CHAPTER 1

INTRODUCTION

Agriculture is of prime importance to every nation. Agricultural development is needed in almost every country of the world today. The race between increasing population and mankind's food supply is real and grim. Agriculture is the only way in which mankind is able to produce the food on which the very lives of humans depend (Matjie 1984) citing Mosher (1966). This situation led to the establishment of a co-operative beef ranch, in the former Bophuthatswana, where the members of the cooperative would apply the correct farming practices in order to produce beef of a high quality and at the same time be a model for farmers on the adjacent leased farms and in the Ganyesa communal grazing area.

The Polar Co-operative Beef Ranch was started in Ganyesa area in 1977. From information from the members of the Co-operative, the Ranch started well but the level of management declined considerably over time. When the Ranch was inspected in 1993, there were obvious problems with respect to the management of livestock and the grazing system being applied. Although the grazing capacity of the veld on the Ranch had not yet been determined, the number of livestock relative to the size of the farm was quite small, indicating that the poor condition was not due to high stocking rates but that there were other factors, which contributed to that situation.

Considering the situation prevailing on the Beef Ranch, it was necessary that special attention should be paid to the Ranch in order to ensure that the original objectives would be realized.

1.1 Problems and motivation for study

The regional extension pasture specialists, visited the Ranch and reported that the farm, which was quite large, had been physically planned and that this plan had been implemented. It was observed, however, that the condition of many of the cattle, especially the old cows, was very poor and most of them exhibited symptoms of mineral deficiency.

There was a general complaint from the participants that the Department of Agriculture had not helped to solve the water problem on the Ranch. It was also claimed that the Extension Officer, who was responsible for the Beef Ranch, was responsible for the loss of some cattle. These issues appeared to have discouraged and demoralized the participants. The situation, therefore, required urgent attention.

1.2 Problem and objectives

The problem investigated concerned the various factors which influenced the administration, management, effectiveness and efficiency of the project.

The objectives of the research were:

(i) to study the Co-operative Ranch, including the characteristics of members of the Co-operative, to determine implications for the agricultural development.

ii) to study the Ganyesa area and the characteristics of people of Ganyesa area (communal grazing area), where the members of the Cooperative Beef Ranch reside, to determine whether the members could have been influenced by the fact that they reside in the communal grazing area and also have livestock in the communal grazing area.

(iii) to investigate the communication of farming practices to the members on the ranch.

(iv) to make recommendations for improving the management of the Co-operative Ranch and communication of recommendations.

1.3 Research hypothesis based on objectives

The study objectives were based on the following assumptions:

(i) That the poor condition of some of the cattle was due to poor management by the participants.

(ii) That the fact that the members of the Co-operative Ranch resided in the Ganyesa communal grazing area, had a great influence on the way the members of the Cooperative Ranch managed the Ranch.

(iii) That there was a lack of training of the members of the Ranch by the Extension Officer and other agents of change.

(iv) That there was a lack of interpersonal and mass contacts by the Extension Officer to motivate the members of the Ranch who did not feel that the project was theirs and that they were, therefore, responsible for the sound management of the Ranch.

(v) That the extension officer was not committed to ensuring the correct management of the Cooperative Ranch.

CHAPTER 2

Range condition and livestock production in Southern Africa

2.1 Introduction

The ability of ruminants to convert forage into edible products for humans is a well known phenomenon, upon which economic livestock production is often based. The availability of the forage is, in turn, dependent upon, among other factors, the types of soils, climate and management practices. In the drier (arid and semi-arid) areas of the world, there is a limitation on rainfall, which is very erratic and inadequate, consequently affecting plant growth and yield. Both the state and productivity of rangeland are determined by the amount of rainfall in that particular year (Mazengera 1993) citing Sandford (1983).

Before discussing the range condition and livestock production on the ABPCBR, it is necessary to highlight the range condition and livestock production in Southern Africa.

2.2 Range condition in Southern Africa

Range condition has been defined as the "state of health" of vegetation (Tainton 1981, 1988; Hurt and Bosch 1991). Trollope et al. (1990) preferred to describe veld condition relative to some functional characteristics, normally sustained forage production and resistance to soil erosion. Du Toit et al. (1991) stated that South Africa, as a result of a generally low and unreliable rainfall, steep topography in the better-watered areas, restricted irrigation potential and large tracts of shallow and/or infertile soil, has only limited potential for arable production.

According to the 1989 R.S.A year book (Anon 1989) only 12% of the land area is suitable for arable production - the remainder is rangeland. This rangeland is a major resource for multipurpose systems. It provides the main fodder for the national cattle and small stock herds. The grasslands of the central highlands and Lesotho are the catchment area for the major river systems of South Africa, and the range supplies many opportunities for eco-tourism, which has an influence in the quality of life for a rapidly - growing urban population. The rangelands of Southern Africa vary in composition from subtropical Savanna and Grasslands to arid shrub steppe. These rangelands have co-evolved with large numbers of indigenous game - both grazers and browsers and have proved remarkably resilient to utilization by domestic livestock. Nevertheless, concern has been expressed at the retrogression of Southern African rangelands (Du Toit et al. 1991). This retrogression has been characterized by seemingly irreversible vegetation change; an increase in the density of the woody components at the expense of the herbaceous component; the encroachment of undesirable exotics and habitat degradation as a result of soil erosion. Du Toit et al. (1991) reported that for decades various commissions of inquiry, eminent ecologists and range scientists have supported the view of vegetation degradation in different parts of South Africa.

It is further reported by Du Toit et al. (1991) that in 1923 the Drought Commission, investigating the deterioration of vegetal cover, found "that since white man has been in South Africa, enormous tracts of the country have been entirely or partially denuded of the original vegetation". Citing reports of early travellers, De Klerk (1947) came to the conclusion that a large section of the Southern Orange Free State must formerly have consisted of grassveld and that shrub was steadily encroaching northwards. In a discussion on the instability of vegetation in South

Africa, Acocks (1975) suggested that major changes, such as the disappearance of forest and shrub forest and the development of very extensive "near-deserts" in the west, were taking place. Comparing the 1953 vegetation boundaries of Acocks with 1972 satellite imagery, Jarman & Bosch (1973) hypothesized that Arid Karroo vegetation had spread some 70 kilometers into the valuable grassland over the previous twenty years. Surveys undertaken during 1983, over some 1,4 million hectares in the Eastern Transvaal, revealed that the condition of vegetation, over more than half this area, was very poor (Du Toit et al. 1991).

It was stated by Aucamp (1981) that the agricultural resources of any country are used to meet the varied needs of its people and, in particular, their food and fibre needs. However, since the manner in which these resources is used will inevitably have a direct bearing on their future productive capacity, it is important that in the process of utilizing them, they are not degraded. Aucamp et al. (1992) stated that there can be no doubt that the welfare of any country, and particularly that of a developing one, is strongly linked to the productive capacity of its agricultural resources. This is so, since the growing populations which characterize developing countries will inevitably make increasing demands on these resources and, in doing so, encourage expansion of agricultural use into increasily marginal, and often sensitive areas. Citing Erasmus (1990), Aucamp et al. (1992) stated that in both the commercial and communal agricultural sectors of a country like South Africa, the sensible utilization of the resource base remains central to the prosperity of the country and its people and further stated that in spite of this need, the current condition of the agricultural resources over much of the South African land surface is apparently very much poorer than some 200-300 years ago, and it appears to be degrading further at an accelerating rate. The extent and the seriousness of this problem in both the commercially - owned and communally - farmed rangelands has frequently been alluded to, in local literature spanning a number of decades (Anon. 1923; Scott 1951; Bayer 1955; Acocks 1975), despite frequent pleas and occasional attempts to take effective measures to reverse this trend.

South Africa's natural rangeland is increasingly exploited for economic gain and the veld condition is deteriorating as a result (Fouche et al. 1985). They further indicated that droughts, with the concomitant short-fall of grazing, are prevalent in South Africa because of its geographical location and climate. It is, therefore, important for the stock farmers to adapt management systems, according to their own specific soil types, vegetation, topography, climate and objectives.

Owen-Smith (1985), citing Du Toit (1981), wrote that, it has been estimated that more than one million hectares within the bushveld region of South Africa has become so densely wooded that there is little grass accessible to cattle even in seasons of normal rainfall and that animal production has been adversely affected by bush encroachment on a further six million hectares. In addition Snyman & Fouche (1993) reported that the eco-systems of the arid and semi-arid areas of Southern African are subject to an erratic moisture supply, which result in substantial and unpredictable flunctuations in plant production, changes in the basal cover and botanical composition. Snyman & Fouche (1991) indicated that, with rapidly increasing demands to use land more economically and efficiently, procedures which result in maximum production over the years, yet still minimize the stress on livestock and vegetation, especially during droughts, are urgently needed.

The condition of rangelands in Southern Africa is traditionally assessed by herbaceous community composition (Foran 1976; Thrash et al. 1993). This is a good indicator of the ability of rangelands to produce forage for large grazing herbivores (Trollope 1990a, 1990b). Grazing, trampling, dung and urine deposition by large herbivores can affect herbaceous composition of rangeland (Novellie 1988; Edroma 1989). Surface water is often a nucleus of herbivore concentration (Young 1970; Child et al. 1971) and high levels of herbivore impact, decreasing with distance from water, then occur (Van der Schijff 1957; Lange 1969). The provision of drinking water for large herbivores may, therefore, influence herbaceous composition (Foran 1980; Tolsma et al. 1987) through selective grazing of preferred species, trampling, dung and urine deposition.

It has also been indicated by Aucamp (1990) and Smit & Rethman (1992), that since the introduction of domestic livestock, large areas of natural veld in South Africa have undergone radical changes and continue to do so. In most cases these changes are detrimental as they result in lower grazing capacity, soil erosion and general degradation of the environment.

In addition to the report by Anon. (1923) on veld deterioration and soil erosion in South Africa, Duvel & Scholtz (1992) have indicated that numerous investigations have been launched and recommendations made and implemented. Financial aid was made available to facilitate the erection of soil conservation works, and legislation passed making provision for the prosecution of land users exploiting and destroying natural resources. Furthermore, extension and research services were initiated, state aid schemes were made available during periods of drought and stock reduction schemes were implemented. All these actions were, according to various reports (Roux 1966; Scotney 1984; Anon. 1984), unable to effectively stem veld retrogression. No baseline comparison is available, but according to the most extensive survey (De Klerk 1987), about 63% of the veld is rated as being in a fair or poor condition in terms of species composition and basal cover. This figure, based on ratings by extension personnel, seems conservative or overoptimistic compared with those of a veld or range specialist (Anon. 1984). It consequently seems doubtful whether country wide, and based on the above subjective ratings, more than 20% of the veld-under commercial production-is in good condition.

Motsamai (1990) found that in Lesotho, the lowlands are the most densely populated zone, and are where most cultivation occurs. Severe degradation has scarred this part of the country, with extensive dissection being common place, due to gully erosion. High intensity, short duration rainfall, events, coupled with light soils and poor land husbandry practices have contributed to extensive erosion. It is further stated by Motsamai (1990) that Lesotho stands out prominently in the world with its severe soil erosion problem. The Lesotho conservation division (Anon 1988) has reported average annual erosion rates of 20 tons per hectare from crop land and 18 tons per hectare from rangelands. These represent a total soil losses of 15,4 million tons per annum from crop land and 23.4 million tons per annum from rangelands. The satellite pictures depict a very clear delineation of the international boundary between Lesotho and the neighbouring country. A straight fence line is also very clearly discernable. There is a stark contrast between vegetation cover and land practices of the two countries.

Mamba & Khumalo (1990) report that in Swaziland the major problem facing communally grazed rangelands is a poor perception of the causes and effects of environmental degradation amongst traditional pastoral societies.

Management of grazing lands is the expression of the human society living on them. It reflects human adaptation to biological, economic and political environments over a long period. Range improvement programmes which fail to take into account these three aspects are unlikely to produce tangile positive results. Mamba & Khumalo (1990) indicate that there is adequate evidence to suggest that soil erosion is caused mainly by overgrazing. This statement indicates that the condition of the veld in Swaziland has been degraded.

The report by Mache (1990), from Zimbabwe, states that a recent soil erosion survey based on detailed analysis of nearly 8 500 aerial photographs indicate that slightly more than 1,8 million hectares of land was degraded. This is a conservative estimate since erosion must be fairly advanced before it is clearly visible on photographs (Whitlow 1987). This survey shows that the most extensive and severe erosion occurs within the communal lands where 1,3 million hectares or 83% of the eroded land is found. In contrast, erosion in the commercial farming areas is less than nine percent.

The 1990 summary report on Botswana (Anon 1990) indicates that there is some deterioration, which is a result of overstocking in certain areas, especially in the eastern part of the country where most livestock are concentrated. Localized overgrazing in Western Botswana and in some wild life areas has also been observed. Further deterioration is taking place in the sand veld due to introduction of livestock in this region. Even the hard veld is threatened with degradation if the livestock population is not reduced. Tribal grazing land policy ranches have rapidly expanded into communal rangeland, mainly in connection with water development in communal areas undertaken by Government.

Highlighting the trend of the veld condition in parts of the areas of South West Africa, Boonzaier et al. (1990), citing Kotze et al. (1987) and Diergaardt (1989), indicated that a shift from communal grazing to rotational grazing system under individual land tenure is the proposed answer to land degradation in Namibia and Namaqualand.

In the Northern Cape Province, portions of which now fall under the North West Province, Fourie, Redelinghuys and Opperman (1984) have indicated that veld deterioration is mainly as a result of overestimating the grazing capacity of the veld and incorrect grazing management. This statement, therefore, indicates that the condition of the veld has declined from the normal state. Fourie et al. (1984) also state that Mallo's (1973) survey of the Vryburg extension district, which aimed at determining the influence of the stocking rate and veld management system on the basal cover and botanical composition of the veld in the Northern Cape (now part of North West Province), indicated that the carrying capacity of the area is over-estimated by as much as 100%, and 97% of the farmers do not apply any recognized grazing system.

2.2.1 Reasons for deterioration of rangelands in Southern Africa

Barnes (1992) wrote that veld degradation, either directly or by implication, has been attributed to one or more of the following factors:

(i) Overstocking
(ii) Excessive use of fire, that is, too frequent burning and stocking too soon after burning in spring.
(iii) Stocking with sheep without simultaneously stocking, in terms of mature animals, of at least one head of cattle to seven sheep.
(iv) Failure to provide sufficient paddocks. It is held that this leads to:

- excessive concentration of livestock in favoured areas, with subsequent localised degradation and;
- an inability to apply recommended grazing systems, involving short periods of stay and relatively long periods of absence.

In contrast Aucamp et al. (1992) wrote that the basic cause of veld deterioration is the growing human population which makes increasing demands on the resource and in so doing encourages expansion into marginal and often sensitive areas.

Owen-Smith (1985), citing du Toit (1981), wrote that large areas in the Bushveld had become so densely wooded that there was little grass accessible to cattle. This indicates that one of the causes of veld deterioration in Southern Africa is bush encroachment and consequently the reduction of the grass component of the vegetation that affects grazers. This statement is corroborated by Fouche et al. (1985) who maintained that the main cause of veld deterioration is veld management rather than inadequate rainfall.

Young (1970) and Child et al. (1971) indicate that the surface water is often a nucleus of herbivore concentrations and high levels of herbivore impact, decreasing with distance from water. This indicates that if water supply is inadequate, cattle tend to graze in the vicinity of the water point resulting in overutilization of the area near the water point and underutilization of the areas far from the water. This situation is area selective grazing which may affect the species composition and basal cover on the average.

It is stated by De Klerk (1987) and Duvel & Scholtz (1992) that according to an extensive survey, about 63% of the veld is rated as being fair or poor in condition in terms of species composition and basal cover. This figure, based on the rating by extension personnel, seems overoptimistic compared with those of range specialists. They conclude that it is doubtful that more than 20% of the veld under commercial production is in good condition. This situation, therefore, indicates that the farmers, and extension personnel, are over-optimistic when evaluating the condition of the veld. Duvel & Scholtz (1992) further list other causes of veld deterioration as poor veld management and non-adoption of recommended grazing practices or principles.

Mamba and Khumalo (1990) report that the main cause of veld deterioration in Swaziland is overgrazing and list secondary causes as:

(i) A steady increase in both human and livestock populations resulting from advances in veterinary and human health disciplines which have led to intensified pressure on rangeland.

(ii) Growth of agri-business in the country, which contributes substantially to increasing pressure on rangeland.

(iii) Land tenure system, which does not hold anyone responsible for exploiting the rangelands.

(iv) Use of untimely an indiscriminate fires, resulting in increased soil loss and reduced soil fertility.

(v) Steady growth of fuel wood requirements for rural communities and urban dwellers.

In the 1990 summary report (Anon. 1990) from Botswana, it is stated that the main cause of land degradation is overgrazing which is caused by remote control management by livestock owners who reside in towns and the Tribal Grazing Land Policy ranchers who are still allowed to graze animals on communal rangelands.

According to the statements and reports given, it is clear that the main cause of veld deterioration in most countries of Southern Africa is overgrazing.

2.3 Livestock production in Southern Africa

In describing livestock production in Southern Africa, use is made of data from F.A.O. (Anon. 1991). These data indicate not only the total number of the different livestock species and their production but the total population as well as the number that is active in agriculture and the extent of the area that is used for agriculture. Table 2.3.1 indicates the land use in some of the countries of Southern Africa.

Table 2.3.1: Land use in some of the countries of Southern Africa.

Year and extent of area (1000ha units) and % area

	1975		1980		1985		1990	
BOTSWANA	**1000's**	%	**1000's**	%	**1000's**	%	**1000's**	%
Land area	56673	100	56673	100	56673	100	56673	100
Arable land	1330	2.0	1360	2.5	1360	2.5	1380	2.5
Rangeland	33000	58.0	33000	58.0	33000	58.0	33000	58.0
Forest and Woodlot	11060	20.0	11012	19.5	10960	19.5	10710	19.5
Other land	11283	20.0	11301	20.0	11353	20.0	11383	20.0
MALAWI								
Land area	9408	100	9408	100	9408	100	9408	100
Arable land	2260	24	2360	25.0	2350	24.9	2390	25.4
Permanent crops	18	0.2	20	0.2	26	0.3	26	0.3
Rangeland	1840	20.0	1840	20.0	1840	20.0	1840	20.0
Forest and Woodlot	4830	51.3	4731	50.0	4180	44.4	3630	38.5
Other land	460	5.8	517	5.0	1012	10.7	1519	16.0
LESOTHO								
Land area	3035	100	3035	100	3035	100	3035	100
Arable land	372	12.2	292	9.6	300	9.9	320	10.5
Rangeland	2000	66.0	2000	66.0	2000	66.0	2000	66.0
Other land	663	21.8	743	24.4	735	24.1	715	23.5
NAMIBIA								

Land area	82328	100	82328	100	82328	100	82328	100
Arable land	652	0.8	655	0.8	660	0.8	660	0.8
Rangeland	38000	46.2	38000	46.2	38000	46.2	38000	46.2
Forest and Woodlot	18570	22.5	18420	22.4	18270	22.2	18120	22.0
Other land	25106	30.5	25252	30.7	25397	30.8	25547	31.0
SWAZILAND								
Land area	1720	100	1710	100	1720	100	1720	100
Arable land	167	9.7	185	10.8	160	9.3	200	11.6
Permanent crops	3	0.2	4	0.2	4	0.2	4	0.2
Rangeland	1143	66.5	1102	64.1	1120	65.1	1185	68.9
Forest and Woodlot	105	6.1	103	6.0	104	6.1	104	6.1
Other land	302	17.6	326	19.0	332	19.3	227	13.2

ZAIRE								
Land area	226760	100	226760	100	226760	100	226760	100
Arable Land	6910	3.1	7050	3.1	7200	3.2	7250	3.2
Permanent crops	540	0.2	550	0.2	600	0.3	610	0.3
Rangeland	15000	6.6	15000	6.6	15000	6.6	15000	6.6
Forest and Woodlot	179280	79.1	177610	78.3	175960	78.0	174310	77.0
Other land	25030	11.0	26550	11.7	28000	12.3	29590	13.0
ZAMBIA								
Land area	74339	100	74339	100	74339	100	74339	100
Arable land	4993	6.7	5100	6.9	5180	7.0	5260	7.1
Permanent crops	7	0.01	8	0.01	8	0.01	8	0.01
Rangeland	30000	40.4	30.000	40.4	30.000	40.4	30.000	40.4
Forest and Woodlot	29900	40.2	29548	40.0	29200	39.3	28850	38.8
Other land	9439	12.7	9683	13.0	9951	13.4	10221	13.7
ZIMBABWE								
Land area	38667	100	38667	100	38667	100	38667	100
Arable land	2465	6.4	2465	6.4	2650	6.9	2720	7.0
Permanent crops	59	0.2	74	0.2	84	0.2	92	0.2
Rangeland	4856	12.6	4856	12.6	4856	12.6	4856	12.6
Forest and Woodlot	20330	52.6	19930	51.5	19530	50.5	19130	49.5
Other land	10957	28.3	11342	29.3	11547	29.9	11869	30.7

OUTH FRICA								
and area	122104	100	122104	100	122104	100	122104	100
rable and	12570	10.3	124490	10.2	12355	10.1	12360	10.1
ermanent rops	822	0.7	814	0.7	814	0.7	814	0.7
angeland	81740	66.9	81420	66.7	81378	66.6	81378	66.6
orest nd oodlot	4150	3.4	4150	3.4	4515	3.7	4515	3.7
ther and	22822	18.7	23280	19.1	23042	18.9	23037	18.9

* Permanent crop = Land planted to fruit trees.
* Other land = Land occupied by pans etc.

Table 2.3.1 indicates that the extent of the area under rangeland is quite large in Swaziland (66%), Lesotho (65%), Botswana (58%) and South Africa (67%) (Anon 1991). Local statistics (abstract of agricultural statistics 1993) indicate that 82,3% of the land is under artificial and natural pasture in South Africa. The condition of grazing in these countries has on the average been shown to be poor. This indicates that while the areas under rangeland in these countries are fairly large, they have been badly managed. Table 2.3.2 indicates the extent of the agricultural land in the R.S.A. according to the local statistics.

SOUTH AFRICA								
Land area	122104	100	122104	100	122104	100	122104	100
Arable land	12570	10.3	124490	10.2	12355	10.1	12360	10.1
Permanent crops	822	0.7	814	0.7	814	0.7	814	0.7
Rangeland	81740	66.9	81420	66.7	81378	66.6	81378	66.6
Forest and Woodlot	4150	3.4	4150	3.4	4515	3.7	4515	3.7
Other land	22822	18.7	23280	19.1	23042	18.9	23037	18.9

* Permanent crop = Land planted to fruit trees.

* Other land = Land occupied by pans etc.

Table 2.3.1 indicates that the extent of the area under rangeland is quite large in Swaziland (66%), Lesotho (65%), Botswana (58%) and South Africa (67%) (Anon 1991). Local statistics (abstract of agricultural statistics 1993) indicate that 82,3% of the land is under artificial and natural pasture in South Africa. The condition of grazing in these countries has on the average been shown to be poor. This indicates that while the areas under rangeland in these countries are fairly large, they have been badly managed. Table 2.3.2 indicates the extent of the agricultural land in the R.S.A. according to the local statistics.

Table 2.3.4: Sheep and goats numbers in R.S.A. (1000) according t local statistics. (Abstract of agricultural statistic 1993).

Year	Sheep R.S.A. (1000)	Sheep Total including "National States" (1000)	Goats R.S.A (1000)	Goats Total including "National States" (1000)
1975	30989	33838	2315	5271
1976	30985	31661	2353	4051
1977	31961	32450	2459	3663
1978	31788	32238	2652	3896
1979	31203	31644	2692	4249
1980	30753	31259	2729	4122
1981	30743	30968	2758	3902
1982	30671	30911	2861	4136
1983	29121	29362	2774	4126
1984	27789	-	2779	-
1985	27110	-	2794	-
1986	26988	-	2880	-
1987	26993	-	2990	-
1988	27688	-	2944	-

Table 2.3.2 indicates that in the R.S.A, the extent of Rangelan during 1988 was 72,192,000 ha and tables 2.3.3 and 2.3.4 indicate th cattle, sheep and goats numbers expressed in M.L.U. as being 885213 M.L.U. This indicates that the stocking rate on average wa 8ha/M.L.U. This figure appears to be reasonably fair but considerin the condition of the veld, as indicated in the literature, the vel in certain areas of the R.S.A. has been overgrazed.

Table 2.3.5: Total populat opulation and econo ation (Anon 1991)

Country	Year	Population (1000) Total	Population (1000) Agricultural	Economic Active population (1000) Total	Economic Active population (1000) Population in Agric.	% in Agriculture
BOTSWANA	1975	755	590	278	217	78.1
	1980	902	633	325	228	70.3
	1985	1083	723	374	250	66.7
	1989	1257	801	419	266	63.6
	1990	1304	820	431	271	62.8
	1991	1351	841	444	276	62.1
LESOTHO	1975	1187	1045	597	525	88.0
	1980	1339	1154	662	571	86.2
	1985	1538	1279	735	611	83.2
	1989	1723	1389	802	644	80.4
	1990	1774	1412	820	653	79.6
	1991	1826	1440	838	661	78.8
NAMIBIA	1975	482	373	216	167	77.4
	1980	563	417	244	180	74.1
	1985	664	467	275	194	70.3
	1989	761	511	305	204	67.1
	1990	788	523	313	207	66.3
	1991	817	535	321	210	65.5
SWAZILAND	1975	482	373	216	167	77.4
	1980	563	417	244	180	74.1
	1985	664	467	275	194	70.3
	1989	761	511	305	204	67.1
	1990	788	523	313	207	66.3
	1991	817	535	321	210	65.5
ZAMBIA	1975	4841	3624	1665	1242	74.9
	1980	5738	4203	1850	1355	73.5
	1985	7006	4984	2277	1620	71.1
	1989	8142	5650	2622	1819	69.4
	1990	8452	5827	2716	1872	68.9
	1991	8777	6011	2818	1930	68.5
ZIMBABWE	1975	6143	4612	2466	1851	75.1
	1980	7126	5190	2869	2090	72.8
	1985	8292	5851	3311	2336	70.6
	1989	9406	6457	3710	2547	68.6
	1990	9709	6617	3815	2600	68.2
	1991	10020	6780	3921	2654	67.7
SOUTH AFRICA	1975	25301	6891	9124	2255	24.7
	1980	28270	5198	9853	1626	16.5
	1985	31569	5530	11313	1776	15.7
	1989	34507	5414	12559	1763	14.0
	1990	35282	5375	12889	1755	13.6
	1991	36071	5369	13233	1760	13.3

Table 2.3.5 shows that in the economically active population of th countries mentioned above, there is an increase in the number of th population active in agriculture from 1975 to 1991, except for Sout Africa, although the proportion involved in agriculture has decline in all countries. The reason for the declining proportion involve in agriculture might be that some farmers are not interested i agriculture because of poor land tenure system i.e. the farm being tc small to make a reasonable living from it or there is no secure tenur system.

It is also shown in Table 2.3.5, that South Africa has the lowes percentage of the population active in agriculture. The reason migh be that in the less developed and developing areas of South Africa most of the people work in the urban areas and leave farming to ol people and women. This situation might result in poor management c livestock and ultimately low production.

Table 2.3.6: Cattle slaughtered for beef and veal (1000 head) and th carcass production in 1000kg (Anon.1991)

	1979-81		1989		1990		1991	
Country	1000s	Prod. Kg 1000s	1000s	Prod. kg 1000s	1000s	Prod. Kg 1000s	1000s	Prod. kg 1000s
Botswana	190	42750	231	51975	195	43875	162	36450
Lesotho	71	15975	85	19125	86	19350	87	1957
Malawi	79	17775	90	20250	99	22275	103	23175
Namibia	196	44100	170	38250	179	40275	195	43875
South Africa	3018	679050	2875	646875	2934	660150	3082	693450
Swazi-land	74	16650	57	12825	65	14625	65	14625
Zaire	149	33525	180	40500	185	41625	188	42300
Zambia	186	41850	224	50400	234	52650	244	54900
Zimbabwe	521	117225	376	84600	409	92025	400	90000

Table 2.3.6 shows that South Africa had the highest carcass productic while Lesotho, Malawi and Swaziland are markedly lower compared with othe countries.

Table 2.3.7: The number of sheep slaughtered for mutton and lamb in 100(head and carcass production in 1000kilogram (Anon 1991).

	1979-81		1989		1990		1991	
Country	1000's	Prod. Kg 1000s	1000's	Prod. kg 1000s	1000's	Prod. Kg 1000s	1000's	Prod. kg 1000s
Botswana	40	600	58	870	60	900	62	930
Lesotho	357	5355	420	6300	425	6375	430	6450
Malawi	21	315	50	750	55	825	58	870
Namibia	893	13395	680	10,200	700	10500	3300	49500
Swazi-land	12	180	13	195	13	195	13	195
Zaire	224	3360	255	3825	260	3900	265	3975
Zambia	7	105	14	210	15	225	16	240
Zimbabwe	48	720	46	690	41	615	35	525
South Africa	9916	148740	9900	148500	9860	147900	10020	150300

Table 2.3.7 shows that South Africa is the highest producer of mutton an(lamb, followed by Namibia and Lesotho. Other countries such as Zambia Swaziland, Malawi and Botswana have a very low carcass production. Th reason for low production might be, the poor management of livestock o poor adaptation of sheep in other countries which ultimately results i lower production. Table 2.3.8 indicates the number of goats slaughtere in 1000 head and the carcass production in 1000 kg.

Table 2.3.8 Goats slaughtered in 1000 head and carcass production in 1000 kg.
(Anon 1991)

Country	1979-81		1989		1990		1991	
	1000's	Prod. Kg 1000s	1000's	Prod. kg 1000s	1000's	Prod. Kg 1000s	1000's	Prod. kg 1000s
Botswana	237	3555	417	6255	460	6900	460	6900
Lesotho	257	3855	340	5100	350	5250	360	5400
Malawi	202	3030	270	4050	300	4500	330	4950
Namibia	313	4695	360	5400	370	5550	490	7350
South Africa	1817	27255	2020	30300	2030	30450	2040	30600
Swazi-land	145	2175	150	2250	155	2325	155	2325
Zaire	796	11940	964	14460	1138	17070	1155	17325
Zambia	87	1305	156	2340	159	2385	162	2420
Zimbabwe	357	5355	710	10650	720	10800	735	11025

Table 2.3.8 shows that South Africa is the highest producer of goa meat, followed by Zaire and Zimbabwe. Table 2.3.8 also indicates tha South Africa produces less goat meat than mutton. This illustrate the tendency, amongst the people of South Africa, to prefer mutton t goat meat. In most bushveld areas, it is desirable to keep more goat than sheep, in order to utilize the woody component of the vegetation People should therefore, be motivated to eat more goat meat tha mutton in the bushveld areas.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter describes the social aspect of the methodology e.g. the choice of the study area, orientation and planning of the study, information sources, questionnaire objective and design, sampling procedure, interviewing procedure, reliability of the results and data analysis. The chapter also describes the technical aspect of the methodology eg. the procedure of determining the bush density as well as the grasss species composition and grazing capacity on the farm at Atamelang Barui Polar Co-operative Beef Ranch.

3.1 Social aspects

3.1.1 Choice of the study area

There are at present three Co-operative Beef Ranch projects in the Western Region of the North West Province. There is one Co-operative Beef Ranch in the Kudumane (Kuruman) district, one in the Taung district and the third one is Atamelang Barui Polar Beef Ranch in the Ganyesa district. Atamelang Barui Polar Beef Ranch was the first to be established. From information from one of the members of the Co-operative, a promising start was not sustained and the condition of both livestock and veld declined. The Department of Agriculture was concerned that the other two projects might also decline and it was desirable to identify the problems which had caused the decline in the condition of both livestock and veld at Polar Beef Ranch.

Atamelang Barui Polar Beef Ranch was, therefore, chosen to investigate the reasons for such a decline, to develop and monitor the project, to upgrade the level of management and to ensure that the members made a reasonable and sustainable living. The information obtained from the development of this project could then be used to improve the other two ranches and also to help the farmers of the adjacent leased farms as well as those in the communal grazing areas.

3.1.2 Orientation and planning of the study

In addition to a research survey conducted on the Polar Beef Ranch, a survey was conducted on the Ganyesa Communal Grazing Area (GCGA) because the Co-operative members resided in Ganyesa and their residence in the communal grazing area might have affected their management of the Beef Ranch.

On the GCGA, a meeting was convened with the Senior Agricultural Extension Officer and his subordinates to clarify the purpose of the survey. Such information could help them, as extension officers, to improve the management practices of the farmers. The Senior Agricultural officer discussed the issue with the Tribal Authority and an initial superficial survey of the whole Ganyesa area was conducted together with the Senior Agricultural Extension Officer. This was followed by an indepth survey of the GCGA in 1996 in which five extension officers participated.

On the Atamelang Barui Polar Co-operative Beef Ranch, a meeting was convened with the members, and the responsible extension officer, at which the purpose of the survey was explained. It was indicated that the information obtained would help the farmers improve their farming practices on the Beef Ranch. An initial survey of the ABPCBR, which was conducted with the help of the responsible extension officer was followed by an indepth survey in 1995.

3.1.3 Information sources

Existing publications, books, journals, pamphlets and reports were consulted on climate, soil types, vegetation formations, veld types and grazing capacities. Information from farmers was obtained by questionnaires, discussions with groups and individual farmers. The maps on the GCGA, leased farms in Ganyesa and ABPCBR were obtained from the planning section of the Department of Agriculture in the

North West Province. Much information was obtained from the extension officers working in the GCGA, leased farms and the extension officer responsible for the ABPCBR. Some of the information was also obtained from observations in the different grazing camps on the CBR.

3.1.4 Questionnaire objectives and design

There were two questionnaires and these were designed as follows:

(i) The first questionnaire for the farmers of the GCGA
(ii) The second was for the members of ABPCBR.

The questionnaires design aimed at assessing the attitudes, values, perceptions and beliefs of the respondents. The questions were simple to understand. Most of the questions were of the open ended type, which give the respondents an opportunity to express their views in their own words. The questionnaires were evaluated at follows:

(a) In the G C G A, the questionnaire was tested by interviewing six farmers, who were chosen at random by the members of the community and were not part of the sample group.

(b) On ABPCBR, the questionnaire was tested with two herdsmen on the ranch to determine whether the respondents understood the questions.

3.1.5 Sampling procedure

The members of ABPCBR reside in G C G A. Most of the people of Ganyesa have been living in the area for a long time and the community can be regarded as homogeneous as regard culture, income and education. To save time and expense it was considered that 10% of the heads of households (30 farmers) in the G C G A would be adequate as a sample group. This statement is corroborated by Steyn (1982) citing Bureau of Market Research (1977), that several research studies on the income and expenditure patterns of Black households in several National States have been conducted and reliable results have been obtained by interviewing as little as three percent of the population.

For the purpose of this study, any person having land and/or livestock (disregarding the size of the land and the number of livestock) was regarded as a farmer. A random sample was taken from a list of the heads of households. ABPCBR had only 14 members and all of them were interviewed.

3.1.6 Interviewing procedure

Personal interviews were conducted by the extension officers who were thoroughly trained. There were five extension officers who conducted the interviews in the GCGA and three extension officers on ABPCBR. The extension officers were visited regularly during the interview period for at least one day per week. The average period spent with each respondent was one hour.

3.1.7 Reliability of the results

Every effort was made to explain to the respondent, the objective of the survey and questions were phrased in such a manner that the respondents would know exactly what was wanted. The respondents were given the opportunity to be at ease and express their views in full. Each respondent was interviewed separately to maintain the confidential nature of the interviews.

3.1.8 Data analysis

The data was coded by hand for computer processing.

3.2 Technical aspects

3.2.1 Determination of bush density on the farm at ABPCBR

A survey of tree density has been conducted on twelve sites. The tree density (tree units/ha) was determined according to Trollope (undated). The procedure of determining bush density (Trollope undated) is illustrated as follows:

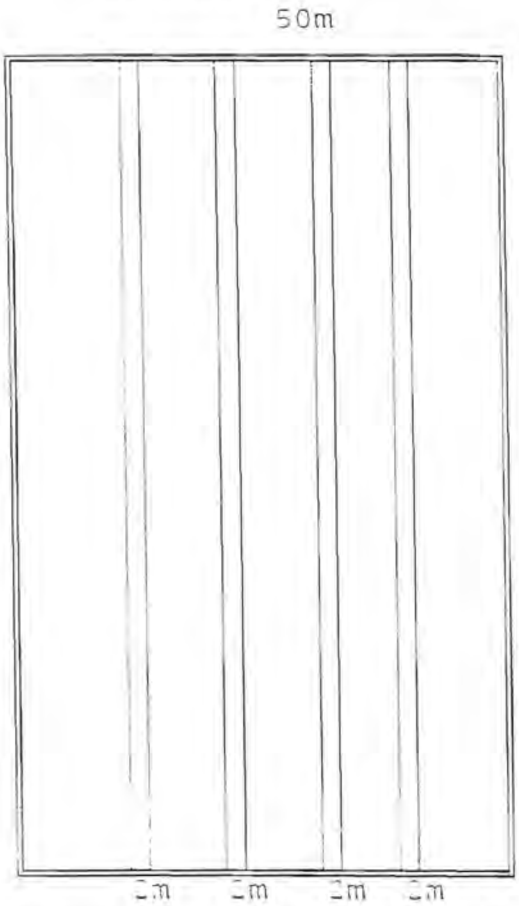

Figure 3.1: The site for determining bush density

In each identified site, an area of 0,5ha (50mx100m) which is representative of the area, was assessed. Four transects each 200m^2 (2mx100m) were measured. The number of trees in each transect (200m^2) was determined, using a two metre staff. The total number of trees in the four transects was calculated by adding all the trees in the four transects together.

The number of trees in a 800m^2 area (four transects) was then expressed per hectare e.g. If the number of trees in the four transects (0.08ha in area) was 120, it would mean that the number of trees per hectare was 1500. Table 3.1 indicates the tree density on the twelve representative sites. (Sites nos 1 to 12 on the map appendix D).

Table 3.1: Tree densities on twelve sites on the Co-operative Beef Ranch, 1995

Sites	Tree/ha	% Trees less than 1 metre	% Trees more than 1 metre	Total %
1	950	0.0	100.0	100
2	800	6.5	93.5	100
3	1250	5.0	95.0	100
4	1500	38.5	61.5	100
5	1600	54.0	46.0	100
6	1700	56.5	43.5	100
7	1600	53.0	47.0	100
8	1050	9.5	90.5	100
9	1250	60.0	40.0	100
10	450	52.0	48.0	100
11	600	50.0	50.0	100
12	1060	8.0	92.0	100

3.2.2 Determination of the grass species composition and grazing capacities on the farm at the ABPCBR

The grass species composition and grazing capacities on nine areas of the ranch were determined.

The technique used to determine the grazing capacity was that used by Jones and Olivier (undated) - of the Glen Agricultural Institute, in determining the G.C. in the Ganyesa district. This is the same as the one used by van der Westhuizen and Pansegrouw (undated pamphlet) to determine the veld condition and grazing capacity in the De Wetsdorp district. Other techniques such as those recommended by Mentis (1983), Stuart-Hill et al. (1986), Hurt and Hardy (1989) and

Hardy and Tainton (1993) were also considered, but this one has been found to be suitable for use by the E.O's and farmers (appendix A.1).

At each site an area of approximately 0,1 ha (30m x 30m) was assessed. In this area, the grass species composition was determined using the Tidmarsh wheel with 200 points being evaluated in each site. The strikes on living material at soil surface were used to determine the basal cover, while the nearest species to the wheel point were used to determine the percentage species composition. The total score of the grazing value was determined by multiplying the percentage of each grass species by the factor indicating the grazing value of that species. The species composition, the total score (grazing value) and the grazing capacity on each site are illustrated in Tables 3.2 to 3.7, using the key species technique of Jones and Olivier (undated) (appendix A.1).

Table 3.2: Grass species composition, basal cover, total score and grazing capacity on sites nos. 1 to 4 on the map-appendix C, 1995.

Species name	%	W Factor	sample site score	Bench mark score
Anthephora argentea	-	10	-	
Anthephora pubescens	-	10	-	
Asthenatherum glaucum	-	10	-	
Brachiaria nigropedata	-	10	-	
Digitaria eriantha	-	10	-	
Panicum coloratum	-	10	-	
Schmidtia papphohoroides	-	10	-	
Stipagrostis uniplumis	-	10	-	
Subtotal highly desirable				
Eragrostis lehmanniana	28	7	196	
Eragrostis trichophora	-	7	-	
Eragrostis rigidior	6	7	42	
Subtotal desirable	34		238	
Aristida stipitata	-	4	-	
Aristida meridionalis	-	4	-	
Eragrostis pallens	-	4	-	
Pogonathria squarrosa	-	4	-	
Subtotal less desirable				
Aristida adscensionis	-	1	-	
Tragus berteronianus	8	1	8	
Aristida congesta	58	1	58	
Schmidtia kalahariensis	-	1		
Subtotal undesirable	66		66	
Veld condition score			304	855
Basal cover %			2.0	

Grazing capacity = $\frac{\text{Bench mark score}}{\text{sample site score}}$ x Grazing capacity of the area ha/M.L.U.

$= \frac{855}{304} \times 10$

= 28.1 ha/M.L.U

Table 3.3: Grass species composition, basal cover, total score and grazing capacity on site No.5 on the map-appendix C, 1995.

Species name	%	Grazing value	sample site score	Bench mark score
Anthephora argentea	-	10	-	
Anthephora pubescens	-	10	-	
Asthenatherum glaucum	-	10	-	
Brachiria nigropedata	-	10	-	
Digitaria eriantha	-	10	-	
Panicum coloratum	-	10	-	
Schmidtia papphohoroides	2	10	20	
Stipagrostis uniplumis	4	10	40	
Subtotal highly desirable	6		60	
Eragrostis lehmanniana	27	7	189	
Eragrostis trichophora	-	7	-	
Eragrostis rigidior	-	[illegible]	-	
Subtotal desirable	27		189	
Aristida stipitata	-	4	-	
Aristida meridionalis	-	4	-	
Eragrostis pallens	-	4	-	
Pogonathria squarrosa	-	4	-	
Subtotal less desirable				
Aristida adscensionis	-	1		
Tragus beterteronianus	-	1	-	
Aristida congesta	67	1	67	
Schmidtia kalahariensis	-	1		
Subtotal undesirable	67		67	
Veld condition score			316	855
Basal cover %			2.0	3.2

Grazing capacity = $\frac{\text{Bench mark score}}{\text{sample site score}}$ x Grazing capacity of the area ha/M.L.U.

$= \frac{855}{316} \times 10$

= 27 ha/M.L.U.

Table 3.4: Grass species composition, basal cover total score and grazing capacity on site No.6 on the map-appendix C, 1995.

Species name	%	W Factor	sample site score	Bench mark score
Anthephora argentea	-	10	-	
Anthephora pubescens	-	10	-	
Asthenatherum glaucum	-	10	-	
Brachiria nigropedata	-	10	-	
Digitaria eriantha	-	10	-	
Panicum coloratum	-	10	-	
Schmidtia papphohoroides	4	10	40	
Stipagrostis uniplumis	6	10	60	
Subtotal highly desirable	10		100	
Eragrostis lehmanniana	15	7	105	
Eragrostis trichophora	-	7	-	
Eragrostis rigidior	8	7	56	
Subtotal desirable	23		161	
Aristida stipitata	3	4	12	
Aristida meridionalis	8	4	32	
Eragrostis pallens	7	4	28	
Melinus repens	7	4	28	
Pogonathria squarrosa	8	4	32	
Subtotal less desirable	33		132	
Aristida adscensionis	-	1	-	
Tragus berteronianus	-	1	-	
Aristida congesta	19	1	19	
Schmidtia kalaharensis	15	1	15	
Subtotal undesirable	34		34	
Veld condition score			427	855
Basal cover %			2.5	3.2

Grazing capacity = Bench mark score x Grazing capacity of the area ha/M.L.U. / sample site score

$$= \frac{855}{427} \times 10$$

= 20 ha/M.L.U.

Table 3.5: Grass species composition, basal cover, total score and grazing capacity on site No.7 on the map-appendix C, 1995.

Species name	%	W Factor	sample site score	Bench mark score
Anthephora argentea	-	10	-	
Anthephora pubescens	-	10	-	
Asthenatherum glaucum	-	10	-	
Brachiria nigropedata	-	10	-	
Digitaria eriantha	-	10	-	
Panicum coloratum	-	10	-	
Schmidtia pappohoroides	-	10	-	
Stipagrostis uniplumis	-	10	-	
Subtotal highly desirable				
Eragrostis lehmanniana	44	7	308	
Eragrostis trichophora	-	7	-	
Eragrostis rigidior	-	-	-	
Subtotal desirable	44		308	
Aristida stipitata	-	4	-	
Aristida meridionalis	-	4	-	
Eragrostis pallens	-	4	-	
Pogonathria squarrosa	11	4	44	
Subtotal less desirable	11		44	
Aristida adscensionis	-	1	-	
Tragus berteronianus	-	1	-	
Aristida congesta	45	1	45	
Schmidtia kalahariensis	-	1	-	
Subtotal undesirable	45		45	
Veld condition score			397	855
Basal cover %			2.5	3.2

Grazing capacity = $\frac{\text{Bench mark score}}{\text{sample site score}}$ x Grazing capacity of the area ha/M.L.U.

$= \frac{855}{397} \times 10$

= 21.5 ha/M.L.U

= 22 ha/M.L.U.

Table 3.6: Grass species composition, basal cover, total score and grazing capacity on site No.8 on the map-appendix C. 1995.

Species name	%	W Factor	sample site score	Bench mark score
Anthephora argentea	-	10	-	
Anthephora pubescens	6	10	60	
Asthenatherum glaucum	-	10	-	
Brachiria nigropedata	12	10	120	
Digitaria eriantha	10	10	100	
Panicum coloratum	-	10	-	
Schmidtia papphohoroides	20	10	200	
Stipagrostis uniplumis	16	10	160	
Subtotal highly desirable	64		640	
Eragrostis lehmanniana	25	7	175	
Eragrostis trichophora	-	7	-	
Eragrostis rigidior	-	7	-	
Subtotal desirable	25		175	
Aristida stipitata	-	4	-	
Aristida meridionalis	-	4	-	
Eragrostis pallens	2	4	8	
Pogonathria squarrosa	3	4	12	
Subtotal less desirable	5		20	
Aristida adscensionis	-	1	-	
Tragus berteronianus	-	1	-	
Aristida congesta	8	1	8	
Schmidtia kalahariensis	-	1	-	
Subtotal undesirable	8		8	
Veld condition score			843	855
Basal cover %			3.0	3.2

Grazing capacity = $\frac{\text{Bench mark score}}{\text{sample site score}}$ x Grazing capacity of the area ha/M.L.U.

$= \frac{855}{843} \times 10$

= 10 ha/M.L.U

Table [illegible] Grass species composition, basal cover, total score and grazing capacity on site No.9 on the map-appendix C, 1995.

Species name	%	W Factor	sample site score	Bench mark score
Anthephora argentea	-	10	-	
Anthephora pubescens	6	10	60	
Asthenatherum glaucum	-	10	-	
Brachiria nigropedata	3	10	30	
Digitaria eriantha	-	10	-	
Panicum coloratum	-	10	-	
Schmidtia papphohoroides	20	10	200	
Stipagrostis uniplumis	18	10	160	
Subtotal highly desirable	47		470	
Eragrostis lehmanniana	42	7	294	
Eragrostis trichophora	-	7	-	
Eragrostis rigidior	2	7	14	
Subtotal desirable	44		308	
Aristida stipitata	-	4	-	
Aristida meridionalis	2	4	8	
Eragrostis pallens	-	4	-	
Pogonathria squarrosa	2	4	8	
Subtotal less desirable	4		16	
Aristida adscensionis	-	1	-	
Tragus berteronianus	-	1	-	
Aristida congesta	5	1	5	
Schmidtia kalahariensis	-	1	-	
Subtotal undesirable	5		5	
Veld condition score			799	855
Basal cover %			3.0	3.2

Grazing capacity = $\frac{\text{Bench mark score}}{\text{sample site score}}$ x Grazing capacity of the area ha/M.L.U.

$= \frac{855}{799} \times 10$

= 10,7 ha/M.L.U

= 11 ha/M.L.U

CHAPTER 4

CLIMATE SOILS AND VEGETATION OF GANYESA DISTRICT

Since Ganyesa district falls within South Africa, in order to discuss the climate, soils and vegetation of Ganyesa, use will be made of the climate, soils and vegetation of South Africa.

4.1 Climate

In discussing the climate of Ganyesa district, use has been made of the climatic regions in South Africa and general summary of their characteristics (Schulze 1994). According to Schulze (1994), the South African Weather Bureau has partitioned South Africa into 15 climatic regions as shown in Figure 6.1. This division into regions is based firstly on geographic considerations, more particularly the prominent mountain ranges (great escarpment), which constitute the main climatic divides.

Fig.4.1: Climatic Regions / Klimaatstreke   Ganyesa

Ganyesa district falls under Regions Ss and Sn: southern and northern steppe (Schulze 1994). This is a semi-arid region receiving on the average about 250mm of rain in the west to 500mm on its eastern boundary. The rainfall comes mainly in showers and thunderstorms falling in the summer months of October to March, the peak of the rainy season being March or February. On average up to 10 rainy days per month may be expected during the peak of the season, whilst during the usually dry and sunny winter months unsettled weather may occur on only one or two occasions per month.

Hail is sometimes associated with the thunderstorms and occurs mainly in early summer (November). Although these storms may sometimes be very severe and cause much damage, they usually cover relatively small areas.

Air temperatures are subject to large diurnal and seasonal variation; in January the average daily maximum lies between 30°c and 33°c and in July it is about 17°c. The average minimum temperatures are of the order of 15 c in January and 0°c in July.

The period during which frost can be expected lasts for about 150 days (May to September) in the south of this region and for about 100 days (June to August) in the north.

Winds are usually North-Westerly attaining their maximum speed in the afternoon; during thunderstorms, strong and gusty south westerly winds of short duration are a common feature and occasional cold snaps are accompanied by unpleasantly cold southerly winds for a day or two.

4.2 **Soils of Ganyesa area**

Regarding the soils of Ganyesa area, use will be made of the soils occurring in South Africa. These are many, occurring in the different land types. Use will, therefore, be made of the land types of the maps - Bray, Morokweng, Mafikeng and Vryburg (1984) - Nos. 2522, 2622, 2524 and 2624 respectively.

The greater proportion of Ganyesa district is covered by the Ae3 land type and a smaller proportion by the Ah6 land type.

4.2.1 Soil forms and soil series

The soil forms occurring in both land types are very similar. In the Ae3 land type, the following soil forms and soil series occur:

Soil form		Soil series
Hutton	-	Shorrocks, Makatini and Mangano.
Willowbrook	-	Sarasdale and Chikinya
Rensburg	-	Rensburg
Milkwood	-	Graythorne
Shortlands	-	Kinross

In the Ah6 land type, the following forms and soil series occur:

Soil form		Soil series
Hutton	-	Mangano, Shorrocks, Roodepoort, Zwartfontein and Portsmouth.
Clovelly	-	Sandbury, Blinkklip, Annandale, Denhere and Makuya.
Avalon	-	Soetmelk
Milkwood	-	Graythorne
Willowbrook	-	Chinyika

NB. In the Memoirs of the Land type maps (1984), the soils have been classified according to the South African soil classification system (A Binomial system for South Africa, published by the Department of Agricultural Technical Services, Republic of South Africa 1977).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

4.2.3 Agricultural value of soils occurring in the Ae3 and Ah6 land types

i) Hutton

- These soils are well drained and aerated and therefore have a lower long term average yield potential than yellow soils due to drier soil conditions.

- Drainage of these soils is very good and are excellent irrigation soils.

- These soils can be used for all dry-land crops in areas where rainfall is sufficient.

- Due to the dry conditions of these soils, dry-land wheat production is not recommended in summer rainfall areas, especially on sandy soils.

ii) Clovelly

- In some areas, especially the North West Free State, the soils are sensitive to erosion because of the fine sand fraction and clay horizons in the subsoil.

- If these soils are deep, the drainage is good.

- Nitrogen leacnig usually occurs on sandy Clovelly soils.

- Clovelly soils are usually poor in natural plant nutrients.

- These soils can be used for most summer crops under dryland conditions.

- Wheat can be produced on dryland in the summer rainfall areas but the subsoil must preferably have a clay percentage of more than 10%.

iii) Rensburg

- The soils store water in the root zone.

- Drainage is poor and can lead to water logging in the rainy season.

- These soils normally have a high clay percentage

- They are very sensitive to trampling by stock. The best use of the soils is to be left in their natural state and no cash crops are recommended on these soils.

(iv) Shortlands

- These soils are usually dry.
- Grain sorghum and sunflower produce well under dryland conditions on these soils.
- In the low rainfall areas, these soils must be left for natural grazing.
- The soils can do well under irrigation.

(v) Avalon

- The soil climate is wet.
- Because of the wet soil climate of these soils, they are suitable for dryland wheat production in the summer rainfall areas.
- These soils have a higher potential compared to other soils due to more water available in the deeper layers.
- If these soils contain fine sand, they may be prone to erosion.
- Compaction is a problem on sandy Avalon soils.

(vi) Willowbrook and Milkwood

- These soils should be left in their natural state.
- These soils are sensitive to trampling by animals.
- No cash crops are recommended.
- These soils normally have a high clay percentage (Hillel 1982).

4.3 The vegetation of Ganyesa area

In describing the vegetation of Ganyesa area, use is made of the vegetation of South Africa. The vegetation of South Africa has been classified according to five formations (Acocks 1953) as follows: Grassland formation, Savanna formation, Karroo formation, forest formation and Macchia (fynbos) formation. Ganyesa area is situated in the Savanna formation.

4.3.1 **Savanna formation**

The Savanna vegetation has developed in the more tropical regions of the country where the rainfall is seasonal (with a pronounced dry period in winter) and where temperatures are generally higher. It is composed of an upper stratum of rather low trees, many of which may provide useful browse, scattered in a grass-dominated undergrowth. Tree density varies greatly from conditions approaching forest at the one extreme, to open grasslands at the other. Most of the trees are deciduous. Throughout these Savanna areas there is a delicate balance between the tree and grass components of the vegetation (Tainton 1981). Tainton (1981) indicated that Walker and Noy-Meir (1979) and Walker (1980) have discussed the relationship between the tree and grass component of the vegetation in some detail. They worked from the assumption that the grass plants have a relatively shallow root system and, therefore, extract the moisture and nutrient requirement largely from the upper soil layers, but that the trees have both shallow and deep roots. Trees and grasses, therefore, compete for moisture and nutrients in the upper soil layers. Here the grasses are the more efficient competitors because of their more extensive root systems. However, at depth, the trees operate without competition. For this reason, the trees once established, form a natural component of the vegetation and will survive even in a vigorous grass sward, the ratio between the two depending on the amount of subsoil water available. However, should the density of the grass layer decline, for any reason, then runoff increases and infiltration of water into the upper soil layers is reduced considerably, but water may still flow into the subsoil layers along quickflow channels or as stem-flow. This gives a decided advantage to the tree component which then becomes more competitive and increasingly able to suppress the grass. Once begun, this process of increasing tree density accelerates as the density of the grass component is subjected to increasing competition from the trees. If unchecked, such communities may become almost grassless (Tainton 1981).

There are six categories of Savanna vegetation formation. Of these, the Kalahari thornveld and bushveld, Transvaal sour bushveld and Transvaal mixed bushveld are represented in the North West Province and are described as follows:

4.3.1.1 **Kalahari thornveld and bushveld**

The Kalahari thornveld and bushveld lies north of the Orange River in a zone of 370-500 mm rainfall, the climax vegetation is thought to be Acacia erioloba Savanna, Olea - Tarchonanthus bush or luxuriant forms of Acacia bush, depending on the soil type of the area concerned. Acacia erioloba is the most prominent tree over large areas in association with other Acacia species (A. tortilis, A. mellifera sub sp. detinens, A. haematoxylon) and with species such as Tarchonanthus camphoratus, Grewia flava, Boscia albitrunca, Dichrostachys cinerea and Olea africana.

The ground layer varies widely from an arid type which includes Karroo shrubs (eg. Rhigozum trichotomum) and the desert grasses (e.g. Stipagrostis uniplumis, Schmidtia kalahariensis in the west, through to a mesophytic grass layer (eg. Themeda triandra, Heteropogon contortus) in the east. A number of poisonous plants (Geigeria ornativa, Tribulus terrestris, Ornithoglossum viride, Urginea sanguinea, Dipcadi glaucum and others) occur in this vegetation type and may cause serious stock losses (Tainton 1981).

4.4 The present vegetation of Ganyesa communal grazing area

This area falls into the Kalahari thorn veld type (No.16, Acocks 1988). The common tree and shrub species include, A. erioloba, A. karroo (mainly in the valleys), A. mellifera subspecies detinens, A. hebeclada, A. haematoxylon, B. albitrunca, D. cinerea, Ziziphus mucronata, Grewia flava and Tarchonanthus camphoratus. Due to overgrazing in some areas there is a tendency for bush encroachment especially A.mellifera and D.cinerea. The tree density has been determined in some of these bush encroached areas and found to be 1500 to 2000 trees per hectare. This has reduced the grazing capacity of these areas tremendously.

The common grass species include S. uniplumis, Eragrostis lehmanniana, Aristida meridionalis, S. kalahariensis and A. congesta subspecies congesta. In some parts of the area, which are better managed, Anthephora pubescens and D. eriantha have also been identified. Due to overgrazing, however, many areas do not progress beyond the E. lehmanniana stage of succession.

Due to the fact that the greater proportion of Ganyesa area is not divided into grazing paddocks, livestock tend to concentrate in the vicinity of the residential area and this area is heavily overgrazed. The dominant grass species in such overgrazed areas is A. congesta.

Ganyesa area as a communal grazing area is also faced with a problem highlighted by Khumalo (1990) that the land tenure system in the communal grazing areas does not hold any one responsible for "mining" or exploiting the rangeland. Due to this land tenure system and the high livestock population, the communal grazing area of Ganyesa is generally heavily overgrazed.

4.5 The vegetation and veld condition of Ganyesa leased farms

According to Bophuthatswana Land Act No. 39 of 1979, leased land is land that has been given to a person, who is a citizen of Bophuthatswana, by the State for rent for a specific period.

The vegetation on Ganyesa leased farms is similar to that described in the communal grazing area except that in some of the leased areas, the veld is better managed and as a result some of the highly desirable grass species such as A. pubescens and D. eriantha are also found. Some of the leased farms were rented to farmers in the same condition in which the State bought them from the owners, while others were developed before allocation. The result is that some farmers can practise rotational grazing systems with ease, because the infrastructure is available, while others do not have sufficient paddocks to practise such systems. One of the conditions of leased farms is to keep the number of livestock to the grazing capacity of the farms but the farmers often ignore this condition because on most of these farms, the number of livestock exceeds the grazing capacity of the farms. The issue of the correct stocking rate is included in the farmers lease contract. It should, therefore, be easy for the Government to ensure that the farmers abide by this rule, but it is not implemented.

CHAPTER 5

SPECIFIC SITUATION IN GANYESA DISTRICT

5.1 Historical background

Ganyesa area is inhabited by the Ba-rolong tribe of the Tlou and Tau clan. The Ba-rolong tribe which at present is residing at Ganyesa originated at Thaba-Nchu. Due to wars and faction fights some of the Ba-rolong tribe left Thaba-Nchu and moved Northwards. Of these some moved in the North-easterly direction and ultimately landed at Mafikeng and others moved Northwards until they settled at Ganyesa. Their first chief at Ganyesa was Chief Abram Letlhogile. He was succeeded by Chief Thibogang Letlhogile who was succeeded by Chief Kegakilwe Letlhogile, the present chief (Letlhogile 1997 personal communication).

5.2 Agro-ecological situation

Ganyesa district comprises GCGA and South African Developmental Trust Farms (SADT). ABPCBR is one of these trust farms. The Ganyesa district is primarily suited for livestock production, although some farmers do have small areas of dryland cropping. During periods of good rains farmers obtain good crop yields especially of maize and groundnuts, but this only occurs once in four or five years. During periods of drought these exposed patches of land are susceptible to wind erosion. Although the farmers are aware of the problem of wind erosion in their lands, they persist in cultivating these lands in the hope that they will get good rains and a good crop yield.

Mr S Letlhogile, Private bag x518, Ganyesa, 8613.

Most of the GCGA is not planned and farmers practise continuous grazing. The increase in these small patches and hence the area under cultivation increases the problem on the grazing area, which is already overutilized due to a high stocking rate.

5.3 Social aspects of the members of the community of Ganyesa district

5.3.1 Introduction

This chapter discusses the social aspects of the community. The main aim was to examine the characteristics of the community and to ascertain whether these characteristics have an influence on the farming activities of the members of the Beef Ranch, because they belong to the larger community.

5.3.2 Personal factors

Personal factors include sex, marital status, occupational status, age and level of education.

5.3.2.1 Sex and marital status

The proportion of the sexes in the population has an important consequences. Where there is a disproportion of one or other, the normal opportunities for marriage are reduced for the majority group (Seobi 1980) citing Nelson (1955). Table 5.1 shows the distribution of the leaders of the community of Ganyesa village according to sex and marital status.

Table 5.1 Distribution of the leaders of the community of Ganyesa village according to sex and marital status, 1996, (n=30).

Category	No.	%
Married men	27	90
Single men	-	-
Widowers	-	-
Widows	3	10
	30	100

It can be seen from table 5.1 that the majority of the leaders of the community (90%) are married and can make decisions, and should, therefore, have a chance of being successful in farming.

5.3.2.2 Occupational status

The occupational status of the community has important social consequences. The mere absence of the men for the greater part of the year is invariably reflected in the cultural operations of the land and the resultant low yields. Even though the responsible male plans his visits to his home in such a manner that it coincides with the ploughing and planting season, agriculture suffers. It allows no preparatory cultivation, nor does it enable him to take advantage of the favourable rainfall. It necessitates leaving the major part of the work to the women and juniors.

There can be no organised system of working. The standard of agriculture, therefore, is lowered and there can be no development (Low 1982), quoting Schapera (1947). Table 5.2 shows the distribution of the leaders of the community of Ganyesa village according to occupational status.

Table 5.2: Dis[...]aders of the Ganyesa village according to occupational status, 1996, (n=30).

Category	No.	%
Permanently at home	26	87
Permanently away	Nil	Nil
Monthly commuter	2	7
Weekly commuter	1	3
Daily commuter	1	3
	30	100

Table 5.2 shows that the majority of the leaders (87%) are permanent residents. The opportunity for farmers to improve their farming activities by information from newsletters, farmer colleagues or even training from the extension officers is, therefore, very good.

5.3.2.3 Age

Chronological age has an impairing effect on physical ability, which is of great importance on family holdings. Figure 5.1 shows the distribution of the leaders of the community of Ganyesa village according to age.

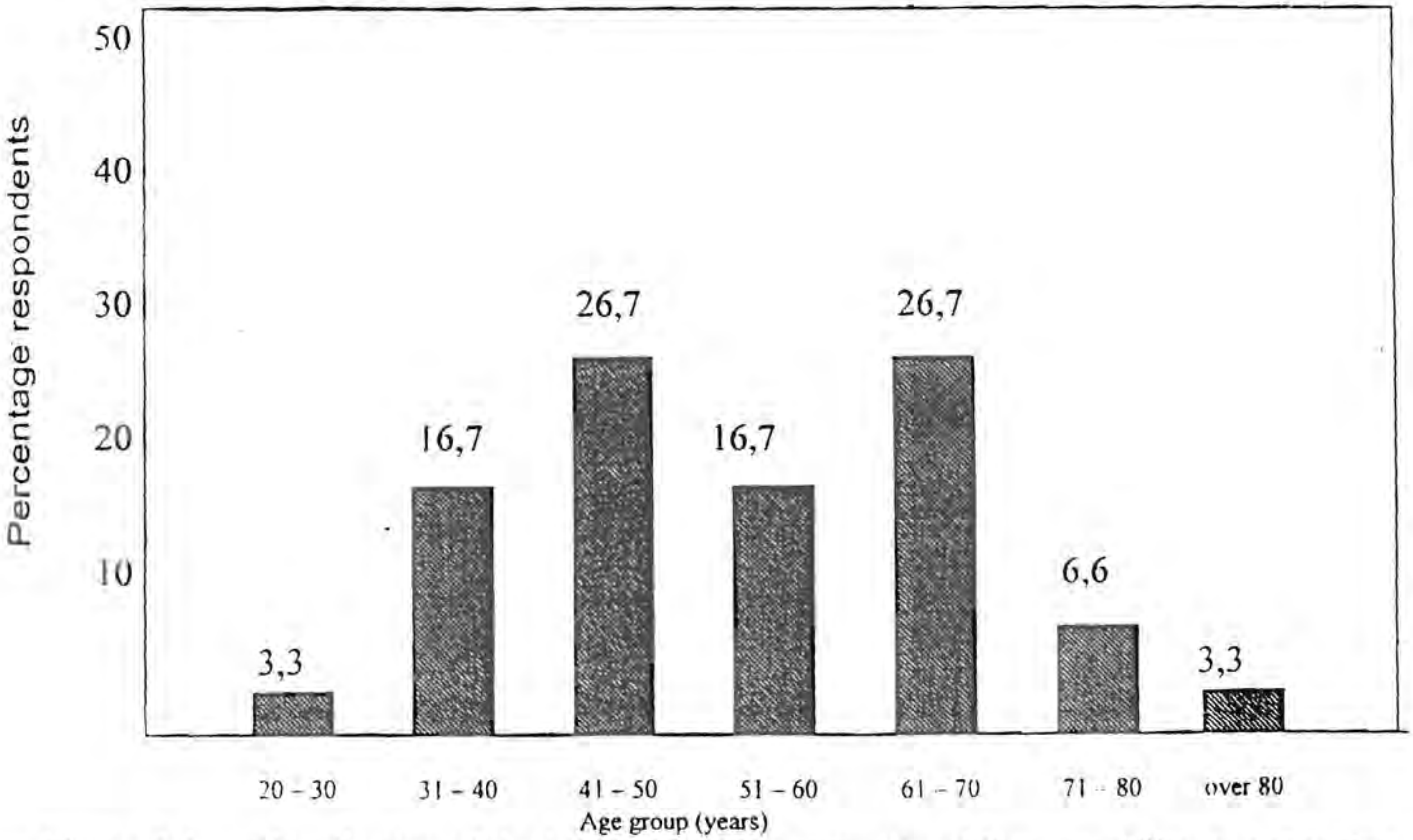

Figure 5.1: Distribution of the leaders of the community of Ganyesa Village according to age, 1996, (n=30)

Figure 5.1 shows that 70% of the leaders of the community of Ganyesa village were between 41 and 70 years of age. It also shows that 90% of the leaders of the community were between 20 and 70 years of age with only 43% of the leaders being between 41 and 60 years of age which is still a physically productive age to make a success in farming.

5.3.2.4 Level of education

Education plays a very important role in agriculture. Tshenkeng (1985) citing Bembridge (1953) states that education is regarded as a basic human need, which, in turn, is seen as a means of meeting other basic needs and accelerating overall development through training workers at all levels. Figure 5.2 shows the distribution of the leaders of the community of Ganyesa village according to the level of education.

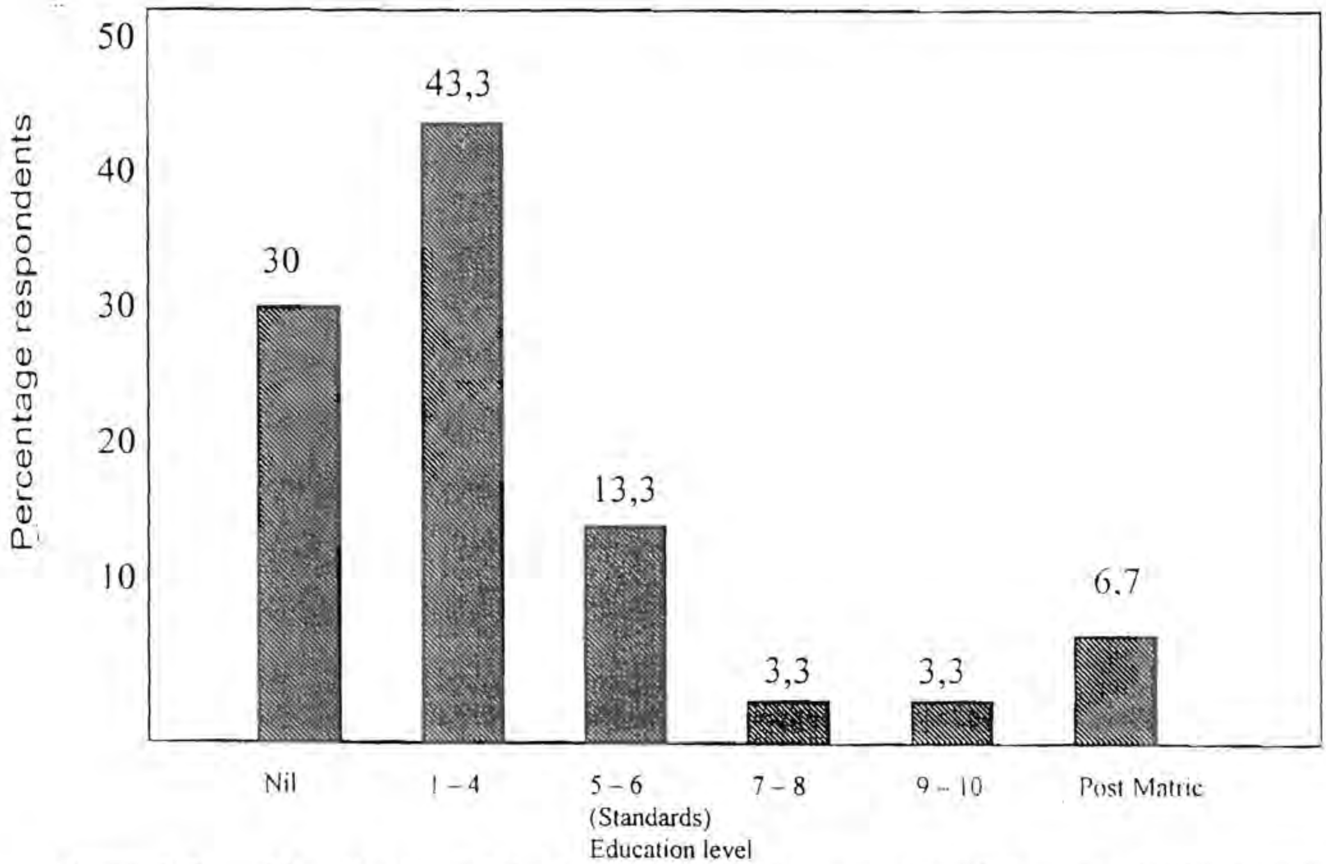

Figure 5.2: Distribution of the leaders of the community of Ganyesa Village according to level of education, 1996 (n= 30)

Figure 5.2 indicates that 43,3% of the leaders of the community of Ganyesa village had a level of education of between Std I and Std 4, and all those leaders when tested, showed that they could read and write Setswana quite well. This shows that they would not experience any problem in reading magazines or newsletters written in Setswana. Only 30% of the leaders of the community had no schooling. The rest of the leaders (27%) were quite literate and would be able to read magazines such as a Farmers Weekly and newsletters written in English.

5.3.3 Leaders of the community of Ganyesa village who own livestock

It was found that 93% of the leaders of the community of Ganyesa village owned livestock and that only two percent (2%) did not own livestock. The number of livestock owned ranged from five M.L.U. to more than hundred M.L.U. per family. This situation shows that nearly all leaders of the community own livestock and that the head of the family especially a male, regards himself as a man if he owns livestock even if the livestock number is only a few. This tendency is the main reason for overstocking in this community. Overstocking is actually not caused by farmers keeping large numbers of livestock but that there are many families, each having a small number of livestock that ultimately result in overstocking and, therefore, the deterioration of the veld.

5.3.4 Agricultural situation

5.3.4.1 Problems with the management of livestock

Livestock are an important form of security for the family. Livestock provide the family with meat, milk and draught power for haulage of manure and kraal compost, which is essential for the maintanenance of soil fertility and crop yields (Theisen 1976). The problems encountered in the management of livestock include: Death of calves after birth and marketing infrastructure.

5.3.4.1.1 Death of calves at birth

When interviewed on the death of calves at birth, 67% of the members of the community indicated that they did not experience any problem of the death of calves at birth while 33% stated that they did. When questioned on the number of calves which died at birth during the past twelve months, the answers ranged from 2 to 7 calves. The cause of death was indicated to be drought, i.e. cows having insufficient milk to feed the calves, as well as cows having difficulties in calving. All the reasons mentioned for the death of calves at birth were due to the fact that there was no specific mating season in Ganyesa area with the result that some cows calved during winter when the condition of the veld was at its poorest.

5.3.4.1.2 Marketing infrastructure

Livestock marketing could be one of the means to reduce the problem of overstocking which is the major problem in the rural areas but from observation, it was not the case in the Ganyesa area. Table 5.3 shows the distribution of the leaders of the community of Ganyesa village according to participation in livestock sales.

Table 5.3: Distribution of the leaders of the community of Ganyesa village according to participation in livestock sales, 1996, (n=30).

Category	No.	%
Livestock auctions and speculations	6	20
Livestock auctions	23	77
Abattoirs	1	3
	30	100

Table 5.3 indicates that the majority of the leaders of the community of Ganyesa village (77%) sell their livestock at the livestock auctions. When asked whether they were satisfied with the price offered, most of them (67%) stated that they were not satisfied with the price. They mentioned that the two major reasons for low prices were that there were few buyers at the auctions bidding for a large number of livestock offered for sale and this resulted in low prices, and the other reason being that the cattle were in poor condition. Although the majority of the members of the community stated that there were few buyers at the auctions, it was observed that the prices for livestock were very low during winter, because cattle were in poor condition.

5.3.4.1.3 Dipping of cattle

The major part of the Ganyesa area is best suited to livestock production. Livestock, therefore, constitute the major part of the farming enterprises. Crop production on a small scale is only being practised in the valley that runs through the main Ganyesa village. In livestock production systems, dipping amongst other factors, plays a very important role in keeping livestock, especially cattle, free from ticks which affect the condition of livestock. When interviewed on the frequency of dipping, the majority (47%) stated that they dip only once a year, and a few leaders (10%) stated that they never dip their cattle.

5.3.4.1.4 Feeding of cattle

A major constraint on ruminant animal production in both commercial and communal production systems in Southern Africa is the low intake during the dry winter months. Feed resources are scarce and generally of poorer quality during winter (Kadzere 1995).

The condition of grazing in Ganyesa area is poor, especially during winter. While the area is semi-arid, the situation is aggravated by overgrazing, which is caused by overstocking. This situation necessitates the feeding of livestock (at least with crop residues) especially during winter. When interviewed, the majority (83%) indicated that they feed their cattle during winter and that they feed mainly crop residues (maize and groundnuts).

5.3.4.1.5 Reasons for keeping cattle

Cattle play an important role in family security. Table 4.4 indicates the major reasons for keeping cattle.

Table 5.4: Distribution of the leaders of the community of Ganyesa village according to major reasons for keeping cattle, 1996, (n=30).

Category	No.	%
Milk	7	23
Ceremonial slaughter	2	7
Source of manure	1	3
Milk and source of cash during times of need.	17	57
Prestige and status	1	3
It is easy to invest in cattle	2	7
	30	100

It can be seen from Table 5.4 that the majority (57%) keep cattle for milk and source of cash during the times of need, such as sending children to boarding schools or universities.

5.3.4.1.6 Total number of cattle in Ganyesa village

When interviewed on the total number of cattle, nearly all leaders of the community (97%) indicated that they did not have any idea of the total number of cattle. A few (3%) tried to guess the answer, but they also, did not know. This shows that the farmers farm without having the knowledge of the number of livestock that are actually kept.

5.3.4.1.7 Discussion

The problems mentioned by members of the community of Ganyesa village were: insufficient milk for the calves after calving; the poor condition of the veld in Ganyesa area (excluding South African Developing Trust farms), the situation being worse in winter when grass is also dry. There is no fixed breeding season and cows often calve during the winter, when the nutritive value of the veld is very poor. The calving season should, therefore, be controlled so that cows calve during the summer season.

The low prices at livestock auctions is often caused by too few buyers and poor condition of cattle. The main reason for low prices is often because farmers sell during winter, when they realize that the cattle will not be able to survive the critical winter period. It is very important, therefore, that farmers should be motivated to sell their livestock before the winter and before cattle lose condition. It is also necessary for the extension officers to determine the number of livestock to be sold, so that they can timeously invite buyers to the auctions, basing their invitations on the number of cattle to be marketed.

From these interviews, it is evident that the farmers are not used to dipping their cattle regularly. It is essential that farmers be motivated to dip their livestock regularly.

The farmers feed their cattle during winter with crop residues. It has been deduced from the poor condition of livestock that the quantity and quality of such residues is limiting. It will be necessary to motivate the farmers to monitor the amounts fed to cattle. It has been observed that the farmers do not know the number of livestock in the area. It is, therefore, desirable that the farmers should be educated on the extent of the grazing area and the number of livestock (mature livestock units - M.L.U) that may be kept in a sustainable manner.

5.3.4.2 Problems with the management of communal veld

5.3.4.2.1 Farmers perception of the veld condition

The veld condition plays an important role in livestock production. If the veld condition is poor, the performance of livestock and hence income, will be unsatisfactory. Leaders in the community were asked to indicate the veld condition with respect to its ability to maintain livestock, especially during the critical winter season. Their response is reflected in table 5.5

Table 5.5: Distribution of community leaders of Ganyesa village according to their perception of the veld condition, 1996, (n=30).

Category	No.	%
Poor veld condition	7	23
Fair veld condition	14	47
Good veld condition	9	30
	30	100

Table 5.5 indicates that the majority of the community leaders (77%) perceived that the veld was in a fair to good condition. When asked to indicate why they regarded the veld to be in a fair to good condition, they based their judgement on the availability of grass and not on the predominant grass species.

5.3.4.2.2 <u>The recommended stocking rate in Ganyesa area</u>

Stocking rate is the most important variable in grazing management. If stocking rate is not near the proper level, then regardless of other grazing management practices employed, objectives will not be met (Walker 1995). The community leaders were asked to indicate the recommended stocking rate for their area but none of them knew. This indicates that community members do not relate the stocking rate to livestock performance.

5.3.4.2.3 <u>Grazing systems</u>

The community leaders were asked to indicate whether they prefer cattle to graze continuously in one camp or the veld be divided into small camps which may be grazed in a rotation. The majority (70%) indicated that they prefer the rotational grazing system while only a few (13%) stated that they prefer the continuous grazing system and the remainder did not express any opinion. From these responses it may be deduced that they feel that the rotaional system holds certain benefits.

5.3.4.2.4 <u>Problems of veld fire</u>

Uncontrolled fires can cause a great damage to the environment, weakening veld composition, reducing its production as well as causing widespread soil erosion. But fire is a useful instrument in veld management. Many farmers and grazing experts, consider controlled burning essential to manage invader species. Fire is also important to remove moribund or unpalatable grasses, providing palatable and nutritious grazing. In the interview, 53% of the leaders of the community indicated that they did not experience veld fires in the area, while 47% stated that they did. Most suspected that the cause of such fires was careless people throwing down cigarette stubs.

The community leaders were asked whether, in their view, they consider veld burning to be of value. The majority (93%), stated that veld fires had no beneficial effect on the veld condition since grass was destroyed. From these response it is clear that they do not have any experience of fire as a management tool.

5.3.4.2.5 The problem of bush encroachment

Bush encroachment has become a serious problem in South Africa, effecting 2.5 million hectares of the Northern Cape alone (Moore, van Niekerk, Knight and Wessels 1985). The seriousness of this situation has long been realized (Donaldson 1967; Donaldson & Kelk 1970, cited by Moore et al., 1985). Moore et al. (1985), further stated that in some parts of the Molopo area, bush encroachment is thought to have already depressed grass production by 80 percent or more. This effect on grass production has resulted in many farms becoming uneconomical units. The community leaders were asked to indicate whether they were experiencing problems with bush encroachment in the area. The majority (67%) indicated that they do experience bush encroachment. The perceived causes are tabulated in Table 5.6.

Table 5.6: Distribution of the community leaders according to their perceptions of the causes of bush encroachment, 1996, (n=30).

Category	No.	%
No cutting of trees	18	60
Overgrazing	5	17
Drought	7	23
	30	100

Table 5.6 indicates that the majority (60%) perceive the cause of bush encroachment to be the fact that trees are not cut and, therefore, tend to develop dense stands. It was observed that 23% of the leaders felt that bush encroachment was caused by drought, while 17% indicated that it was caused by overgrazing. It could also be seen that some of the members associate bush encroachment with poor veld since they stated that it is caused by overgrazing.

The community leaders were asked specifically to explain the effect of bush encroachment on the veld condition. The responses are tabulated in Table 5.7.

Table 5.7: Distribution of the community leaders according to the effect of bush encroachment on veld condition, 1996, (n=30).

Category	No.	%
Suppress grass	24	80
No effect	2	7
No comment	4	13
	30	100

The majority realize that bush encroachment suppresses grasses and, therefore, results in veld deterioration. The community leaders were further asked to indicate how bush encroachment could be controlled. Their feelings in this respect are tabulated in Table 5.8

Table 5.8: Distribution of community leaders according to suggested bush control methods, 1996, (n=30).

Category	No.	%
Cutting of trees by Government	15	50
Cutting of trees by Tribal Authority	7	23
People to be given more land by Government	6	20
Answer not known	2	7
	30	100

Table 5.8 indicates that 73% of the members of the community stated that, to control bush increasing in density, the trees should be harvested. Fifty percent felt that trees should be cut by the Government while 23% felt that trees should be cut by the Tribal Authority. It can also be seen, that some of the leaders of the community (20%) felt that, since the area was encroached by bush, the Government should give them more land.

5.3.4.2.6 Grass species which indicates that the veld is in a poor, fair or good condition

The community leaders were asked to name two grass species in the area, which indicate that the veld is in a poor, fair or good condition. The answers are reflected in Table 5.9.

Table 5.9: Distribution of the community leaders according to naming of grass species which indicates that the veld is in a poor, fair or good condition, 1996, (n=30)

Category	Grass species	NO.	%
Poor condition	A. congesta	10	33
Fair condition	-	Nil	Nil
Good condition	D. eriantha	5	17
Answer not known	-	15	50
		30	100

Fifty percent of the members did not know the grass species occurring in the area, and would not know (based on the predominant species in the area) whether the veld was in a poor, fair or good condition. Some of the farmers (33%) could only name one grass species (Aristida congesta), which indicated that the veld was in a poor condition, while a small number (17%) named only one grass species (Digitaria eriantha), which indicated that the veld was in a good condition.

5.3.4.2.7 Evidence of soil erosion in the area

The basal cover of the grass communities plays an important role in the dissipation of much of the energy of the falling raindrops - energy which would otherwise pound and pulverize the soil surface. Hence the basal cover and the canopy cover of the veld at the time of intense precipitation may exert an important influence on the infiltratrion of water into the soil, by protecting the soil surface from direct raindrop impact, which would reduce the infiltration of water (Scott 1981). The community leaders were asked to indicate whether they had observed evidence of soil erosion in the area over the past twelve months. The majority 60% stated that they had. They were then asked to indicate the seriousness of such erosion. Their responses are tabulated in Table 5.10.

Table 5.10: Distribution of community leaders who observed soil erosion and their perception of the seriousness of such erosion, 1996, (n=18)

Category	No.	%
Very serious	2	11
Serious	11	61
Not serious	4	22
Uncertain	1	6
	18	100

Seventy two percent of the community leaders who observed soil erosion felt that the impact of soil erosion in the area was serious or very serious. When asked what the cause of this soil erosion was, the majority stated that it was caused by runoff. When asked how they could solve the problem, they replied that the Government should hire people to construct gabions for silting up the dongas.

5.3.4.2.8 Discussion

The majority of the community members felt that the veld was in a fair to good condition (Table 5.5). Although they were not clear on the type of grass that was predominant, they felt that there was enough grass available. Some members could indicate that when Digitaria eriantha is predominant, the veld is in good condition (Table 5.9), but when shown the grazing camp and asked which grass species was predominant, they did not know. This indicates that they do not know how to determine the predominant species in the veld. To solve this problem, the local extension officer should make the community members aware of the grass species occurring in the area and their value in determining veld condition. This will also enable people to estimate the grazing capacity of the veld using botanical composition. The fact that the members of the community did not know the recommended stocking rate for their area (5.3.4.2.2), means that they did not know whether the present stock exceeded the grazing capacity of the veld or not. It is essential that the extension service make people aware of the extent of Ganyesa area and the number of livestock (M.L.U) which should be stocked. This information will enable the members of the community to know the extent of stocking in the area and to plan for a fodder bank, especially for the critical winter and early spring periods.

The community members preferred rotational grazing, although they could not give a strong reason for their preference, except that they felt that the veld should rest. The people need to be informed on how moderate grazing stimulates the growth of grass and that overutilization could retard the growth of grass and that it ultimately reduces the grazing capacity of the veld.

A majority felt that veld fires are detrimental because the grass is destroyed. People should be made aware of the danger of fire if it is not controlled, but that fire may be used as a management tool to control bush encroachment and/or to remove moribund grass.

The majority of the community members expressed their concern about bush encroachment. They feel that the situation is being aggravated by the fact that the trees are not utilized and, therefore, become more dense. The people do not relate overgrazing in the area to bush encroachment. People should be made aware of the fact that this area falls within the Savanna vegetation formation, where there is a balance between woody species and herbaceous species. Overgrazing retards the growth of grass and the trees get a chance to suppress the herbaceous component of the vegetation, because they are not utilized. Such encroachment reduces the grazing capacity of the area. The community members felt that the problem of bush encroachment could be solved by cutting of trees and that this should be done by Government. Such people should, therefore, be made aware that the veld belongs to them and that they should take the initiative to control bush. Requests to the Government to subsidize such an exercise would probably be viewed more favourably in the light of such pro-active measures.

The majority of the community members do not know the grass species occurring in the area (5.3.4.2.6). Only a few could identify Aristida congesta as an indication that the veld is in a poor condition. Still fewer members could identify Digitaria eriantha as an indication that the veld is in a good condition. It is necessary that these people be able to identify indicator grass species occurring in the area. This knowledge would enable the people to monitor the veld and would give some indication of the stocking rate to be applied.

The majority of the members confirmed that soil erosion is serious in this area but they did not relate the erosion to the poor veld condition. Instead, they feel that soil erosion in the area is caused by rainfall, and that Government should hire people to construct gabions to facilitate the silting up of dongas. The extension service should make people aware that overgrazing reduces the basal cover of the vegetation which retards the speed of the runoff water over the soil surface and hence the erosive power of the runoff water. The people should also be made aware that it is their responsibility to reclaim the eroded areas and that they could only request the Government for assistance.

Ganyesa like most of the communal grazing areas, is overstocked and this has resulted in veld deterioration. Ganyesa falls under the Western Region of the North West Province which Meyer (1998) indicated that the animal numbers in the Province exceed the carrying capacity of the land by approximately 70% and that overgrazing occurs generally as a result of too high animal numbers and lack of infrastructure.

Although Meyer (1998) from the discussions with the extension staff indicated that one of the reasons of the farmers not selling their livestock is the low prices at the livestock auctions, it has been realized from practical experience that farmers sell their livestock very late in winter and hence the poor condition of livestock and low prices (chapter 5.3.4.1.2). Meyer (1998) indicated also that the policy changes at financial institutions will in future make loans for purchasing stock accessible to more people thereby increasing pressure on the land. This situation already exists in the Western Region of the North West Province. The Landbank is giving loans to people to purchase livestock and this situation increases the pressure on the land. Meyer (1998) also reported that another reason for high stocking rates is that the majority of farmers institutions eg. farmers associations, work towards maximising the income of their members and thereby promoting overstocking.

Ainslie, Palmer, Hurt and Swart (1998) indicated that the central issue that the "new paradigm" introduces to the ecological debate is that livestock owners operating in the communal sector must have access to sufficiently extensive areas of rangeland in order to make optimal use of environmental variability and, quoting Scoones (1994:23) stated that the one way to ensure sufficient rangeland is through flexible resource access arrangements, so that livestock are able to track resource availability across the landscape. Ainslie <u>et al</u>. (1998), further reported that an argument put forward in defence of the dis-equilibrium concept, is that high temporal and spatial variability of resources in semi-arid rangelands encourage herbivores to move across the landscape in order to maximise the use of production in the variable environment. Quoting Ellis & Swift (1988) stated that this argument has been well developed and researched in arid and semi-arid environments but extremely poorly developed in the less arid environments of the eastern seaboard of South Africa, and that clearly high spatial and temporal heterogencity of resources will buffer temporal variation in fodder production resulting from shortages following grazing events and/or climatic fluctuations. This is an important issue in the communal systems, but grazing areas need to be sufficiently extensive to allow for such buffering. Although Ainslie et al. (1998) stated that some parts of South Africa, such as former Transkei, Kwazulu/Natal and parts of the former Ciskei would appear to be sufficiently large to allow for extensive livestock movements (except for areas which have been planned), Ganyesa area does not have a large area for this system to be practised.

In explaining the stability concept, Tapson (1993) indicated that McKenzie (1982:22) elaborates the stability concept to include resistant stability and recuperative stability which is close to Walker's (1980:79) resilience concept. McKenzie (1982:22) defines resilience as the ability of a system to absorb changes in state variables, and still persist intact through time. Tapson (1993) further stated that the particular effect of these concepts in Transkei, is that the desirable climax Themeda veld, being lower on the resilience scale than the less desirable Aristida, has been largely replaced by it. The Aristida on the other hand is showing both high resilience and resistance and recuperative ability, and appears unlikely to be replaced by any other system either higher or lower in the succession and citing McKenzie (1982:21) added that it is a degraded but highly sustainable condition supporting in addition a stocking rate twice as heavy as its accepted carrying capacity. Although Tapson (1993) indicates that Aristida is a degraded but highly sustainable condition, it has a low feeding value and comparatively this stage would support a smaller number of livestock.

5.3.5 Communication situation

5.3.5.1 Introduction

This section of chapter 5, covers the following aspects: sources of information on livestock farming; useful information learnt on the management of livestock; the extension officer in Ganyesa village; three best farmers in the Ganyesa area; newsletters; farmers information days; organisations to which members of the community belong; the strongest organisation in Ganyesa area; demonstration on livestock management; skills learnt from demonstration lessons.

5.3.5.2 Sources of information on livestock farming

The sources of information play an important role. Leagans (1961) stated that the world has never seen a time when the role of the communication was so important. This is so because the world has never seen a time when there was so much to know, so many people who need to know, and so many who want to know so much so quickly. Certainly in newly developing countries nothing is more important than the transfer of useful ideas from one person to another. Leagans (1961) further indicated that in the process of good communication lies the potential for millions of people in those countries to overcome ignorance, poverty and disease, and to attain their goal of economic and social well being.

Communication research has shown that certain sources of information tend to be more influencial in acquainting farmers with new practices (Wilkening 1951, cited by Bembridge 1975). Data on the sources of information on livestock farming, used by leaders, is provided in Table 5.11.

Table 5.11: Data on the sources of information on livestock farming, 1996, (n=30).

Category	No.	%
Extension officer only	16	53
Farmer colleagues	3	10
Own experience	3	10
Extension officer and farmer colleagues	2	7
Extension officer and own experience	6	20
	30	100

It is clear that the majority of Ganyesa community obtain information on livestock farming from the extension officer. From this information, the farmers should not experience problems on livestock farming since they can get information from the extension officer.

The members of the community were asked to indicate useful practices learnt in the management of livestock. The majority (70%) stated that they have learnt the skills of dosing against internal parasites and inoculation of livestock from the extension officer. These skills play an important role in the subsistence farmers because most of them own only a few head of livestock and, therefore, do not look after them as the commercial farmers do.

5.3.5.3 The Extension Officer in Ganyesa village

The extension officer, especially in the rural area, plays a very important role in disseminating technical information. Adams (1982) states that development workers and aid agencies in many countries are becoming increasingly concerned that the benefits rarely seems to reach the resource-poor farmers. Adams (1982) further indicated that it is well known that extension workers find it easier to work with the more affluent farmers who are usually more educated, hospitable and appreciative than poor farmers. The poor majority tend to be neglected and fall further behind. This need not be so. Agricultural extension agencies, with their network of field staff in close contact with the grass roots, are well situated to reach the poor. With only minor changes in organisation and policy, it should be possible to focus attention upon the poor majority, diagnose the needs of various subgroups (including women) and shape services, recommendations and information to fit those needs, all within the frame work of an uncomplicated and inexpensive programme. Although Adams (1982) indicated that the extension officers tend to concentrate on better-off farmers, it has been observed from practical experience in the developing areas that the extension officers actually avoid commercial farmers because most of them feel that these farmers are often more knowledgeable than they are. This situation, therefore, indicates that extension officers need to keep up to date with the latest information so that they can be confident when discussing farming practices with the commercial farmers.

The community members were asked whether they have an extension officer in Ganyesa village. Seventy three percent indicated that they do have an extension officer and 50% of those, stated that they consult the E.O. on livestock management.

5.3.5.4 Frequency of consultation with regard to the management of livestock

The frequency of consultation on the management of livestock is reflected in Table 5.12

Table 5.12: Distribution of community leaders who consulted with the extension officer according to frequency of consultation on the management of livestock, 1996, (n=11).

Frequency of consultation No. times in past twelve months	No.	%
Nil	1	9
1	2	18
2	6	55
3 or more	2	18
	11	100

This table shows that 55% of the community leaders who consulted the E.O. did so only twice in twelve months. Eighteen percent indicated that they consulted thrice or more and another 18% only once. It can be deduced that on average the community members do not consult the E.O. regularly on livestock management.

5.3.5.5 The three best farmers in Ganyesa area

The aim was to ascertain whether the community could identify the three best farmers in the area and their perceptions of the best farmer. The members were asked to name the three best farmers in the area but each person gave different names. This indicates that the members do not have criteria for a good farmer and, therefore, could not specify the best farmer. The members were then asked to indicate why they regard the nominated people as good farmers. Their responses have been reflected in Table 5.13.

Table 5.13: Distribution of community leaders according to their perceptions on the three best farmers in Ganyesa area, 1996, (n=30).

Category	NO.	%
They farm on their own farms	9	30
They have more cattle than other people	12	40
They have good quality livestock	5	17
No comments	4	13
	30	100

Table 5.13 shows that the majority of the members (40%) regarded the farmers with large numbers of livestock as the best farmers in the area, while 30% felt that the best farmers were those who have their own farms and only 17% felt that the three best farmers were those who own good quality livestock.

5.3.5.6 Newsletters or magazines on livestock farming

A newsletter is a channel of communication. A channel of communication is a means by which a message gets from one individual to another. The nature of the information exchange relationship between individuals determines the conditions under which a source will or will not transmit the innovation to the receiver, and the effect of the transfer (Rogers 1983). The community leaders were asked to indicate whether they received newsletters or magazines on livestock farming. The majority (80%) stated that they do not receive any newsletters or magazines and only 20% receive "Farmers Weekly" magazines. This shows that the community does not get enough information on livestock farming, except that from the E.O., which is also inadequate as shown in Chapter 4.3.5.4.

5.3.5.7 Farmers information days

A farmers information day, or field day, is an extension diffusion exercise in which the group approach is used to influence the attitudes of agriculturists and those interested in agriculture by discussion and demonstration in the field. It is an integral part of an extension programme (Graham 1962). The community leaders were asked whether they had attended farmers information or field days. Fifty three percent of them confirmed that they attended such days in the area, while 47% indicated that they had never attended such days. The community leaders were asked to indicate the number of information days they attended during the past twelve months and their responses are reflected in Table 5.14.

Table 5.14: Distribution of community leaders who attended information days in twelve months, 1996, (n=16).

Farmers information days No.	No. Respondents	%
None	2	12.5
1	6	37.5
2	3	19
3	4	25
4 or more	1	6
	16	100

Thirty seven percent of the community attended only one such day, 19% attended two information days and 31% attended three or more. When asked to indicate some skills which they learnt from the farmers information days attended, they mentioned the control of bush encroachment and livestock management.

5.3.5.8 Demonstrations of livestock management

Demonstrations consists of two aspects: result demonstration and method demonstration.

5.3.5.8.1 Result demonstration

"Seeing is believing". An important teaching method is to demonstrate what actually happens when a particular practice is followed (Mosher 1978). Result demonstration is a method used to evaluate a particular practice by comparison.

5.3.5.8.2 Method demonstration

"Learning requires doing". Method demonstration of a single operation should actually be carried out by the farmer if he is to implement an improved technique. Method demonstration practices are very important in an extension service because the aim of the extension worker is to teach the farmers new farming practices so that they can apply them with little or no guidance. This is what development in rural areas actually implies (Tshenkeng 1985). The community leaders were asked whether they know of any demonstration on livestock farming conducted in Ganyesa area. The majority (83%) of the members stated that they did not know while 17% did recall some demonstrations where these had been held. The members were then asked to indicate who conducted the demonstrations. Forty seven percent stated that they were conducted by people from outside the area, while 33% stated that demonstrations were conducted by the local E.O. and 20% stated that they were conducted by farmers. From the statement above, it is clear that the E.O. was involved in conducting demonstrations because even if he himself did not conduct demonstrations, he is responsible for the arrangements for people from outside the area.

The community leaders who indicated demonstrations conducted in the area, stated that the skills they learned from such demonstrations were: castration of calves; dehorning of cattle; how to use a hypodermic syringe and inoculation of cattle against diseases.

5.3.5.9 Organisations in Ganyesa area

Organisations such as farmers' associations play an important role in agriculture because of benefits such as credit and marketing facilities. In this way hardworking farmers stand a chance of improving their productivity (Tshenkeng 1985). Bembridge (1983), cited by Tshenkeng (1985), stated that an important advantage of farmers associations is that they have an intimate knowledge of each farmer's circumstances and are able to link credit with the purchase of inputs, marketing and the extension service.

5.3.5.9.1 Organisations to which community leaders belonged

The community leaders were asked to name the organisations to which they belonged. A list of such organisations is reflected in Table 5.15.

Table 5.15: Distribution of community leaders according to the organisations to which they belonged, 1996, (n=30).

Category	No.	%
National African Farmers Union	10	33
South African Agricultural Union	6	20
United Christian Democratic Party	2	7
None	12	40
	30	100

Forty percent of the members did not belong to any organisation while 33% belonged to National African Farmers Union (NAFU), 20% belonged to South African Agricultural Union (SAAU) and 7% belonged to United

Christian Democratic Party (political party). It is clear that a large percentage of the members of the community did not belong to any organisation. The reason might be that the E.O. did not motivate the people to join the farmers unions or members did not realize the advantage of belonging to such farmers unions.

5.3.5.9.2 The strongest and the most influencial organisation in Ganyesa area

The community leaders identified the two farmers' unions (NAFU and SAAU) as the strongest and most influencial organisations. When asked to state the reason for such evaluations, they indicated that at meetings the possibilities of inviting more buyers to the livestock auctions to improve the prices were discussed.

5.3.5.10 Discussion

The majority of the community leaders indicated that their source of information on livestock production is the local E.O. although they still experienced problems with the death of calves at birth (5.3.4.1.1). This indicates that the community did not receive enough information on fodder flow planning. It was observed that the cows in Ganyesa area do not have a calving season and may even calve in winter when the quality of grazing is exceedingly poor. In order to solve this problem, the E.O. should motivate the community members to obtain crop residues from neighbouring farmers to feed their cattle during winter. The E.O. should also emphasize the importance of planning the communal grazing areas into grazing camps. In this way bulls could be kept in a separate camp so that mating could be controlled.

The community members indicated that they do consult the E.O. about livestock management but low prices at the livestock auctions (5.3.4.1.2) are discouraging. Such low prices occur during winter when livestock are in a poor condition. The E.O. should, therefore, motivate farmers to sell their livestock before the onset of winter, when livestock are still in a good condition and prices are still high.

It has been found that the contact between the E.O. and farmers is irregular (5.3.5.4). This problem could be solved by individual visits of the extension agent to the farmers. Such visits although costly are the most effective extension methods, because they facilitate concentration on particular problems of the farmer and because they demonstrate the interest of the E.O. in the problems of the individual farmer (Mosher 1978). Regular visits by the E.O. to the individual farmers, result in greater trust and interaction but because of the high costs involved in individual contact, the extension agent should mostly apply group methods and only when necessary resort to individual contacts.

While it is the perception of many community members that people who have more cattle are the best farmers, it is the duty of the E.O. to motivate members to run their farming as a business in which the optimum number of livestock are maintained in good condition (even in winter) and a reasonable living is made without degradation of the resources.

As members attend very few farmers information days (5.3.5.7), it is important that the E.O. makes greater use of this channel of communication to transfer information on livestock farming.

The majority of the community members do not belong to any organisation. The E.O. should, therefore, motivate the members to register as members of the farmers' unions even if they do not own large numbers of livestock. The benefits they would derive by joining the farmers' unions should be emphasized. This will also help the E.O. because the members of the community will obtain information on livestock farming from their farmer colleagues in the farmers' unions.