Chapter 5

DESCRIPTION OF SURVEYED DATA

5.1 INTRODUCTION

The characteristics of farmers within the area where the adoption of new technologies are analysed, is important. It is also important to know to what extent the farmers are susceptible to new ideas and technologies and to what extent they were exposed to these technologies before. The external environment (conditions) and resources available to these farmers must be investigated to be included into the diffusion programmes. The flow of information is a further important link in the diffusion process. On the one side is the sender (extension officers, co-farmers, the media, and family) of the message about new technologies and on the other side the farmers who are the recipients of the information (message) on new technologies within the specific characteristics of these farmers and the infrastructure as well as the location (Von Thünen's theory) that will determine the rate and level of adoption.

To understand the total environment in which technologies must be exploited, it is important to analyse the demographic information (human capital endowments), attitude towards risk, availability and accessibility as well as the functioning of extension services, infrastructure and institutions as well as the information on the adoption of small ruminant veterinary technologies. The data described in this chapter is derived from the survey done in Qwaqwa.

5.2 DEMOGRAPHIC INFORMATION OF THE SAMPLE FARMERS

This section describes the characteristics of communal households in Old Qwaqwa, of those renting farms from the South African Development Trust Corporation Limited (SADTC) or owning private farms in New Qwaqwa. The data is described in quantitative and qualitative terms. The discussion of the data is mainly restricted to the explanatory variables influencing the adoption of veterinary technology as identified in Chapter 3.

In this study a small ruminant farmer is defined as any person owning five or more small ruminants (mutton sheep, woolled sheep, Boer goats and Angora goats) for breeding purposes. Only eight per cent of the 99 farmers in the sample were women (widows) who had to take over the farming activities when they lost their husbands. This number is too small to do any statistical analysis and will be treated in the total group of 99 farmers. The fact that most of the farmers are men corresponds with the research done by Norton and Alwang (1993) who found that in many African countries male farmers tend to livestock farming while the women are in charge of food and crop production.

Age is the only variable that had a normal distribution and therefore the mean will be used as summary statistic in this case. All other variables have skew distributions and therefore the median is used to summarise the information in these cases as the median is a more representative criterion than the mean in data sets with skew distributions (Steyn, Smit & Du Toit, 1994). The age of the farmers and the distribution of their family members are shown in Table 5.1.

Table 5.1: AGE OF FARMERS AND DISTRIBUTION OF FAMILY MEMBERS	
Age (n=99)	**Median family members**
>54	1
35 - 54	1
15 - 34	2
7 - 14	1
<6 years	0
Total family size	7
Mean age	55

The median family size in the total sample is seven and varies from one to 15 per household. The age of farmers in the sample varies from 19 years to 85 years, with a mean of 55 and a coefficient variation of 26,9 per cent.

5.3 HUMAN CAPITAL ENDOWMENTS

Human capital endowments are made up by different personal characteristics. In this section emphasis is placed on educational qualifications, knowledge which includes literacy and arithmetic abilities, farming experience, and farming efficiency (weaning percentage).

The educational qualifications of the farmers, their spouses and their children are shown

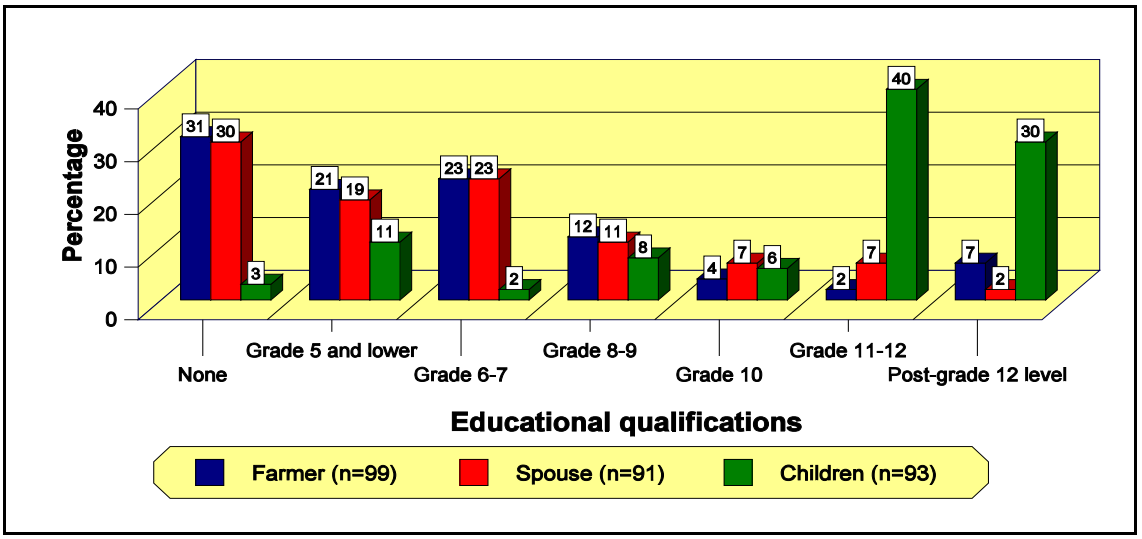

Figure 5.1: **Educational qualifications**

in Figure 5.1.

As can be seen in Figure 5.1, the educational level of the farmers and their spouses is much lower than that of their children. The major improvement in educational services and facilities which took place in the period 1980 to 1991 (DBSA, 1985; Central Statistical Services [South Africa, Republic], 1985, 1991a) is the reason why this tendency in the data is observed. The educational level of the farmers, spouses and children vary from no school education to post-grade 12 level. Only seven per cent of the farmers and two percent of the spouses have a qualification higher than grade 12. Thirty per cent of the farmers have children with qualifications higher than grade 12.

The **literacy skills** were determined by means of direct questions to the farmers regarding their ability to speak, read and/or write English, Afrikaans and Sotho or any other native language. The **arithmetic skills** were measured in terms of none (cannot do any calculations), little (can add and subtract with ease), average (can add, subtract and multiply with ease) and good (can add, subtract, multiply and divide with ease). Two basic skills are necessary because if the farmer cannot read the instructions and is not able to make basic calculations regarding the dosage of the medication, the result can be disastrous in some instances, particularly under deficient extension supervision, as has been the case in Qwaqwa since 1994. The literacy abilities of the farmers in the survey are shown in Figure 5.2.

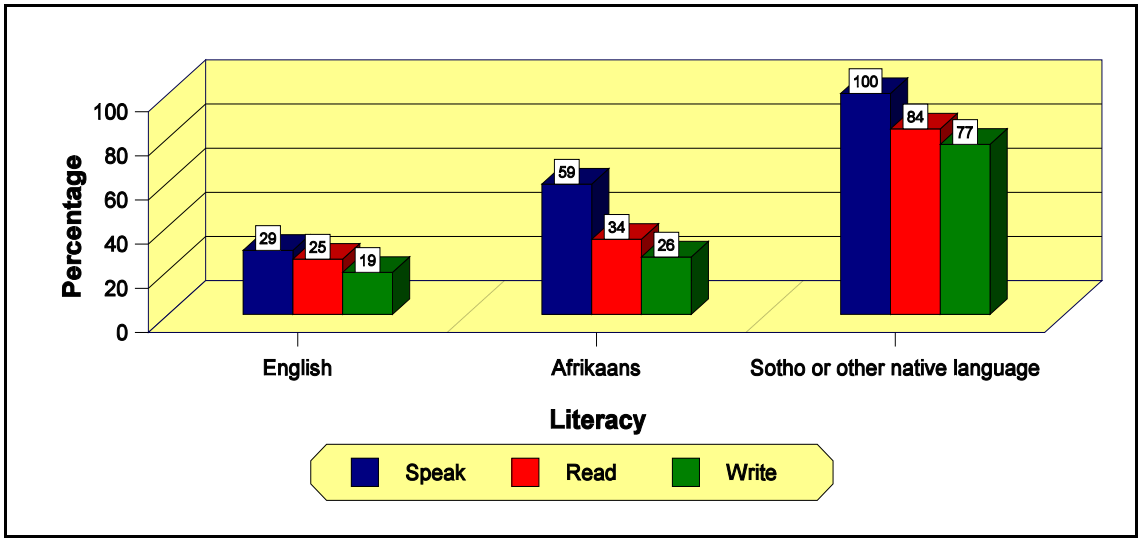

Figure 5.2: **Literacy abilities of respondents**

The results in Figure 5.2 reveal that only 40 per cent of the farmers in the sample have the ability to read English or Afrikaans, whereas 33 per cent of the farmers are literate in English or Afrikaans and have an average or good ability to make basic arithmetic calculations.

Basic arithmetic skills also play an important role in the adoption of medication technology. These results are shown in Figure 5.3.

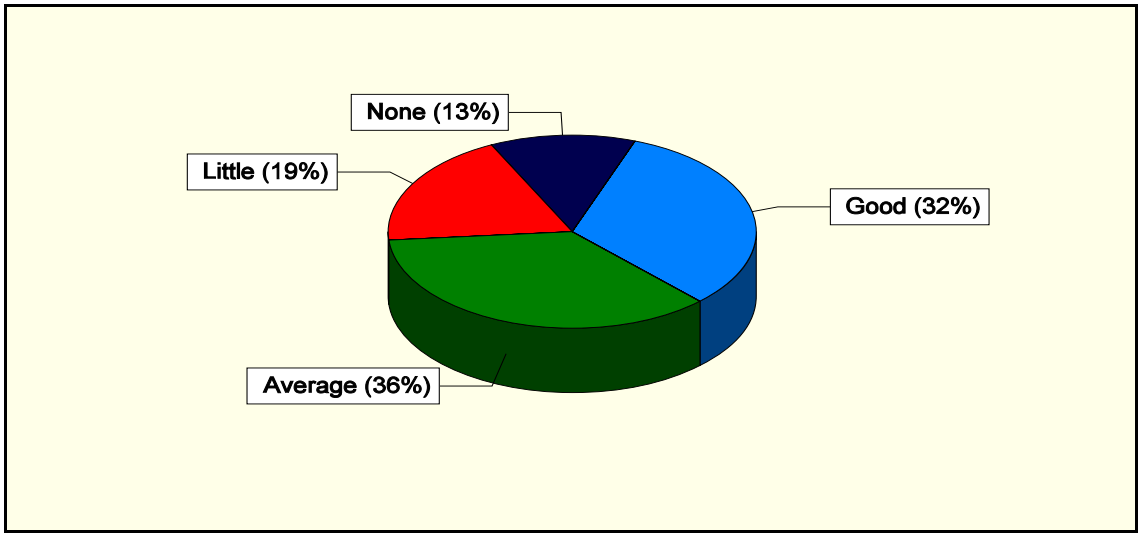

Figure 5.3: **Arithmetic abilities of respondents**

The above figure shows that 36 per cent of the farmers in the sample have an average arithmetic skill and 32 per cent have a good arithmetic skill. The conclusion can be made that if only 33 per cent of the farming population can read the specifications of medication technologies properly and make basic calculations on the dosage of medication, transfer of medication technologies by means of extension officers or other additional help in this field is important.

Farming experience is presented (proxied) in Figure 5.4.
Farming experience with livestock varies from one to 55 years and crop production experience from three to 40 years. The median years of farming experience with livestock of nine years, is an indication that the farmers in Qwaqwa have a median of five years exposure (1989 to 1994) of the veterinary technology transfer programmes managed by the government before 1994.

If weaning percentage is an indication of the farming efficiency of the sample group, it is relatively low (Figure 5.5). One of the main reasons for the low weaning percentage of the sample farmers is the lack of proper nutritional management and mating technologies. (A full discussion on mating or breeding technologies will follow later in

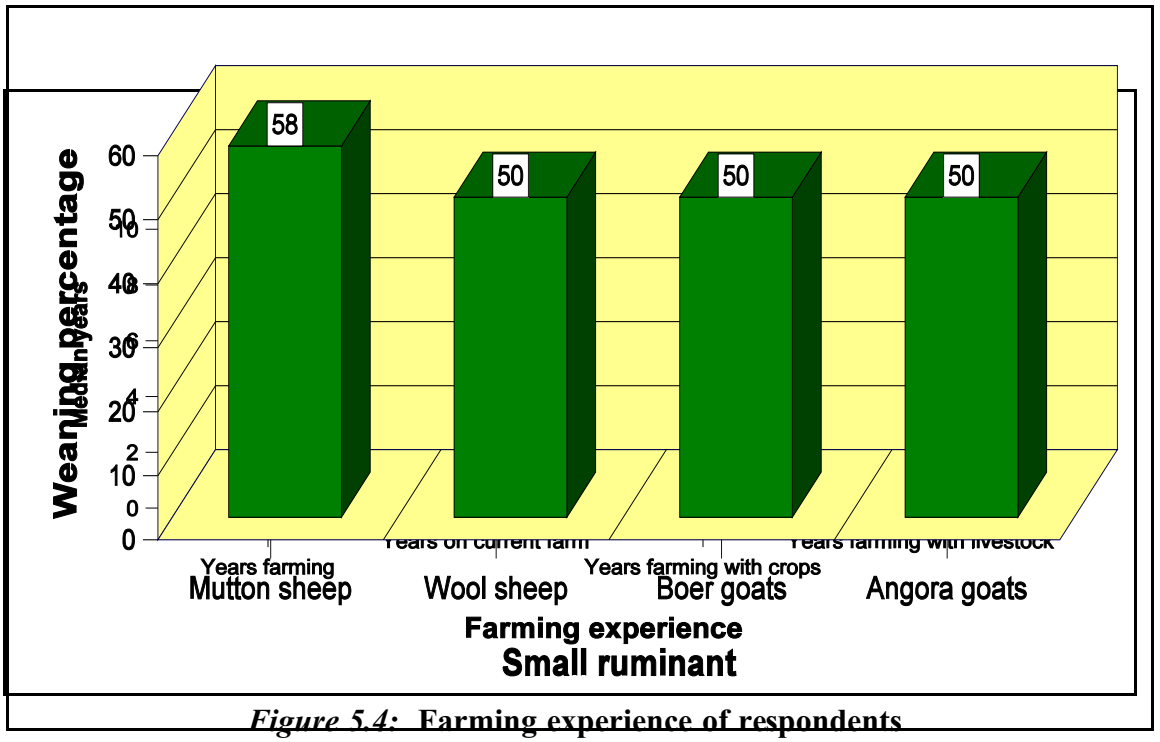

Figure 5.4: **Farming experience of respondents**
Figure 5.5: **Weaning percentage**

the chapter.)

Training is also part of human capital endowments. Farmers were asked to indicate all the sources on the usage of veterinary technologies they approach to obtain training when it is needed. The results are presented in Table 5.2.

Table 5.2: **TRAINING SOURCES APPROACHED BY SAMPLE FARMERS**	
Training sources	**Percentage**
Television	1
Extension publications (all leaflets periodicals)	1
Co-farmers – neighbours	20
Department of Agriculture – Extension officers	36
Cooperative extension officers	24
No one – use own physical or technical records	23
Bank manager	1
Supplier of inputs such as the cooperative manager	6
Market agents	1
Read in the press (news papers, magazines, etc.)	8
Sheering association: chairperson	14
Livestock inspector	3
The media	1
Does not know where to get training	2

Only 36 per cent of the 99 farmers indicated that they approach the Department of Agriculture's extension personnel when they are in need of training. Twenty-five per cent use either their own knowledge or do not know where to get training, 24 per cent approach cooperative extension officers, 20 per cent of the farmers approach co-farmers and 14 per cent approach chairpersons of sheering associations. These results indicate that only about a third of the farmers are using the extension officers of the Department of Agriculture to fulfill their training needs on the usage of medication. The majority of the farmers use other sources of information. About half of the farmers use their own or their neighbour's knowledge for their training needs, which is not only dangerous, but also a sign of the lack of efficiency of the present extension services.

5.4 MANAGEMENT SKILLS AND ENDOWMENTS

Management consists of various fields, namely planning, decision-making, record-keeping (financial, physical and economical), financial management and marketing management. In the first section of Table 5.3, a summary is given of the extent of planning. Financial

strategies which are important for long term success are given in the second section of the same table.

Table 5.3: **EXTENT OF PLANNING AND FINANCIAL STRATEGIES**	
Extent of Planning	**Percentage**
Thorough plans and objectives stated	21
Some plans (rough, incomplete)	30
Only some idea about planning	43
No plans (not considered)	6
Days planned in advance (median days)	122 days
Important financial strategies for long term success	**Median rating***
1. To have sole land rights	4
2. Keep production costs low	2
3. Must get financial management training before I start farming	4
4. My farm must earn a substantial profit for growth	2
5. I must be able to honour my instalments each year	2

* Not important = 1.
Important to not important = 2.
Important = 3.
Important to very important = 4.
Very important = 5.

Forty-three per cent of the farmers indicated that they only have some idea about planning, 30 per cent have some rough and incomplete plans, 21 per cent have thorough plans and set objectives, while six per cent have no plans for the future. The fact that only 21 per cent of the sample farmers have thorough plans is an indication that farmers are quite dependable on extension and veterinary advice in adopting small ruminant medication technologies. It further emphasises the importance of guiding the farmers towards a prophylactic system of medication management of small ruminant herds.

The data further revealed that the median period that farmers planned ahead varies from 0 days to 1 460 days (four years). Ten per cent of the farmers are planning between nil and seven days ahead. Fifteen per cent are planning 30 days ahead; 12 per cent 60 days and 28 per cent 365 days. Fifty-one per cent of the farmers are planning up to 122 days

or four months ahead and 89 per cent to a maximum of 365 days or one year. The fact that approximately a quarter of the farmers are planning a month or less in advance is an indication that it is expected that the adoption of medication technologies for preventative reasons will not be up to standard.

A question was asked on the importance of the financial strategies a farmer must follow or have long term farming success. This was rated from 1 (not important) to 5 (very important). Only one of the statements could score 5, one 4 and so on. These statements are also listed in Table 5.3. On the question, what the farmers think the most important financial strategies are which they must follow in order to ensure a long term success of their farm or farming operation, both sole land rights (65%) and financial management training before they start farming (59%) was given a high priority (important to very important) by the farmers. The rest of the strategies all scored lower priorities.

Decision-making is also an integral part of planning (see Table 5.4). When it comes to technical decisions, in 58 per cent of the cases the farmer is taking this decision on his/her own and the husband and wife together in 17 per cent of the cases. Financial decisions are taken in 44 per cent of the cases by the husband and wife together, 22 per cent by the husband, wife and children and in 21 per cent of the cases by the farmer alone.

Table 5.4: **DECISION-MAKING**

Person making the decisions	Technical* (%)	Financial* (%)
Farmer	58	21
Farmer and wife	17	44
Farmer, wife and children	11	22
Wife	2	3
Father	2	1
Farmers and father	1	1
Manager	1	-
Farmer and manager	1	1
Farmer and son	6	4
Mother and son	-	1
Farmer and mother	1	1

* n = 99

From these results it is possible to generalise that most of the technical decisions are made by the farmer alone, while financial decisions are taken with more involvement of the rest of the closer family (wife and children). The same tendency was observed by Nell, Viljoen and Lyne (1997) in a study in Thaba Nchu amongst the same type of farmers.

Keeping records is perhaps one of the most important barometers of managerial skills. It is very difficult for a farmer to manage a farm without proper farming records. The results of the study regarding financial management are shown in Table 5.5.

Table 5.5: **FINANCIAL MANAGEMENT**

Record-keeping		**Percentage**		
Farmers keeping records		97		
Farmers who think that record-keeping is important		99		
Level of record-keeping		**Median level***	**Percentage (n = 96)**	
			n	%
Cost records		3	96	43
Income records		3	96	43
Production records:	Crops	3	44	34
	Livestock	3	96	42
Labour records		3	94	38
Inventory records		2	91	35
Importance and purpose of records		**Median of importance** ***	**Percentage (n = 96)**	
Important in determining financial position		3	70	
Important for decision-making and planning		3	57	
To keep the bank or cooperative manager happy		1	52	

* Thorough and neat = 4
Rough and incomplete = 3
Only idea = 2
None = 1

** Not important = 1
Important = 2
Very important = 3

Table 5.5 indicates that income and cost records are thoroughly and neatly kept by 43 per cent of the 96 farmers keeping these kind of records or 42 per cent of all farmers. Crop production records are thoroughly and neatly kept by 34 per cent of the farmers who keep these records and 42 per cent of the farmers keeping livestock production records, are keeping them thoroughly and neatly. Labour records are thoroughly and neatly kept by 38 per cent of the 94 farmers keeping labour records and 35 per cent of the 91 farmers who used an inventory, keep a thorough and neat inventory. It is interesting that one farmer even keeps his records on the wall of the cave he is living in. These results indicate that nearly all farmers (97%) are keeping some or other kind of basic records, but less than half (45%) of the farmers are at least keeping rough and incomplete.

The importance of record-keeping is reflected in the reaction of the farmers to the statements for the reason they want to use the records for (Table 5.5). Seventy per cent of the farmers said that records are very important in determining their financial position, 23 per cent said it is important and only six per cent said that record-keeping is not important. Fifty-seven per cent of the farmers rated the usage of records for decision-making and planning as very important and 36 per cent as important. Fifty-two per cent of the farmers rated the last statement, namely keeping the bank and cooperative managers happy, as not important. The reason for this last result is that only 30 per cent of the farmers are using foreign capital (see Table 5.9).

Marketing management is one of the very important management endowments. If a farmer cannot market his/her livestock production at a profit, the chances of adopting and buying new livestock technologies are low. To a certain extent diversity of marketing channels also indicate the entrepreneurial skills of the farmer. Only 26 per cent of the 99 farmers (10% farmers from Old Qwaqwa and 16% from New Qwaqwa) have markets within accessible distance from their farms (Table 5.6).

Table 5.6: **MARKETING CHANNELS USED BY FARMERS**

Market system/ channel**	Sheep (n=91)		Goats (n=57)		Wool and skins (n=90)		Hair and skins (n=53)	
	n	%*	n	%*	n	%*	n	%*
Auction or public sale	34	56	11	55	2	50	–	–
Open market in town	20	42	7	75	3	50	1	100
Private sale	57	50	42	67	12	100	4	100
Local trader or cooperative	4	100	1	100	74	100	48	100
Own consumption	69	24	36	33	–	–	–	–
Value-adding direct marketing	1	100	–	–	–	–	–	–
Exchange with neighbour	1	100	–	–	–	–	–	–

* Median % of animals or produce marketed through this channel, of those who use this channel.

** Number of farmers within accessible distance from markets: 26.

Only 37 per cent of the sheep farmers are using auctions or public sales as marketing channels for sheep and they are marketing only a median of 56 per cent of their production in this manner (Table 5.7). The other 44 per cent of the production is used for their own consumption. Sixty-three per cent of the sheep farmers sell 50 per cent of their sheep by means of private sale and 76 per cent of the sheep farmers consume 24 per cent of the sheep production themselves.

Seventy-four per cent of the goat farmers sell 67 per cent by means of private sale and 63 per cent consume 33 per cent of the goat production themselves. The high percentage of private sales and own consumption of goats was expected because the Sotho people use goats for religious and cultural purposes (Ashton, 1955).

5.5 ENTREPRENEURIAL INFORMATION

The creative person is the one who will try new technologies before his/her co-farmers do so. A set of statements to measure the attitude and characteristics of the farmers towards the different entrepreneurial indicators, namely leadership, need for achievement

of goals, creative skills, motivation to progress, the need for autonomy and attitude toward risk were constructed with the help of Human (1997) and tested with the help of Komako (1998). The responses to these statements are given in Table 5.7 below.

Table 5.:7 **STATEMENTS TO DETERMINE ENTREPRENEURIAL SKILLS**

Section	Statements (n=99)	Median score*
1	**Leadership**:	
	You are not afraid to try a new technique (pesticide) before your fellow farmers and you will first try to do it on your own before seeking help (self-starter)	3
	Even though people tell you "it can't be done", you have to find it out for yourself	4
2	**Need for achievement of goals**:	
	If you have a problem (challenge) on your farm you will keep on trying to solve the problem (challenge) and you will not quit	4
	You have the ability to organise the four production factors (land, labour, capital and management) in such a way that the goals set for the farm are achieved	3
3	**Creative skills:**	
	You have the ability to adapt to changes in the farming environment	3
	You are always looking for opportunities to increase the profit of your farm	4
4	**Motivation to progress**:	
	You have the urge to achieve the goals set for your farm for the future	4
	You like supporting and helping your fellow farmers when you see they are struggling or when they come to you with problems	4
5	**Need for autonomy**:	
	You do not often need to ask other people's opinions before you decide on important things – you can rely on your own knowledge or family to make good decisions	3
	You are not afraid to be different when it comes to the adoption of new technologies on your farm	3
6	**Attitude towards risk**	
	Variety A will give you a profit of R10 000 in two out of ten years and in the other eight years R0 (High profit, high risk) (3)	
	Variety B will give you a profit of R3 000 in six out of ten years and in the other four years R0 (Medium profit, medium risk) (2)	2
	Variety C will give you a profit of R2 000 in eight out of ten years and in the other two years R0 (Low profit, low risk) (1)	

* Strongly disagree = 1
Disagree = 2
Agree = 3
Strongly agree = 4

Practical examples customary to Qwaqwa were also used to make sure that the best quality answers possible were attained from the farmers. The farmers had to indicate whether they strongly disagree (1), disagree (2), agree (3) and strongly agree (4). Sections 1 to 6 (indicators of entrepreneurial skills) carry the same weight. The score for risk attitude (section 6) was then multiplied by 2,7 to obtain the same weight as the other sections (1-5) also used to determine entrepreneurial skills (Human, 1998; Pretorius, 1998). The lowest possible score is 13, the highest 48 and the average 30,5. The sum of the scores for the questions asked (sections 1-6) (Table 5.7) indicates the level of entrepreneurial skills. The scores in the sample varied from 23 to 47, with a mean and median score of 36. This normal distribution with a mean/median score of 36, higher than the average score possible (30,5), is an indication that the entrepreneurial skills of the farmers tend to be above average according to the questions asked.

5.6 FARM OR HERD SIZE

Due to the fact that Old Qwaqwa has a communal tenure system and New Qwaqwa rented or privately owned farms, herd size instead of farm size were used to measure the size of the farming operation. The size of the farms in New Qwaqwa varied between 161 ha and 1 260 ha, with an average size of 455 ha. These farm sizes were not determined through market forces but were determined by the state on the basis of areas which would give the same Nett Farm Income under the same circumstances.

The herd sizes for the different livestock types are summarised in Table 5.8. The numbers of the different livestock types all have a very skew distribution.

Table 5.8: **HERD SIZES FOR DIFFERENT LIVESTOCK TYPES**

Livestock types	Median numbers
Cattle (n = 91)	18
Mutton sheep (n = 53)	34
Woolled sheep (n = 42)	41
Boer goats (n = 29)	31
Angora goats (n = 43)	42
Pigs (n = 8)	3
Poultry (n = 3)	70
Other (donkeys and horses) (n = 13)	3

5.7 CREDIT-USE (INDEBTEDNESS) AND ACCESS TO CREDIT

Only 16 per cent of the farmers in Old Qwaqwa and 56 per cent of the farmers in New Qwaqwa make use of foreign capital (Table 5.9), but 64 per cent of the farmers in the total sample are in need of credit. Credit is not available to 36 per cent of the farmers, and 39 per cent of them stated that the bank does not want to lend them money due to insufficient security, and 28 per cent stated that they do not have access to credit.

Table 5.9: **USAGE AND ACCESS TO CREDIT**

Usage and access to credit and indebtedness (n=99)	**Percentage**
Farmers using foreign capital	30
Farmers needing credit	64
Credit available for farmers	64
Credit not available for farmers	36
Reason why credit is not used (n=36)	**Percentage**
Do not need extra money	19
Have no access to credit	28
The cost (interest) of money is too high	19
Bank does not want to lend money due to insufficient security	39
Poor repayment ability of farm	19
Do not know where to get credit	6
Afraid of credit	6
Drought – debt too high	11
Children have to pay debt if farmer dies	3
Source of funding livestock inputs and rams	**Percentage**
Own funds	88
On credit	0
Combination of own and credit	12

Credit granted by the agricultural cooperative (Table 5.10) was exclusively used for crop production loans by New Qwaqwa farmers. From the four loans granted by the Agricultural Bank of South Africa to New Qwaqwa farmers, two were for bonds to

purchase two privately owned farms and the other two were for crop production loans. The 10 Agri-Mark loans to New Qwaqwa farmers were mainly used for production loans (7) and repayment sales agreements (hire purchases) (3). The two commercial bank loans were both awarded to Old Qwaqwa farmers.

Loans from family and friends were mainly used to help pay for school tuition fees of the farmers' children. The number of farmers involved, mean and median interest rates and amounts taken up by the farmers, are summarised in Table 5.10. Of the 30 formal sources, which granted credit to the farmers, 20 are from New Qwaqwa and 10 from Old Qwaqwa. This is an indication that farmers in New Qwaqwa make more use of credit than farmers in Old Qwaqwa. The usage of informal credit sources is very low and needs no further discussion. During the survey most of the farmers indicated that they are afraid of the high interest rates of the informal credit sources, family excluded.

Table 5.10: **INDEBTEDNESS OF FARMERS**

Sources	Median		Mean	
	Interest rate (%)	Amount	Interest rate (%)	Amount
Formal sources:				
Commercial bank (n = 2)	20,00	R12 000	20,00	R33 000
Agricultural cooperative (n = 15)	19,00	R40 000	18,75	R47 706
Agricultural Bank of South Africa (n = 4)	19,00	R80 000	18,75	R92 500
Agri-Mark (n = 10)	19,00	R43 000	15,89	R51 222
Informal sources:				
Credit unions (n = 1)	300,00	0	300,00	0
Credit clubs (n = 0)	–	–	–	–
Family and friends (n = 5)	0	R200	6,00	R1 280
Stokvels (n = 1)	25,00	0	25,00	0

5.8 ATTITUDE TOWARDS RISK

Figure 5.6 summarises the results of the farmers' attitude towards risk. (See also Table 5.7 for the questions asked to determine the attitude towards risk.)

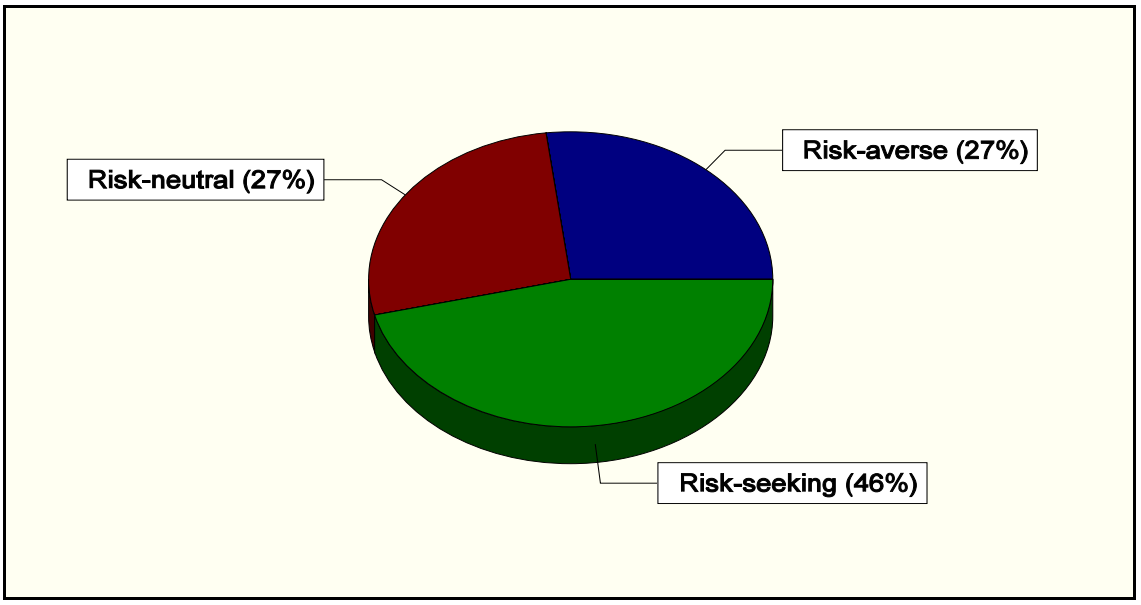

Figure 5.6: **Attitude towards risk**

Twenty-seven per cent of the farmers are risk-averse or prefer a low profit, 27 per cent risk-neutral or medium profit and 46 per cent are risk-seeking or high profit seeking. It is possible to realise from these results that only a minority of the farmers in Qwaqwa are risk-averse, and therefore most of the farmers would be potential adopters of new technologies if it can increase their profits.

5.9 EXTENSION SERVICES

Extension is one of the most important components of technology transfer (Nagy, Sanders & Ohm, 1988; Ojo & Evbuomwan, 1997; Pinstrup-Andersen & Pandya-Lorch, 1997). Problems experienced with extension services in Qwaqwa were discussed in Chapter 4. The small ruminant farmer views extension advice as extremely important, as 97 per cent of the 99 farmers indicated that they needed extension advice (Figure 5.7). The results on questions concerning the supply and demand of extension services are summarised in

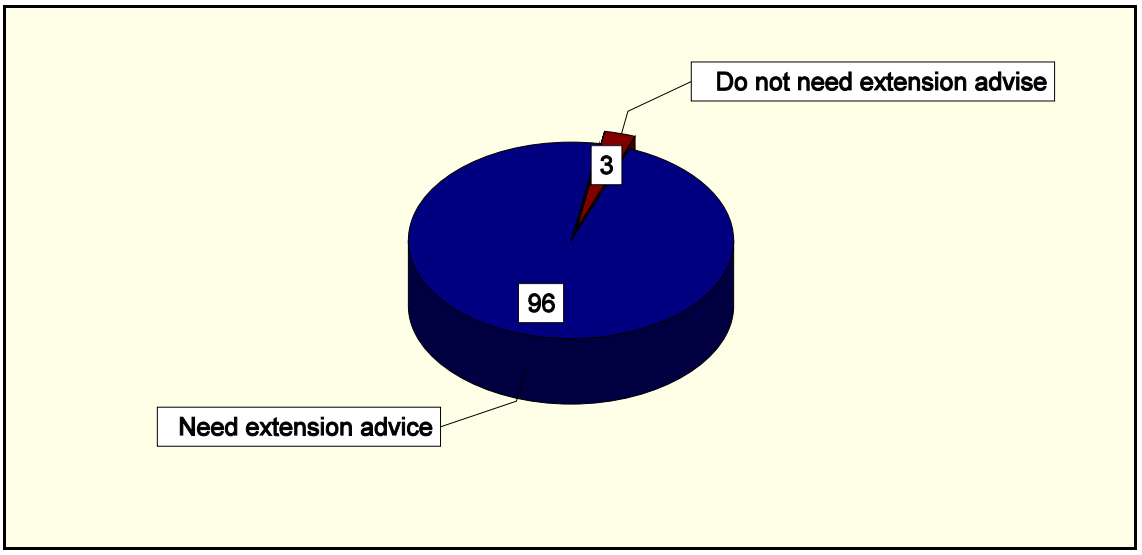

Figure 5.7: **Need for extension services**

Table 5.11. The availability of government extension officers is rated by 51 per cent of the farmers as accessible and the availability of cooperative extension officers by 50 per cent of the farmers.

Approximately half of the farmers have the perception that extension officers (government and cooperative) have the desired technical knowledge to assist them, but less than a third of the farmers feel that they have the desired financial knowledge to assist them (Table 5.11).

Table 5.11: **SUPPLY AND DEMAND FOR EXTENSION SERVICES**

Availability and accessibility of extension officers	**%**	
Government extension officers	51	
Cooperative extension officers	50	
Input supplier's extension officer	27	
Times visited by extension officers	**Median**	
Government extension officers	0	
Cooperative extension officers	0	
Input supplier's extension officer	0	
Total visits per year	3	
Perception of farmers whether extension officers have the desired level of technical and financial knowledge	**Number**	**%**
Technical:		
Government extension officers	46	47
Cooperative extension officers	51	52

Input supplier's extension officer	25	25
Financial:		
Government extension officers	24	24
Cooperative extension officers	31	31
Input supplier's extension officer	8	8

Visits by extension officers play an important role in the communication process of the diffusion of technology. However, the results on the number of these visits showed a median of zero and needs a more detailed discussion. The number of times that farmers in the total sample were visited by government extension officers varied between 0 and 24 per year, whereas 56 per cent farmers did not receive a single extension visit from the government extension officers in a year. Ten per cent of the farmers were visited once a year and nine per cent of the farmers 12 times a year. The cooperative extension officers also showed the same variation of zero to 24 visits a year. Fifty per cent of the farmers have not received a single extension visit from the cooperative extension officers in a year. Eight per cent of the farmers were visited four times a year. The visits by input supplier's extension officer varied between zero and ten times a year, and only 22 farmers received at least one visit per year.

The farmers thus received a median of three extension visits (from the three different extension sources available) per year. The number of visits a year of the three extension sources gave a median of zero visits, which is an indication that this section of data is very skewly distributed. A few farmers get a high number (up to 26 times) of visits per year and 23 per cent of the farmers are never visited by extension officers. Twenty-one per cent of the farmers receive one or two visits a year from extension officers.

5.10 INFORMATION SOURCES

The manner in which new technology messages are carried to the user or adopter is a further important tool for the technology transfer process. Information sources were also included as an explanatory variable that was tested for its significance in explaining technology transfer and adoption. Information sources approached by the farmers are

summarised in Table 5.12 under the main categories: technical decisions, financial decisions, marketing decision and information on new technologies.

Table 5.12: **INFORMATION SOURCES USED FOR TECHNICAL, FINANCIAL AND MARKETING DECISIONS AND INFORMATION ON NEW TECHNOLOGIES**

Sources used for decision-making and information	Technical decisions* (%)	Financial decisions* (%)	Marketing decisions* (%)	Information on new technologies* (%)
Radio, television, extension publications (all leaflets periodicals), read in the press (newspapers, magazines, etc.)	32	10	15	25
Co-farmers – neighbours	23	12	19	11
Department of Agriculture – Extension officers	49	30	27	39
Cooperative extension officers	33	14	10	26
No one – use own physical or technical records	7	45	21	7
Bank manager	2	6	1	2
Supplier of inputs such as the cooperative manager	4	2	4	8
Veterinary surgeon	5	–	1	3
Sheering association chairperson	18	15	12	14
Livestock inspector, father, family, the media	6	2	–	5
Sell to buyer who is the closest to farm – do not consider different markets	–	–	16	–
Market agents	–	–	19	–
Compare the prices of the different markets	–	–	6	–

* n = 99

As can be seen in Table 5.12 the Department of Agriculture's extension officers are the main source of information that the local farmers approach when they have to make technical decisions. The second most important source of information is the cooperative extension services that are approached by 33 per cent of the farmers, followed by the media (radio, television, and extension publications) (32%), co-farmers (neighbours) (23%) and the chairperson of the sheering association (18%). All other sources of information have a relatively low importance for technical decision-making.

When it comes to financial decisions, the farmer's own records are the most important sources used. The extension officers of the Department of Agriculture are the second most important source approached, followed by the chairperson of the sheering association, extension officers of the cooperatives and are co-farmers (neighbours) (Table 5.12). All

other sources of information have a relatively low importance for financial decision-making.

With respect to the most important source of information to take marketing decisions, are the extension officers of the Department of Agriculture, followed by the farmer's own physical and technical records, co-farmers (neighbours), market agents, the media (radio, television, and extension publications), and the chairperson of the sheering association. All other sources of information have a relatively low importance for marketing decision-making.

The extension officers of the Department of Agriculture are the most important source approached when the farmers need information on new technologies. The second most important source of information is the cooperative extension officers, followed by the media (radio, television, and extension publications) that can be seen as information gathered by the farmer himself, as well as his own physical and technical records, chairperson of the sheering association and co-farmers (neighbours) (Table 5.12). All other sources of information have a relatively low importance for information on new technologies.

It is clear from the information obtained that the extension officers from the Department of Agriculture and the cooperatives, the farmer’s own technical and financial records, the sheering association's chairperson and the media are the main sources approached by farmers in Qwaqwa when information is needed on new technologies and when making technical, financial and marketing decisions. The chairpersons of the sheering associations give advice at their own expenses. They are in an excellent position to establish the link between farmers and the extension services of the Department of Agriculture. It is therefore very important to provide better information and logistical assistance to these individuals in future technology transfer programmes and must be acknowledged in future agricultural policy on development of agriculture.

5.11 SMALL RUMINANT INFORMATION

This study concentrates on small ruminant livestock veterinary technologies, namely veterinary surgeon services and medication. Medication refers to the four major medication groups used in small ruminant farming, namely **external parasite remedies**, **internal parasite remedies**, **antibiotics** and **vaccination**. The small ruminants referred to in this study includes **mutton sheep**, **woolled sheep**, **Boer goats** and **Angora goats**.

5.11.1 Physical and financial information on small ruminants

The only livestock production information available of Qwaqwa at the beginning of this study was broadly defined as sheep and goats and their numbers. No information was available on mutton and woolled sheep or Boer and Angora goats. The sample selection of this study was therefore based on sheep and goat farmers. After the data was processed, it was realised that the total sample had 53 mutton sheep herds, 42 woolled sheep herds, 29 Boer goat herds and 43 Angora goat herds (Table 5.13).

Table 5.13: **SMALL RUMINANT NUMBERS, INCOME AND LOSSES**

Median	Small ruminants			
	Mutton sheep	Woolled sheep	Boer goats	Angora goats
Sample (n)	53	42	29	43
Rams	2	1	1	1
Ewes	22	25	20	20
Total small ruminants	34	41	31	42
Weaning percentage	58	50	50	50
Income	R1 500	R2 950	R860	R1 300
Losses: Dead	2	3	1	1
Stolen	0	0	0	0

As can be seen from Table 5.13 the median herd sizes of the different types of small ruminants are very similar. The median weaning percentage for mutton sheep is 58 per cent and for woolled sheep, Boer and Angora goats it is 50 per cent. The median gross farm income per year varies between R860 for Boer goats and R2 950 for woolled sheep. The number of sheep/goats that died in 1997 is quite low when compared with the losses

of small ruminants during the winter of 1996 when some farmers lost nearly their total herds. The number of sheep that died in 1997 varied from 0 to 70 and the number stolen varied from 0 to 105. The number of goats that died varied from 0 to 50 and the number stolen varied from 0 to 15. The theft of livestock started to decline when the farmers started their own anti-livestock theft unit (Komako, 1998).

5.11.2 Breeding technology information

The breeding technology information concentrates on the usage of registered and graded rams and mating seasons. Registered and graded rams are genetically superior animals that may improve the value and the production potential of the herds. The use of such rams is advocated and made available by the extension services of the Department of Agriculture in Qwaqwa. The use of a mating season implies that rams must be removed from the herd for a certain period of the year. Mating seasons are therefore quite difficult to use in a communal grazing system with frequent contact of different herds. The results on breeding technology are summarised in Table 5.14.

Table 5.14: **USAGE OF RAM TECHNOLOGY**

Types of rams used*	**Small ruminants**							
	Mutton sheep (%) (n=53)		**Woolled sheep (%) (n=42)**		**Boer goats (%) (n=29)**		**Angora goats (%) (n=43)**	
	No.	%	No.	%	No.	%	No.	%
Borrowed rams	1	2	5	12	2	7	1	2
Any rams	5	9	0	0	0	0	0	0
Local grade rams	26	49	3	7	8	28	8	19
Registered and grade rams	7	13	27	64	5	17	16	37
Community owned rams	1	2	1	2	2	7	1	2
Own bred rams	14	26	11	26	11	38	15	35
Boer goat ram on Angora ewes	0	0	0	0	0	0	1	2
Total	54	100	47	100	28	100	42	100

* A farmer could use more than one type of ram.

The use of ram technology shows a great variation. Borrowed rams refer to rams borrowed from co-farmers; any rams refer to the purchase of any type of ram that the farmer can get hold of; local grade rams refer to rams bought from local breeders; registered and grade rams are bought from breeders outside Qwaqwa; communal owned rams are rams that are communally bought and own bred rams are rams bred on the farmer's own herds.

Woolled sheep herds have the highest rate of adoption of registered and graded rams (local grade rams included) – 71 per cent of the 42 woolled sheep herds – followed by mutton sheep herds with 62 per cent of the 53 mutton sheep herds, Angora goats with 56 per cent of the 43 Angora goat herds and Boer goats which showed the lowest adoption rate of ram technology with 45 per cent of the 29 Boer goat herds using registered and graded rams (including local grade rams).

Thirty-eight per cent of the Boer goat farmers, 35 per cent of the Angora goat farmers and 26 per cent of the mutton sheep and woolled sheep farmers make use of their own bred rams. Farmers using their own bred rams are running the risk effects of inbreeding over time. Sheep farmers (mutton and woolled) are 91 in total, from which only four have both types of sheep. Three per cent of these farmers are using registered rams only with one of the types of sheep and only one per cent are using registered rams with both types of sheep. According to Claassens (1998) the lack of ram technology transfer after 1994 is one of the reasons why a considerable portion of the farmers are using own bred rams. As discussed in Chapter 3, the extension programme deteriorated after 1994 as discussed in Chapter 3 and ram technology transfer was severely affected by the policy change by the Department of Agriculture.

Reasons for not using ram technologies were not indicated for the different types of small ruminants separately. Sixty-six per cent of the small ruminant farmers are using ram technologies for registered and graded rams. The reasons why ram technology was not used by 34 per cent of the farmers are summarised in Table 5.15. The high price of the registered and graded rams and the cash available to buy them was the main reasons for not adopting ram technologies. The accessibility and availability of rams were also important reasons why ram technologies were not adopted.

Table 5.15: **REASONS FOR NOT USING RAM TECHNOLOGY**

Reasons for not using registered or graded rams*	n=31	%
Rams are too expensive	14	45
Have no money (cash) available to buy rams	15	48
Cannot get credit to buy rams	1	3
Rams are not easy accessible	5	16
Have no transport to get the rams to the farm	5	16
The transport is too expensive to get the rams to the farm	4	13
Rams will not have a large enough effect on reproduction levels to pay for the extra expenses	5	16
It will increase the production risk of the farm	2	6
It will increase the financial risk of the farm due to higher debt	2	6
Decent rams are not freely available	4	13
Satisfied with own rams	2	6
Use communal rams	1	3
No fencing – infrastructure (cannot keep rams on communal veld with own ewes)	0	0
Do not know ram producers	0	0
Just started farming	5	16
Farm for own consumption	0	0

* Farmers were allowed to give more than one reason.

Mating season is also a very important breeding technology that can help to increase the reproduction levels of small ruminants (Devendra & McLeroy, 1982). Seventy-five per cent of the small ruminant farmers have adopted mating season technology. The seasons in which the rams are mating the ewes, are summarised in Table 5.16.

Table 5.16: **USAGE OF MATING SEASON TECHNOLOGY**

Mating season	Small ruminants							
	Mutton sheep (n=53)		Woolled sheep (n=42)		Boer goats (n=29)		Angora goats (n=43)	
	No.	%	No.	%	No.	%	No.	%
Summer	5	9	7	17	3	10	5	12
Autumn	22	42	24	57	21	72	32	74
Winter	5	9	2	5	0	0	0	0
Spring	6	11	2	5	1	3	1	2
Total used mating seasons	38	72	35	83	25	86	38	88

Seventy per cent of the mutton sheep herds, 83 per cent of the woolled sheep herds, 86 per cent of the Boer goat herds and 88 per cent of the Angora goat herds are mated in one of the mating seasons of the year. The rest of the farmers are keeping the rams with the ewes throughout the year. The autumn mating season (spring lambing/kidding) is the most used season by the adopters of mating season technology.

5.11.3 Reasons for farming with small ruminants

Farmers were asked to prioritise (from 1 as not important to 4 as very important) reasons for farming with different types of small ruminants. If a farmer had more than one type of small ruminant, he had to rate the importance (1–4) of several reasons for farming, which included: for normal commercial farming, investment, source of money, risk reduction, own consumption, cultural or other reasons. The analysis for each type of small ruminant and for each reason for farming was complicated as the number of herds in each type of reason was too low to allow testing individual types of small ruminants. It was therefore decided to generalise this variable by only analysing the answer given to the larger herd of the farmer and to the score given to the importance of farming for normal (commercial) reasons. The results are summarised in Table 5.17.

Table 5.17: **REASONS FOR FARMING WITH SMALL RUMINANTS**

Item	Median rating
For normal commercial farming	2
Other Reasons:	
As an investment	1
As a source of money in case of emergency	1
To reduce risk diversification	0
For cultural and religious reasons	0
For own consumption	1
Other (Because he likes sheep)	0

* 4 = Very important
3 = Important
2 = Less important
1 = Unimportant
0 = Option not chosen

Normal (commercial) farming was rated a median of two, followed by farming for investment purposes, as a source of money in case of emergency and farming for own consumption with a median of one. The rest of the reasons had a zero median rating. These results indicate that the small ruminant farmers in Qwaqwa tend to be more commercially driven than towards culturally and subsistence farming.

5.11.4 Livestock veterinary technologies

The adoption of veterinary surgeon services and four separate medication technologies are five dependent variables, as described in Chapter 3, which will be analysed in this study towards the extent or level of adoption. Each section will be introduced by a definition of the different adoption levels. The definition of the different levels of adoption for the different medication groups were done in collaboration with a panel, which consisted of Naude, Erasmus, Greyling, De Wet and Schwalbach. The four medication groups were identified by means of their specific use and cure for the groups of parasites and diseases.

5.11.4.1 Veterinary surgeon services

The following have been defined with regard to the adoption of veterinary surgeon services:

- ***Adopter:*** Uses veterinary surgeon services at least once a year.
- ***Non-adopter:*** Uses no veterinary surgeon services.
- ***Potential adopter:*** A non-adopter who would have used veterinary surgeon services if they were made available and accessible.

The usage of veterinary surgeon services are shown in Figure 5.8. Veterinary surgeons are one of the crucial persons in the medication technology transfer process (Bhattacharyya *et al.*, 1997). This is one of the main reasons why it was decided to include this technology in this study as a dependent variable.

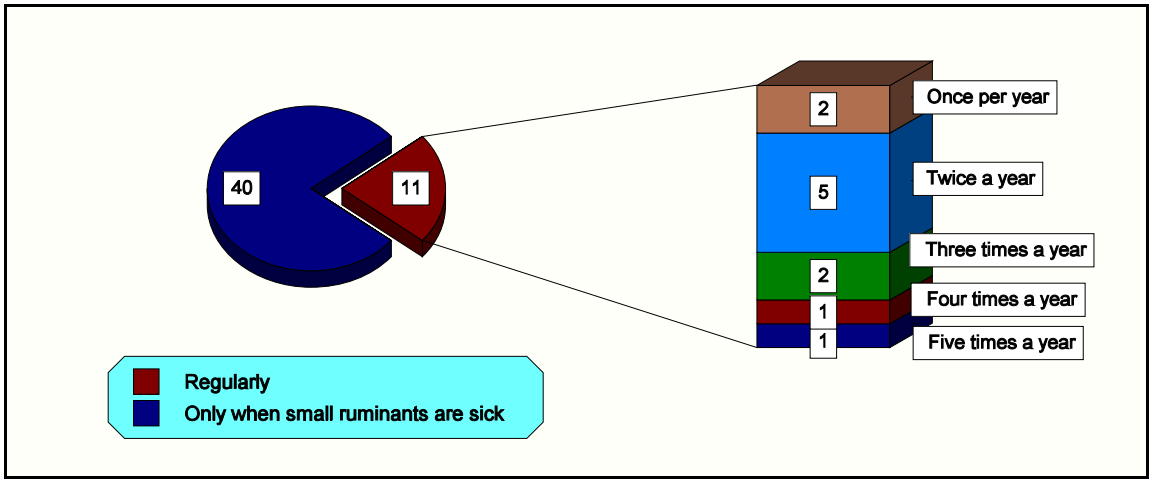

Figure 5.8: **Usage of veterinary surgeon services**

Fifty-two per cent of the 99 farmers make use of a veterinary surgeon at least once a year. Those identified as adopters of veterinary surgeon services amounted to 51 farmers and the non-adopters were 48. The 35 non-adopters who gave reason number 4 and/or 12 as a reason (Table 5.18) for not adopting veterinary surgeon services are classified as potential adopters. The adopters and potential adopters totalled 87 per cent of the farmers in the survey. The non-adopters of veterinary surgeon services totalled 13 per cent of the farmers.

Of the 51 farmers who use a veterinary surgeon, 78 per cent use them only when their animals are sick and only 22 per cent are using a veterinarian on a regular basis. The majority of farmers who visit the veterinary surgeon on a yearly basis, do so twice a year (Table 5.18).

Table 5.18: **USAGE OF VETERINARY SURGEON SERVICES**

Reasons for not using veterinary surgeon services	Total number (n = 48)	%
1. Veterinary surgeon services are too expensive	25	52
2. Have no money (cash) available to afford veterinary surgeon services	10	21
3. Cannot get credit to make use of veterinary surgeon services	5	10
4. The veterinary surgeon services are not easily accessible	34	71
5. Have no transport to take the sick animals to the veterinarian	15	31
6. The veterinary surgeon services will not have a large enough effect on production levels to pay for the extra costs involved	2	4
7. It will increase the production risk of the farm	0	0
8. It will increase the financial risk of the farm due to higher debt	8	17
9. Involved in organic farming	0	0
10. Cultural reasons	0	0
11. Veterinary surgeon services are not freely available	30	63
12. Buy medication and use it without the help of veterinary surgeon	1	2
13. Do not need a veterinary surgeon – no diseases	1	2
14. Own knowledge of small ruminants enough	1	2

It is evident from Table 5.18 that the most important reasons why veterinary surgeon services were not being used by 48 of the small ruminant farmers, are that the veterinary surgeon services are not easily accessible (71%), not freely available (63%), too expensive (52%), they have no transport to take sick small ruminants to the veterinary surgeon (31%) and they cannot afford veterinary surgeon services (21%).

5.11.4.2 Adoption of external parasite remedies

The following types of adopters were identified with regard to external parasite remedies (Erasmus, 1998; McDonald, 1998; Schwalbach, 1998). The definitions are the same for all four types of small ruminants.

- ***Full adopter:*** Treats small ruminants two times per year.
- ***Non-adopter:*** No treatments.
- ***Partial adopter:*** Treats small ruminants once a year.
- ***Over-adopter:*** Treats small ruminants more than two times a year.
- ***Wrong adopter:*** Uses only a wrong remedy for external parasites.

According to McDonald (1998), external parasites (ticks and scab) are not a major problem in Old and New Qwaqwa because of the relatively low temperatures. The remedy Ivomec controls external as well as internal parasites. The use of external parasite remedies relies on what the farmer sees on the animals and in a herd intervention. An average of two external parasite breakouts can be expected in a year under "normal circumstances" (Naude, 1998). Over-adoption of external parasite remedies is not critical because ticks and scab cannot easily build resistance to these drugs if over-adoption occurs. The major disadvantage of the over-adoption in this case is that the farmer will be wasting his money. According to Erasmus (1998) the usage of a wrong remedy in combination with a correct remedy for external parasites is not a major issue. If a farmer has indicated that Ivomec is used as an internal parasite remedy and not as an external parasite remedy, it will be assumed that the farmer is also an adopter of internal parasite remedies, as these remedies have a double internal/external parasite effect simultaneously (IVS Desk Reference, 1998).

The list of external parasites remedies used is presented in Table 5.19. HI-TET is the only wrong remedy used in this category. A vast range of external parasite remedies is used in Qwaqwa. Each one has its own usage specifications, which increases the need for extension or other help to correctly applying these remedies.

Table 5.19: **LIST OF EXTERNAL PARASITE REMEDIES USED**
Commercial name of remedy (*Active principle* *)
Drastic Deadline *(Flumethrin 1%)*
Ivomec *(Ivermectin 1%)*
Zipdip *(Triazophos 40%)*
Littlesdip *(Carbolic acid)*
Triatix *(Amitraz 1%)*
Clout (*Deltamethrin 1%)*
Dazzle *(Diazinon 30%)*
HI-TET 300 LA** *(Oxytetracycl. HCl 300 mg/ml)*
Zeropar *(Chlorfervinphos 30% Alphamthrin 30%)*
Sumiplus *(Clorfenvinphos 30%, Esfesvalerate 2,2%)*
Topclip *(Diazinon)*
Paracide *(Alphamethrin 7%)*
Keroldip *(Carbolic acid)*

* The active principle is shown in brackets.

** Wrong remedy for external parasites.

The results of external parasite remedy adoption are summarised in Table 5.20. No traditional remedies were used as external parasite remedies by the local farmers.

Table 5.20: **SUMMARY OF EXTERNAL PARASITE REMEDY ADOPTION**

Adopters	External parasites (%)			
	Mutton sheep (n=53)	Woolled sheep (n=42)	Boer goats (n=29)	Angora goats (n=43)
Non-adopters	0	0	0	0
Partial adopters	13	9	14	12
Full adopters	62	69	45	58
Over-adopters	23	17	34	30
Wrong adopters	2	5	7	0
Median times per year	2	3	4	3
Traditional remedies (n)	0	0	0	0

The application of external parasite remedies on all types of small ruminants varies from once a year to ten times a year. This is an indication that small ruminant farmers in Qwaqwa are aware of the existence of external parasite remedies and that the animals must be treated for these parasites.

There were no non-adopters, seven partial adopters, 33 full adopters, 12 over-adopters and one wrong adopter using only HI-TET (twice a year) as an external parasite remedy for **mutton sheep**.

There were no non-adopters, four partial adopters, 29 full adopters, seven over-adopters and two wrong adopters who only use HI-TET, a wrong remedy for external parasites on **woolled sheep**. The median times that correct external parasite remedies were used was three times a year.

There are no non-adopters, four partial adopters, 13 full adopters, 10 over-adopters and two wrong adopters for **Boer goats**. The wrong adopters used only HI-TET (twice a year). The median times of correct application of external parasite remedies was four times a year.

There were no non-adopters, five partial adopters, 25 full adopters, 13 over-adopters and no wrong adopter for **Angora goats**. The median times of correct external parasite remedies application was three times per year.

5.11.4.3 Adoption of internal parasite remedies

The following types of adopters were identified with regard to external parasite remedies (Erasmus, 1998; Naude, 1998, McDonald, 1998; Schwalbach, 1998). The definitions are the same for all four types of small ruminants.

- ***Full adopter:*** Uses remedies acting against roundworms four to six times, tapeworms two to four times and nasal worms more than once per year.

- ***Non-adopter:*** No remedies used.
- ***Partial adopter:*** Uses **less** than the defined levels for a full adopter in any of the groups.
- ***Over-adopter:*** Uses remedies acting against roundworms, tapeworms and nasal worms **more** than the defined times per year in any of the groups.

It is very difficult to define a partial, full and over-adopter with regard to internal parasite medication technology as the treatments necessary to deworm small ruminants will vary from farm to farm and from herd to herd. Factors like population density of small ruminants, rainfall, temperature and breed also play a role in the burden of internal parasite infestation. The level of environmental contamination, the condition of the herd and the level of management also plays an important role on the number of treatments per year. Over-adoption of internal parasites medication technology is dangerous in the sense that it can result in a resistence built-up of a resistance against the specific remedy. After an in-depth discussion with Erasmus, Naude, McDonald and Schwalbach (1998), it was decided that the modelling will focus on the most common or important internal parasites in Qwaqwa, namely roundworms, tapeworms and nasal worms.

The list of internal parasite remedies used is presented in Table 5.21. HI-TET is the only remedy listed that is a wrong remedy for internal parasites. Some of these remedies have simultaneous action against two or three groups of internal parasites. This aspect was taken into consideration when classifying these farmers.

Table 5.21: **LIST OF CONVENTIONAL INTERNAL PARASITE REMEDIES USED AND THEIR RESPECTED RANGE OF ACTION**

Name of remedy (*Active principle* *)	**Acting against**			
	Roundworm	**Tapeworm**	**Nasal worm**	**Liver fluke**
Ranide *(Closantel 75 mg/ml)*	✔		✔	✔
Ivomec *(Ivermectin 1%)*	✔		✔	
Valbazen *(Albendazole 1,9%)*	✔	✔		✔
Lintex M/Ex-A-Lint *(Niclosamide 75%)*		✔		
Systemex *(Oxfendazole)*				✔
HI-TET 300 LA** *(Oxytetracycl. HCl 300 mg/ml)*				
Multispec *(Mebendazole 5%)*	✔	✔		
Tramisol Plus *(Levamisole HCl 2,5% Rafoxanide 2,5%)*	✔		✔	✔
Valbantel *(Albendazole 1,9%, Na-closantel 3%)*	✔	✔	✔	✔
Seponver Plux *(Closantel 25 mg/ml, Mebendazole 37,5 mg/ml)*	✔	✔	✔	✔
Prodose Lint *(Niclosamide 20%)*	✔	✔		
Ripercol *(Levamisole HCl 30 mg/ml)*	✔			
Flukiver *(Closantel 50 mg/ml)*				✔

* The active principle is shown in brackets.

** Wrong remedy for internal parasites.

Source: IVS Desk Reference (1998).

The results of the internal parasite remedy adoption are summarised in Table 5.22. A number of farmers make use of traditional remedies (natural herbal remedies) for the treatment of internal parasites (11 mutton sheep herds, 10 woolled sheep herds, 11 Boer goat herds and 17 Angora goat herds). The effect of these remedies is not known and therefore not considered in this study. More research on these herbal/ traditional remedies is recommended.

Table 5.22: **SUMMARY OF INTERNAL PARASITE REMEDY ADOPTION**				
Adopters	**Internal parasites (%)**			
	Mutton sheep (n=53)	**Woolled sheep (n=42)**	**Boer goats (n=29)**	**Angora goats (n=43)**
Non-adopters	4	0	3	0
Partial adopters	66	67	66	72
Full adopters	13	19	10	7
Over-adopters	17	14	21	21
Traditional remedies (n)	11	10	11	17

Four per cent of the **mutton sheep** farmers were non-adopters, 66 per cent partial adopters, 13 per cent full adopters and 17 per cent over-adopters. Amongst the **woolled sheep** farmers there were no non-adopters, 67 per cent partial adopters, 19 per cent full adopters and 14 per cent over-adopters. Three per cent of the **Boer goat** farmers are non-adopters, 66 per cent are partial adopters, 10 per cent are full adopters and 21 per cent over-adopters. Amongst the **Angora goat** farmers there are no non-adopters, 72 per cent are partial adopters, seven per cent full adopters and 21 per cent over-adopters.

The variation in the utilisation of remedies against three of the most important internal parasite groups is summarised in Table 5.23. Mutton sheep farmers showed a great variation of dosing times of between once and 12 times per year.

The variation in dosing times is the greatest amongst the woolled sheep and Angora goat herds for tapeworms. The dosage given varies from zero to 30 times per year in the woolled sheep herds and once to 30 times in the Angora goat herds. The second highest variation is in the dosage of roundworms also amongst the woolled sheep and Angora goat herds. All the maximum dosings, except for roundworms in the Boer goat herds, are more than double of the recommended number of times per year.

Table 5.23: **MINIMUM, MAXIMUM, MEAN AND MEDIAN TIMES DOSED AGAINST THE THREE MOST IMPORTANT INTERNAL PARASITES**

Internal parasite	Mutton sheep (n=53)	Woolled sheep (n=42)	Boer goats (n=29)	Angora goats (n=43)
Roundworms				
Minimum	0	0	0	0
Maximum	12	24	10	24
Mean	3	4	3	4
Median	3	4	3	3
Tapeworms				
Minimum	0	0	0	1
Maximum	12	30	9	30
Mean	3	5	4	6
Median	2	3	4	4
Nasal worms				
Minimum	0	0	0	0
Maximum	8	10	10	7
Mean	2	2	2	1
Median	2	1,5	1	0

The median times of dosing for roundworms in the woolled sheep herds on the minimum level as defined for the rest, is lower than the recommended programme. This is an indication that full adoption of roundworm remedies will be low. The median times dosed for tapeworms and nasalworms are within the definition of full adopters for most of the four types of small ruminants. However, the median times dosed for roundworms are lower than the minimum recommended programme. This is an indication that the full adoption of tapeworm and nasalworm remedies is relatively high and full adoption of roundworm remedies will be relatively low. It is therefore expected that full adoption of internal parasite remedies will be quite low and partial adopters quite high. This will be further discussed in Chapter 7.

5.11.4.4 Adoption of antibiotics

The following types of adopters were identified with regard to antibiotics (Erasmus, 1998; McDonald, 1998; Schwalbach, 1998). The definitions are the same for all four types of small ruminants.

- ***Full adopter:*** Uses both systemic and local antibiotics to treat sick small ruminants.
- ***Non-adopter:*** Uses no antibiotics.
- ***Partial adopter:*** Uses only either systemic or local antibiotics, but not both.

This category has full adopters, partial adopters and non-adopters. The adopter is the farmer who uses both systemic and local antibiotics, a partial adopter is a farmer who uses systemic or local antibiotics and the non-adopter uses either a wrong medication or no antibiotics. The usage of antibiotics is important in any small ruminant farm and eye infections were identified by Naude (1998) as one of the most important ailments of small ruminants in Qwaqwa that requires the use of antibiotics. Respiratory and digestive bacterial infections are also very common problems in small ruminant farming (Schwalbach, 1998).

The list of antibiotics used in Qwaqwa is presented in Table 5.24. Thibenzole, a worm remedy, is the only wrong remedy used in this category and only one woolled sheep farmer used antibiotics, eye powders and Thibenzole. This farmer can therefore be seen as an adopter of antibiotics.

Table 5.24: **LIST OF ANTIBIOTICS USED**

Name of remedy (*Active principle* *)
Terramycin 100 (*Oxytetracycline, HCl 100 mg/ml*).
Terramycin Eye Powder (*Oxytetracycline, HCl, Benzocaine 20 mg/g*).
Wound aerosol NF (*Dichlorophen 1%, Propetamphos 0,25%, Pine oil 2,5%*).
Airbiotic wound spray .
HI-TET 300 LA (*Oxytetracycline, HCl 300 mg/ml*).
Doxymycin (*Doxycline 25 mg/ml*).
Thibenzole (*Thiabendazole 17,6% m/v*).

* The active principle is shown in brackets.

The results of antibiotic adoption are summarised in Table 5.25. Antibiotic technology amongst farmers were fully adopted by 21 per cent of the woolled sheep and Boer goat farmers, 15 per cent of the mutton sheep farmers and 11 per cent of the Angora goat farmers. Sixty-nine per cent of the woolled sheep farmers, 66 per cent of the mutton sheep farmers, 30 per cent of the Angora goat farmers and 18 per cent of the Boer goat farmers partially adopted antibiotics. Nineteen per cent of the mutton sheep and Angora goat farmers, 17 per cent Boer goat farmers and 10 per cent of the woolled sheep farmers are non-adopters of antibiotics on their herds.

Table 5.25: **SUMMARY OF ANTIBIOTICS ADOPTION**

Adopters	Use of antibiotic technology (%)			
	Mutton sheep (n=53)	**Woolled sheep (n=42)**	**Boer goats (n=29)**	**Angora goats (n=43)**
Non-adopters	10 (19%)	4 (10%)	5 (17%)	8 (19%)
Partial adopters	35 (66%)	29 (69%)	18 (62%)	30 (70%)
Full adopters	8 (15%)	9 (21%)	6 (21%)	5 (11%)
Traditional remedies (n)	0	3	2	0

5.11.4.5 Adoption of vaccines

According to Naude (1998) the minimum recommended vaccination programme for small ruminants in Qwaqwa is pulpy kidney (twice a year for mutton sheep, woolled sheep, Angora goats and Boer goats), blue tongue (once a year for all four types of small ruminants) and black quarter (once a year for all four types of small ruminants). Non-adopters are using no vaccination at all and partial adopters are those farmers who did use vaccination but not the minimum recommended programme. Farmers who used a wrong remedy as a prophylactic for a certain disease instead of a vaccine, for example Terramycin, can be seen as wrong adopters. If they only use wrong remedies, they are seen as non-adopters. There are only one mutton sheep farmer, two woolled sheep farmers and two Boer goat farmers who used no vaccinations and wrong remedies.

The following types of adopters were identified with regard to vaccines (Erasmus, 1998; McDonald, 1998; Schwalbach, 1998). The definitions are the same for all four types of small ruminants.

- ***Full adopter:*** Uses all the minimum recommended vaccinations – pulpy kidney twice, blue tongue and black quarter once a year (No farmers in sample).
- ***Non-adopter:*** Uses no vaccination to prevent diseases.
- ***Partial adopter:*** Uses vaccination but not all the minimum recommended vaccinations.

This category of medication can be described as a preventative measure for the most common diseases that could be prevented by vaccination. Usually, vaccines should be used according to a specific programme, but sometimes after an animal has died with a certain suspected disease, farmers use vaccination as a late effort to prevent an outbreak and serious economical losses.

A list of vaccines used in Qwaqwa for disease control is presented in Table 5.26. The remedies Ivomec, HI-TET and Vitamin-A are not vaccines to prevent diseases as indicated in the mentioned table, but were used by some of the farmers for this purpose.

Table 5.26: **LIST OF VACCINES USED IN QWAQWA TO PREVENT SMALL RUMINANT DISEASES**

Name of vaccine (*Active principle* *)
Pulpy kidney vaccine
Blue tongue vaccine
Black quarter vaccine
Ivomec** *(Ivermectin 1%) (Ivermectin 1%)*
Botulism ("Lamsiekte")
HI-TET 300 LA** *(Oxytetracycl. HCl 300 mg/ml)*
Anhrax vaccine
Stiff sickness vaccine
Vitamin A Forte** *(A 500 000 iu, D 50 000 iu, E 50 iu)*

* The active principle is shown in brackets.

** Wrong remedy for diseases.

The results of vaccine adoption are summarised in Table 5.27. There are no full adopters according to the proposed minimum vaccination programme in any of the small ruminant types. There are only partial adopters and non-adopters in this category of medication technology. Eighty-three per cent of the mutton sheep farmers, 86 per cent of the woolled sheep farmers, 72 per cent of the Boer goat farmers and 72 per cent of the Angora goat farmers are partial adopters. Seventeen per cent of the mutton sheep farmers, 14 per cent of the woolled sheep farmers, 28 per cent of the Boer goat farmers and 28 per cent of the Angora goat farmers are non-adopters of vaccination technology. Vaccination patterns are too wide to work on a percentage for the partial adopters.

Table 5.27: **SUMMARY OF VACCINE ADOPTION**

Adopters	Diseases (Vaccination)			
	Mutton sheep (n=53)	Woolled sheep (n=42)	Boer goats (n=29)	Angora goats (n=43)
Non-adopters	9 (17%)	6 (14%)	8 (28%)	12 (28%)
Partial adopters	44 (83%)	36 (86%)	21 (72%)	31 (72%)
Full adopters	0	0	0	0
Traditional remedies (n)	0	0	0	0

Stiffsickness vaccine is an example of a wrong medication as only cattle can get this disease (Hunter, 1993). The clinical symptoms of severe nasal excretion are confused with a heavy attack of nasal worms, which is actually an internal parasite, or dust irritation (Naude, 1998). The three farmers who indicated that they vaccinate for botulism, also vaccinate for pulpy kidney and are classified as partial adopters. The same clinical signs are not seen amongst sheep but they are equally susceptible. The impaired sheep show sings of emaciation and degenerated feeding habits (Blood, Henderson & Radostits, 1997). There were three farmers who indicated that they vaccinate for stiffsickness, of which two also vaccinated for pulpy kidney and the other farmer vaccinated for black quarter and also giving Vitamin A wrongly. All three these farmers are classified as partial adopters.

5.12 AGRICULTURAL SUPPORTIVE INSTITUTIONS

Agricultural supportive institutions (cooperative, input suppliers and banks) are in general not freely or easily accessible and available to farmers in Qwaqwa. Figure 5.9 shows the accessibility level of the different institutions, as perceived by the local small ruminant farmers.

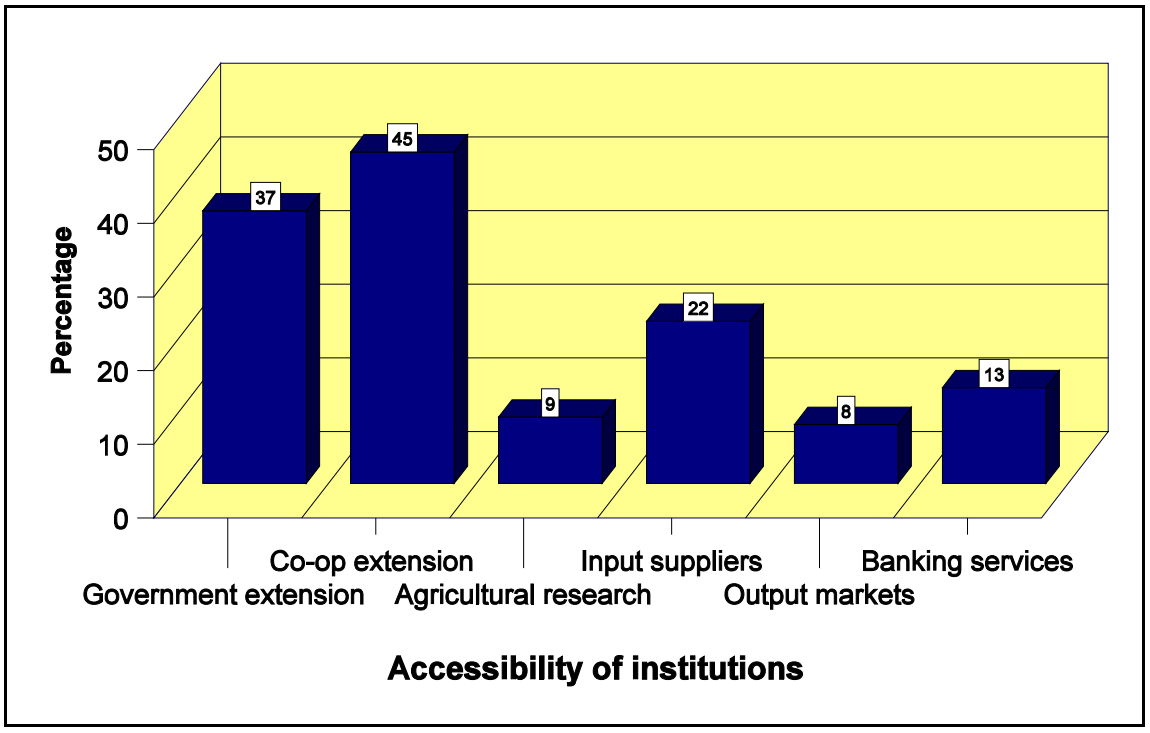

Figure 5.9: **Accessibility of institutions to farmers (%)**

Forty-five per cent of the farmers felt that the cooperative extension system is accessible and only 37 per cent regard the government extension system as accessible. Agricultural research is accessible in only six per cent of the cases and input suppliers in 22 per cent of the cases. Output markets are accessible in only eight per cent of the cases, and perhaps the most shocking result is that banking services are regarded as accessible to 13 per cent of the 99 farmers.

5.13 CONCLUSION

The educational level of the vast majority of farmers is very low. This is reflected on the relatively low capacity of need in English or Afrikaans, essential abilities for farmers to correctly adopt medication technologies with minimal assistance. Perhaps this is the main reason why a vast majority of the farmers regard the extension services as very important and a good part of the farmers approach them for technical, financial, marketing advice and information on new technologies.

The number of extension visits to farmers in general is very low, with a considerable part of the farmers not being visited at all. This is the reason why the extension services are considered as not easily available or accessible. The low availability of roads and transport discussed in Chapter 4, increased the transaction costs involved to obtain new technology information. These conditions in Qwaqwa, similar to most of the former homelands, are major constraints to an efficient diffusion/adoption of new livestock technologies which are essential to improve livestock production levels and the quality of life for local farmers.