

**The impact of training
using a structured
primary animal health care model
on the skills of rural small scale farmers**

By

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Submitted in partial fulfilment of the
requirements for the degree

Master of Science in Veterinary Science

in the

Faculty of Veterinary Science

Department of Production Animal Studies

University of Pretoria

Onderstepoort

October 2013

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ACKNOWLEDGEMENTS

The author sincerely wishes to thank the following people:

- My family for their patience, support and sacrifice in affording me the time to concentrate on my studies,
- My supervisor Prof Pete Irons for his guidance, support and motivation during the course period,
- My co-supervisor Dr Fanie Terblanche for his technical input,
- Prof Peter Thompson for his assistance with design of the questionnaire and statistical analysis of the results,
- Afrivet Business Management, particularly Dr Peter Oberem, Dr Danie Odendaal and Mr Matthew Carter for initiating the partnership with University of Pretoria on establishing a Chair on Primary Animal Health Care program; providing me with the training material developed since 2008 by Afrivet with support from the Africa Enterprise Challenge Fund (AECF) to use in the research project; and assisting with funding of the research project,
- Mr Jacob Sefara, also from Afrivet, for assisting during the training sessions of the identified farmers,
- Mr Eugene Machimana for assisting with the marking of the scripts and translation of some of the material into Xitsonga language,
- North West Department of Agriculture and Rural development, in particular the Directorate of Veterinary services represented by Dr Langa Madyibi, the local State Veterinarian Dr Thethelani Mlilo and the Animal Health Technicians (Ms Constance Kaotsane and Mr Jan Maime) of Moretele district, for assisting with logistical arrangements and providing a list of potential farmers in the area,
- Mpumalanga Department of Agriculture, Rural development and Land administration in particular the Directorate of Veterinary services represented by Dr Oupa Rikhotso, the local state veterinarian Dr Ayanda Mpehle and Mr Jerry Ntsimane the Animal Health Technician in Mnisi area for assisting with logistical arrangements and providing a list of potential farmers in the area,
- The participating farmers in the identified sites of Makapanstad and Ratjiepane villages which are both in the Moretele district and, Welperdiend B village in the Bushbuckridge district,
- Dr Hannes Pienaar of the Department of Agriculture, Forestry and Fisheries for assisting with the production of the Maps of the selected areas.

DECLARATION

I, Rebone Moerane, do hereby declare that the research presented in this dissertation, was conceived and executed by myself, and apart from the normal guidance from my supervisor, I have not received assistance.

Neither the substance nor any part of this dissertation has been submitted for a degree or is to be submitted for a degree at this University or any other University

The dissertation is presented in partial fulfilment of the requirements of MSc in Veterinary science in the Department of Production Animal Studies, Faculty of Veterinary science, University of Pretoria.

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Signed

Rebone Moerane

Date

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List of abbreviations

- AHT - Animal health technician
- AECF - Africa Enterprise Challenge Fund
- ATS - Afrivet Training Services
- CAHW - Community animal health worker
- EO - Extension officer
- FAO - Food and Agricultural Organisation of the United Nations
- NW - North West Province
- LSD - Lumpy Skin disease
- PAHC - Primary animal health care
- OECD - Organisation for Economic Cooperation and Development
- OIE - Office International des Epizooties now known as World Organisation for Animal Health

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SUMMARY

THE IMPACT OF TRAINING USING A STRUCTURED PRIMARY ANIMAL HEALTH CARE MODEL ON THE SKILLS OF RURAL SMALL SCALE FARMERS

BY

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Primary animal health care (PAHC) programs are aimed at the provision of basic animal health services at local level. No single approach has emerged as the one of choice. The aim of this study was to evaluate the impact of training using the PAHC model developed by Afrivet Training Service, on the skills of small scale rural farmers.

Seventy nine farmers were selected randomly from Makapanstad, Ratjiespanne and Mnisi area using a statistical software EpiCalc 2000 v1.02. The selected farmers were assessed for knowledge and skills with background information collected prior to a 5 day training session. Data was captured using Microsoft Excel and analysed using Stata 12.1. Means were compared using participant's t-test or ANOVA while the proportions were compared using Fisher's exact test. The statistical significance was assessed at $p < 0.05$.

The findings prior to training indicated that complete data was available for 77 participants, of which the majority were adult males with age of mean \pm SD of 49 \pm 18.2 years. The average herd size was 12 \pm 14.1 cattle. There was a significant involvement of youth and females at 31% and 32% respectively. The unemployment rate amongst participants was 91%. Farmers perceived clinical services as being unaffordable. Most of the participants (79%) preferred to treat a sick animal themselves or seek advice from the neighbouring farmers as compared to 21% who approached a veterinary professional for assistance. Lack of knowledge, poor access to products and poor communication between farmers and veterinary officials was identified.

Post-training assessment indicated that farmers gained skills to observe, examine and treat; implement preventative measures independently. There was a better understanding of the farmers' role in the provision of animal health care. There was no significant difference in overall skill level between the various age groups, level of education and farming experience. There were differences between the genders in the acquisition of specific skills during the training, with females performing better in data recording while males were more skilled at determining temperature using a thermometer.

The conclusion is that the training model used had a positive impact on the ability of the participants to provide first-line animal health care and keep records. A modified, standardised method to evaluate knowledge before and after training is proposed for future studies. Further studies are also required to evaluate the impact of the training on animal health and production, food security and socio-economic impact.

Key words: Primary animal health care, training, small scale farmers, assessment, knowledge and skills.

CHAPTER 1: INTRODUCTION

The term primary animal health care (PAHC) service is generally used to describe basic animal health services at the local level aimed at improving the health and wellbeing of animals. As such it includes preventative measures and effective identification and treatment of sick animals. Unfortunately, there is no universally accepted definition of primary animal health care within the veterinary field, the focus being on describing the services rather than defining the concept of primary animal health care.

Veterinary professionals and para-veterinary professionals worldwide use different approaches or programs to implement PAHC with the aim of empowering small scale or developing farmers to ensure and maintain healthy animals. The same can be said about South Africa. Although there have been several attempts and discussions on implementing a PAHC program in the country there is no common approach or framework.

The national priorities and challenges adopted by government call upon various stakeholders including the veterinary profession to implement programs that have an economic impact for poor rural communities. Thus the urgent need for a common framework to be developed and used by the veterinary profession in order to have maximum impact on rural economic growth.

The company Afrivet Training Services (ATS) has developed training manuals and a model for a PAHC program with funding from Africa Enterprise Challenge Fund (AECF). More than 2400 farmers have been trained in various provinces in the country and neighbouring countries such as Zimbabwe and Zambia. However limited research has been done to assess the validity or impact of the approach, material and models. Post-training assessment was conducted by an independent company at one training site, but these results are limited in scope and design.

The South African government has recently developed a draft strategy on PAHC and has set aside funds to support the implementation of the national program. During several discussions with the responsible authorities, it became apparent that there is a need for the training institutions to develop models which could be used nationally and to assist the state in monitoring the impact of their programs. This need gave rise to the present study.

The hypothesis of the study is that the training of rural small scale farmers through a structured approach using a PAHC model will lead to:

- Improvement of the farmer's skills and practical implementation of what they have been taught;
- Improvement in communication between the farmers and the veterinary professionals (animal health technician, state or private veterinarian) and local extension officers;
- Facilitate the realisation by farmers of their role in the provision of primary animal health care to their livestock.

CHAPTER 2: LITERATURE REVIEW

2.1. Agricultural production, food security and the role of small scale farmers

a. Global agricultural production and demand

Agricultural production is generally considered by development organisations worldwide to be a key activity for promoting rural development, improving food security and alleviating poverty in rural areas⁴⁰. Livestock in particular is considered to be the main commodity used for various economic, cultural and social purposes by the rural population⁴⁰.

According to the agricultural outlook report produced in collaboration by the Organisation for Economic Cooperation and Development (OECD) and the Food and Agricultural Organisation (FAO) of the United Nations for the period 2012-2021⁴⁰:-

- Agricultural production needs to increase by more than 60% over the next 40 years to meet the increasing demand for food;
- Growth in agricultural production is expected to decline from 2% per annum to 1.7% per annum;
- Developing countries will provide the major source of growth in production;
- World meat trade will rise by 1.5% per annum over the next decade;
- The demand for beef will grow globally by 1.8%, mutton by 1.8%, poultry by 2.2% and pork by 1.4% per annum;
- Consumers will eat an extra 3.2 kg of meat per capita;
- The average growth in milk production is estimated at 25% per annum;
- With per capita income and human population increasing globally, the demand for food will increase by approximately 50%.

This increased demand creates challenges which must be addressed among others by promoting growth in or increased productivity, particularly among small producers and empowering these farmers to manage risks. Primary animal health care is an opportunity which should be considered to assist the farmers in managing the risks.

b. **Contribution of animal products**

In developing countries, animal products generally contribute immensely to the gross domestic product and the wellbeing of society. In South Africa, the 2010/11 statistical reports indicate that the income from animal products accounted for about 48% of the gross income from the total agricultural sector¹³. The gross farm income from all agricultural products is estimated at R131.6 billion with a net farm income of R32.5 billion^{12,13}. Government statistics unfortunately do not differentiate between the contribution by the commercial and small scale farming sector. The increase of the contribution of animal products is attributed to the rising demand and increased real disposable income⁶. Small scale farmers in the South African context are mostly black farmers who originated in the previous homelands areas during the apartheid era. They were regarded as being unproductive, non-commercial and subsistence farmers³⁰. There is unfortunately to date no uniform national policy that clearly defines a small scale farmer and thus the tendency is to regard any non-commercial black farmer in the rural areas of the country as being a small scale farmer.

The production of animal products in small scale farming systems also contributes significantly to job creation. It has been established through studies conducted by the FAO, that production of 1 million litres of milk per year on small scale dairy farms creates about 200 on- and off-farm jobs, as compared to production of milk in a developed country using an intensive system whereby the same volume of milk production will create less than 5 on-farm jobs^{21,24}. We therefore assume that an implementation of a primary animal health care program will lead to improved production and thus contribute positively towards food security and economic growth.

c. **Use of livestock**

Small scale livestock owners in African rural communities use animals as assets for various reasons besides production. These include as savings to be sold to meet major expenditures (e.g. pay for school fees), insurance for emergencies or unexpected events (illness, funeral), collateral for borrowing, wealth accumulation, draught/traction, and for consumption¹⁵. However Doward *et al* (2005), indicated that the use of livestock as an asset is dynamic and changes

over time depending on markets, technical and social opportunities and constraints¹⁴.

In studies conducted by Glober *et al.* (2008) and Scholtz *et al.* (2008)^{24,45}, among 2570 households owning livestock, they found that respondents use livestock for various purposes as follows:

- 47% for cash and meat consumption at home;
- 13% for cultural and ceremonial events;
- 15% for investment purposes as banking facilities is a problem in rural areas;
- 10% for milk production; and
- 15% for work purposes and other uses.

The monetary value of direct benefits from livestock in communal areas is estimated at \$656/household/annum¹⁵. Based on the valuable contribution of livestock to rural farmers, it is critical that the health and production of their livestock is maintained and improved to maximise their value²².

d. **Meat production in South Africa**

A large proportion of South Africa's natural resources is available for livestock production. About 68.5% of the total land area (122,3 million hectares) in the country is used for grazing. This amounts to an estimate of 11.93 million hectares in the developing areas (former homelands) and 71.99 million hectares in the commercial sector¹³.

The average herd size of cattle amongst small scale farmers within communal farming areas is variously reported as 42 animals or 19 animals whereas it is reported to be 413 in the commercial sector^{24,45}. Scholtz *et al.* (2008) report that about 10.2% of these are kept for milk production⁴⁵.

South Africa is a net importer of meat. Statistics¹³ published in 2012 indicate the following:

Table 2.1: Meat produced and imported during 2010/11

Species	Number (millions)	Meat produced (tons)	Meat imported (tons)	Consumption (tons)
Cattle	13.7	819 600	56 000	864 000
Pigs	1.6	206 000	-*	233 000
Sheep & Goats	21.3 sheep and 2.03 goats	140 200	10 100	149 000

* Figures not available

The projected demand for 2012-2021 for beef will grow by 23%, poultry by 48%, mutton by 20%, pork by 44% while the demand for milk will grow by 22.5% and dairy products will increase by 34%⁶. It is therefore clear that innovative approaches will be required in meeting the demand.

e. **Government priorities**

As part of a signatory to the declared Millennium Development Goals, South Africa has committed to meeting the targets set in 2000 and 2006⁵⁰. The 2010 report indicates major challenges with regards to eradicating extreme poverty and hunger. While we managed to reduce the percentage of people living below the poverty line of \$1 per day from 11.3% in 2000 to 5% in 2006, we still have an estimated 34.8% of the population living below \$2.50 per day. Unemployment is a major factor, with a rate of 24% in 2009⁵⁰.

To deal with the challenges of meeting the Millennium Development Goals, one of the proposed solutions is to strengthen food security interventions and skills development initiatives for the rural population⁵⁰. In improving food security, we have to consider the technology used (research outputs on the technique, implements, etc), the institutional framework relating to the legislation and policies, the people influencing the demand and policy, and the natural resources

available to improve production and productivity⁵⁷. Four different strategies have been proposed to drive growth in food production⁵¹:

- Local food production orientation. This entails the empowerment of local people to be involved in the management of food production whereby local and indigenous knowledge and systems are used in the production of food;
- High-resource technology-driven orientation, entailing high technological input for agricultural development and food security, high profit and output maximisation;
- Guided technology-driven orientation whereby there is high-level technology used with extensive oversight through public involvement; and
- The right to food orientation whereby the constitutional right of a human being becomes the key driver in agricultural development and food security⁵⁷.

Despite the implementation of various development programmes and policy reviews since 1994 in South Africa, small scale farmers still experience challenges. These include among others, land issues, financial support, access to markets, technology transfer and the general support for the farmers. The use of primary animal health approach is thus relevant as it focuses more on the local food production orientation with the transfer of relevant technology to the farmers to assist them in improving livestock production at local level.

2.2. Impact of veterinary services

a. Contribution of veterinary services

Veterinary services can meaningfully contribute towards poverty alleviation and sustainable livelihoods if they are designed to accommodate the poor and include various stake-holders to provide such services^{22,27,32}. Animal diseases contribute to economic losses. Some countries including South Africa use an eradication policy (slaughtering out of animals both affected and contact animals) for certain animal diseases to protect trade with other countries, reduce the negative impact on production and reproduction, and limit the risk to human health in the case of zoonotic diseases²².

Even though such policies are aimed at generally preventing the spread of such diseases or controlling the diseases, they also have short-term negative impacts such as increased food prices and other market effects, and increased expenditure to control outbreaks^{42,47}. These negative impacts are particularly acute in developing countries and thus the implementation of various initiatives to improve veterinary services as a means of reducing the risk of disease. The implementation of a primary animal health care program is one of the initiatives that could be considered in reducing the risk and improving the health of livestock in a country.

b. **Animal disease control in South Africa**

South Africa has specific laws enacted or gazetted to regulate animal health and public health aspects namely; the Animal Diseases Act of 1984, and the Meat Safety Act of 2000. In terms of the Animal Diseases Act 35 of 1984, any owner or manager of land on which the animals are kept is expected to ensure that all reasonable steps are implemented to prevent the infection of animals with any animal diseases or parasite and spreading thereof from the relevant land or animal. This includes reporting of animal diseases¹.

However, recent experience with the outbreak of Rabies disease and Foot-and-Mouth disease in Kwa-Zulu Natal including poor reports on initial outbreaks of Rift Valley disease outbreak, indicate that the majority of farmers particularly small scale farmers are not aware of their responsibilities. The country has experienced several outbreaks of animal diseases with negative impacts on trade and increased government expenditure in controlling the diseases. A lack of the knowledge and skills and the absence of a structured system providing effective veterinary services are cited as some of the major contributing factors similar to the study by Makgatho *et al.* (2005)³³. We therefore assume that a primary animal health program will improve the knowledge & skills of the small scale farmers and it will also assist in improving communication between the farmers and the veterinary professional. The involvement of the farmers in recording and reporting early diseases will assist in the surveillance of such diseases as indicated in the study by Allport *et al.* (2005)².

2.3. Limitation to the provision of veterinary services

In terms of the international standards set by the World Organisation for Animal Health (OIE), veterinary services are provided by a veterinary team which includes veterinarians and veterinary paraprofessionals in government, private or non-governmental organisations in consultation with stakeholders and role players^{37,56}. The quality of the services depends on the ethical, organisational, legislative, regulatory, and technical principles as highlighted in Article 3.1.1 of the Terrestrial Animal Health Code publishes annually by the OIE⁴¹.

According to Msellati et al. (2012)³⁷, good veterinary governance is necessary for sustainable economic development and encompasses delegation, financing, performance, informing and enforcement aspects. Prior to the 1980's, the state was the predominant provider of veterinary services in Africa. Since then economic pressures or fiscal shortfalls have resulted in private sector involvement with the establishment of private practices. An economic framework whereby the rivalry and excludability concepts has been described to distinguish between public and private goods within the veterinary services, has been described and outline by Umali-Deininger *et al.* (1992) and Holden (1999) and is summarised in Figure 2.2 below^{28,52}. The tension refers to the extent to which the use of services reduces the availability to others whilst the excludability refers to the extent to which the provider or consumer can exclude other people from accessing the services. Services that should be financed privately include clinical services, drug sales, some extension, some research, vaccine production, and vaccinations against endemic diseases whereas services classified as public goods include services such as control of epidemic or zoonotic diseases, some extension services, some research, control of food-borne diseases, and drug quality control^{28,52}.

Excludability

		Low	High
Rivalry	Low	Public goods Epidemic or zoonotic disease including surveillance, movement control Some extension Some research Food-borne diseases Drug quality control	Toll goods Vaccine production Diagnostic services Veterinary clinics Dips
	High	Common pool goods Specific disease control in communal land	Private goods Endemic disease prevention Drug sales Some extension Some research

Figure 2.1. Characteristics of veterinary services

In South Africa, veterinary paraprofessionals include animal health technicians, veterinary technologists, veterinary nurses, laboratory animal technologists and animal welfare assistants. Their roles and responsibilities are clearly indicated in the regulations, rules, and code of conduct for the practicing of the profession governed by the South African Veterinary Council⁵⁵.

The control of animal diseases in rural areas has, to date, been championed by the State veterinary services (Animal health technicians in particular) focusing mainly on regulatory aspects with private practitioners and non-governmental organisations providing voluntary non-regulatory clinical services. Animal health technicians were previously known as stock inspectors and were employed by the state to inspect animals and to assist with the control of controlled animal diseases. In 2005 their qualification was recognised and they were allowed to be registered by a regulatory body⁵⁵. They are spread in local municipal areas and they are generally considered the first line of communication with the local farmers regarding animal health matters.

However, even with the current system in place, the emerging farmers or small scale farmers in the rural areas still experience poor access to veterinary services due to the following:

- Only about 300 rural private veterinarians are in the field. Their services are mainly utilised by commercial farmers. Rural communal farmers perceive private veterinary services to be costly. As highlighted by Chillonda *et al.* (2001), the attitude of the farmers towards risks such as drought and animal diseases has an effect on their decision-making process by influencing perceptions or potential benefits associated with the decision¹¹. This can lead to decisions based on sub-optimal economic reason or unwillingness to adopt innovation, resulting in failure to adopt prophylactic measures or to diversify to reduce risk¹¹. Farmers currently wait some time before a veterinarian attends to their animal due to distance travelled by the veterinarian. This also increases the cost of the service. The net result is that farmers are reluctant to call veterinarians out to their farms for emergency procedures;
- The state veterinary services has 186 veterinarians and 934 animal health technicians who focus mainly on regulatory services (e.g. controlled animal diseases – inspections, dipping and vaccinations of animal diseases of economic importance). In terms of the recent experience of Afrivet Training services, based on engagement with farmers and animal health technicians, it was found that on average, an animal health technician services/oversees several dipping tanks/wards/inspection points serving more than 1000 farmers, often seeing the farmers once a month at times when there are no outbreaks or surveillance programmes running;
- From various reports from the Department of Agriculture, Forestry and Fisheries, there is an indication of many vacancies within the state veterinary services;
- There is generally no state-subsidised emergency service available for the majority of farmers.

The implementation of a primary animal health care program is intended to empower farmers to deal with most of the animal health and production challenges considering the limitations of veterinary services. As an additional benefit of the structured approach presented here it is envisaged that the farmers would assist veterinary services in the country in controlling and preventing further spread of animal diseases.

The provision of an animal health care service depends on the following factors⁴⁷:

- Structure – the environment determining the demand and supply of services;
- Process – interaction between the provider and the person requiring the services; and
- Outcome – the consequences and effect on the health of animals and humans.

Whereas clear deficiencies have been highlighted regarding the structure and process of the provision of veterinary services to small scale rural farmers, there is no empirical data demonstrating the outcome. However, anecdotal evidence of shortcomings in disease control measures and complaints by farmers of a lack of service-delivery indicate that the outcomes of the current system are unsatisfactory.

From the above it is clear that there is a major deficit in the provision of veterinary services to the developing portion of the livestock farming sector. Primary animal health care is proposed as one intervention with the potential to improve the health status of the national herd if effectively implemented, by means of providing stock owners with the knowledge and skills to provide first-line treatment and to communicate effectively with veterinary professionals.

2.4. Veterinary extension and farmer training

Agricultural extension, including veterinary extension, is generally regarded as the application of scientific research and new technology to agricultural practices through farmer education. As such it is a process of enabling change in individuals, communities and industries^{5,16}. The techniques used in agricultural extension include training, demonstrations, meetings, use of educational material, and mass media^{18,49}.

Extension methods either follow a top-down approach, a bottom-up or participatory approach, or a combination of the two. The decision on the method to be used depends on whether the intention of the program is developmental, informational or institutional¹⁶. A training or extension program must consider the following aspects:

- Technical feasibility – what can be achieved within the environment, socio-economic and political atmosphere;
- Environmental impact – what will the impact on the environment in the area be;

- Economic feasibility – can the intended target audience afford the training and technology;
- Social impact – is the practice socially acceptable;
- Gender issues – what are the gender sensitive issues in the area;
- Age – is the training targeting specific age group or not;
- Language – can the people understand the language to be used²²?

Learning is considered as the process of acquiring or modifying existing knowledge, behaviour, skills, values or preferences and involves synthesizing of information¹⁸. There are different ways of learning which could be either through feeling, watching, thinking or doing^{26,31}. According to Ambrose *et al.* (2010), it is a process that leads to change as a result of experience and it increases the potential for improved performance and future learning³. Because of learning being a process and not a product, it is more important to focus on the behaviour at the end of the learning experience than the spoken or written words⁴. Evaluation of practical skills is more important than the learner's ability to speak about a process. These principles were considered in the present study design, both in the training model design as well as in the assessment of impact.

There are also various theoretical models of learning that one could apply depending on prevailing circumstances, namely:

- Behaviourist learning theory – prioritising reward behaviour or conditioning as means of promoting learning;
- Cognitive learning theory – emphasising memory;
- Constructivist learning theory – whereby learners are actively involved in constructing their development;
- Humanistic learning theory – whereby the focus is on freedom, dignity and potential;
- Experiential learning theory – active involvement which requires experience based training which fosters a sense of self-confidence, independence and increased level of skill^{17,26}.

The PAHC model developed by ATS applies the Experiential learning theory whereby the farmers are actively involved in the training and they develop a sense of self-confidence through acquiring specific skills.

Behavioural change can be influenced by various variables such as intention, environment, skills, attitude, norms, emotion, self-standards, and self-efficacy^{18,39,44}. The success of training mainly depends on the active involvement of an individual and the motivation to participate. According to Tolman model¹⁷, behavioural change depends on three sets of variables as depicted in Table 2.2.

Table 2.2: Variables for measuring behavioural change

Independent variables – variables which cannot change but influence change of behaviour	Intervening variables	Dependant variables – variables which change based on improvement of skills and knowledge
Environmental factors	Knowledge, Capacity	Action or Adoption behaviour (livestock numbers, animal health practices, animal production practices, communication)
Personal factors (Age, Gender, Farming experience, Literacy, etc.)	Perception	
Extension contact	Needs	

Any assessment on the effectiveness and impact of a training program would have to consider some of the variables in each category as indicated in Table 2.2 above.

The FAO also published a guide on the appropriate approach to use for improving extension as indicated in Table 2.3 hereunder¹⁸.

Table 2.3: Approaches for improving extension services

Improving extension	Type of approach
Appropriate scale	General agricultural extension approach Project approach
Relevant message	Participatory approach Farming system approach Cost sharing approach
Reliable Educational message	Specialised commodity approach Farming system approach Educational institution approach
Effective Educational programme	Training & visit approach Educational Institution approach

From the above table, it can be seen that for an effective educational program to be achieved, both the training & visit approach as well as educational institution approaches are recommended. The advantage is that research is linked to extension and the local scientists involved in the development of curriculum are involved in transferring knowledge. For a veterinary extension program to succeed, the extension veterinarian must lead and provide relevant material and continuing education to the local veterinary professional and clients³⁵.

According to Capps (2008), there are four levels of Kirkpatrick's evaluation model which could be used to evaluate the impact of training⁷, namely:

- Reaction - Reaction – indication of the feeling of participants about the training;
- Learning - the evaluation of knowledge and/or skills, and change in attitudes through demonstration and tests;
- Behaviour – change in behaviour through action and activities post training; and
- Results – long term impact of the training or the final results that occurred because of attendance and participation in a training program.

2.5. Development of a primary animal health care concept

In response to the deficit between veterinary services and community needs the primary animal health concept was developed. This occurred around the same time as the primary health care concept in the human health system³⁸. In Africa, this occurred during the 1970's when economic pressure linked to the World Bank loan and the International Monetary Fund forced the increasing role of the private sector in community-based services which were previously provided for by government. The services provided for by government were seen to be ineffective and in some instances there were no services at all and thus the initiative by non-governmental organisations. Veterinary services in developing countries were forced to review their approach towards service-provision, particularly in Africa and South East Asia^{31,32,43}.

International organisations, particularly non-governmental organisations, initiated several pilot projects with the intention of developing the Community Animal Health Workers (CAHW) who would assist farmers and ensure that some of the veterinary services were privatised with access to veterinary products^{10,31,32}. The intention approach was to position the CAHW as part of the private sector under the control of government and to use them for both public and private sector work.

A CAHW has been defined as a person from the community trained to function in the community in close relationship with the healthcare system³². The duties of a CAHW differ from one country to the other and mainly includes curative treatment of animals, vaccinations of livestock and in some instances, involvement in animal disease surveillance and extension services¹⁰. Such a person could be a volunteer or receive a salary but is not a civil servant. The use of CAHW's in some of the African countries led to the improvement of disease control systems through improved animal disease reporting and surveillance^{2,9}. The main challenges identified were the perceived threat of CAHW-s to the veterinary profession and the lack of policy change and legislative support for the CAHW to be recognised^{2,9,10}. The experience from the implementation of several trials and pilots on CAHW-s led to the compilation of a training manual by the Food and Agricultural Organisation (FAO) to be used by various developing countries with governments encouraged to recognise the CAHW as a para-veterinary professional group¹⁹. In South Africa, there has been very little effort to date and there is general reluctance in piloting or testing the use of CAHW and this is probably due to the belief that the country is producing veterinary para-professionals (particularly AHT-

s) who have for years been involved in assisting farmers in the field and until they are fully utilized in the field, there is no need to pilot the use of CAHW.

South Africa post-1994 has a generally privatised clinical service program provided mainly by private veterinarians according to local circumstances and not regulated by any national policy. The state veterinary services concentrate their efforts mainly on controlling animal diseases with major socio-economic and health implications. Some provinces do provide some level of clinical services and allocate funds accordingly. The AHT-s remains the first line of contact between farmers and the state veterinary services in various municipal areas/wards. Their main tasks include the control of animal diseases and provision of non-regulatory activities which includes training and extensions services to local farmers. In some instances there is another group called dip tank assistants or rangers who have been used particularly in foot and mouth disease surveillance zones to assist with dipping and inspection of livestock. They are normally acquired from the local areas and understand the dynamics within the local communities. They are generally respected members of the community. They generally assist among others with communicating with local farmers on important dates and procedures, ensuring that the infrastructure used is maintained for dipping or vaccination exercise, etc.

The service provided by the government is complemented by special efforts from the private sector (Private veterinary professionals, non-governmental organisations, industry). Besides all of the services provided, small scale farmers still complain and thus a different innovative approach is required.

This study will focus on a new initiative in Southern Africa which has been developed by Afrivet Training services whereby primary animal health care is defined as follows: "Primary animal health care is the good animal health and production management practices that a livestock handler or animal owner needs to undertake on an on-going basis to maintain health and production". This initiative also clarifies the services to be provided by veterinary professionals.

The training as a method of veterinary extension in the new model is intended for individual farmers in South Africa. In addition, specific people such as the so called "dipping assistants" or "rangers" could be trained so that they could assist particularly government in rural areas in animal disease surveillance, promoting access to basic

services and general animal disease control in the country. The training is not intended to produce qualified Community Animal Health Workers or veterinary para-professionals. It is envisaged that both public and private veterinary professionals in each area will be trained to provide the training to strengthen the link between the small scale farmers and the available veterinary services.

The envisaged benefits of effective PAHC training through this model, are that stock owners will play a meaningful role in animal health and productivity as follows:

- They will better understand their role in animal health;
- They will help promote effective animal disease surveillance and control at farm level and nationally;
- They will improve food security by contributing towards more protein of animal origin being produced for marketing and consumption;
- This will lead to more jobs being created locally contributing towards rural development; and
- They will contribute towards provision of safe and wholesome products which comply with the relevant legislation and quality assurance measures.

A structured PAHC model and associated training program and material have been under development since 2008. To achieve the envisaged benefits, the material must be scientifically tested for its reliability and validity and the impact on the livestock owners or handlers must be quantified or demonstrated. The assessment has to consider the behavioural change, knowledge and skills gained by the participants of the training program in PAHC.

Once validated, the training and extension message would have to be adapted to local circumstances to optimise the impact^{32,53}. The demand for better services and the need to assist government in developing models on primary animal health care creates opportunities for institutions to conduct relevant research to improve services.

The main objectives of this study was

- To demonstrate and quantify the improvement in knowledge and skills of farmers following training using a structured approach; and
- To identify variables that may have an impact on the efficacy of training.

The hypotheses for the study is that training of rural small scale farmers using a structured PAHC model will lead to:

- Improvement of the farmer's skills and practical implementation of what they have been taught;
- Improvement in the communication between the farmers and the veterinary professionals (animal health technician, state or private veterinarian) and local extension officer; and
- Facilitate the realisation by farmers of their role in the provision of primary animal health care to their livestock.

CHAPTER 3: MATERIALS AND METHODS

A prospective cohort study was used to test the hypothesis with participants assessed before and after training using the ATS PAHC training material. The process followed by the researcher was as follows:-

- Stakeholder engagement – all relevant people (Tribal offices, farmers, municipality, government officials) were consulted and selected farmers committed themselves to participating in the study;
- Background information was collected by the researcher prior to training;
- Pre-training assessment was conducted by the researcher. The assessment focused on the knowledge and did not assess skills;
- Training was conducted by the researcher in all areas. All participants were exposed to a five day training session for 7 hours daily;
- A 1 hour and 30 minute written assessment was conducted on the last day of training followed by a practical assessment for each participant; and
- Monthly feedback sessions were conducted by the researcher with the participants for a total of 5 additional months.

3.1. Area

Farmers were selected in three areas namely Ratjjepane, Makapanstad and Mnisi as indicated in Table 3 below. Makapanstad and Ratjjepane are situated approximately 75 kilometres from Pretoria and they are located in the North West Province of South Africa. Mnisi area (Wolverdiend village) is situated about 54 kilometres north-east from Bushbuckridge town in the Bushbuckridge municipality (Ehlanzeni District) of Mpumalanga Province, South Africa.

These identified areas are villages under the leadership of tribal authorities. Ratjjepane and Makapanstad are villages under the leadership of Chief H. Makapan while Wolverdiend village in the Mnisi area is under the leadership of Chief P.P. Mnisi. The three villages are located within areas which were reserved by the apartheid regime for settlement of black communities with female population of 51% for Makapanstad and Ratjjepane areas and, 54% for Bushbuckridge area. Agriculture and in particular livestock farming is the major source of economic activity⁵⁰. They are characterised by communal farming practices with continuous grazing systems. The average household size in the areas is 4.2 people with a 52% and 46% unemployment rates for Mnisi and Ratjjepane/Makapanstad areas respectively⁵⁰. Infrastructure development in the areas

is poor with 73% of households still using pit latrines in Mnisi and 96% in the Makapanstad and Ratjjepane areas. Only 30% of the households in Mnisi and 44% in Makapanstad and Ratjjepane have piped water in the dwellings and inside the yard⁵⁰. In the Mnisi area, the community farming in the vicinity of the Welverdiend B diptank was selected. Further location and demographic information of the areas is given in Table 3 below.

Table 3: Information on selected areas

Area	Local Municipality	Province	Coordinates	Number of farmers*	Animal population
Makapanstad	Moretele	NW	25° 14' S 28° 6' E	87	950
Ratjjepane	Moretele	NW	25° 18' S 28° 11' E	53	1020
Welverdiend B	Bushbuckridge	Mpumalanga	24° 34' 42" S 31° 21' 34" E	80	909

* Records kept in registers by the State veterinary offices

The choice of the areas was mainly influenced by the distance to be covered during the implementation of the project, and the areas fell within the identified key areas for the implementation of the Faculty's training and research programs. The Faculty runs a mobile clinic which visits the Makapanstad and Ratjjepane areas every Wednesday as part of community engagement programme with the involvement of veterinary students and in partnership with community clinics implemented by the South African Veterinary Association. In the Mnisi area, the Faculty has established a Mnisi community programme which is part of a One Health research, training and community engagement initiative. It includes the management of Hluvukani animal clinic (approximately 10km from Welverdiend) and the Hans Hoheisen Wildlife research station whereby students and researchers engage the community on various services and research projects⁵⁴. In this context the primary animal health care program has been identified as part of the community engagement activities to be implemented.

The areas are used mainly by small scale farmers within the previously disadvantaged communities and their maps are indicated in Figure 3.1 below.

Moretele district is in the North West Province. It has an average annual rainfall of 459mm with average temperatures ranging from 12⁰C to 25⁰C. The veld type in the area is mixed Bushveld, Kalahari Thornveld and Springbok Flats Turf Thornveld. The agricultural production in the area is mainly livestock with cattle being the main commodity. Mnisi is located in the Buschbuckridge district of the Mpumalanga Province. It has an average annual rainfall of 560mm. The veld types in the area are Grassland, Savannah and some Tropical bush⁵⁴. The main agricultural activity in the area is also livestock production with cattle being the main commodity of choice. The most common animal disease problems are ticks, worms, wounds, footrot, blackquarter and, foot-and- mouth disease particularly in the Minis area⁵⁴.

The veterinary services in the two districts differ in the following respects:

- Moretele State veterinary area is divided into three wards and there are 3 animal health technicians providing services in this wards mainly concentrating on regulatory services. The farmers are dependent on the mobile clinic operated by the University of Pretoria once a week (Wednesdays) for non-regulatory or clinical services. The state veterinary services sometimes subsidises the vaccines such as Anthrax and Brucellosis vaccines. The state also recently started to procure other products such as dewormers and acaricides to re-sell to the local farmers but farmers are mainly dependant on the nearest co-operative to have access to various over-the-counter products;
- Mnisi area also has a state veterinarian with three animal health technicians providing services in the area. The state officials mainly concentrate on dipping and weekly inspection services for any symptoms or signs of foot-and-mouth disease. The non-regulatory services are provided for by the University of Pretoria whereby a clinic and mobile facility has been made available. The final year veterinary students spend two week rotation in the area and they together with a permanent veterinarian appointed by the university provide non-regulatory services in the area.

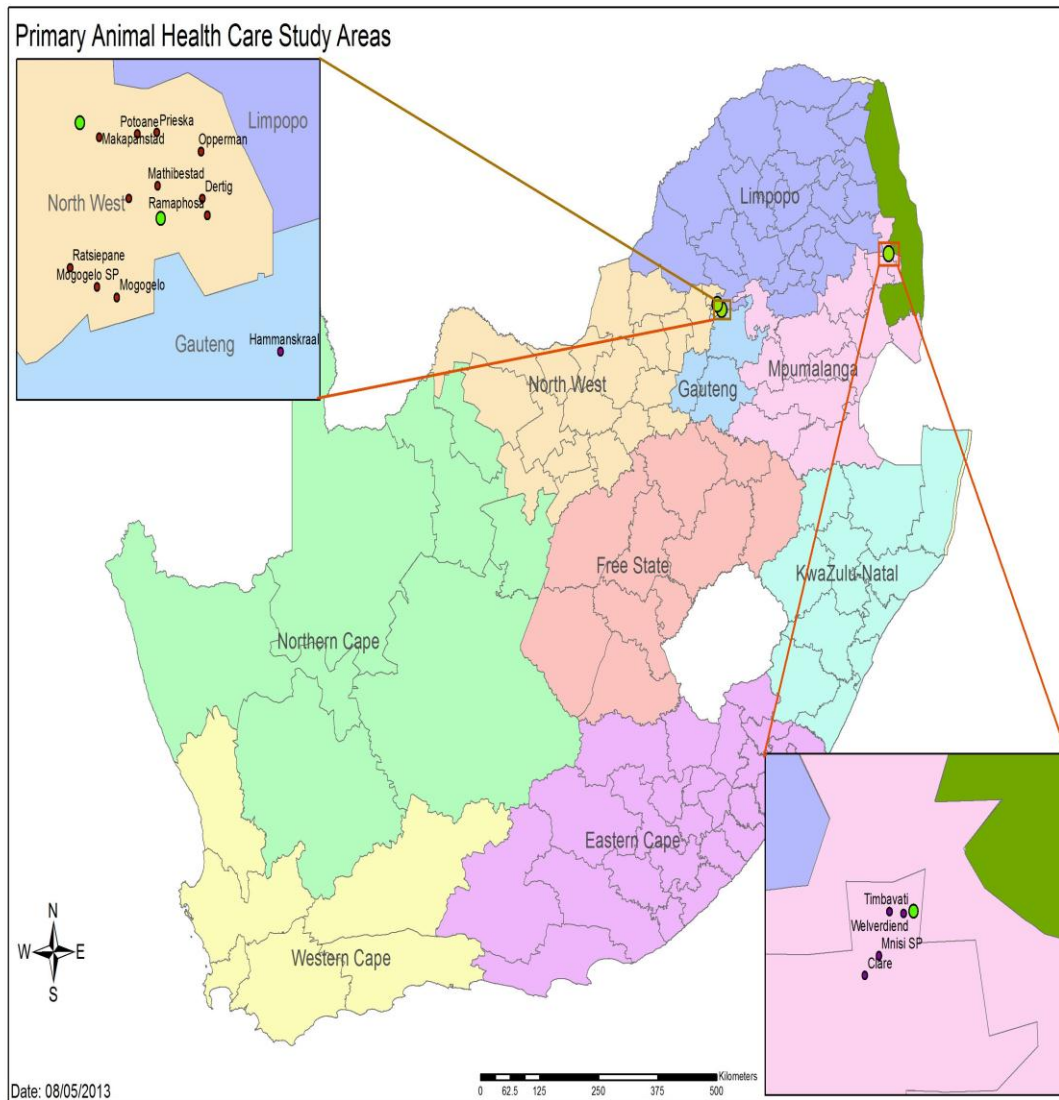


Figure 3.1: Maps of select sites

3.2. Selection of farmers

A list of all farmers in the identified areas (Makapanstad, Ratjiepane and Welverdiend B), was obtained from the respective State Veterinary services and 30 farmers were selected randomly from each list using EpiCalc 2000 v1.02 (<http://www.brixtonhealth.com/epicalc>). An allowance was accommodated within the total number of 30 participants per area to allow for attrition during the research period with the envisaged total of 25 farmers completing the project. A total sample size of N= 90 farmers was targeted in the identified three areas. The sample size was estimated and influenced by the resources available and considering that the two districts were geographically far apart, we estimated the data to be adequate to show any possible differences in impact of training between the sites. There was no financial incentive

provided to the farmers. Farmers were incentivised by the prospect of providing them with the knowledge and skills and the provision of a thermometer and a weigh belt for each participant. The initial intention was to provide a toolkit to the participating farmers and unfortunately the funding was a limiting factor.

3.3. Background information

A questionnaire was developed and used to collect background information from the participants prior to implementation of the training programme either as primary or secondary data followed by collection of data after training. The data included the following:-

- Name of participant;
- Age and gender;
- Level of education;
- Farming experience;
- Employment status;
- Source of income;
- Livestock census;
- Animal disease problems (syndromes) in the area;
- Preventative and treatment procedures followed when animals are ill;
- Animal husbandry practices followed; and
- Communication methods used and the frequency thereof.

The collection of data was accomplished mainly through visits to identified areas prior to the training and during the contact sessions held with the participants.

3.4. Training of farmers

The focus of the training was on the first module of the PAHC model (Module 1 called – Early disease identification and treatment) made up of a five day training session consisting of three days of theory and practical in a classroom and two days of practical demonstrations with live animals. The model was developed by experienced practitioners from Afrivet Training Services based on their previous experience and the model follows on extensive trial since 2008 funded by the Africa Enterprise Challenge Fund. The training was conducted by the researcher in the identified areas.

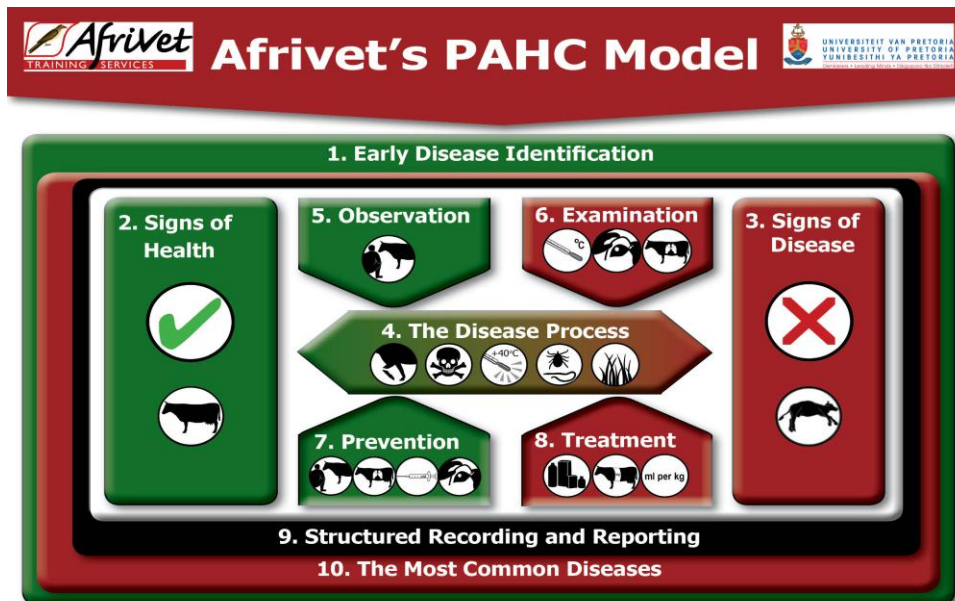


Figure 3.2: Overview of the model on early disease identification and treatment

The module as summarised in Figure 3.2 above, covers the following topics

- a. Introduction (Challenges and opportunities) – participants and researcher introduce themselves and a written assessment is conducted. This is followed by introduction of the topic, definitions and identification of challenges and opportunities relating to PAHC in a participatory approach. The session ends with participants requested to answer as a group on specific questions and to identify and prioritise the 10 most important animal diseases in their area.
- b. Signs of health – during this session, the trainer covers the basic anatomy and physiology of a working animal body whereby the functioning of basic body systems are explained as indicated in Figure 3.3. Participants are then shown a video of a healthy animal and requested to give signs of health observed. The trainer demonstrates a model as indicated in Figure 3.4 below, on the approach used to identify signs of health. The trainer with the full participation of the participants now uses the model demonstrated to observe and identify signs of health of the same animal shown on the video.

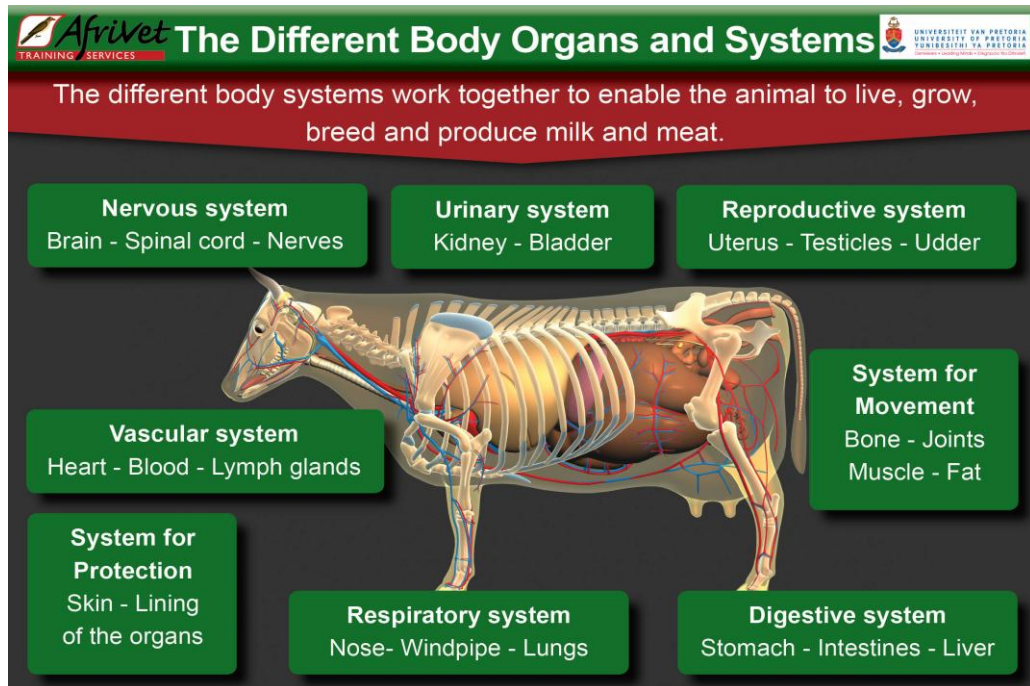


Figure 3.3: Animal body systems

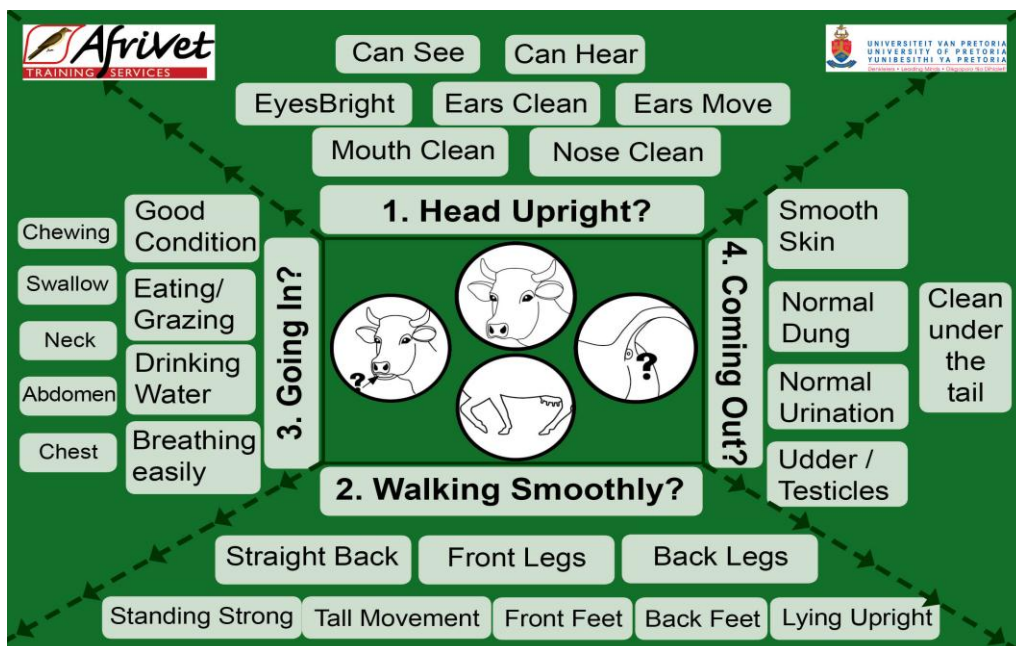


Figure 3.4: Signs of health model

- c. Disease as a process – participants are trained on the five main causes of diseases as indicated in Figure 3.5 below and the process of development of a disease is explained. At the end of the session, participants should be able to

demonstrate the understanding of the different processes of the five main causes of animal diseases.



Figure 3.5: Type of causes of animal diseases

- d. Signs of disease – A video of a sick animal is used for the participants to identify signs of disease. This is followed by the trainer using the model already demonstrated as indicated in Figure 3.6 below to demonstrate to participants how they could identify signs of disease. The participants are subsequently requested to use the model to identify signs of disease on a video which is followed by discussions.

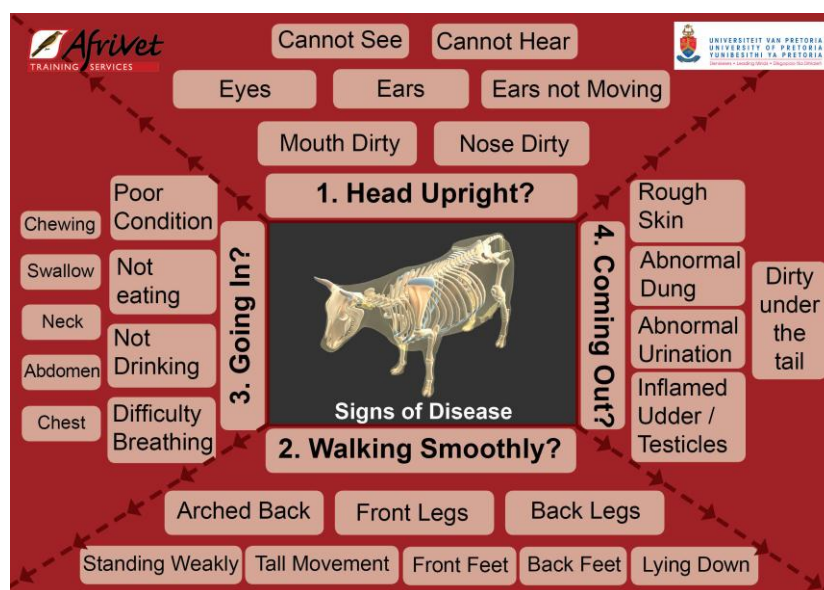















Figure 3.6: Signs of animal diseases model

- e. Observation – the trainer uses forms used to record and report disease incidents as shown in Figure 3.7 below to demonstrate how participants could observe and record their findings. This is followed by the use of another video of a sick animal with participants practically observing and recording their findings. The trainer then facilitates a discussion of the findings and outcome.

		Disease Surveillance Form							
1. Reportee Details		Date: _____							
Name: _____		Contact Number: _____				ID#: _____			
2. Farmer Details		Name: _____							
Contact Number: _____		ID#: _____				District/Village/Farm: _____			
District/Village/Farm: _____		Nearest Town: _____							
3. Background Information									
Type of Animal?	Cattle	Goats	Sheep	Donkey	Pig				
Other:	_____								
Sex & Age of Animals?	Mature Male	Young Male	Mature Female	Young Female	Calf/Lamb				
Number of Animals Affected?	_____		Number of Animals in Group?		_____				
Further Information: _____									

4. Observations									
1. Head Upright?	Mouth	Nose	Eyes	Ears					
Further Information: _____									
2. Walking Smoothly?	Straight Back	Standing Strong	Lying Upright	Tail Movement					
	Front Legs	Front Feet	Back Legs	Back Feet					
Further Information: _____									
3. What Goes In?	Condition	Neck	Chest	Abdomen					
	Eating	Drinking	Breathing	Hunger Groove					
	Chewing	Swallowing	Chewing Cud	Other?					
Further Information: _____									
4. What Comes Out?	Smooth Skin	Normal Urine	Udder/Testicles & Sheath	Normal Milk					
	Under the Tail	Normal Dung		Other?					
Further Information: _____									
5. Examination									
	1. Temperature: _____								
	2. Inner Lining of the Eyelid: _____								
	3. Condition Score (1-5): _____								
Further Information: _____									
6. Cause of Disease									
	Injury		Poison		Infection		Parasites		Nutrition
Further Information: _____									
Disease Identified: _____									
7. Treatment									
	Body Weight: _____								
	Product: _____								
	Dose: _____								
Treatment Outcome: _____									



									
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Figure 3.7: Example of recording form

- f. Examination – the trainer uses slides and video to demonstrate the important aspects of a body examination as indicated in Figure 3.8 below, namely taking of body temperature, inspecting the conjunctiva and using hands to palpate the







whole body from head to tail. Participants are provided with thermometers and then given practical training on the procedure to be followed.



Closer Examination



Whenever the first signs of disease are observed, a closer examination must be completed.

Examine the:

- Neck & breastbone
- Front limbs & feet
- Chest
- Abdomen
- Under the tail
- Hind limbs and feet

- 1. Take the Animal's Temperature**
An increase in body temperature is the best indication that you are dealing with an infectious disease that can cause irreversible damage if not treated within 24 hours. **A temperature above 40°C is a fever reaction and is always an emergency and urgent treatment is needed.**
- 2. Examination of the Inside Eyelid and Head**
The inside lining of the eyelid gives us a window into the blood supply. **When an animal has too little blood (anaemia), and the lining of the eyelid is white or light pink, it is always an emergency and urgent treatment is needed.**
- 3. Hands-on Examination of the Rest of the Body**
When examining the rest of the body we are trying to confirm what we have seen during observation and assess the condition score of the animal. **When an animal can't eat, drink (swallow) or breathe easily, it is always an emergency.**

Daily follow up examinations must take place after treatment until no signs of disease are found.

Figure 3.8: Steps followed for closer examination

- g. Treatment – participants are trained on stock remedies available in terms of Act 36 of 1947 in South Africa. The aspects covered include among others:-
- Important aspects to look for when purchasing the products from the wholesalers (e.g.co-operatives);
 - the processes to be followed in determining the dosage;
 - what equipment to use;
 - the correct injection sites;
 - how to store the products; and
 - what other important precautions to consider.

The equipment and products to be used are brought into a room to demonstrate the process and procedure and then allow participants to practice using sterile water. This is followed by a practical demonstration with live animals.

- h. Prevention – participants are taught on basic biosecurity measures and improving immune status of the animals (mainly vaccination). The session ends

with development of a general basic vaccination programme for the area which is informed by the challenges and common animal diseases identified earlier.

- i. Common diseases – The 10 most important animal diseases are identified and prioritised during the introductory session. During this session, all the 10 most important animal diseases in the area are covered following the model (disease process, signs of disease, treatment options, prevention options and any other specifics).

Monthly feedback sessions were held with the trained farmers for a minimum period of five months (between July 2011 and March 2013) to further collect data and evaluate the impact of the training programme.

3.5. Assessment of training

The assessment of the farmers was conducted by the same person who conducted the training (facilitator/researcher). It mainly focused on the cognitive (mainly knowledge) and the skills domains (manual skills) and it was conducted as follows:-

- An hour written assessment prior to training;
- A formative assessment to assist participants during the training. Group discussions and feedback sessions were conducted for the assessment; and
- A summative assessment consisting of written and practical components were conducted at the end of the training session. For both the written and the practical sessions, the minimum pass rate was set at 40%.

The farmers were also asked several common questions as a group prior to the training being conducted on the same day. The questions asked were as follows:-

- Do you own and are you able to use a thermometer?
- What is the normal temperature in a cow?
- Do you follow a structured system in observing, examining and reporting a sick animal to any veterinary professional?
- How do you weigh your animal and are you able to calculate dosage required to treat an animal?

Assessment forms were designed and used to assess the knowledge and skills of the participants before as indicated in Appendix I, during and at the end of the training

sessions as indicated in Appendices II and III. The written assessment after training focused on different aspects to those assessed before training. The assessment focused on the following aspects:-

- Knowledge - Definition of PAHC, understanding of the role of a veterinary professional related to PAHC, body parts and their function, basic signs of health in an animal, definition of vaccination, understanding of the main causes of animal diseases, examination of an animal and treatment of an animal. The knowledge was assessed using the developed questionnaire which was given to the participants to answer specific questions before training and after training.
- The practical test was divided into the assessment of:
 - Practical demonstration by the farmers of their manual skills to observe signs of health and disease in an animal, examine an animal, taking of body temperature, ability to use a veterinary product (vaccine, medicine) and to inject an animal; and
 - Recording and reporting skills - The farmers were trained and provided with a form to capture relevant data to inform a veterinary professional on their observations/findings in case they encountered a sick animal. The 5-6 monthly feedback sessions were used to collect the report forms and to engage farmers in a participatory approach to discuss the animal disease/syndrome they encountered and actions implemented to deal with a sick animal.

3.6. Data collection

The data was collected by the researcher using designed questionnaires and the assessment forms used during training. The information captured included background information and results from the assessments conducted before, during and after training sessions.

3.7. Data analysis

Data collected was captured using Microsoft Excel and transferred for analysis using Stata 12.1 (StataCorp, College Station, TX and U.S.A). Means were compared using participant's t-test or ANOVA while the proportions were compared using Fisher's exact test. The statistical significance was assessed at $p < 0.05$. Graphs, charts and tables will be used to present the results.

CHAPTER 4: RESULTS

4.1. General

A total of 80 farmers representing 36% (N=220) of the farmer population in the three identified areas registered and signed the consent form to participate in the training. One withdrew due to unforeseen circumstances leaving 79 who completed the five day training session. All participants were small scale farmers in the communal land of the selected areas.

4.2. Background information

The background information was captured before the training commenced. Not all farmers completed all parts of the questionnaire. The analysis of the available information is as follows:-

a. Age

The age of all participants ranged from 22-84 years with a mean \pm SD of 49 \pm 18.2 years. The mean for Makapanstad was 60yrs, for Mnisi was 34yrs and for Ratjjepane 58yrs. An analysis of the age categories by locality is shown in Table 4.1 below. There is a significant difference in the proportional age representation of the participants between localities with $p < 0.001$. About 31% (n=23) were youth up to 35 years of age, with Mnisi youth (n=18) taking up the highest percentage (78%) of this group. Of the farmers with age above 35 years and classified as adults, 38% (n=52) were above 65 years of age. No participants at Mnisi fell within this group.

The age representation was skewed as a result of the sampling and replacement of selected farmers who were either not available or no longer farming in the area. This was compounded by the fact that some farmers send their children to participate since they feel that they are too old to participate.

Table 4.1: Number and percentages of farmers per age category

Area	Age category				Total
	< = 35yrs	36-50yrs	51-65yrs	>65yrs	
Makapanstad	4 (14)	1 (3)	11 (38)	13 (45)	29 (100)
Mnisi (Welverdiend)	18 (62)	10 (35)	1 (3)	0 (0)	29 (100)
Ratjjepane	1 (6)	5 (29)	4 (24)	7 (41)	17 (100)
Total	23 (31)	16 (21)	16 (21)	20 (27)	75 (100)

b. **Gender**

The total participation of women farmers was 32% (n=22) and male farmers at 68% (n=46) and there was a significant difference ($p \leq 0.001$) in the proportional representation between the areas. Gender breakdown by locality is shown in Table 4.2. There were no female participants at all in Makapanstad while Mnisi had the highest female participants at 52% (n=16).

Table 4.2: Gender representation of participants

Area	Gender		Total
	Male	Female	
Makapanstad	20 (100)	0 (0)	20 (100)
Mnisi	15 (48)	16 (52)	31 (100)
Ratjjepane	11 (65)	6 (35)	17 (100)
Total	46 (68)	22 (32)	68 (100)

c. **Farming experience**

The farming experience among participants differed from farmers with less than 5 years farming experience to farmers with more than 20 years of experience. The farmers were grouped into various groupings and 34% (n=22) fell within a group with more than 11-20 years farming experience with livestock. However there was no significant difference in the proportional representation of different categories of farming experience between the three areas.

Table 4.3: Farming experience among participants

Area	Farming experience				Total
	< = 5yrs	6-10yrs	11-20yrs	>20yrs	
Makapanstad	4 (20)	5 (25)	6 (30)	5 (25)	20 (100)
Mnisi	3 (11)	6 (22)	13 (48)	5 (19)	27 (100)
Ratjjepane	5 (29)	5 (29)	3 (18)	4 (24)	17 (100)
Total	12 (19)	16 (25)	22 (34)	14 (22)	64 (100)

d. **Level of education**

The level of education among participants differed with the majority 58% (n=37) having obtained secondary education followed by 27% (n=17) with only primary school education, 12% (n=8) at tertiary level. Only 3% (n=2) of the participants made up only by Mnisi farmers had no schooling. There was no significant difference in proportional representation of these educational categories between the three areas. Most participants with tertiary education were at Mnisi (5 of the 8 people). The tertiary training was in non-agricultural fields with only one participant having a bachelor's degree in agricultural production.

Table 4.4: Level of education

Area	Level of education				Total
	None	Primary	Secondary	Tertiary	
Makapanstad	0 (0)	8 (40)	10 (50)	2 (10)	20 (100)
Mnisi	2 (7)	2 (7)	18 (67)	5 (19)	27 (100)
Ratjjepane	0 (0)	7 (41)	9 (53)	1 (6)	17 (100)
Total	2 (3)	17 (27)	37 (58)	8 (12)	64 (100)

e. **Employment status**

Employment in this study was considered as formal employment in any sector excluding any type of farming activities. The unemployment rate amongst participants is 91% (n=62) and there were significant differences ($p=0.02$) between the areas, with Mnisi having an unemployment rate of 100%. The main source of income of these participants was government grants and temporary employment in government-funded projects. Only 9% (n=6) of the farmers indicated their main source of income as being livestock farming, with most of these being in the Makapanstad area.

f. **Livestock numbers**

The majority of the farmers mainly own cattle and the herd size per owner ranges from 2 - 63 with the median \pm SD of 12 ± 14.1 cattle. There was no significant difference in the herd size ownership when comparing the three areas.

Table 4.5: Herd sizes in the selected areas according to respondents

Area	Cattle Numbers	
	Median	Std Dev
Makapanstad	12	16.2
Mnisi	13	14.6
Ratjjepane	10	10.0
Combined	12	14.1

g. **Animal husbandry procedures**

Most of the farmers do not implement basic animal husbandry procedures selected by the researcher, as indicated in Table 4.6 below:

- 65% (n=42) do not castrate surplus bull calves with Mnisi farmers representing 52% (n=22) of this group;
- 69% (n=45) of the farmers do not dehorn their calves. Again, Mnisi farmers make the biggest proportion of the group at 56% (n=25). Most farmers within the Makapanstad group (75%) dehorn their calves;
- 54% (n=35) of the participants never vaccinate (vaccination conducted by the farmers themselves and excluding vaccination conducted by the government) their animals. The Mnisi farmers again make the biggest proportion of this group at 69% (n=24), with Makapanstad farmers in a better position as only 15% (n=3) do not vaccinate their animals; and
- 98% (n=64) don't involve a veterinarian in pregnancy diagnosis in their herd and there is no significant difference amongst the three areas.

Table 4.6: Animal husbandry practices

Area	Castrate				Dehorn				Vaccination				Pregnancy diagnosis			
	N	S	A	T	N	S	A	T	N	S	A	T	N	S	A	T
Makapanstad	9	8	3	20	5	7	8	20	3	3	14	20	19	1	0	20
Ratjiespanne	11	3	3	17	15	1	1	17	8	5	4	17	17	0	0	17
Mnisi	22	5	1	28	25	2	1	28	24	4	0	28	28	0	0	28
Total	42	16	7	65	45	10	10	65	35	12	9	65	64	1	0	65

N=Never, S=Sometimes, A=Always and T=Total

h. Animal health issues

The most common animal disease problems or syndromes within the cattle identified by the farmers prior to training without any laboratory or diagnostic confirmation by the veterinary professional are highlighted in Table 4.7 below.

Table 4.7: Frequency of animal diseases/syndrome pre- and post-training

Frequency	Pre-training	Post-training
Once a month	Tick infestation, abscesses	-
Quarterly	-	Lameness, lumpy skin disease (LSD) and ticks
Twice a year	Heartwater, worms, redwater	Parafilaria, redwater, gallsickness, footrot, eye infections, worms, mastitis, diarrhoea in calves
Once a year	Gallsickness, footrot, mastitis, black quarter and lumpy skin disease	Dystocia, heartwater, 3 day stiff sickness, abortion, abscesses, pneumonia

However by comparing the animal diseases or syndromes reported pre-training and those reported post-training using the designed forms as indicated in Table 4.7 above, indications are that:

- there are several major animal disease problems/syndromes with potential negative impact which are not brought to the attention of veterinary officials;
- Lameness was a major problem mainly in Mnisi and Makapanstad and the actual cause couldn't be established;
- Mastitis was a common problem in all three areas and,
- Lumpy skin disease was a common problem mainly in Makapanstad and Ratjiejane.

The other major animal health related challenges identified by the farmers include:

- Poor response time from veterinary professionals (especially in the Makapanstad and Ratjiejane areas) when sick animals are reported to them. This is due to the mobile clinic visiting once a week and the local state veterinarians not providing a clinical service;
- Lack of equipment for both the farmers and the local animal health technician such as a thermometer;
- The poor standard of handling facilities especially in the NW Province;
- Clinical services being considered by the farmers to be expensive and unaffordable; and
- Poor accessibility to veterinary products (medicines). There were no local sources, thus this entailed travelling long distances (60-140 km return trip) to purchase the products at cooperatives in the neighbouring towns.

i. **Communication – methods and frequency**

The level of communication between the farmers and the veterinarian, animal health technician and the extension officer is shown in Table 4.8 below. If one looks at communication with these professionals within a period of less than a month, only 15% (n=10) will communicate with a veterinarian, 31% (n=20) will communicate with the animal health technician and only 6% (n=4) with the extension officer. The participants in Ratjiejane have the least frequent communication with the AHT and the extension officer as compared to the other two areas as 94% (n=16) never communicate with the animal health technician and 100% (n=17) never communicate with the extension officer. A total of 55% (n=36) never communicate with the veterinarian; 42% (n=27) never

communicate with the animal health technician and 40% (n=26) never communicate with the extension officer.

Table 4.8: Frequency of communication between farmers with professionals

Frequency	Veterinarian				Animal health technician				Extension officer			
	M	R	Mnisi	Total	M	R	Mnisi	Total	M	R	Mnisi	Total
Never	12	8	16	36	0	16	11	27	7	17	2	26
Once in 3-5 months	6	4	9	19	11	1	6	18	9	0	26	35
Once a month	2	0	2	4	7	0	6	13	3	0	0	3
Once in 2 weeks	0	1	0	1	2	0	0	2	0	0	0	0
Once a week	0	4	1	5	0	0	5	5	1	0	0	1
Total	20	17	28	65	20	17	28	65	20	17	28	65

M=Makapanstad, R= Ratjjepane

The communication is generally through contact sessions with 48% (n=31) of the farmers always meeting with the local animal health technicians during arranged meetings as indicated in Figure 4.2, which is backed up by some telephonic communication (25% of mobile phone use).

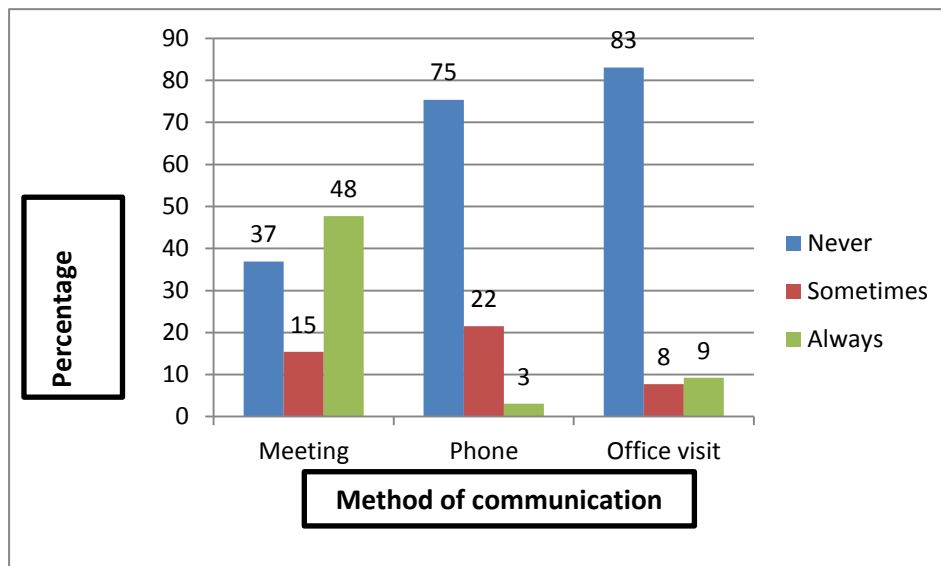


Figure 4.1: Frequency and method of communication indicated by respondents

The first avenue of assistance followed by farmers on encountering a sick animal varies. Most (52%, n=33) preferred to first attempt treatment on their own. Of those seeking assistance elsewhere, 27% (n=17) preferred to approach another local farmer, 14% (n=9) would prefer a veterinarian and 6% (n=4) would prefer to use the animal health technician as the first person to treat their sick animal as indicated in Table 4.9 below. From the group that would first call a veterinarian, there is a significant difference ($p < 0.01$) amongst the three areas with Mnisi group being more likely to call a veterinarian. It is also interesting that while the AHT and the EO are the local people assigned by government to assist farmers, only 6% will contact the AHT and none will contact the EO to assist in case of their animal becoming sick.

Table 4.9: Person contacted when animal is sick

1 st person to call in case of sick animal	Makapanstad		Ratjiejane		Mnisi		Total		
	Yes	No	Yes	No	Yes	No	Yes	No	Total
Vet	0	20	1	16	8	19	9	55	64
AHT	1	19	0	17	3	24	4	60	64
EO	0	20	0	17	0	27	0	64	64
Another Farmer	5	15	5	12	7	20	17	47	64
Treat self	13	7	11	6	9	18	33	31	64

4.3. Assessment of the farmers

a. Knowledge

Of the 77 farmers that wrote the test prior to training which included definitions and signs of health and disease, 77% (n=59) passed the test with a minimum pass level of 40% as indicated in Table 4.10 below.

The analysis of the test results subsequent to training indicate that 64% (n=49) passed the test as indicated in Table 4.11 below. There was no significant difference when comparing the mean performance of assessment before training

between the areas. The same can be said when comparing the mean performance of assessment after training between the areas.

Table 4.10: Written test performance before training

Marks group	Makapanstad	Ratjjepane	Mnisi	Total
0-39	5 (17%)	5 (31%)	8 (26%)	18 (23%)
40-60	17 (57%)	6 (38%)	19 (61%)	42 (55%)
61-79	5 (17%)	4 (25%)	4 (13%)	13 (17%)
80-100	3 (10%)	1 (6%)	0 (0%)	4 (5%)
Total	30 (100%)	16 (100%)	31 (100%)	77 (100%)

Table 4.11: Written test performance after training

Marks group	Makapanstad	Ratjjepane	Mnisi	Total
0-39	10 (33%)	5 (31%)	13 (42%)	28 (36%)
40-60	11 (37%)	6 (38%)	12 (39%)	26 (34%)
61-79	6 (20%)	5 (31%)	4 (13%)	18 (23%)
80-100	3 (10%)	0 (0%)	2 (6%)	5 (6%)
Total	30 (100%)	16 (100%)	31 (100%)	77 (100%)

The marks of the summative assessment were captured and analysed and as indicated in Table 14.12 below, 64% (n=49) of the participants passed the test with a 75% (n=18) pass rate among the youth and 58% (n=31) pass rate among adults. Amongst the adult farmers who wrote the test, 20 of them were above 65 years old and there was a 50% pass rate within the group.

Table 4.12: Farmer performance in post-training assessment by age group

Age group	Makapanstad		Ratjiejane		Mnisi		Total	
	Pass	Total	Pass	Total	Pass	Total	Pass	Total
0-35	4	4	1	1	13	19	18	24
36-50	0	0	4	5	5	12	10	17
51-65	8	11	3	4	0	1	11	16
>65	8	13	2	7	0	0	10	20
Total	20	28	10	17	18	32	49	77

There was no significant difference when comparing the mean performance between areas, age groups, gender and, when comparing the relationship between farming experience and performance. However there was a difference when looking at the relationship between educational level and performance ($p < 0.007$) with participants who had some form of education performing better (with mean performance of 50%-68%) than the others (with mean performance of 37%).

From the scatter plot of age vs. post training written assessment as shown in Figure 4.3 below, it is clear that as a farmer becomes older, the score declines slightly (0.37% for every year of age) and it is statistically significant ($P = 0.006$). However, this association disappeared when adjusted using regression model for the level of education.

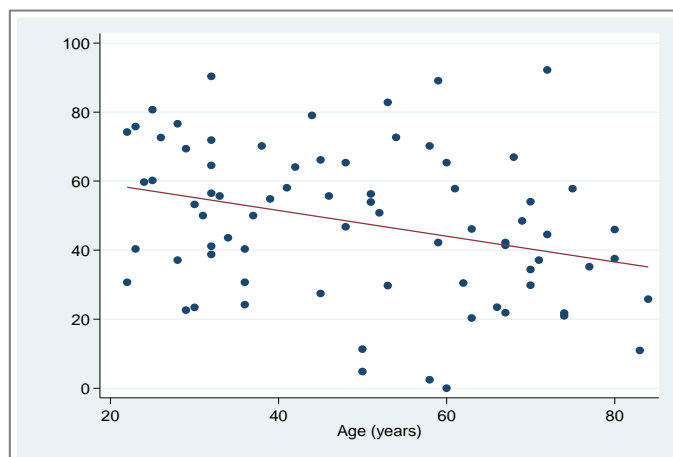


Figure 4.2: Comparative analysis of age and post training written performance

While the majority of the farmers thought that PAHC was the responsibility of a veterinary professional prior to training, 56% (n=43) could correctly define PAHC after training and 87% (n=67) understood the role of a veterinary professional regarding PAHC as indicated in Table 4.13 below.

Table 4.13: Performance on definitions of PAHC and the role of Veterinary professionals

Understanding	Definitions							
	PAHC				Role of Vet professional			
	M	R	Mnisi	Total	M	R	Mnisi	Total
Yes	14	15	14	43	25	15	27	67
No	14	2	18	34	3	2	5	10
Total	28	17	32	77	28	17	32	77

M=Makapanstad, R=Ratjiepane

The participants were also assessed post-training on specific sections of the course. The findings from this assessment were as follows:

- 84% were able to describe signs of health in an animal;
- 78% had knowledge on body parts of an animal;
- 60% understood the groups of various causes of animal diseases; and
- 53% clearly understood the proper choice and use of veterinary products (choice of antibiotic, required dosage calculations and storage of products), compared to none of the farmers having this knowledge prior to training.

b. Skills

There was a varying level of participation in the feedback sessions by the trained farmers. The overall difference when comparing skills between specific parameters could be summarised as follows:-

- There was no significant difference when comparing the relationship between the farming experience with the manual skills and the level of education with manual skills.

The manual skills of the 65 farmers are summarised in Table 4.14 below:-

Table 4.14: Skills - Ability to perform identified skills after training

Area	Ability to use thermometer	Ability to weigh a cow	Intramuscular injection procedure	Subcutaneous injection procedure	Recording of findings	Total
	Yes	Yes	Yes	Yes	Yes	
Makapanstad	19 (95)	19 (95)	20 (100)	20 (100)	1 (5)	20 (100)
Mnisi	12 (40)	21 (70)	22 (73)	23 (77)	27 (90)	30 (100)
Ratjiepene	7 (47)	9 (60)	4 (27)	10 (67)	11 (73)	15 (100)
Total	38 (58)	49 (75)	46 (71)	53 (82)	39 (60)	65 (100)

- Use of thermometer – A total of 58% (n=38) were able to use one of the basic diagnostic tools that any farmer should have namely a thermometer. There was a significant difference ($p < 0.001$) between the areas with the Makapanstad farmers (95%) performing better than the rest and being the only successful farmers in this skill. There was also a significant difference when comparing performance and gender as indicated in Table 4.15 below, as 73% (n=32) of the males could use a thermometer compared to 29% (n=6) of the females ($p < 0.001$). Only locality or area had a slight confounding effect on the difference in performance of gender. There was no significant difference by farming experience and education.

Table 4.15: Relationship - Use of thermometer and gender

Gender	Skills – Use of thermometer		Total
	No	Yes	
Male	12 (27)	32 (73)	44 (100)
Female	15 (71)	6 (29)	21 (100)
Total	27 (42)	38 (58)	65 (100)

- Use of weight tape - A total of 75% (n=49) could demonstrate the correct method to weigh a cow using a weight tape as compared to none prior to training and there was great improvement in the overall skills level across all three areas. There were no significant differences between the gender and farming experience. There was a significant difference when comparing the different areas ($p=0.027$) with Makapanstad performing better than other areas at 95%. There was also a significant difference when comparing the skills with the level of education ($p=0.035$) as the participants without education performed significantly lower than the rest.
- Intramuscular injection – A total of 71% (n=46) could demonstrate the correct intramuscular injection procedure subsequent to training. There was a significant difference ($p<0,001$) between the areas with 100% of Makapanstad farmers being able to inject. The majority of Ratjipeane farmers (73%) did not successfully acquire this skill. There were no significant differences in this competency when comparing performance with gender, farming experience, level of education.
- Subcutaneous injection – A total of 82% (n=53) could correctly demonstrate the subcutaneous injection procedure. Participants in all three areas performed well and there was a significant difference between areas ($p=0.014$) with Makapanstad farmers performing better than others. There was however no significant differences between the gender, farming experience and level of education.
- Recording findings – None of the farmers had a system of recording and reporting any signs observed, treatments or any procedure conducted on their animals prior to training. The assessment concentrated on the farmers being able to observe, examine an animal, treating and then being able to record their findings on a form developed for them. Of the farmers assessed, 60% (n=39) could record their findings on the forms provided. There was a significant difference ($p<0,001$) between the areas with participants in Makapanstad performing lower than those in the other areas, although the majority had acquired the competency. There was also a significant difference ($p<0.001$) between males and females with regards to recording their findings, with 95% (n=20) of the females clearly recording their findings as compared to only 43% (n=19) of the males.

Table 4.16: Skills on recoding of findings - Gender differences

Gender	Recording o findings		Total
	No	Yes	
Male	25 (57)	19 (43)	44 (100)
Female	1 (5)	20 (95)	21 (100)
Total	26 (40)	39 (60)	65 (100)

There was no significant difference when comparing recording skills with farming experience and education.

From the scatter plot of age vs. post training practical assessment as shown in Figure 4.4 below, the score slightly increases (0,10% for every year of age), however it is statistically not significant ($p=0.176$). The association disappeared when adjusted using regression model for the level of education ($p=0.883$).

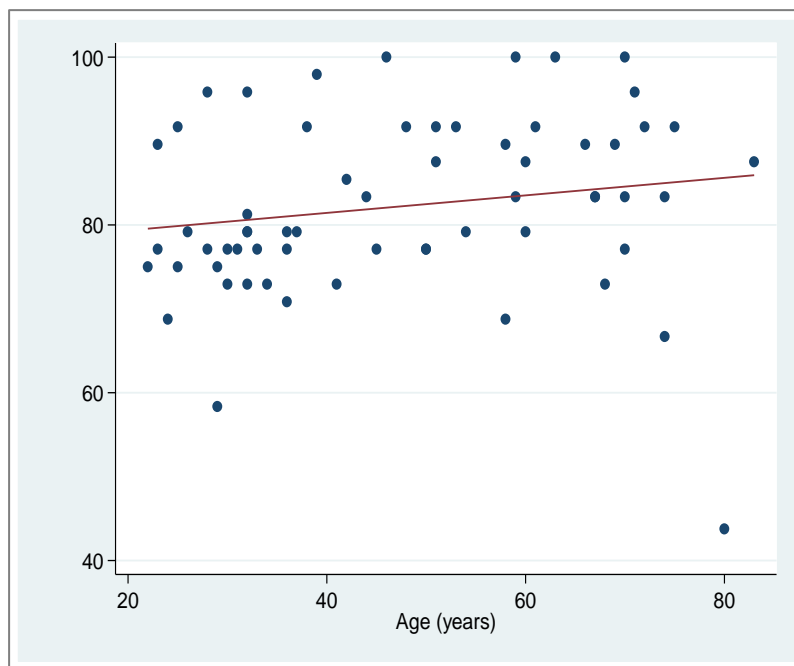


Figure 4.3: Comparative analysis of age and practical session

CHAPTER 5: DISCUSSION

5.1. Participation and background information

The willingness of the study participants to enrol for this study is in line with the usual ready participation of South African rural small scale farmers, in relevant training especially if it is sponsored. However, the number complying fully with the provision of background information and assessment of practical skills was lower. The reduction in the completion of background information could be attributed to trust issues relating to security of their information, despite the farmers and researcher having completed a consent form that confirmed the confidentiality of the information. At the time of granting their consent a number of participants expressed concern regarding possible access of their information by the South African Revenue Services officials.

There was a fairly even overall distribution of farmers within various age groups as compared to the findings of Globber *et al* (2008) and Makgatho *et al* (2005) whereby the farmers were mainly males at 50-70years of age^{24,33}. However, youth were overrepresented at Mnisi whereas senior citizens were overrepresented at the other two localities. The difference in age between areas had an impact on the written performance of the participants as older people performed lower than the youth and this is attributed to the level of education as the youth were better educated than the elderly was. However the difference in age did not markedly influence the skills acquired as there was no significant difference between age groups with the exception of recoding and reporting skills where youth performed better than adults.

The unemployment rate was found to be at 91% with Mnisi group having the highest rate at 100%. This is worrying and confirms the urgent need to improve income from available resources in rural areas, especially considering that one of the major assets for the rural people is livestock, in this case the cattle⁷. Even young people with tertiary qualification were unemployed in the study areas. It is interesting that the farmers in general do not see or perceive livestock farming as a form of employment (i.e. self-employment).

The gender representation differed significantly between the areas with more males participating at 68% than females considering the range of 51% - 54% female population in the areas . Makapanstad had no female representation at all while Mnisi

group had the highest female representation. The actual reason for the difference was not explored, and one of the reasons could be attributed to the slow pace of change from the previous customary practice whereby livestock particularly cattle farming was considered a responsibility for males in the communities.

The level of education among the participants was very good with more than 97% of the farmers being able to read or write either English or an African language (either Northern Sotho or Setswana or Xitsonga). Only 3% of the participants did not attend any level of schooling and these participants were assisted with the completion of the written assessments by the assessor. The interaction between language and performance of the participants were not investigated but in all areas they were provided with translation of the material into the language prevalent in their area. The level of education had an influence on the performance of the farmers with participants who had some form of education performing better than others on the written test and the ability to weigh an animal using a weight tape. This skill requires some interpretation and calculation, which may explain this finding.

It is of concern that despite extension initiatives over many years in the rural areas, farmers are generally still dependant on Government services to provide basic animal production practices such as castrations, vaccination and dehorning. This situation is particularly notable in Mnisi where most farmers do not consistently castrate surplus bulls, dehorn and vaccinate their animals. It is also interesting that despite clinical services being provided in the areas and the farmers being aware of availability of services of a veterinarian, 98% do not involve a veterinarian in pregnancy diagnosis. This is likely to contribute to poor production in rural areas and should be attended to.

Despite the mobile clinics operating in the three selected areas, most of the farmers are still reluctant to use the services of a veterinarian and pay for such services which is in agreement with the findings of Pica-Ciamara *et al* (2010)²². The majority of the farmers especially in Makapanstad and Ratjiejane, still prefer to first attempt dealing with their sick animals themselves before contacting anyone else, indicating low reliance on the veterinarian and the animal health technician and one of the reasons could be that they consider clinical services to be an expensive venture. . Both economic and infrastructural factors contribute to this situation and a multidisciplinary approach is proposed as a solution. This would necessarily entail empowerment of the farmers to personally implement basic observation, examination, and treatment of their

animals for common ailments, and improved communication systems to provide guidance to farmers and data for surveillance purposes.

There is also poor communication between the farmers and government officials despite improved telephone technology, which is clearly not used to the advantage of either party. The Mnisi farmers, being in a foot-and-mouth disease surveillance zone, are fortunate in that they have a weekly opportunity to meet the AHT at the compulsory dipping sessions that is used as a means to inspect animals for signs of foot and mouth disease.

The results indicate that the participating farmers have knowledge on the common animal disease problems they encounter. However, there is no structured reporting system in place between the farmers and the veterinary professionals, which is likely to result in underreporting of diseases. This is consistent with the noticeable increased reporting of conditions post training, which could indicate either a true increase in disease prevalence compared to what is reported by the state veterinary officials or an increase in awareness among the farmers. The lack of a structured system to report disease incidents therefore results in lack of capacity to assist the farmers, including negative impacts on emergency assistance, control of animal diseases and disease surveillance in an area.

5.2. Assessment

The assessment of the acquired skills on early animal disease identification and treatment module indicates an improvement of the ability of the trained farmers. There was lack of association between the skills with farming experience or with the level of education. Farmers could irrespective of age, acquire the skills transferred to them which was different as compared to the written performance.

All farmers had an understanding and could use the recording and reporting forms. The use of the forms with monthly interaction between the veterinary professional, especially the AHT, could improve disease surveillance in the area and improve pre-disaster warnings and preventative measures in line with the findings of McCrindle *et al*, 1999³⁴. The question though is whether the farmers will be willing to continuously use the forms if they cannot relate to any direct benefit or incentive in line with the findings of Allport *et al* (2005)² whereby the CAHW-s were used for surveillance with

the incentive being the fee they could charge for the clinical services they were providing. Female participants performed better than males (95% and 43% respectively) in this skill. This could explain the poor performance in this skill by Makapanstad farmers, who were all male.

While no farmers owned or were able to use a thermometer or knew the normal temperature of a cow before training, 58% could safely use one after the training session. This improvement will no doubt assist the farmers in detecting fever in animals and they will be able to distinguish between the common infectious diseases in the area that leads to fever in animals and other animal diseases that do not lead to a development of fever in animals. This is standard practice in the commercial farming sector but is absent amongst small scale farmers. It was interesting that males could use a thermometer better than females. Again, the gender imbalance at Makapanstad may explain the better performance in this skill compared to the other two areas. However, one cannot rule out the influence of culture as it is a general custom for males to own and look after cattle while the women are expected to look after the house and crop production. It is only since the democratic dispensation in the country that women are slowly involved and encouraged to be involved in livestock production.

A total of 75% could demonstrate how to weigh a cow using a weigh tape as compared to none prior to training. No participants had a system to weigh their animals and thus had no idea on what to expect when marketing animals and were unable to determine the correct dosage during treatment of animals. It is sobering that with several over-the-counter veterinary products being easily accessible in the country under the provisions of Act 36 of 1947, farmers still lack the knowledge and have no means of weighing their animals despite the product usage instructions on the dosage to be followed. This constitutes a serious predisposing factor towards drug residue in products of animal origin and a threat towards food safety. It might also translate into the small scale rural farming sector because of this issue, being excluded from participating in the red meat value chain.

A high proportion of participants could properly demonstrate intramuscular and subcutaneous injection procedures. While most participants could indicate that a product must be injected either intramuscular or subcutaneous before the training they were unable to specifically demonstrate the correct injection site. This was easily corrected through the practical sessions held with the farmers.

The initial pass rate of 77% (n=59) during the pre-training written assessment could be attributed various reasons that may include previous training by veterinary officials, exposure to concepts on various media, and engagement with researchers who interacted with the farmers in the past. If we consider the total summative mark of the written assessment, we can safely allude to the fact that the 64% pass rate indicates an understanding of the concepts by the farmers. Due to the fact that the written assessment had different questions during the pre- and post-training assessments direct comparisons of outcomes were not possible. This was a shortcoming in the study design which should be corrected in future research project to enable clear comparative analyses.

The youth performed far better on written test than the adults (75% pass rate among the youth and 58% pass rate among adults). There was a negative association between age and score, which was confounded by education level as indicated in Figure 4.3 due to the fact that the older people generally had lower education levels. This study does not however provide means to establish the appropriate method of assessment for different groups and it is an area that requires further exploration. The age and education influence on the written performance also needs to be further explored so that the material and approach could be adapted to ensure that even the elderly and farmers without schooling perform as well as the others.

The farmers who failed the written test still managed to understand and use the structured forms for the recording and reporting of their observations and actions when dealing with a sick animal. This indicates the potential for the use of the form independent of the provision or impact of the theoretical training.

The literature on behavioural change especially in the human health field, describe models and determinants for promoting behavioural change^{16,17,26,33,35,40} and, using some of the determinants in this particular study, one could summarise the outcome as follows:-

- Professional role and identity – the role of the local veterinary or para-veterinary professional is critical in influencing change of behaviour of the farmers. They can do that by training the farmers on the concept around PAHC and continuously provide advice and assistance. By the same token, the role and

responsibility of the farmer/participant must be clearly spelled out to ensure commitment in the process.

- Knowledge – the acquisition of new knowledge by the farmers is positive and even though there was a 64% pass rate, it can be improved with time and repetition of definitions and concepts by the local professional.
- Skills – more than 50% of the farmers could demonstrate the acquired skills. Long-term retention of these skills was not assessed.
- Belief about capabilities or self-reliance – the PAHC model used during the training provided the farmers with an opportunity to practice what they learned and with the 5-6 feedback sessions, most of them developed confidence in reporting back on what they had done in the previous month and it also provided an opportunity to further learn from the challenges and experience of fellow participants.
- Motivation, attitude and allowing sufficient time for change - Even though the number of participants reduced from the targeted 90 farmers, the remaining farmers continued to demonstrate their positive attitude towards acquiring new knowledge and skills.
- Environmental context and resources – It was evident during the research period that for the farmers to effectively implement what they learned, they needed certain resources such as access to veterinary products at local level. This indicates the potential for establishment of local entrepreneurs to take the opportunity to supply products at local level.
- Social influence – within all the groups of farmers, there were several excellent participants who were also influential people within the groups. The use of such people as agents of change within the areas might assist in accelerating change and implementation of the skills acquired.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

The training program using a primary animal health care model, had an immediate impact as the farmers gained overall skills to observe, examine, treat and implement preventative measures on their own. All age groups generally performed well in the written and practical assessment. It would have been of value to compare the level of the knowledge before and after training, to assess the skills a year or two later, and to evaluate the impact of the implementation of the knowledge and skills gained by then.

The training will assist the small scale farmers to handle problems with guidance from a veterinary professional and is expected to reduce the incidence and prevalence of loss of livestock in the rural areas due to animal diseases and thus ultimately improving livestock productivity. The farmers were enthusiastic during the feedback sessions using the recording and reporting forms and they gained confidence during each session held.

There is evidence from the farmers within the study that there is poor communication between the farmers, the local veterinary professional and the government extension officer. The forms and tools used in this study could be adapted and used by farmers and local veterinary professionals to improve communication and surveillance in the local areas. It is unrealistic to expect farmers to gather scientific information without active participation in the process and for them to value their role and responsibilities³.

It is important that the demographics of the participants is taken into consideration and adapt the training to accommodate different areas and circumstance. It is also advisable to have a different assessor or moderator available during assessment of the participants to avoid the trainer being the assessor particularly with regards to the skills assessment.

The research project was limited to a specific period and thus could not be adapted to evaluate the perception of the farmers regarding the value of their animals.

The major recommendations from the study are as follows:-

a. When training farmers using the model developed, follow the process as indicated in Figure 6.1 below and;

- Use the experiential learning theory whereby the participation of the farmers is key and they must develop self-confidence, independence and acquire relevant skills;
- The training programme must follow an effective education programme (i.e. Visitation of the farmers and training at local site);
- Adapt the training taking into consideration the age and level of education;
- The focus of the training and its assessment must be on behavioural change and various variables must be considered (namely independent, intermediary and dependant variables). An appropriate assessment for illiterate farmers must be explored and further investigated;
- Because learning is a process, we need to allow the farmers to practice and demonstrate adoption of the skills learned; and
- Encourage local veterinary professionals to seriously consider conducting similar training programmes in their areas in an attempt to improve animal disease control and improve communication with the farmers.

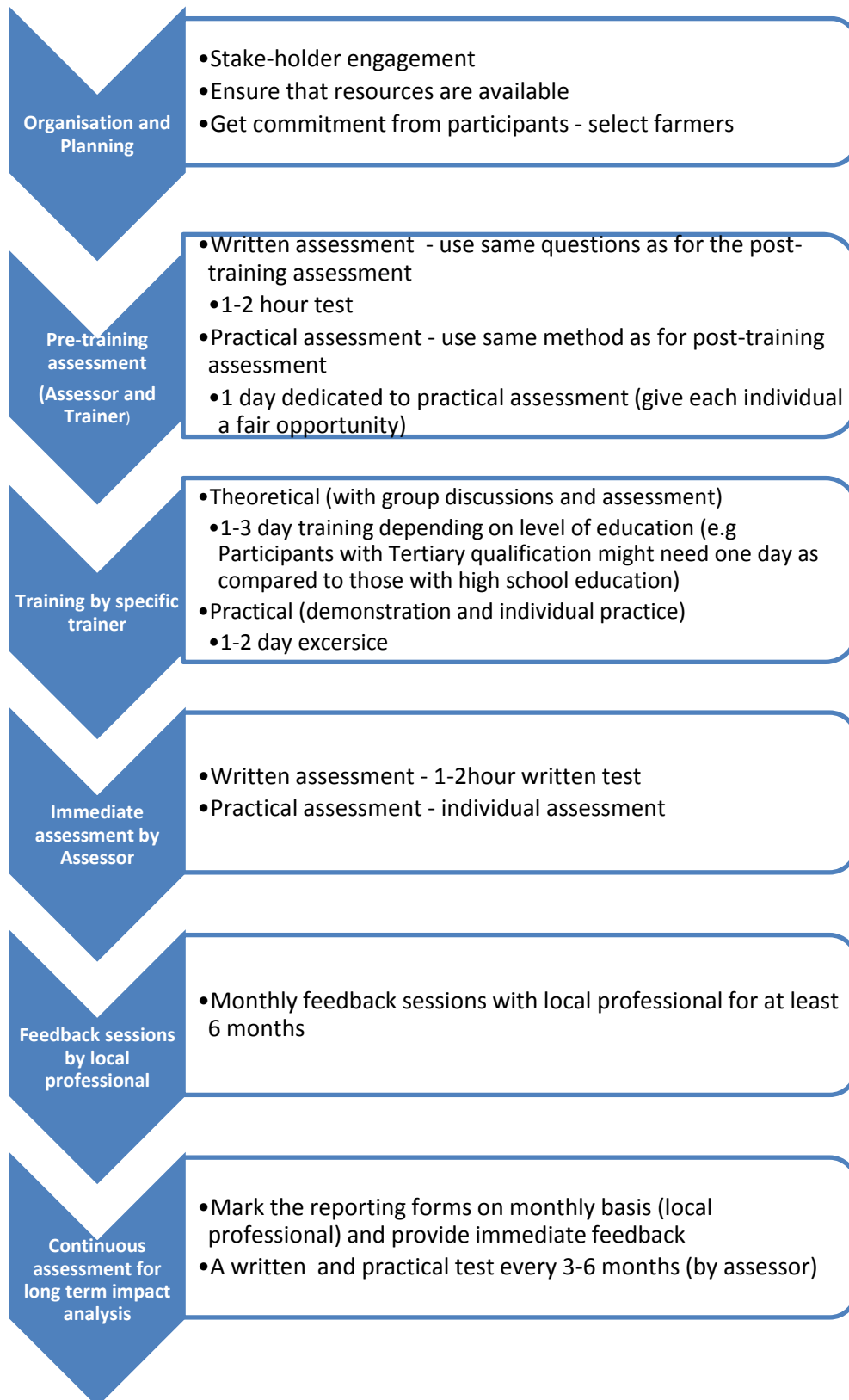


Figure 6.1: Recommended approach on training of farmers

- b. Professional role and identity – the role of the local veterinary or para-veterinary professional is critical in influencing change of behaviour of the farmers. They can achieve this by training the farmers on the concept around PAHC and continuously provide advice and assistance. By the same token, the role and responsibility of the farmer/participant must be clearly spelled out to ensure commitment in the process.
- c. Follow up similar assessment of the trained participants a year or two later;
- d. The research project to be repeated in other provinces to compare the differences with the written assessment being the same before and after training;
- e. Further research to be conducted on adapting the recording and reporting system to make it even simpler than it is and even consider modern technology such as cell-phone use;
- f. A long term research project (minimum of 3 years) to be implemented in order to compare the impact of the training on production aspects within the communities with areas where there has been no similar training; and
- g. The establishment of a viable and sustainable farming model for cattle and other livestock farming in the communal areas is essential. The majority of farmers within the study still perceive their farming not as a business whereby they are owners and self-employed. This is a serious problem and could lead to the degradation of the natural vegetation.

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Appendix I

Assessment Form

Primary Animal Health Care for Livestock Farmers

Learner`s Name:

ID:

Province:

State Vet:

Assessment takes place at different intervals of the learning process and includes the following:

- Assessment at the beginning of the training programme to assess basic knowledge prior to training
- Assessment during the training programme in the form of interactive sessions, questionnaires and video clips
- Assessment after completion of the program to assess knowledge and skills obtained during the training.

The assessment experience should be user friendly, transparent and fair. Should you feel that you have been treated unfairly, you have the right to appeal. Please ask your facilitator about the appeal process and make your own notes.

A: Pre-Assessment

1. In your own understanding, what is Primary Animal Health Care (PAHC)? Or, how would you describe Primary Animal Health Care? Or, what is your understanding on Primary Animal Health Care?

O tshaloganya eng fa re bua ka Primary Animal Health care?

.....

.....

.....

.....

2. What is the role of a Veterinary professional with regards to Primary animal health?

Tiro ya ngaka kgotsa mooki mabapi le PAHC ke eng?

.....

.....

.....

.....

3. Do we need to have Primary Animal Health Care (PAHC) in the country? If so why, where and when?

A o bona PAHC e tlhokagala go ka nna teng?

.....

.....

.....

4. What is the normal temperature of a:

Animal:	Temperature?
1. Cow	
2. Sheep	
3. Goat	
4. Horse	
5. Pig	

5. Give minimum 5 signs of health in an animal?

Naya matshwao a matlhamo a a bontshang fa serui se tshetse sentle?

1.
2.
3.
4.
5.

6. Give minimum 5 signs of disease in an animal?

Naya matshwao a le matlhamo a bolwetse?

1.
2.
3.
4.
5.

7. How do you weigh animals in your area?

O dirisa eng go bona bokete ba serui sa gago?

-
-
-

8. What is vaccination and how do vaccines work?

Moento ke eng le gore o dira jang?

-
-
-

9. If you were to dip cattle how would you go about preparing the dip and how would you maintain the dip for the acaricide to be effective?

Fa o dipa kgatlhanong le dikgofa, o dirisa dipi ya gago jang?

.....
.....

Name of facilitator: ID#

Facilitator's comments:

- a. General assessment

.....
.....
.....

- b. Any other specific analysis including what must receive special attention during training

.....
.....
.....

Signature.....

Appendix II

B Assessment after the training programme

1.1 Session 1 – Introduction to Afrivet PAHC model

- a. In your own understanding, what is Primary Animal Health Care (PAHC)? Or, how would you describe Primary Animal Health Care? Or, what is your understanding on Primary Animal Health Care?

O tšhaloganya eng fa re bua ka Primary Animal Health care?

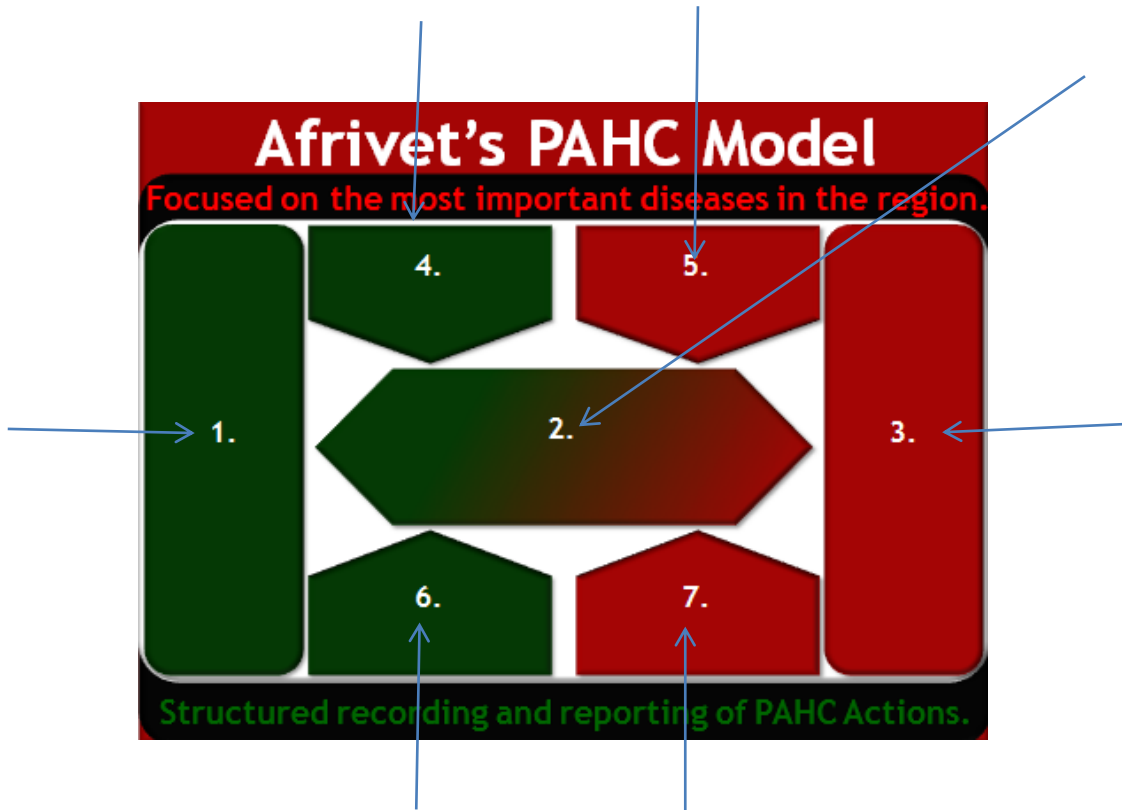
.....
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- b. What is the role of a Veterinary professional with regards to Primary animal health?

Tiro ya ngaka kgotsa mooki mabapi le PAHC ke eng?

.....
.....
.....
.....

c. Fill in the names for each box hereunder



d. Provide the function for each body system in the table below?

Tiro ya karolo e ya mmele ke eng?

Skin and lining (Letlalo)	
Nervous (Ditshika)	
Sensory	
- Matlho	
- Ditsebe	
- Nko	
- Molomo	
Circulatory (Madi)	
Respiratory (Makgwafo)	
Digestive (Mala)	
Urinary(Diphio)	
Reproductive	
Bone and Muscle (Marapo le Mesifa)	

1.2. **Session 2 – signs of health**

- a. Show a video – participants to list the signs of health observed. Then discuss

1.3. **Session 3 – Signs of Disease**

- a. Show a video – participants to list the signs of disease observed, then discuss.
- b. Give 5 main causes (groups) of animal diseases?

Mefuta ya malwetse e metlhano ke efe?

- 1.
- 2.
- 3.
- 4.
- 5.

1.4. **Session 5 – Closer examination**

- a. What are the three main aspects for a closer examination?

Fa o tlihatlhoba serui sa gago, ke eng tse tharo tse di botlhokwa tse o thswanetseng ke go di dira?

-
-
-
-
-

- b. What could cause an increase in body temperature ?

Ke eng se se ka tthatlosang temperature ya phologolo?

-
-
-
-
-

- c. What are the causes of the following colours of the lining (mucous membrane)
Ke eng se se ka bakang gore mmala wa matlho a nne jaana?

Colour of Inner Lining	Possible Cause?
1. White/Pale	
2. Yellow	
3. Brown	
4. Red	
5. Blue/Purple	

1.5. **Session 6 – the use of stock remedies**

- a. What are stock remedies? ***Melemo ee re ibitsang stock remedies ke eng?***

.....

- b. Give the different groups of stock remedies that you can get over the counter?
Naya mefuta ya stock remedies e o ka e rekang kwantle ga go ka bona ngaka?

.....

- c. Before using any stock remedy, what must you check for?
Pele o dirisa stock remedies, ke eng se o tshwanetseng go se lebelela?

.....

- d. Practical – Give weight of an animal and the farmer must accordingly work out the dosage for each animal (cow, calf, sheep, goat)

.....
.....
.....

- e. What is important for proper storage of remedies? **Ke eng se se botlhokwa mabapi le tshomarelo ya di stock remedies?**

.....
.....
.....

1.6. Session 7 – Vaccination and disease prevention

What is a vaccine? **Moento ke eng?**

.....
.....
.....
.....

- a. What are the most important vaccines for cattle/sheep/goats and when do you vaccinate? **Meento e e botlhokwa ya dikgomo/dinku/dipudi ke efe le gore o e dirisa leng?**

Cattle.....

.....
.....

Sheep and Goats

.....
.....

1.7. Session 8 – Common diseases

a. Show a video of common animal diseases in the area and participants to indicate

- What signs they observed? **O bona matshwao afeng?**

.....
.....
.....

- What is the likely cause of the disease? **Ke eng se se bakang bolwetse?**

.....
.....
.....

- How will they treat the animal? **O ka alafa phologolo ka eng?**

.....
.....
.....

- How will they prevent further infection or outbreaks in future? **O ka thibela jang go ata ga bolwetse?**

.....
.....

C: Practical Assessment (at the end of training)

To be completed on a separate disease surveillance form:

1. Provide a group of animals and participant to
 - a. Practically demonstrate the recording of signs of health – provide the forms
 - b. Practically demonstrate the recording of signs of disease – provide the forms
2. Participant to demonstrate the basic animal handling skills
3. Participant to demonstrate the closer examination
 - How to take temperature?
 - How to check the lining (mucosa of the eye)?
 - How to examine the rest of the body?
4. Participant to weigh the animal.
5. Participant to demonstrate the process of drawing up medicine into a syringe and injection sites on an animal.
6. Participant to demonstrate stock kit handling method.

Name:

ID:

Area:

Date:

A: Observation: See attached Disease surveillance Form

B: Clinical Examination (Demonstration)

1. Temperature

.....

2. Inner lining

.....

3. Body examination

.....

4. Drawing product into syringe

.....

5. Calculating dosage

.....

6. Injection sites

.....

Name of Evaluator:

Signature:


Appendix III



Disease Surveillance Form



Date: _____

1. Reportee Details					
Name: _____			ID#: _____		
Contact Number: _____			ID#: _____		
2. Farmer Details					
Name: _____			ID#: _____		
Contact Number: _____			ID#: _____		
District/Village/Farm: _____			Nearest Town: _____		
3. Background Information					
Type of Animal?	Cattle	Goats	Sheep	Donkey	Pig
	Other: _____				
Sex & Age of Animals?	Mature Male	Young Male	Mature Female	Young Female	Calf/Lamb
Number of Animals Affected?	Number of Animals in Group? _____				
Further Information: _____					
4. Observations					
1. Head Upright?		Mouth	Nose	Eyes	Ears
Further Information: _____					
2. Walking Smoothly?		Straight Back	Standing Strong	Lying Upright	Tail Movement
		Front Legs	Front Feet	Back Legs	Back Feet
Further Information: _____					
3. What Goes In?		Condition	Neck	Chest	Abdomen
		Eating	Drinking	Breathing	Hunger Groove
		Chewing	Swallowing	Chewing Cud	Other?
Further Information: _____					
4. What Comes Out?		Smooth Skin	Normal Urine	Udder/Testicles & Sheath	Normal Milk
		Under the Tail	Normal Dung		Other?
Further Information: _____					
5. Examination					
1. Temperature: _____					
2. Inner Lining of the Eyelid: _____					
3. Condition Score (1-5): _____					
Further Information: _____					
6. Cause of Disease					
Injury		Poison	Infection	Parasites	Nutrition
Further Information: _____					
Disease Identified: _____					
7. Treatment					
Body Weight: _____					
Product: _____					
Dose: _____					
Treatment Outcome: _____					
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