians and have little time to devote to arranging books. From observations made it was concluded that the most convenient system for a particular school would therefore tend to evolve of itself, with some grouping of the books according to themes used in the preschool.

### 13.3.2 Animal themes in books and toys

Altogether 2259 books were analysed and it was found that the relative frequency distributions of the types of books intended for children in the three preschools were very similar.

The fact that animals featured in such a high percentage of books and toys for preschool children was significant for the implications regarding human-animal interaction. The question remained as to whether this was as a result of adults choosing books involving animals as being suitable for preschool children or whether children were also attracted to books involving animals.

The truth of the latter argument was substantiated by the fact that there was a statistically significant bias towards animals central to the theme, in the books chosen by the children themselves. There was also a statistically significant bias by children towards books where anthropomorphic animals were the protagonists in a realistic but fictional setting.

Anthropomorphic animal stories are not a new invention. Aesop, who lived in ancient Rome, used such animals in his fables, to illustrate human interactions and human morals.



Anansa, the spider-man, has also featured in traditional cautionary tales of Central Africa. In South Africa, several traditional tales of Zulu and Sotho speaking people and the San, have a wise hare as the central protagonist.

Anthropomorphic animals in modern children's books may similarly promote certain values. For example, Peter Rabbit in the book of that name by Beatrix Potter, was stealing the farmer's vegetables and was punished. Children were in this way gently informed that stealing was not a good idea. Because Peter Rabbit was wearing clothes and standing upright, they could readily identify with his actions. His home had tables and chairs, just as did the home of their own life-world. They could therefore relate to his experiences in his life-world.

If Peter had been a person, would the story have been as effective? James Serpell (1986) mentions that, in the first years of life, children do not distinguish clearly between humans and non-humans and will treat family pets as though they were to all intents and purposes, human. He felt that this could be because they were not yet indoctrinated with the idea that man was on an entirely different plane. This could also, he felt, be the reason why primitive peoples gave human thoughts and actions to other creatures.

It is difficult to explain why children should prefer stories where humanised or fantasy animals are the main protagonists. The following possible reasons are postulated as contributing to the bias in favour of this type of book:

- Children of preschool age do not differentiate much between reality and fantasy. Anthropomorphic or fantasy animals are therefore not seen as unrealistic.
- Children of preschool age tend to ascribe human characteristics to animals and even to inanimate objects. These

stories therefore merely reflect that which the child sees as possible and probable.

- Anthropomorphic animals could be perceived as less threatening than people because animals are seen as "cute". The child therefore finds it easier to relate to the protagonists in the story.
- Fantasy and fantasising are part of the human psyche and thought processes. Anthropomorphic and fantasy animals may be seen as a valuable source of fantasy or "let's pretend" for the preschool child.
- Anthropomorphic animals have no ethnic, physical or racial connotations. A wicked fox or rude rabbit are acceptable without being stereotypical. Laughing at a silly donkey is acceptable if the donkey is wearing clothes and behaving like a human, whereas laughing at a silly or mentally impaired human child, is not.
- Animals behaving like humans could be amusing and entertaining. A real dog wearing a skirt and pushing a pram in a circus might stimulate amusement. This would, however, be less acceptable than anthropomorphic animals in books, as the training involved might include mental and or physical cruelty.
- Human beings of all ages across the world find anthropomorphic animal characters amusing. Mickey Mouse is popular in Japan, Europe and America as well as in Uganda and South Africa.

### **13.3.3 Children from low-income areas**

Children at preschool were not yet literate and therefore most of the picture books were designed to be read to the children by a mediator and pictures were used to explain the story.

Certain picture books were intended for children to attempt to read themselves. These books had very few words and a limited vocabulary. As, however, children in South Africa were only taught to read once they had left preschool, even these books would be read to the preschool child by a teacher or parent acting as mediator.

The attitude of the mediator to the book, whether or not they made it interesting or exiting for the child, would possibly influence the child's opinion of the book. This is a valid proposition if the position found in low-income schools is taken into account.

In South Africa, 33% of adults were illiterate (Turok et al, 1993). In those areas targeted by Creches Care, the socio-economic level was low and the level of functional literacy was also low.

Teachers at the preschools in these areas came from impoverished homes where reading books and magazines was not necessary for day to day survival. The paper they represented could be more usefully employed, for example, to light a fire in winter, as many of these areas did not have electricity. Reverence for the care of books has evolved in literate societies where books are a source of knowledge and enjoyment. In a predominantly illiterate, impoverished society, the value of books cannot be appreciated in the same way.

Although the teachers at the preschools in low-income areas were literate, they were therefore unlikely to act as mediators in such a way that the children would gain a positive impression of books as a source of enjoyment and knowledge. Under these circumstances it was impossible to judge which books would appeal to the children.

The next chapter will leave the confines of the preschool to investigate animal interactions during preschool excursions.

## CHAPTER 14

### EXCURSIONS BY PRESCHOOL CHILDREN TO URBAN FARMS, PRETORIA SPCA AND THE ZOO

#### 14.1 Introduction

Planned activities such as excursions could promote child development by deliberately exposing them to new situations outside their life-world. During the survey reported in Chapter 8, it was found that planned excursions to Pretoria Zoo, Pretoria SPCA and farms, were a feature at schools in both high and low income areas.

During excursions different facets of the child-animal interactions can be explored. These include environmental education (eg the zoo or nature reserves), humane education (eg animal welfare) and agriculture (eg urban farms).

The objective of this investigation was to propose and evaluate a teaching method for use on excursions using MLE with animals as facilitators. The zoo, urban farms and the SPCA would also be evaluated in terms of animal well-being and suitability for visits by preschool children.

##### 14.1.1 Environmental education

The International Union for Conservation of Nature and Natural Resources (IUCN) has defined environmental education as the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness between man, his culture and his surroundings (IUCN, 1971). This definition and a set of principles known as the Tblisi principles have been adopted by the environmental Education Association of Southern Africa

(EEASA). There are 12 principles, four have direct relevance to the preschool and are listed in Figure 14.1 (UNEP, 1977).

The Tblisi principles suggest that environmental education should:

- consider the environment in its totality - natural and built, technological and social be a continuous life-long process, beginning in the preschool and extending through all formal and non-formal stages
- be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective
- explicitly consider environmental aspects in plans for development and growth
- utilise diverse learning environments and a broad array of educational approaches to teaching and learning about and from the environment with due stress and practical activities and first hand experience.

Figure 14.1: The Tblisi principles (UNEP, 1977, p 1-8)

According to Calitz and Faber (1993), the challenge for the preschool teacher is to develop an environmental education model or models which will provide teachers, children and the wider community with knowledge, values and positive attitudes to the environment. Political problems and chronic poverty are factors which have distanced people from the environment. These authors ascribe this to the possibility that people feel no responsibility for something which does not belong to them. In line with this point of view, the EEASA have proposed a holistic view of environmental education (Fig 14.2).

This summarises the approach to learning which is characterised by an open and interactive process (dialogue-encounter-reflection) involving teacher and learners within a holistic political, social, economic and biophysical context (EEASA, 1993).

In terms of preschool education, these aims are probably too sophisticated. The holistic and interdisciplinary approach is, however, in accordance with the aims of preschool education and may be applicable, in particular, to preschools in developing areas in South Africa (Calitz, 1993a; Calitz & Faber, 1992).

# EDUCATION FOR CHANGE IN DEVELOPING ENVIRONMENTS

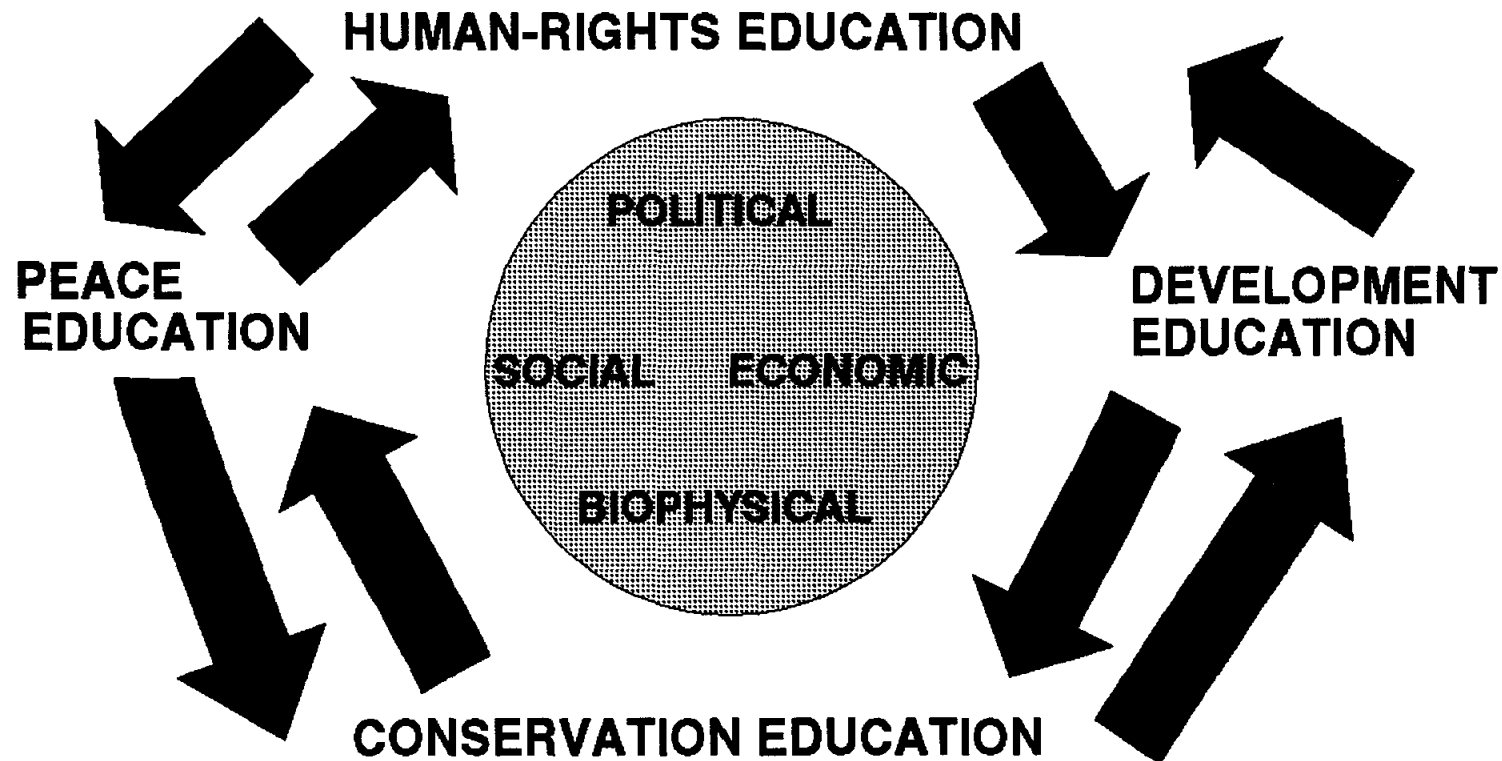
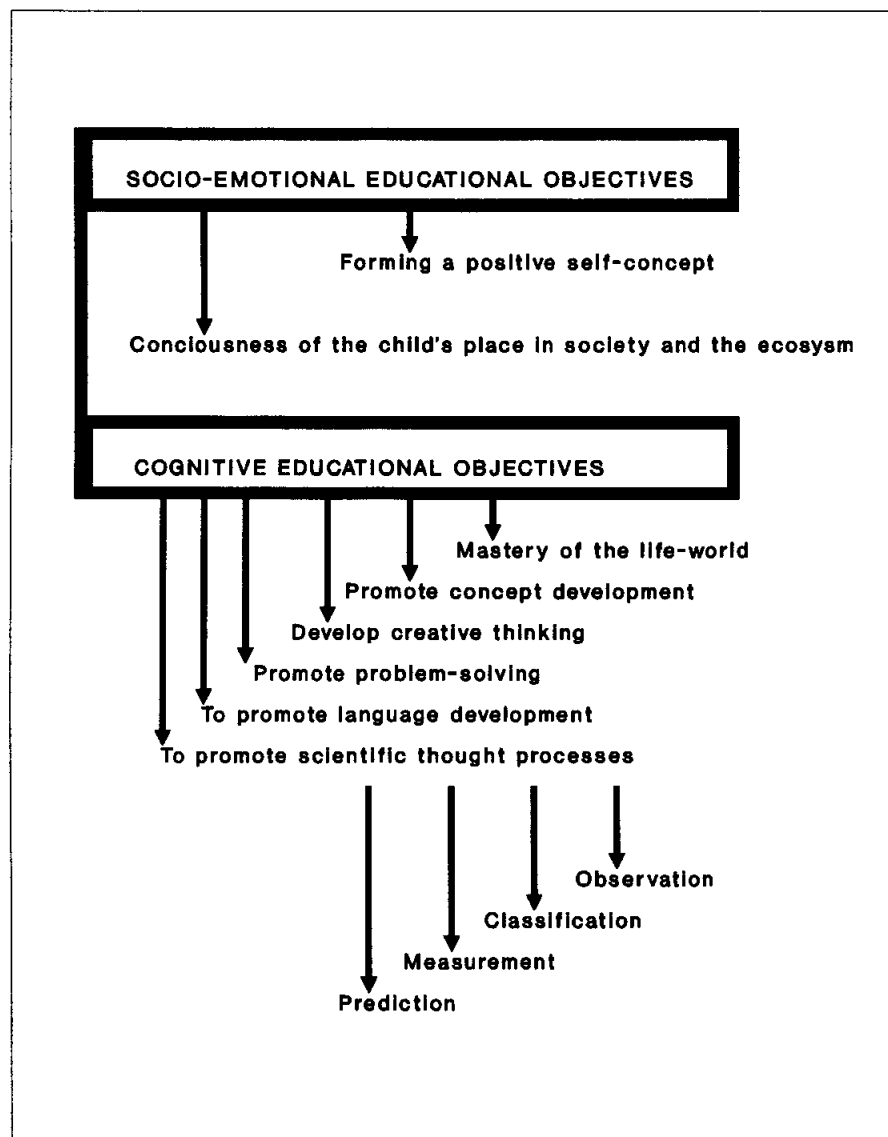


Figure 14.2: Holistic view of environmental education

Modern man has lost contact with the environment. There is an overemphasis on material possessions and the satisfaction of individual desires. The need has arisen to address environmental education from an attitudinal and conceptual base rather than fragmenting it into themes and facts. The preschool teacher, therefore, should not only regard environmental education as an extension of the child's life-world, but at the same time encourage a positive attitude to the environment (Calitz, 1993a). In order to do this, Calitz (1993b) has proposed objectives for environmental education in the preschool. These are illustrated in Figure 14.3.



**Figure 14.3: Objectives for environmental education in the preschool (Calitz, 1993b)**

Although there is a directory of informal and non-formal activities in environmental education in South Africa, a study of the contents indicated that the activities were not designed to accommodate preschool excursions (Dept of Environmental Affairs, 1990). During the survey of preschools in Pretoria, it was mentioned that preschools visited urban farms, museums and the zoo (Chapter 8). Although none of those visited were listed in the directory, they could contribute to environmental education in the preschool.

#### 14.1.2 Urban farms and agricultural museums

Green Chimneys is located on a 150 acre farm north of New York City. It is an actual working farm, coupled with a residential programme for children who are experiencing behavioural and academic difficulties. The success of the programme was ascribed to the contact between these children and the farm animals (King, 1983; Ross et al, 1984).

During the early 1970's, groups of people in London decided to turn under-utilised derelict land into city farms. The initiative followed knowledge that farm animals were being used for educational purposes in the Netherlands. This developed into the National Federation of City Farms, a non-profit-making organisation which linked up with the national curriculum in Britain (National Federation of City Farms, 1993). The educational aims are summarised in Figure 14.4.

*"As a synthesis of people, the natural elements and plants and animals, the farms have represented an outstanding means of enabling children to survive in a world of concrete" (De Staerke, 1990, p2).*



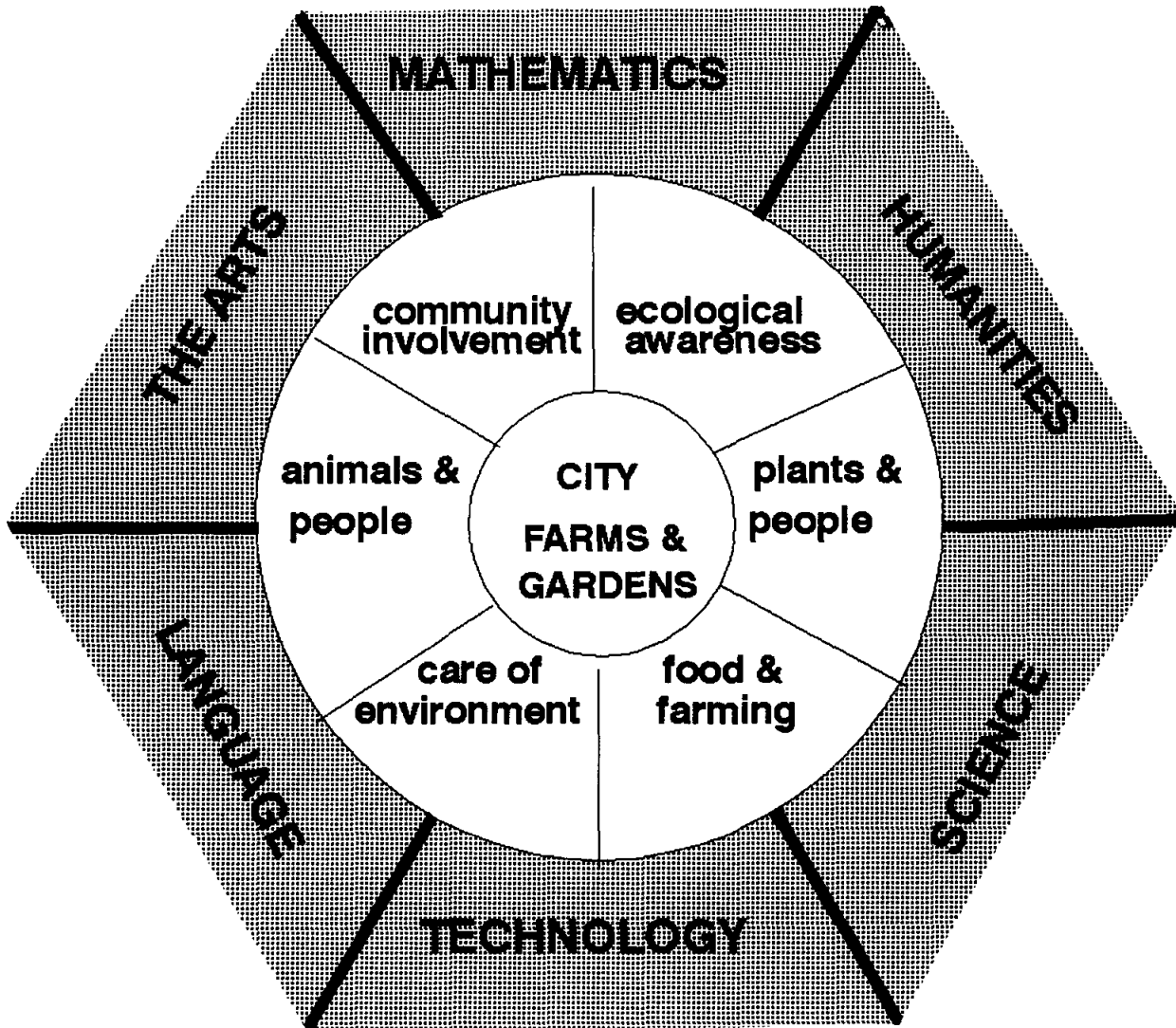


Figure 14.4: Educational aims of the National Federation of City Farms (NFCF, 1993, p 3).

By the 1990's a Federation of City Farms had been formed and linked to the European Federation of City Farms. Countries involved included Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden and the UK (European Federation of City Farms, 1991).

At the Pretoria Society for the Prevention of Cruelty to Animals (SPCA), the existing pound for large animals was converted into a small urban farm with attractive buildings and renamed "Storybook farm" in 1990. Preschools regularly visit the farm by appointment and are taken around and shown the animals. At the same time information is given on humane education (Venter & McCrindle, 1992).

It was also observed that preschools in Pretoria undertook excursions to urban farms and agricultural museums in and around the city. The management systems at these farms were therefore investigated from a veterinary as well as an educational point of view.

#### **14.1.3 Excursions to the zoo**

It was found during the survey reported in Chapter 8, that a majority of schools from both high and low income groups visited the Pretoria zoo. The function of zoos is therefore pertinent to the role played by veterinarians in the health and education of preschool children.

Within the next decades, species extinction might eliminate between 20-50% of the earth's species. Captive breeding has been claimed to be a useful tool in biodiversity. This role in conservation has been proposed for zoos because they could play a major role in educating and informing the public, although only 3% of endangered species are kept in zoos (Rahbek, 1993; Veselovsky, 1986). The National Zoological Gardens in Pretoria was established in 1899 and occupies 60 hectares. It is not only the largest zoo in South Africa, but also one which enjoys international status and which is affiliated to IUCN. Approximately 140 mammalian and 320 avian species are accommodated, and in the adjacent aquarium and reptile park, 300 aquatic and 90 reptilian species are housed (National Zoological Gardens, Undated booklet).

#### 14.1.4 **Animal welfare and humane education**

According to the American Veterinary Medical Association (AVMA), animal welfare is a human responsibility that encompasses all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and when necessary, humane euthanasia. In contrast to this, animal rights is a philosophical view and personal value system characterised by policy statements made by various animal rights groups. The two are not synonymous (AVMA, 1981).

In 1980 the Minnesota Humane Society field-tested a curriculum developed by the Humane Society of the United States. Teachers suggested that too much of this curriculum was based on animal rightist theories and in 1982 a new curriculum entitled "Share the Care" was developed in conjunction with educational bodies in Minnesota. The project promoted awareness of animals, their environment and their interrelationships with humans. The aim of the curriculum was to instil compassion and respect for animals and improve human-animal interaction (Broun et al, 1984).

The Pretoria Society for the Prevention of Cruelty to Animals (SPCA) has developed a specific ethos which emphasises the human-animal bond as a way to promote animal welfare. It has also appointed an educational officer to liaise with schools and preschools (McCrinkle, 1994; Venter & McCrinkle, 1992; Venter, 1993)

#### 14.2 **Results**

The results obtained from this investigation are presented in two sections. In the first section, a teaching strategy was suggested and evaluated using the method of observational research presented in Figure 7.5. In the second section,

venues ( $n = 5$ ) in and around Pretoria were evaluated using a checklist. This checklist was drawn up from the literature surveyed in earlier chapters.

#### **14.2.1 Teaching strategy for preschool excursions to animal facilities**

The Pretoria zoo was visited during weekday mornings in order to observe the teaching strategies used by preschool teachers during excursions. Preschool teachers ( $n = 50$ ) were informally interviewed on the structure of such excursions during visits to preschools.

Following this, a teaching strategy was suggested, based on the learning theories summarised by Mouly (1973) and Ault (1983) and the technique of MLE suggested by Wiechers (1991) and Calitz (1993a). In order that children could be prepared and the learning reinforced thereafter, it was decided to link the excursions to a curricular web or theme (Flemming et al, 1977; Sobut & Bogen, 1991). Routes and teaching plans were developed specifically for the Pretoria Zoo, using the themes birds and primates (Appendix I).

The factors that were considered when drawing up these routes and teaching plans are shown in Table 14.1.

This teacher-mediated learning methodology and the teaching plans were presented for three years running at the Pretoria Zoo, at workshops for teachers ( $n = 130$ ) from mainly low income areas. Re-evaluation was performed by visiting the zoo and observing the teaching techniques being used during excursions. As teachers from high-income areas had not attended the workshops, the difference in approach was noted. The methodology used was qualitative evaluation (Marshall & Rossman, 1989; Walker, 1988).

**Table 14.1: Factors which were used to design a teaching strategy for use by preschools during a visit to the zoo**

<b>Factor</b>	<b>Reference</b>
Physical constraints and limitations imposed by the age of the children: distance between foci of interest had to be short and time made for a visit to the toilets	Sahler & McAnarney (1981)
There had to be different levels for the three age-groups of children at preschools	Grobler et al (1990)
Animals were used as facilitators to motivate concept formulation and problem solving.	See Section *
A balance of activities to compensate for the short attention span of young children was essential	See section *
Open areas at the zoo were chosen for noisy activities so that the animals and other visitors would not be disturbed	See Chapter *
Teacher mediated learning was suggested on the basis of linking simple to complex, concrete to abstract and familiar (life-world) to unfamiliar	See Section * Calitz (1993b) Wiechers (1991)
The excursions were linked to a curricular web or theme so that children could be prepared beforehand and learning reinforced afterwards.	Flemming et al (1977) Sobut & Bogun (1991)
Children were to be actively encouraged to make a game of picking up any litter after a picnic lunch	See Section *

The results of informal interviews are presented in Table 14.2.

Observations made during visits to the zoo before and after the workshop series had been given showed some differences. It was found that previous to the seminars, visits to the Zoo were characterised by the following:

- Children were taken rapidly from one cage to another. Teachers pointed out one or two features (eg look at the chimpanzee! Isn't he funny!)
- Children were taken to the opposite side of the zoo to see the lions and tigers.
- Teachers allowed toddlers to urinate in the bushes as due to lack of planning, insufficient time was allowed for use of the toilets.

- Children became tired, bored and irritable and teachers became frustrated (Plate 14.1).
- A lot of time was spent on the lawns in front of the cafeteria. Litter was left behind when children departed.
- No theme or direction was used for teaching children, they were merely "taken to the zoo". The zoo itself was considered to be a theme.

**Table 14.2: Results of informal interviews with teachers regarding visits to the zoo**

Statement made by preschool teacher	Frequency (n = 50)
Planning involved getting indemnity forms from parents	36
Planning involved organising transport for the children	50
Planning involved contacting the educational officer at the zoo	6
Planning involved contacting the school inspectors	5
Teaching strategy linked visit to a nature table or activities involving zoo animals	48
Teaching strategy linked visit to preparation, telling children about zoo	50
The zoo was used as a theme at school	47
The children were shown the animals closest to the gate	4
Children sometimes got very tired because the lions and tigers were so far away	12
The children were shown the monkeys, the flamingoes, giraffes and elephants	29
Children always wanted to buy ice creams and snacks and it was difficult to control them	18

Using the above information, a teaching strategy was suggested and presented during a series of seminars held with preschool teachers at Pretoria zoo during the period 1988 to 1990. The suggested strategy incorporated MLE and focused on concept formation and environmental education. It was also linked to a theme so as to provide an introduction prior to the visit and reinforcement thereafter. The hand-outs supplied

to teachers during these seminars are presented in Appendix I. The method was evaluated by observing visits by preschools during the period 1990 - 1994. Those preschools whose teachers had not attended the seminars acted as controls, as the observations made above still held true.

After the seminars, the following was observed in the case of preschools whose teachers had attended the seminars:

- Teachers spent a long time at each cage. Children were encouraged to observe and ask questions.
- The cages nearest to the entrance were visited so children did not become too tired.
- Toilets were included in the planning and time was taken for a "toilet break" which approximated the "toilet time" in the daily school programme.
- Children were interested, enthusiastic and energetic (Plate 14.2)
- Time spent on the lawns was planned to coincide with a break and something to eat. Children were allowed to romp and play. Litter was gathered by children prior to leaving.
- Themes such as "birds" and "monkeys" were used and concepts taught utilizing the zoo visit (Plate 14.2).

#### **14.2.2 Evaluating facilities**

From the veterinary point of view the housing and management of animals was important. In addition to this, from the preschool's point of view, it was important that the place that was visited was laid out in such a way that it could be used for preschool excursions.





Plate 14.1: Teacher with tired bored children at the zoo.



Plate 14.2: Children enthusiastic and interested at the zoo.



In order to evaluate the urban farms in Pretoria ( $n = 5$ ), which could be visited during preschool excursions, checklists were used. Farm animal management and housing systems and suitability for preschool excursions were ranked. The Pretoria SPCA was included, as it had a small urban farm attached to it. Evaluation scores were then tabulated and compared.

Tables 14.3 to 14.8 show the results of an evaluation of the farm animal section of Pretoria Zoo, Pretoria SPCA, an urban farm and the two agricultural museums accessible to Pretoria preschools.

The key used in all the tables is shown below in Figure 14.5.

<p><b>Key:</b></p> <p>A: Pretoria zoo B: Willem Prinsloo Agricultural Museum C: Silverton Agricultural Museum D: Gift Acres Children's farm E: Pretoria SPCA farm animal area Y: Yes N: No U: Unknown Scoring: 0 = none, 1 = very poor, 2 = poor, 3 = good, 4 = very good, 5 = excellent</p>
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**Figure 14.5: Key used in Tables 14.4 to 14.8**

The evaluations were done under different headings. The first was an evaluation of whether it would be possible to meet the educational objectives of the preschool.

**Table 14.3: Evaluation of whether educational objectives were met at urban farms in Pretoria (n = 5) used for preschool excursions**

EDUCATIONAL OBJECTIVE	A	B	C	D	E
Children have an opportunity to:					
- touch	Y	Y	Y	N	Y
- smell	Y	Y	Y	N	Y
- taste	Y	Y	Y	N	N
- hear	Y	Y	Y	Y	Y
- see	Y	Y	Y	Y	Y
animals or products					
Background information supplied to teachers (Evaluated on a score of 1-5)	3	1	1	0	4
Opportunities exist for:					
- concept development	Y	Y	Y	Y	Y
- language development	Y	Y	Y	Y	Y
- biological discoveries	Y	Y	Y	Y	Y
- problem solving	Y	Y	Y	Y	Y
- experience and exploration	Y	Y	Y	N	N
- environmental education	Y	Y	Y	N	N
- human-animal interaction	N	Y	Y	N	Y

It may be seen from the above table that only E and A supplied background information to teachers. Facility D gave insufficient opportunity to children to use their senses to explore and limited human-animal interaction.

In Table 14.4 the suitability of the venue for use by children of preschool age is investigated. The checklist therefore includes information on whether a balance of activities is possible, the physical limitations of the child (such as height of railings and distances between objects of interest) and factors which influence the safety of the children.

It should be noted that Facility D was the least suitable, however none of the facilities were ideal for use by preschool children and teachers would have to be aware of the possibilities that child-safety would be a problem. It is therefore important that sufficient helpers accompany excursions so that children could be supervised at all times.

**Table 14.4: Evaluation of whether criteria were met for child-orientated design by urban farms in Pretoria (n = 5) used for preschool excursions**

<b>CHILD-CENTRED DESIGN FEATURE</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Balance of activities possible:</b>					
- structured	Y	Y	Y	N	Y
- unstructured	Y	Y	Y	N	N
- informative	Y	Y	Y	Y	Y
- creative	Y	Y	Y	N	Y
- noisy	Y	Y	Y	N	N
- quiet	Y	Y	Y	Y	Y
- observation possible	Y	Y	Y	Y	Y
- participation possible	N	Y	Y	N	Y
<b>Physical limitations of child</b>					
- distances between foci of attention short	Y	N	N	Y	Y
- convenient toilets	Y	N	Y	Y	Y
- small sized toilets for children available	N	N	N	N	N
- availability of food suitable for preschooler	Y	N	Y	Y	N
- space for noisy activities	Y	Y	Y	Y	N
<b>Safety-orientated</b>					
- traffic hazards	N	Y	N	N	Y
- danger from animals	N	Y	Y	N	N
- water (drowning)	N	Y	Y	N	N
- water (non-potable)	Y	Y	Y	N	N
- poisoning (plants/chemicals)	N	N	N	N	N
- hygiene	Y	N	N	Y	Y
- risk of zoonotic disease	N	Y	Y	N	N

In addition to design of facilities being suitable for children, it should be suitable for animals. Positive human animal interaction cannot take place unless the wellbeing of the animals is assured. In Table 14.5, therefore, criteria for the wellbeing of animals are evaluated.

Included in this list are the criteria suggested for management to control disease, which were previously discussed in Chapter 5 and formed part of the evaluation criteria for care of animals kept permanently at preschools. Hygiene seemed to be the weakest link. This was manifested by poor faecal disposal and presence of food remnants in the cages; poor drainage often contributed to the problem. Overcrowding was also a common problem.

**Table 14.5: Evaluation of whether criteria were met for animal well-being by urban farms (n = 5) used for preschool excursions**

DESIGN FOR ANIMAL WELL-BEING	A	B	C	D	E
<b>Disease and parasite control</b>					
- fly control	5	4	4	5	5
- external parasites	5	4	5	3	4
- potable water	5	4	4	5	5
- hygiene	3	2	3	3	4
- regular vaccination	5	5	5	U	5
- overcrowding	N	Y	N	Y	N
- built to facilitate cleaning	N	N	N	N	Y
- drainage	3	3	3	1	4
- sewage disposal	3	3	3	3	4
<b>Environmental comfort:</b>					
- ethogram	1	4	4	3	5
- space	2	5	5	3	4
- shade	3	3	5	4	5
- shelter	5	4	5	3	5
- bedding	2	2	2	1	3
- light	5	5	4	5	5
- dampness	5	5	4	5	5
- environmental enrichment	1	4	4	2	5
<b>Nutrition</b>					
- suitable food	5	5	5	3	5
- fed regularly	5	5	5	5	5
- presence of wire/plastic bags	N	N	Y	N	N
- poisonous plants	N	N	N	N	N
<b>Supervision</b>					
- experienced labour force	N	N	Y	N	Y
- veterinarians on staff	Y	N	N	N	Y
- outside veterinarians called for injured or sick animals	N	Y	Y	Y	N

In Table 14.6 the more specifically veterinary criteria have been evaluated. The type of species kept at these facilities is interesting because it may be related to ease of management of facilities run, not to make a profit out of farming, but to make a profit out of visitors.

The average condition score and state of health of the animals observed was good. However, as these evaluations were done on several occasions (n = 5) at different times of the year, it was noted that there was a high turnover of animals, particularly with regard to rodents. This may have been due to very strict culling being used to control, if not disease, then at least the manifestations of disease.

**Table 14.6: Species, condition scoring and health evaluation of animals seen at urban farms (n = 5) used for preschool excursions**

ANIMAL CHARACTERISTIC	A	B	C	D	E
Species					
- cattle	Y	Y	Y	N	Y
- horses	Y	Y	Y	Y	Y
- goats	Y	Y	Y	Y	Y
- sheep	Y	Y	Y	Y	Y
- pigs	N	N	N	Y	Y
- chickens	Y	Y	Y	Y	Y
- ducks	Y	Y	Y	N	Y
- geese	Y	Y	N	N	Y
- peacocks	N	N	Y	N	N
- guinea pigs	N	N	N	Y	Y
- rabbits	N	N	N	Y	Y
Average condition score	2,5	3	3,5	3	3
External evidence of disease seen	N	N	N	N	N
- farm animals	N	N	N	N	N
- poultry	n/a	n/a	n/a	N	N
- rabbits and guinea pigs					

**Condition scoring:**

Done according to accepted principles for measuring body fat thickness in the live animal, utilising the scores 1-5 where:

- 1: Animal very thin
- 2: Animal thin
- 3: Animal good condition
- 4: Animal overfat
- 5: Animal dangerously obese

The following table examined the handling facilities available for the animals. This was also an area where considerable improvement could be made (Table 14.7).

**Table 14.7: Uses to which animal were put and evaluation of available handling facilities at different urban farms (n = 5) used for preschool excursions**

EDUCATIONAL OBJECTIVE	A	B	C	D	E
Handling facilities adequate	3	3	3	1	4
Equipment used appropriate	3	2	3	3	4
Use to which animals were put					
- Milking	Y	Y	Y	N	N
- Riding	Y	Y	Y	Y	Y
- Traction	Y	Y	N	N	N
Environment hazardous to working animals	N	N	N	N	N

### 14.3 Discussion

It is unlikely, if the theories of Piaget (1970) are correct, that preschool children would learn anything by traipsing around from cage to cage being bombarded by unconnected pieces of simplified scientific education. Yet this was the pattern found in initial visits to the zoo and substantiated by the informal interviews with teachers. The result was tired, irritable, uncontrollable children. Most of the teachers observed, gave up the unequal struggle and spent the day picnicking on the lawns outside the cafeteria. A lack of concentration on the fundamentals of environmental hygiene was also responsible for a high degree of littering seen on these lawns. While not objectionable from the viewpoint of recreation, it was felt that the opportunity for teacher-mediated learning during the excursion, was lost.

Problem-solving cannot take place in the absence of a problem, and problem-solving behaviour may only be stimulated in young children if they are motivated. In the egocentric preschooler this motivation is probably directly related to self-interest (Mouly, 1973). However, if a sufficiently different environment can stimulate the child's natural curiosity, problem-solving behaviour could be coupled to concept formation. Otherwise a problem set by a teacher may become merely a task, and the child's problem-solving behaviour merely stimulated towards avoiding having to do the task.

Excursions are valuable because the teacher can engineer unusual events which will upset the equilibrium in the child's cognitive structure and motivate engagement in problem-solving behaviour. The programme designed and tested at Pretoria Zoo did just this. Children were not physically overtaxed and the balance of activities meant that they did not become bored. Concepts and problem-solving were easily introduced and there was eager participation. Focusing on picking up litter as a game resulted in clean lawns when a party of children moved on.

An evaluation of the urban farms available in Pretoria for preschool excursions showed several deficiencies which could be addressed. In general, educational objectives could be met, however, the areas were generally not environmentally safe and child-centred enough for young children, and this should definitely be improved.

Veterinary public health officials should perhaps become involved in the inspection of such facilities to improve animal well-being and hygiene. There were also problems regarding the management of animals which could possibly have been improved by employing or consulting a veterinarian and making sure that the labour-force employed was experienced in the handling and management of animals. The average condition score of the animals seen was, however, satisfactory and no external evidence of disease was apparent. This might have been achieved by regular culling of diseased or emaciated animals. Handling facilities were also, in many cases, inadequate. Veterinary advice would go a long way to improving the situation.

In order for MLE with animals to be effective, teachers and parents sometimes need expert advice on animal behaviour and biology that is not available from the usual resources such as books. Such information may also be available to professionals but difficult for the lay-person to access or understand. The private veterinarian is usually available to the community and might be prepared to offer advice in this field, ie act as a resource for parents or teachers. The benefits to the veterinarian would not be financial, but would promote the profession and increase the standing of private practitioners as persons with special and valuable knowledge.

## CHAPTER 15

### CONCLUSIONS, EVALUATION AND RECOMMENDATIONS

#### 15.1 Introduction

The holistic development of children under the age of seven years is facilitated by exposure to educare. It was found that animals were involved in themes and topics at all preschools investigated and that teachers regarded them as an important aid to child development. Criteria were presented so that veterinary input could improve the housing and management of animals, both at preschools and animal facilities visited during preschool excursions. It was proposed that addressing malnutrition by provision of safe foodstuffs of animal origin, could lead to a change in the paediatric disease profile in low income areas. Provided that veterinary control was maintained, the risk of zoonotic disease in preschool children was considered to be limited, as proportional morbidity in the populations investigated, was found to be very low. If such control failed, however, the risk of an epidemic could increase as it was found that a large number of zoonoses could affect children at preschool. A role for the veterinarian as part of the primary health care team was strongly recommended.

It is suggested that animals should be used as facilitators in the education of preschool children. In terms of educational objectives, both the literature reviewed and the results of this study showed that child-animal interactions would be mainly classified as falling into the affective and cognitive domain. Because of the variables involved in any human-animal encounter, it was felt to be particularly important that preschool children should be carefully monitored and guided during their first interactions with animals. How this was done would determine to a great extent the advantages the encounter would have for a particular child and whether it would produce the desired effect. The informal system of education, as used in the preschool, allowed the necessary latitude yet provided sufficient



supervision to make the child-animal interaction a success. Veterinarians were involved in the health of animals and therefore had a role to play where there is an interaction between children and animals.

## **15.2 Summation of study objectives**

In Chapter 1, the objectives of the study were stated in the form of two research questions. These were, firstly, the extent to which animal interactions were involved in the holistic development of the preschool child; and, secondly, the veterinary perspective on child-animal interaction as it bears on health and education during the preschool years. The answers obtained during the course of this study are summarised below.

### **15.2.1 Child-animal interaction and holistic child development**

The child between 3 and 7 years of age is inquisitive, eager to learn and socially able to accept new experiences and surroundings. Both positive sensory stimulation and adequate nutrition are required for normal physical and intellectual development. It is therefore regarded as important that children be exposed to situations which take advantage of this phase, to promote holistic development.

Situations which allowed for development in the cognitive, affective and psychomotor domain were deliberately planned as part of the curriculum at preschools. In addition, the dietary requirements of the rapidly growing child were met through nutritional programmes. It was found, during the course of this investigation, that child-animal interactions were involved directly or indirectly in both of these. They included direct contact with living animals at school, animal themes as part of curricular webbing, animals in books, toys and games at school as well as excursions to animal facilities such as the zoo. Dietary requirements were partly met by utilising protein of animal origin. Negative facets of child-animal interaction, such as euthanasia and zoonotic diseases were also investigated.

In Piaget's (1970) preoperative stage of cognitive development, the child believes that they are the centre of the universe. The social climate at the preschool facilitates the change from an egocentric to a social self. Animals and animal topics were found to be facilitators. The contention by VanLeewen (1981) that it was not necessary for a child to be the individual owner of a pet to reap the benefits of animal interaction, were supported.

In no sense was it found that the use of animals in the preschool could be regarded as exploitive, as argued by Fox (1981). Although animals were found to constitute part of the learning experience for a preschool child, this learning experience was essentially a learning of empathy.

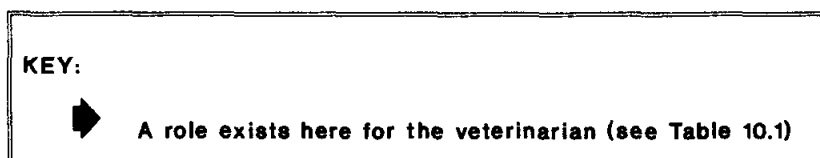
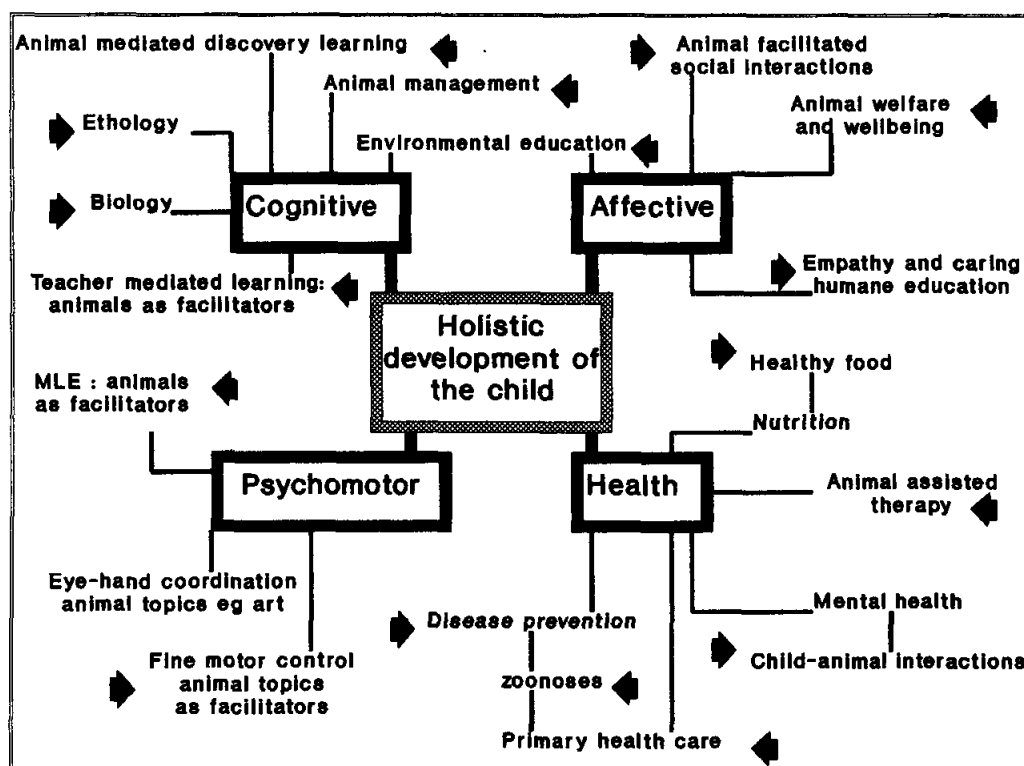
It was the negativistic, aggressive, utilitarian and doministic attitudes of the egocentric phase that were changed as the child's focus was extended to encompass beings outside themselves. The preschool was observed to be an opportunity to teach and monitor empathy in the course of child-animal encounters within the preschool, through books and charts and toys on animal topics, and during excursions to zoos, welfare organisations and farms. Through positive animal interaction this empathy and caring could also be extended, as postulated by Calitz (1993a) to environmental issues.

In the course of this study it was found that animals and animal-topics could also act as mediators in the total development of the child or as facilitators in teacher-mediated learning. Although Levinson (1972), McGinnis (1978) and Zemanek (1992) have shown that pets can be meaningful aids to child development, this study suggests that the net should be cast wider to include animals in general, as well as animal themes and topics. Because animals captured children's attention and stimulated their curiosity, they could be used to teach concepts as diverse as pre-maths and language.

Animal themes could also be used to facilitate fine muscle coordination in art or involved in games or songs.

### 15.2.2 The role of the veterinarian

The various roles which could be played by veterinarians in the holistic development of the preschool child within a non-formal educational environment are illustrated in Figure 15.1.



**Fig 15.1:** The various roles which could be played by veterinarians in the holistic development of the preschool child

It is suggested that the veterinarian should also be prepared to be considered as a resource-base for preschool teachers or the parents of a preschool child. Although it was demonstrated that no direct financial advantages would ensue, acting as a teacher or parent resource should enable the private practitioner to promote the veterinary profession as an asset to the community (Table 15.1). In the case of state veterinarians it could also facilitate good community relations and veterinary extension for disease control.

**Table 15.1: The different roles which could be filled by different veterinary specialities in the health and education of the preschool child**

Preschool field	Veterinary input	Type of veterinarian
Animal mediated learning Animal management Animal ethology Animal well-being Child-animal interactions	Veterinarian as parent or teacher resource	Private practitioner Veterinary ethologist
Animal facilitated learning Animal biology	Veterinarian as parent or teacher resource	Private practitioner
Humane education Animal welfare	Veterinarian at welfare organisation	Private practitioner Veterinarian in animal welfare
Environmental education	Veterinarian as parent or teacher resource	Private practitioner Zoo veterinarian Wildlife specialist
Animal facilitated social interactions Child-animal interactions Animal assisted therapy	Veterinarian directly involved	Private practitioner Veterinarian with special knowledge in the field of human-animal interactions Veterinary ethologist
Healthy food Primary health care	Veterinarian directly involved	Public health or state veterinarian
Disease prevention and control in animals	Veterinarian directly involved	Public health or state veterinarian

The literature reviewed suggested that physical health and growth in children were promoted by a diet adequate in animal protein. Positive child-animal interaction could also contribute to socialisation and mental hygiene through psychological well-being. Health could, on the other hand, be threatened by zoonotic diseases. It was, however, found, that although there were a large number of zoonotic diseases which could

affect the preschool child, veterinary disease control and implementation of hygienic precautions in the preschool should result in a very low risk of disease from animal contact or ingestion of animal products. The veterinarian's role as part of the primary health care team was also substantiated.

Parents should play an important part in the education of their children, from birth to adulthood and posters or notices were placed at school for parents to see and read. This could be used to improve the control of zoonoses, as posters or parent information on diseases such as rabies could be distributed through preschools and creches.

Not only freedom from zoonotic disease, but the well-being of animals should be considered, if positive human-animal interactions were to result in the anticipated benefits. It is proposed that the checklists designed for evaluation of animal housing and the detection of disease in animals kept at preschools would contribute to the well-being of animals kept at preschools.

Blue (1986) suggested that experience of life, death and grief was one of the benefits of child-animal interaction in preschools. It was found that the mourning process in children exposed to the euthanasia of a rabbit kept at preschool was less than that described for the loss of a pet. This was explained on the basis that attachment between a child and an animal at preschool was not as intense, as the animal was shared by a large number of children and the contact time between child and animal was limited. It was, however, suggested that the veterinarian should play a strongly supportive role for the staff in such a situation.

Preschool children enjoyed realistic fiction where the central protagonists were anthropomorphic animals. It is therefore suggested that these should be used to facilitate extension messages about animal welfare and zoonotic diseases, aimed

at young children. It was also suggested that veterinarians should contribute a positive input to the evaluation of animal ethology and human-animal interactions in books featuring animals. In low income areas where illiteracy was high in the surrounding population, preschools did not make use of books, and children would not therefore be influenced by the animal content. They did, however, see wall charts at the preschools and these could be used to convey the positive aspects of human-animal interactions.

Management of animals at agricultural museums and urban farms should perhaps be targeted for veterinary supervision as serious deficiencies were found in those investigated. The ethogram based on animal well-being as suggested by Odendaal (1994a) could be used for this purpose.

### **15.3 Critical evaluation of the study**

Observational research is an inductive process, where the data obtained are used to build theoretical models. Because impartiality on the part of the observer or researcher is an integral part of observational research, the data obtained were not always ideal. Real life is not a laboratory, and, particularly in the case of children, it was neither ethical nor desirable to set up controls. It could also be argued that the very presence of such controls could influence the impartiality or objectivity of the results obtained.

The means to obtain data were also not always available. For instance, in the case of the private practice, the age distribution of diagnoses made would have been valuable. However, the doctors did not enter this variable into their daily records, although the date of birth was specified on patient cards. These cards were unfortunately not available for scrutiny due to the medical ethical code which precludes doctors from revealing patient details.

This investigation was also, of necessity, very broadly based, because the informal teaching at the preschool is aimed at the holistic development of the child. An investigation directed at a single facet only, for example, one zoonotic disease and its effects on the preschool child, would have considerably simplified the structure of this dissertation.

#### **15.4 Contribution of the study**

This study has highlighted the important role that veterinarians could play by acting as a resource for preschool teachers and parents of preschool children, with respect to knowledge about management, ethology, well-being and diseases of animals. It has also emphasised the role of the veterinarian in community health and as part of the primary health care team. As such, it may be seen as a contribution to a previously little-noticed opportunity for veterinary science.

The preschool movement has progressed with such rapidity in South Africa that it is considered to be a major force for reconstruction and development. Involvement of veterinarians and emphasis on the role played by child-animal interactions in the holistic development of the child substantiates the valuable role played by the veterinarian in the wider community. This is significant in the current political climate in South Africa, where contributions by the profession to the reconstruction and development programme have been advocated (De Bude, 1995).

#### **15.5 Recommendations and suggestions for further research**

The veterinarian theoretically has the knowledge to advise parents and preschool teachers on the behaviour and management of animals as well as the prevention of zoonotic diseases. In reality, veterinarians tend to specialise in a particular field once they have qualified. Several years down the line they may no longer be up to date in any but their own field.

Specialists in animal ethology, human-animal interactions and the epidemiology of animal diseases are, however, available and it is recommended that both state and private practitioners make use of this expertise when advising preschools. The preschool movement has grown to such an extent since 1987 that virtually every veterinarian in South Africa will now have one or more preschools in their vicinity. This is particularly true in the developing areas where the preschool movement has been seen as a vital part of the reconstruction and development programme (RDP) in South Africa (Turok et al, 1993).

It is also strongly recommended that veterinary advice should be sought in order to improve the management and handling of animals at urban farms and agricultural museums. Preschool children should be considered when designing these facilities in order to make them more child-centred and safer for preschool children. Facilities for managing and handling domestic animals at the National Zoological Gardens could also be improved.

In order to assist preschool teachers in using animals for mediated learning experiences and holistic child development, it is strongly recommended that the applicable findings of this study be incorporated as part of the study guides for the higher education diploma in preprimary education. Of particular note are the criteria for housing animals at preschools, criteria for the prevention of zoonotic diseases at preschools and the evaluation of animal content in books for young children. Suggestions for teaching strategies during excursions to animal facilities as well as those suggested where an animal kept at school has to be euthanased, could also be considered.

Suggested areas for further research are listed below:



- **Methods for more exact estimates of the incidence or prevalence of zoonoses in the human population in South Africa.**
- **The prevention of zoonoses as part of primary health care and the role of the veterinarian as a part of the primary health care team.**
- **Structure, layout and environmental enrichment in housing for animals kept at zoos, urban farms and agricultural museums.**
- **Types and layout of charts which would be affective in promoting positive human-animal interactions in pre-schools and creches in disadvantaged communities.**
- **The role of anthropomorphic animals in literature for adults as well as children.**

**In conclusion, it was established during this investigation that animal topics and animal interaction had an important place in the preschool curricula. A majority of preschool teachers appreciated that animals had social and psychological value as well as educational value for the preschool child. It is suggested that involvement and interest in the field of preschool education will promote the image of the veterinary profession as a whole as well as the veterinarian's own practice.**

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## APPENDIX

### HANDOUTS FOR PARTICIPANTS: WORKSHOPS ON ZOO VISITS

It should always be borne in mind that the emphasis of a school tour is on **education** and not on **recreation**. To realise this aim, an educational tour should be planned well in advance, taking the following points into consideration:

#### I. OBJECTIVES

- Education or Recreation?  
Concentration span  
Physical limitations of young children
  
- Concepts  
Mathematical: Big/small, near/far, number of legs/horns/wings similar/different.  
Linguistic: Names of animals, their young, parts of birds/animals.  
Artistic: Colours and sounds, paintings and drawings, music, singing and dancing.  
Biological: Classification, ecology, reproduction, anatomy, eating and elimination, habits and habitat.
  
- Nature conservation:  
"If the world dies we die with it", endangered species, nurturing and caring.
  
- Problem solving:  
Opportunities to discover, explore, be challenged through direct experience.
  
- Balance of activities: structured/non-structured, informative/creative, active/quiet, indoor/outdoor, observing/participating, alone/together.

## II. HOW ARE THEY TO BE REALISED?

- Choose a topic: eg birds, monkeys, herbivores, night animals, baby animals and birds, farm animals, carnivorous animals, animals and birds that live around water, fish, reptiles.
- Background information: Use the library, museum, textbooks (eg birds - enclosed sheet A).
- Differentiate according to age (eg enclosed sheet B - differentiated approach to birds).
- Zoo visit: route, information, associated activities (eg enclosed sheet C).
- Follow up to zoo visit: reinforce the learning experience (Enclosed sheet B).

### 1. Didactical planning

- (a) **What** are the objectives of the tour? Why are we visiting a specific institution? What should the pupils gain from their visit?
- (b) **How** are these objectives to be realised? What are the teachers and pupils to do before the visit, during the visit and after the visit?

To reach the didactical goals, a teacher should plan the tour as an integral part of the syllabus, and not as a separate activity.

### 2. Administrative planning

- (a) Inform **parents and school committee** by calling a parents' meeting in good time:  $\pm$  3 months ahead.
- (b) Obtain **permission** from your inspector of schools.

- (c) Contact the **Lecture Guide** of the region you wish to visit in good time and let him make all arrangements concerning the places of interest. He will furnish the following: Suitable places of interest for your classes, dates and entrance fees. If there is no Lecture Guide, the principal must make the necessary arrangements.
- (d) Arrange for **buses** or other means of transport.
- (e) Make sure that enough **funds** are available, to pay for all expenses.
- (f) Confirm definitive appointments and **keep to these dates and times**.

## **A: BIRDS - BACKGROUND INFORMATION**

**Definition: What is a bird?**

- Warm-blooded vertebrate with feathers
- Wings instead of forelimbs
- Lay eggs which hatch into chicks
- Beaks instead of teeth
- Two feet, two, three or four toes

**Food and feeding:**

- Herbivores: seeds, plants, fruit
- Carnivores: meat, insects, smaller animals
- Omnivores: everything
- Shape of beak according to food
- Beak used for feeding, courting, nest-building, defence, preening, feeding the chicks
- High metabolic rate: birds need a lot of food, a little at a time
- High carbohydrate makes seed eaters most active, meat eaters least active
- Seeds are hard: Seed eaters have strong, short beaks (finch, sparrow)
  - size of beak according to size of seeds
- Feed young on "pigeon's milk": digested seeds in crop
- Fruit eaters need to eat more because less concentrated
- Parrots hold food in one claw while eating
- Long, curved beaks - nectar - humming birds
- Omnivores find food mainly on the ground, eg starling, turkey, chicken, guinea fowl, pheasant
- Filter feeders: Flamingoes, ducks
- Scavengers: carnivores that eat dead animals, eg vultures
- Vultures: long, strong, curved beaks to tear off meat
- Birds of prey: hunters, long, sharp talons, curved beaks, eg hawks, owls, eagles
- Insectivores, eg swallow, starling. Oxpeckers eat ticks
- Fish eaters, eg cormorants, kingfishers

### **Movement in birds:**

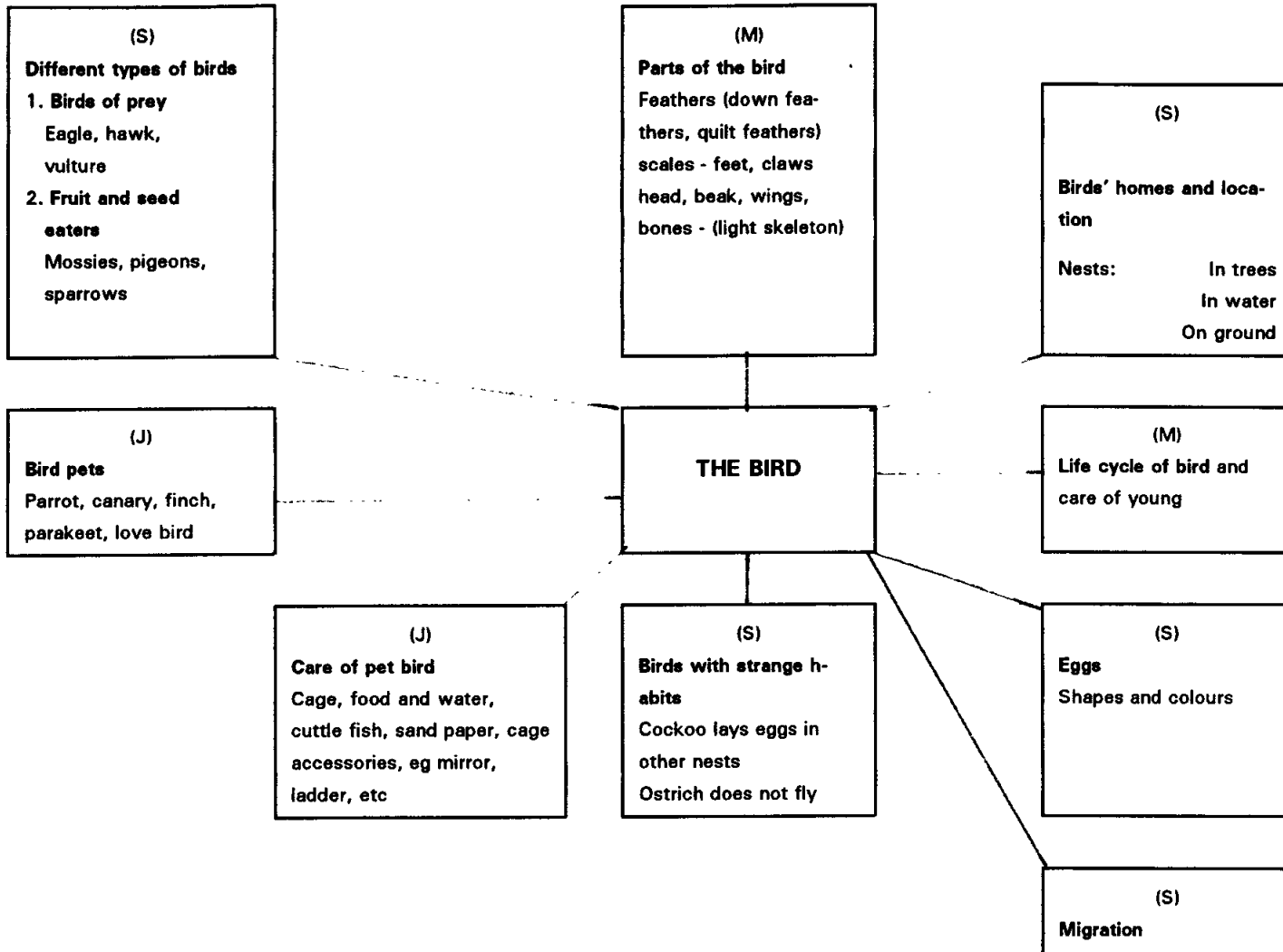
- Fly, walk, hop, clamber, run, swim
- Different types of feathers according to function
- Down to keep ducks warm and waterproof
- Quills - long, strong flight feathers, used as pens
- Bright colours: Males to attract females, eg partridge
- As camouflage, eg parrots among jungle flowers and fruit
- Seasonal: Male only brightly coloured in mating season, eg weavers
- Strong, long wings to carry extra weight, eg birds of prey
- Penguins: Wings now flippers. Feathers like scales on wings, furry on body. Can fluff out to trap air so can float
- Ostriches cannot fly, long, strong legs. Plumes: Feather dusters
- Flight: Aerodynamic lift over smooth wings
- Eagles and vultures glide on air currents
- Lands by raising wings, lowering tail

### **Reproduction:**

- Oviparous: lay oval eggs, pointed at one side, in Spring
- Incubation: Sitting on eggs. Hatching: When chicks emerge
- Adults feed and care for chicks in nests, teach to fly
- Weavers' nests, gulls' nests, eagles' nests



# THE BIRD - CURRICULAR WEB



## B: THE BIRD - A DIFFERENTIATED APPROACH ACCORDING TO AGE OF CHILDREN

	Junior	Junior	Senior
<b>TABLE*</b>	Our Pet Bird - Cage with bird plus food, accessories in cage. Book	Birds in the Garden. Food they eat, bird table, bird bath	Nests and Eggs - different types of nests, shapes and sizes of eggs
<b>CREATIVE ACTIVITY</b>	<ol style="list-style-type: none"> <li>1. Build a nest with twigs and mud in an eggbox</li> <li>2. Birds seed pressed into salt dough</li> <li>3. Salt dough eggs - modelling</li> <li>4. Hand prints (chickens)</li> <li>5. Making individual cookies</li> </ol>	<ol style="list-style-type: none"> <li>1. Painting egg shells</li> <li>2. Egg shell mosaic using crushed egg shells</li> <li>3. Feather painting</li> <li>4. Salt dough birds</li> <li>5. Scrambled eggs on toast (group)</li> </ol>	<ol style="list-style-type: none"> <li>1. Painting a bird - powder paint</li> <li>2. Box construction bird</li> <li>3. Bird mobile</li> <li>4. Bird mural - koki and pastels. Each individual bird is cut out and pasted onto a group mural.</li> <li>5. Making meringues (group)</li> </ol>
<b>POEMS/RHYMES</b>	I have a little yellow bird. Her name, I know, is Molly. She flies around about her cage and always is so jolly.	Some birds are big and tall Some birds are short and small They fly and eat and sing all day Let's hope the never go away	The eagle is so big and strong His lovely wings are wide and long In the day he circles high And searches with a beady eye Down he swoops, all of a scurry
<b>SONGS</b>	Fishes swim in water clear Birds fly up into the air Little fishes softly creep Little children go to sleep	To the tune of "Wheels of the Bus" The birds in the sky go flap, flap, flap ... all through the sky The chicken on the farm goes peck, peck, peck... The eagle in the sky flies high, high, high, etc	
<b>ORIENTATION (VISITS)</b>	A visit to the pet shop	Listening to a recording of birds' calls and walk in the veld or park	Visit to a bird sanctuary Putting up a bird table Visit to the Zoo Visit to the Museum
<b>EXPERIMENTS</b>	Boiling an egg - observe an egg before and after. Taste.	Blowing an egg	Suction of boiled egg through opening of milk bottle

\* The Transvaal Museum, Pretoria, lends collections to teachers

## **C: THE ZOO VISIT - THEME BIRDS**

### **Route, information associated activities and concepts**

#### **Section 1: Seed-eaters (see map)**

- Information Kiosk: Background on birds. Tables what birds do for us.  
Concepts: Biological and linguistic
- Pheasants and finches: Not South African birds.  
Concepts: Colours, type of food, large and small.
- Weavers: Weave their nests. Change colour in winter.  
Concepts: Widow finch is black. Sing "Two little blackbirds".
- Budgies: Pets. "Who owns a budgie?" Colours, shape of beak.
- Grey Lourie: "Kwêvoël". Common in bushveld.  
Concepts: Sound.
- Doves, pigeons, Crowned pigeon is from New Guinea.

#### **Section 2: Vultures**

- Concepts: Vocabulary: Wings, flight, feathers, claws.  
Mathematical: Size, number of wings, legs, claws  
Biological: Nests, cliff-face, white droppings, strong beaks, claws to tear meat from bones. Vacuum cleaners of the veld  
Conservation: Egyptian vulture endangered species, why?
- Related activity: Vultures soar - children can run with arms outstretched on way to next cage.
- Also in cage: Walberg's eagle, yellow-billed Kite.

#### **Section 3: Flamingoes**

- Information Kiosk: Look at birds on pictures, read names, ask if children can see these birds in the cage.
- Concepts: Biological: Nests made of mud, young flamingoes a different shape (Information Kiosk), funny beaks - filter feeders. Ducks also filter feeders. Shape of feet.

**Mathematical:** Comparison - length of legs and necks of flamingoes and ducks

**Artistic:** Colours, song: "Two little ducks"

- **Related activity:** Try to stand on one leg.

**Section 4: Pause on lawns for tea and toilets** (If children very tired, visit can end here. Please clean up litter, with children, before your leave).

### **Section 5: Birds of Prey**

Vultures eat animals that are already dead, birds of prey catch other birds or animals to eat

- **Gymnogene:** Eats insects - "Kaalwangvalk"
- **Bateleur:** Concepts: Colours (black, red)  
**Biological:** Strong talons, sharp curved beak - not as long or strong as vulture, as he does not tear meat from carcasses.
- **Jackal Buzzard, Martial eagles:** Size, length of wings, eyes of carnivorous birds very large
- **Hornbill:** Stripes and spots, shape of bill. Eats insects, small lizards, hops from branch to branch - so long tail, short wings (eagles soar so have long wings, shorter tail)
- **Black eagle** eats dassies - farmers friend.

### **Section 6: Waders**

- **Concepts:** Biological: Three toes forward and one back or absent. Eat insects, arthropods, tadpoles. Colours, purple gallinule with red face
- **Names:** Hadedah (sound), Bald Ibis, Plover, Dikkops (common wild bird in our veld - ask if any of the children have seen one)
- **Note:** Weavers and pigeons.

### **Section 7: Parrots**

- Not found in South Africa. Strong beak, short thick legs, short tails, wings - not strong fliers. Clamber around in forests (and on wires of cages). Eat fruit, nuts, flowers. Brightly coloured to match rainforests
- **Concepts:** Biological - see above. Why are feet so thick and strong?

- Mathematical:** Compare size of wings with vultures, eagles.
- **Colours, sounds.** Parrots can talk
    - **Macaw:** Bright coloured. Same as Mr Ferney
    - **Pheasants:** Male and female different colours. Why?
    - **Guinea fowl:** Spots. Who has seen one?
    - **Meyers parrot:** Only SA parrot. Found in Lowveld.
    - **Lovebirds:** Always in pairs. If one dies the other will not take another mate. Colours
  - **Cockatiels:** Pets. Can talk. Who has one?

**Section 8: Waltrap Ibis:** What is endangered species.

### **Section 9: Birds**

- **Examples of different types (revision)**
- **Gymnogene:** Bird of prey
- **Crow:** Omnivore
- **Black shouldered Kite:** Meat-eater (scavenger)
- **Starling:** Omnivore
- **Francolin:** Seed-eater
- **Indian Mynah:** Nuisance in Natal
- **Crowned Plover:** Water-type

### **Section 10: Water birds**

- **Concepts:** Colour: Yellow-billed ducks, black swan  
**Biology:** Swimming birds, geese, ducks, swans have webbed feet. Oil on feathers traps air and keeps them floating

## **NORTHERN TRANSVAAL ASSOCIATION FOR EARLY CHILDHOOD EDUCARE**

### **ZOO PROJECT - PRIMATES - APES**

#### **INTEREST TABLE**

Back drop with monkeys on it.

Food that monkeys eat - apples, bananas, oranges, peanuts, leaves, bamboo, sugar cane, insects - **MONKEY FOOD.**

#### **DISCUSSION - MORNING RING**

Using the background provided information, discuss one type of ape on different days. Discuss the topics suitable for your particular age group. Use the questioning method getting the children to give you the information and not telling the answers.

#### **CREATIVE ACTIVITIES**

**1. Hand prints**

Place hands in paint or mud and make various pictures. Chickens, tree - spring, autumn, green, peacock.

**2. Thumb prints**

Place thumb in paint or mud and make a picture.

**3. Foot prints**

Bare foot mud or paint prints on paper.

**4. Plaster of paris, mud or salt dough, hand and footprints. Make a model of hands and feet.**

**5. Leaf prints - rubbings - collage**

As monkeys are found in trees, activities incorporating trees can be used. Draw or paint a tree and let children glue real leaves or leaves they have drawn and cut out themselves.

**6. Paper plate masks**

Draw a monkey face on the plate, colour and cut out eyes.

**7. Puppets**

- Finger puppets, make small envelope, draw animal or human faces on them. Place on fingers and have a puppet show
- Make a puppet like a ring
- Draw an animal then cut out holes for two fingers which will be the legs of the puppet.

**8. Tails**

Stuff pantyhose with newspaper and pin onto child to be a tail.

**9. Zoo cages**

- Styrofoam dish - draw an animal inside this with wet chalk, draw bars over the front to look like bars of the cage
- Glue wool or strips of paper over the front to look like bars
- Shoe box - make an animal from clay or dough or draw animals on the floor of the box, cover with wool or strips of paper to look like a cage.

**10. Colour collages**

Brown-yellow-red - orange (monkey colours)

Green - leaf colours.

**11. Stone collage**

**12. Mud pictures - finger paint**

**13. Box construction - make animals.**

## **SONGS AND GAMES**

1. **Monkey See, Monkey Do (like Simon Says).**
2. **Old MacDonald had a Zoo**  
and in his Zoo he had some chimps -  
With a hu hu here and a hu hu there -
  - he had some lemurs - with a ukka ukka here -
  - he had some baboons - with a whahoo here -
  - he had some monkeys - with a scree scree here -
  - he had some tamarins - with a whistle whistle here -
  - he had some gorillas - with a thump thump here -
3. **To the tune of Frere Jacques**  
**See the monkeys, see the monkeys**  
**In their cage, in their cage**  
**Hear them as they chatter, chitter, chitter, chatter**  
**I can too, I can too.**
4. **The animals went in two by two, hoorah!**
5. **Bobbejaan klim die berg**
6. **Tommy Thumb**
7. **Thumpkin he can dance**
9. **Two little monkeys**  
**Two little monkeys jumping on the bed, jump, jump, jump**  
**(use two index fingers doing jumping action)**  
**One fell off and bumped his head**  
**(one finger falls - other finger is placed on head)**  
**We took him to the doctor and the doctor said**  
**(Walk index fingers to doctor)**  
**That's what you get for jumping on the bed.**



### **Here I come No 1**

Here I come no 1  
Like a zebra I can run  
Here I come no 2  
Jumping like a kangaroo  
Here I come no 3  
Climbing like a chimpanzee  
Here I come no 4  
Like a lion I can roar  
Here I come no 5  
Like a sealion I can dive  
Here I come no 6  
Like a monkey doing tricks.

### **Ten little monkeys**

1 little monkey swinging on a tree  
2 little monkeys paddling in the sea  
3 little monkeys playing on a swing  
4 little monkeys dancing in a ring  
5 little monkeys drinking lemonade  
6 little monkeys digging with a spade  
7 little monkeys wearing sailor hats  
8 little monkeys waving cricket bats  
9 little monkeys standing on their heads  
10 little monkeys sleeping in their beds.

### **Six little monkeys**

6 little monkeys went to see a hive  
One of them got stung by a bee, then there were 5  
6 little monkeys walked along the shore  
One of them rowed away, then there were 4  
4 little monkeys climbed up a tree  
One of them tumbled down, then there were 3  
3 little monkeys found a pot of glue  
One of them got stuck in it, then there were 2  
2 little monkeys found a currant bun  
One ran away with it, then there was 1  
1 little monkey left all alone, cried all afternoon  
So they put him in a rocket ship and sent him to the moon.

### **My little thumb**

**My little thumb keeps moving (3)**

**Tra la, tra la, tra la.**

**My thumb, and fingers keep moving (3) etc**

**My thumb, my fingers and hands keep moving (3) etc**

**My thumb, my fingers, my hands and arms keep moving (3) etc**

**My thumbs, my fingers, my hands, my arms and head keep moving (3)**

**An then I stand right up**

**My thumb, my fingers, my hands, my arms, my head and legs keep moving (3) etc**

### **MOVEMENT ACTIVITIES**

1. Swinging on anything that is safe to swing on.
2. Climbing - ropes or anything high and safe.
3. Walk like a monkey - hands and feet.
4. Somersaults - teach pupil to pull in head so as not to hurt himself.
5. Hand stands and cartwheels.
6. Stand with legs apart, turn upside down and look between.
7. Take off shoes and pick up stones with toes.
8. Finger rhymes finger exercises.
9. Body image - a monkey can put his foot in his mouth, can you? A monkey can scratch his back - can you?
10. Drama - pretend to be various kinds of apes.

## **STORIES**

**Jungle book**  
**A day at the Zoo**  
**Follow the Zoo Keeper**

### **My little thumb is all alive**

**1, 2, 3, 4, 5, my little thumb is all alive**  
**First it wags this way, then it wags that,**  
**Little thumb, little thumb, what are you at?**

**5, 4, 3, 2, 1, my big toe is very great fun**  
**First it turns up, then it turns down**  
**And then goes pitter-pat off to town**  
**Pitter-pat, pitter-pat off to town.**

### **Monkey, Monkey**

**Monkey, monkey high up in the tree**  
**I see you, and you see me**  
**Hang by your fingers**  
**Hang by your toes**  
**But don't fall down on your little pink nose.**

## PRIMATES

### Background information

What is a primate? (Slide 1: Gorilla). They are a group of mammals that have many characteristics similar to people. In fact man himself is classified as a primate. The bony ridges above the eyes are typical for primates and are very easily seen in the gorilla and in man himself. In order to be able to judge distance accurately while swinging through the trees, monkeys and apes developed binocular vision, that is, both their eyes face forwards. Apes also developed colour vision and their brains grew so that they could live by their wits. Monkeys and apes are the cleverest of all animals.

Primates are classified into PROSIMIANS or lower primates such as lemurs and bush babies and ANTHROPOIDAE or apes and monkeys. The lower primates, like the lemur, tend to walk on all four legs and have less developed brains. Amongst the higher apes are the New World monkeys like the spider monkey. They come from Africa. Examples of these are Baboons and Vervet monkeys. The Great Apes are those most similar to man. They are the Gibbon, Chimpanzee, Gorilla and Orang-Utang. These apes walk upright most of the time and have no tails (Slide 2: Gorilla walking upright).

One of the special features of the primate is the thumb (Slide 3: Gorilla climbing in tree). Primates' thumbs have evolved so that they can grasp things between thumb and finger. This was originally very useful for climbing trees. However, it is even more useful for using tools. We all know that people use tools. So do certain of the apes and monkeys. Chimpanzees, for example, use a piece of twig pushed into an ant-hole to catch ants. The chimp then licks the ants off and repeats the exercise. Holding the twig and pushing it into a small hole, would be almost impossible without a thumb. Some apes, unlike man, have big toes that operate in the same way as thumbs. Most monkeys and apes have nails on the ends of their fingers, although a few have claws. The Lemur, for example, has a single, long grooming claw on each hind leg.

Apes, particularly the great apes, look after their babies very well (Slide 4: Baby chimp). The young are almost helpless at birth and are carried by their mothers. In the case of chimps the baby is almost two years old

before it is allowed to walk by itself.

Lemurs are found only on Madagascar. There are no large predators on Madagascar, so they did not need to be as clever as the monkeys of Africa who had to learn to outwit leopards and hyaenas as well as man (Slide 5, 6).

The ring-tailed lemur has scent glands under his tail (Slide 7). When groups meet, they wave their tails to introduce themselves to each other by their smell.

The ruffled lemur is particularly beautiful with his black and white fur (Slide 8).

Nagapies are also pro-simians. They are nocturnal or night animals and have very large eyes, so they can see in the dark (Slide 9).

The Tamarin (Slide 10) is a New World monkey. The golden lion tamarin is an endangered species (Slide 11).

Baboons are old world monkeys. The Hamadryas baboon was worshipped in Ancient Egypt (Slide 12). South Africa has different types of baboons but they are all very closely related (Slides 13, 14, 15, 16).

Spider Monkeys have long arms and prehensile tails. They are particularly agile, swinging through the jungles of South America (Slide 17). There are also Samango monkeys in the zoo (Slide 18). They are found in Africa. Very similar shaped is the Langur, from Asia. These monkeys are regarded as being sacred in India.

Gibbons (Slides 19, 20) have very long arms. They always walk on their back legs and have no tails. They are the smallest of the great apes.

Vervet monkeys (Slides 20,21) are very common in South Africa and may be found anywhere there are trees. They become a pest to farmers because of the damage caused to fruit crops such as bananas and oranges.

The Orang-Utang is one of the great apes (Slides 23, 24, 25). The males develop pads of fat around their faces as they grow older.

## THE ZOO VISIT

### Route, information, associated activities and concepts

#### Section 1: Chimpanzee

- **Concept:** Caring. Chimps are very good mothers. Their babies are looked after until they are seven years old. One of the chimps has two children, an older one and a younger. How many children in your family?  
**Concepts:** Biological and linguistic.
- **Concept:** Mathematical: Look at ears. do you have ears? How many?
- **Compare to life world:** Chimps have long hair on their bodies. Do you? How do you keep warm?
- **Look at the apparatus that the chimps swing on.** Have you climbed on one like it? Can you swing on a tyre?
- **Concept:** Biological. Does a chimp have a tail? Look at his eyes. They are in the front of his head. This is like looking through binoculars. Other animals have eyes on each side of their faces. Look at chimp's hands. Does he have a thumb? Do you have a thumb? How is he using his thumb? How many thumbs does he have?
- **Activity:** Can you pull faces like a chimp? Can you walk like a chimp? Can you make noises like a chimp? (Use these suggestions while walking to next cage).

#### Section 2: Lemurs

- **Concepts:** Vocabulary: Tails, scent glands, fur, stripes, Madagascar, map  
**Mathematical:** Size, length of tails  
**Biological:** Walk on all fours (chimps walk on hind legs), eyes on each side of face. Long claw on back foot for grooming. Also use teeth for grooming. Not as clever as chimps (smaller brain) (See poster next to the entrance).  
**Artistic:** Look at colours and textures: Eyes, fur, tails
- **Related activity:** Listen to noise: Uka-uka-uka-uk
  - Black Lemur (colour)
  - Red fronted lemur (wrong label on cage) Bright orange eyes
  - Ring tailed lemur, scent glands under tail

- Ruffled lemur. Looks like a panda. Very cuddly looking.  
Questions: As for the answers given above!

### **Section 3: Tamarinds, Sloth and Marmosets**

- **Concepts: Mathematical:** Size, speed of movement, length of fur, length of tail, number of toes, fingers.  
**Biological:** Sloth is not a primate. Why? Number of toes, lack of thumb, not very clever, not very agile. Where do they come from? South American jungles. What is an endangered animal? (See information board on Tamarins).  
**Artistic:** Colours of fur. Tamarins are golden and black. White fur on faces of marmosets.
- **Related activity: Observation:** Watch monkeys and see how they behave the same and differently to people
  - **Back eared marmoset:** Very tiny. Two bright eyes. Has it got binocular vision?
  - **Sloth:** Very slow (related activity, move as slowly as a sloth). Not a primate. Why? hair like long strands of moss so you do not see him in a tree very easily.
  - **Common Marmoset:** Striped body, larger than other.
  - **Cotton topped Tamarin:** White face, sharp whistle (listen to the sounds monkeys make).
  - **Tamarin:** Black with golden black.

### **Section 4, 5 and 6: Baboons, Spider Monkey, Samango and Langur**

- **Concepts: Linguistic:** Prehensile, buttocks, penis, vulva, canine teeth.  
**Biological:** baboons have very obvious buttocks and reproductive organs. Children often comment on this. Use the proper word to describe the organ if the children ask about it. Be very matter-of-fact and not embarrassed. This is an ideal opportunity to approach a difficult subject in a scientific way. The same approach applies to defecation and urination. Point out that people are not monkeys, they use toilets and wash their hands. Spider monkeys have prehensile tails. Baboons do not. What is a prehensile tail? Can a baboon swing by its tail? Can a spider monkey?
  - **Hamadryas baboon:** Sacred to Egyptians
  - **Cape Baboon:** Colour. Live on rocks and mountains.
  - **Hamadryas Baboon** again

- Spider Monkey: Prehensile tail. Colour difference between sexes. New World Monkey.
- Samango. Found in Africa. Has it a tail? Size? Type of ears? Type of face? has it a thumb?
- Langur: Looks similar to Samango, but is not. Found in Asia. has it a tail? Size? etc.

**Tea and toilets:** (If children very tired, visit can end here. Please clean up litter, with children, before you leave).

### **Section 7: Squirrel Monkeys**

- Colour (yellow)
- Binocular vision? Prehensile tail? Can you see which are males and females?
- Active or lazy?

### **Section 8: Gibbon**

- Concepts: Biological: One of the great apes. Walks upright like man, never uses arms for walking. Uses them to swing through the trees. No tail. Eats fruit.  
Mathematical: Length of arms.

### **Section 9: Vervet Monkeys, Macaques**

- Biological: Vervet monkeys common in South Africa. Ask who has seen them before. Comparisons: Vervet and Macaques, Gibbon and Large gibbon
- Activities: Let children tumble on grass, pretending to be monkeys.

### **Section 10: Mandrills**

- Concepts: Colour: Buttocks and faces brightly coloured.  
Biological: Tails not prehensile. Look more like baboons than chimpanzees.

### **11. Orang-Utang**

- Concepts: Biological: Walks on hind legs. Very clever. Has he a tail? One of the great apes. His name is "Laggies". Fat pads around his



face show that he is male. Endangered species.

Mathematical: How many fingers and toes? colour: Red-brown.

## **DIDACTICAL PLANNING**

### **a. Objectives**

- Education or recreation?  
Concentration span  
Physical limitations of young children
- Concepts: Mathematical: Big/small, near/far, number of legs/horns, wings/birds/animals, similar/different.  
Linguistic: Names of animals, their young, parts of birds/animals.  
Artistic: Colours and sounds, paintings and drawings, music, singing and dancing  
Biological: Classification, ecology, reproduction, anatomy, eating and elimination, habits and habitat
- Nature Conservation: "If the world dies we die with it", endangered species, nurturing and caring
- Problem solving: Opportunities to discover, explore, be challenged through direct experience
- Balance of activities: Structured/non-structured, informative/creative, active/quiet, indoor/outdoor, observing/participating, alone/together.

### **b. How are they to be realised?**

- Background information: Use the Library, Museum, Textbooks, eg enclosed sheet on Primates as topic
- Differentiate according to age of children
- Preparation for the visit: Tables, creative activities
- Zoo visit: Route, information, associated activities, etc
- Follow up to zoo visit: Reinforce the learning experience.

### **Administrative planning**

- Inform parents/School committee
- Arrange indemnity forms
- Obtain permission from inspector
- Contact lecture guide for the area to be visited
- Arrange buses/transport and funding
- Confirm appointments and keep to the times.