

**EVALUATION OF THE MANAGEMENT PRACTICES OF SMALL-SCALE
DAIRY FARMERS IN THE NORTH-EASTERN FREE STATE**

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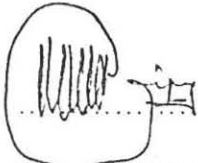
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DECLARATION OF INDEPENDENT WORK

I, Takisi Janki Masiteng, hereby declare that this research project submitted to the Technikon Free State for the awarding of the degree MAGISTER TECHNOLOGIAE: AGRICULTURE, is my own independent work that has not previously been submitted to any institution by me or any other person for the awarding of a qualification.



.....

SIGNATURE OF STUDENT

20/10/2000

.....

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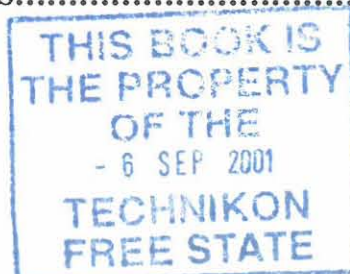
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EVALUATION OF THE MANAGEMENT PRACTICES OF SMALL-SCALE DAIRY FARMERS IN THE NORTH-EASTERN FREE STATE

SUMMARY

The study evaluated the management practices of small-scale dairy farmers in the North-Eastern Free State. The sampling area focused on small-scale dairy farmers in the former self-governing territory of Qwaqwa, as well as parts of the Harrismith, Kestell and Bethlehem districts where newly settled land-reform beneficiaries are concentrated. A total number of 114 farm units were established and 96 black farmers were settled by Agri-Eco.

Small-scale dairy farming in the North-Eastern Free State is mostly practised by black farmers on communal and state land farms. In the new political dispensation, small-scale dairy farmers are still "disadvantaged". These farmers struggle to secure financial assistance from financing institutions due to various reasons such as a lack of land tenure or other assets for security reasons, a lack of reliable marketplaces, poor infrastructure, inadequate production programmes and production experience, and a lack of technical know-how. The research found that most of the problems experienced by the farmers were related to the unresolved land tenure system (communal land), availability of water, working capital, veld burning, co-operation among farmers (farming group schemes) and extension services to advise small-scale dairy farmers. Regarding labour, all the small-scale dairy farmers in the sample made use of human labour due to a lack of the availability of mechanical implements. Regarding their future as small-scale dairy farmers and their aspirations and needs, farmers agreed that prerequisites for success are: knowledge, skills, training and co-operation among themselves. The study showed that future interventions aimed at improving and strengthening the sustainability and the livelihoods of the small-scale dairy farmers, ensuring equity and reducing economic vulnerability of small-scale dairy projects should take into account a number of different factors, which include the following: (i) Government should endeavour to provide an effective extension service, establishing linkages with formal channels of marketing, local markets and informal marketing systems, training in farming principles, financial assistance, assistance in obtaining a farm or more land, improving environmental conservation and promoting social infrastructure. (ii) Other farmers and neighbours can play

a major role in training, providing technical assistance to dairy farmers and providing advice on marketing. (iii) Participatory approaches are needed in addressing the problems and the needs of the small-scale dairy farmers, as they allow farmers to maintain full authority over land, natural resources and water management and management decisions. The study reveals that mixed farming should be promoted, since it is unlikely that small-scale farmers can make a living purely from dairying.

EVALUERING VAN DIE BESTUURSPRAKTYKE VAN KLEINSKAALSE SUIWELBOERE IN DIE NOORDOOS-VRYSTAAT

OPSOMMING

Die studie het die bestuurspraktyke van kleinskaalse suiwelboere in die Noordoos-Vrystaat evalueer. Die proefgebied het gefokus op kleinskaalse suiwelboere in die voorheen selfregerende gebied van Qwaqwa, sowel as dele van die Harrismith-, Kestell- en Bethlehem-distrikte waar nuut gevestigde landhervormingsbegunstigdes saamgetrek is. 'n Totale getal van 114 plaaseenhede is gestig en 96 swart boere is deur Agri-Eco gevestig.

Kleinskaalse suiwelboerdery in die Noordoos-Vrystaat word hoofsaaklik deur swart boere op gemeenskaplike en staatsgrondplase bedryf. In die nuwe politieke bedeling is hierdie suiwelboere steeds "minder bevoorreg". Hierdie boere sukkel om finansiële bystand van finansiële instellings te verkry om verskeie redes, byvoorbeeld 'n tekort aan grondbesit of ander bates vir sekuriteitsdoeleindes, 'n tekort aan betroubare markte, swak infrastruktuur, onvoldoende produksieprogramme en produksie-ervaring, en 'n tekort aan tegniese kundigheid. Die navorsing het bevind dat die meeste van die probleme wat deur die boere ondervind word, verband hou met die onopgeloste grondbesitstelsel (gemeenskaplike land), beskikbaarheid van water, bedryfskapitaal, veldbrande, samewerking tussen boere (boerderygroepsemas) en voorligtingsdienste vir die advisering van kleinskaalse suiwelboere. Betreffende arbeid, het alle kleinskaalse suiwelboere in die proef van menslike arbeid gebruik gemaak as gevolg van 'n tekort aan die beskikbaarheid van meganiese implemente. In verband met hul toekoms as kleinskaalse suiwelboere en hul strewes en behoeftes, het boere saamgestem dat die volgende voorvereistes geld vir hul sukses: kennis, vaardighede, opleiding en onderlinge samewerking tussen hulle. Die studie het getoon dat toekomstige ingrypings wat gemik is op die verbetering en versterking van die volhoubaarheid en die voortbestaan van die kleinskaalse suiwelboere, en wat gelykberegtiging sowel as die verlaging van die ekonomiese kwesbaarheid van kleinskaalse suiwelprojekte wil verseker, 'n verskeidenheid faktore in ag moet neem, wat die volgende insluit: (i) Die regering moet

poog om bystand te bied deur middel van effektiewe voorligtingsdienste, die daarstelling van skakels tussen formele kanale van bemarking, plaaslike markte en informele bemarkingstelsels, opleiding in boerderybeginsels, finansiële bystand, bystand in die verkryging van `n plaas of meer grond, verbetering van omgewingsbewaring en die bevordering van sosiale infrastruktuur. (ii) Ander boere en hul bure kan `n groot rol speel in opleiding en die verskaffing van tegniese bystand aan suiwelboere, sowel as die verskaffing van bemarkingsadvies. (iii) Deelnemende benaderings is nodig om die probleme en behoeftes van kleinskaalse suiwelboere aan te spreek, aangesien dit boere in staat stel om volle gesag te behou oor die grond, natuurlike hulpbronne en waterbestuur, en bestuursbesluite. Die studie maak die gevolgtrekking dat gemengde boerdery bevorder moet word, aangesien dit onwaarskynlik is dat kleinskaalse boere `n bestaan kan maak bloot uit die suiwelbedryf.

INTRODUCTION

1.1 PROBLEM STATEMENT

The pre-1994 government's policy of separate development has resulted in development challenges, especially in the previous homelands of Qwaqwa, Kwandebele, Kangwane, KwaZulu, Lebowa and the TBVC states (Transkei, Bophuthatswana, Venda, Ciskei). The challenge is to meet the needs and aspirations of an expanding and developing population. The most basic of these requirements for livelihood is gainful employment. The Qwaqwa area has a limited natural resource base. It is important that the limited available resources be fully utilised to produce food, create employment opportunities and contribute towards the country's economy. The needs and aspirations of people could be met through the development of sustainable livelihoods, taking into account the natural, physical, social, financial and human resources. Most of the rural small-scale farmers in African countries wish to improve their standard of living (Mukhala, 1999). Small-scale farmers would also like to make a profit, generate income, increase wellbeing, and improve food security and sustainability of environmental resources.

Small-scale dairy projects were initiated in 1989 by the old Qwaqwa government (Department of Agriculture) in the Qwaqwa extension wards of Makeneng, Tsheseng and Makwane. At Monontsha and Mangaung agricultural wards, individual farmers are actively practising dairying in backyards and on communal lands. Even after the 1994 general election the idea was propagated and implemented in various areas in the Free State province and beyond the geographical borders of the province. Four dairy projects were launched, namely Raohang Makeneng dairy, Metsimatsho dairy project (which was moved to Humewood experimental state land farm in 1994), Dinkoeng dairy and Delville dairy. The Department of Agriculture in the Free State province introduced a strategy of pioneering small-scale dairy farming programmes in their extension service, with the intention that it would, hopefully, encourage or stimulate people who were willing to farm with dairy cows (Ntsane, 1999). The former Agri-

Eco farm workers launched other small-scale dairy projects in the North-Eastern Free State. New farmers who are settled on state land (114 farm units) and land-reform beneficiaries on state land were also engaged to practice dairy farming.

A necessary step in studying farm management practices is the systematic gathering of information about the real farm situation. Thus, where government has undertaken capital-intensive projects, they should be monitored and the necessary support systems put in place on a regular basis. Failure to evaluate the situation and take early remedial action frequently results in the failure of the project. The evaluation of farm management practices is not an abstract science that can be conducted in isolation from the real situation of small-scale dairy farm operation (Ntsane, 1999).

In South Africa "small-scale" is often equated with a backyard, non-productive, non-commercial, subsistence agriculture that is found in the former homeland areas. It is generally associated with black farmers, generating the perception that black farmers do not have the ability to become large-scale commercial farmers (Kirsten & Van Zyl, 1998). Most black farmers, whether small-scale or not, have limited access to land and capital, and have received inadequate or inappropriate research and extension support in the past. For the purpose of this study, the definition of a small-scale dairy farmer in the new dispensation is "anyone who uses cattle and agricultural resources to derive all or part of their livelihood from dairy cattle, irrespective of the scale of operation". This definition recognises the farming community and the environment in which they live as a continuum or a spectrum (Van der Mey, 1995). For small-scale dairy farmers to be successful, they should be equipped with good management practices, technical skills and comprehensive financial, management and extension support. Supporting the needs of these new entrants is important and in accordance with the policy of the Provincial and National Department of Agriculture.

There has been insufficient research to specifically address the needs of the small-scale farmers or households in the developing farming sector. Scogings *et al.* (1999) stated that government inputs into services for farmers had been skewed in favour of commercial farmers in the past. Similar support should now be provided for both existing and new communal

farmers, such as those on redistributed, formerly commercial land that is now used on a communal basis. The agricultural extension service has not been effective in reaching the small-scale farmers with technological innovations. Extension has largely served the commercial, wealthier and motivated farmers and therefore tended to focus its client contact on innovators and early adopters in the hope that they would pass this information on in a 'trickle down' process to the rest of the community. Unfortunately, indications are that knowledge does not easily trickle down to peasants, but instead new ideas seem to diffuse effectively within homogenous cells of the community (Adupa & Düvel, 1999).

It is essential for government to develop a strategic management plan for farmers in order to facilitate a common area so as to identify a starting point for a programme of improvement. A viable strategic management practice resulting from the joint effort of technically trained staff, farmers and local organisations selected by the community, should be developed to bridge the communication gap. Hart (1999) believes that the nature and the type of services provided to the resource-poor farmers by means of the extension process are important to the success of the farming or value-adding activity.

An extension programme drawn up by the Department of Agriculture must be driven by demands as identified by the local surveys. The policy makers, planners and implementers of projects and programmes should focus on sound conservation principles and the integration of environmental issues into land reform projects in order to enhance the long-term sustainability and viability of the natural resource base (Dillon, 1999). As the majority of the newly settled clients are concentrated in the peri-urban, state land farms and communal areas, resources have to be directed to them and services redesigned and equipped to meet their varied needs.

It is important to note that this research project aims to improve and strengthen the sustainability and livelihoods of the small-scale dairy farmers. The research is responsive to small-scale dairy farmers' own interpretation of and priorities for their farming activities. The holistic approach adopted in this research attempts to identify the main constraints faced by farmers, as well as the promising opportunities open to small-scale dairy farmers. The research

will build upon farmers' own definitions of these constraints and opportunities. The research attempts to gain a realistic understanding of what shapes small-scale farmers and how the various influencing factors can be adjusted so that, taken together, they produce more beneficial outcomes. It also attempts to reflect the activities, needs and constraints of the small-scale dairy farmer, and to provide planners, implementers and policy makers with up-to-date information on small-scale dairy farming.

1.2 LITERATURE REVIEW

1.2.1 Introduction

1.2.1.1 The small farmer concept in South Africa

Smallholder type farming played a significant role in the supply of food to the diamond and gold mines during the latter part of the previous century (Van Rooyen & Botha, 1994). The Tomlinson Commission in the 1950s was the first to seriously promote the concept of small-scale farming as a development strategy. The small-scale farming approach advocated by Tomlinson was based on the observation that agriculture in "traditional black areas" had the potential to produce surplus agricultural commodities and to create the basis for economic development in the country. The concept of small-scale farming has been promoted, inter alia, by the Department of Development Aid (in its various forms) since the late fifties (Van Rooyen & Botha, 1994). Van Rooyen & Botha (1994) state that Tomlinson's vision also promoted the concept of "economic unit" farm sizes, which enabled a rural household to produce a reasonable income that would enable farmers to make a living through full-time farming.

As a result of decades of dispossession and race-based land laws, land distribution in South Africa is among the most biased in the world, with large capital-intensive farms dominating much of the rural areas. The result is that only 28% of South Africa's rural population (a large proportion are farm workers and their dependants) live on 88% of the agricultural land. Thus the remaining 12% of agricultural land supports 72% of the rural population in the overcrowded former homelands that lack the infrastructure for successful agriculture (Ministry

of Agriculture and Land Affairs, 1998). One of the main aims of Land Reform is to redistribute land to the landless, as well as farm workers, tenants and the historically disadvantaged so that it can be used for homes, for subsistence production and to improve livelihoods. In order to be sustainable, the Land Reform Programme must give people access to land right across the spectrum from subsistence farmers to large commercial ventures. This must go hand in glove with access to the water, support services and infrastructure that enable people to make productive use of land (Ministry of Agriculture and Land Affairs, 1998; Shackleton *et al.*, 1998).

Small-scale agrarian structure and relatively equitable distribution of land is an important asset, both for agricultural growth and as a social safety net. Despite what is often asserted, small-scale farming is no less efficient than large-scale farming. Decades of international agricultural research have failed to demonstrate economies of scale beyond what a family can manage comfortably on its own. The most productive agricultural sectors in the world are dominated by small-scale, part-time family farming. The small to average farm size should therefore be seen as an asset, not as an impediment to future agricultural growth. The secure right to land is one of the most important social safety nets imaginable (Sirur & Van den Brink, 1995).

Small-scale or smallholder agriculture in Africa has characteristic features that distinguish it from large-scale agriculture. In general, smallholder agriculture, which is not homogeneous, is a low-input and low-output system with wide social dimensions impacting positively or negatively on productivity. Paradoxically, however, small-scale agriculture is the linchpin of rural development in many African communities (Kotsokoane, 1999). An appropriate definition of small-scale farmers may enable the government to make black farmers the target of various support measures that would improve their access to resources, and also to redress the inequities created by past apartheid policies. The problem is that black farmers are not a homogeneous group and not all of them can be defined as small-scale, whether 'small' refers to land size, income or labour utilisation (Ministry for Agriculture and Land Affairs, 1998).

Production in agriculture is the judicious application of the production factors-land, labour and capital-by means of management in order to derive the maximum yield of agricultural products

(Du Toit Moolman & Burger, 1987). Land has a maximum production limit because the production potential is limited by the soil's physical properties, and thus land is therefore subject to the law of diminishing returns. The availability of land is becoming limited, while the demand for food increases annually. This necessitates increased production per unit surface area (Du Toit Moolman & Burger, 1987). The lack of availability of adequate amounts of suitable land at a reasonable cost to raise all or part of the needed feed (the fodder flow) can result in high feed costs in many areas. The advantages of not raising crops include more time to manage the dairy herd and eliminate the need for equipment. However, a real need for suitable grazing land exists for the small farmer (Matthee, 1997).

1.2.1.2 Profile of South African producers

Dillon (1998), Kirsten & Van Zyl (1998) as well as Kotsokoane (1999) conclude that, taking income as the main determinant, South African producers fall into the following categories:

1. Established commercial farmers, mainly white, with farming as the sole or substantial means of livelihood. Mainly full-time under leasehold or freehold tenure with good resources.
2. Resource-poor producers falling into the following subcategories:
 - ◆ Pre-commercial (step-up-progressive) with a reasonable income from farming. Mainly black and resource-limited under communal, leasehold or freehold tenure. Willing to learn improved farming techniques.
 - ◆ Semi-commercial (step-up) and not earning enough from farming to give up other employment. Severely resource-limited on communal or other tenure arrangements, including sharecropping.
 - ◆ Subcommercial (subsistence) with a negligible surplus for sale or storage. Extremely small parcels of land under communal tenure, including sharecropping. Land often lies fallow through lack of resources (finance, power, equipment, inputs and information). Upward mobility is restricted.

Small-scale farmers constitute the bulk of the world's farmers. Small-scale farmers operate in a context of increasing local population pressure, with a very small resource base and a

chronically low standard of living (Sirur & Van den Brink, 1995). Small-scale farmers live in the margin rather than in the mainstream of society in terms of political influence and the provision of health, education and other services and usually live in absolute poverty (Dillon & Hardaker, 1993).

1.2.1.3 Human needs and aspirations

Brundtland *et al.* (1986) stated that the satisfaction of human needs and aspirations is the major objective of developing countries. The basic needs for food, clothing, shelter and jobs are not being met, but beyond their basic needs these people have legitimate aspirations for an improved quality of life. The aspirations of livestock owners in the communal rangelands are constrained by stock theft, the lack of suitable labour, the lack of flexibility to change farming enterprises and the increasing human population. Brundtland *et al.* (1986) reported that sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life.

Carney (1998) explains that a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. Scogings *et al.* (1999) believes that in order to achieve sustainable agriculture in the communal rangelands, land use must be ecologically sound, economically viable, socially acceptable and politically supported. Sustainable agricultural production and conservation of natural resources should be emphasised in the agricultural policies of South Africa.

1.2.2 Livestock ownership

1.2.2.1 Livestock systems

Landless livestock production systems are found in rural areas all over Asia, while urban

systems are common everywhere in the developing world. Milk cattle, in particular, appear to be gaining in importance as the urban demand for milk rises (Wilson, 1995). The value of animals, animal production and animal holdings, be they cattle, sheep, goats or poultry, are of major significance for most of the citizens of the Free State (Van Niekerk, 1997). Cousins (1995), Krause (1997) and Scogings *et al.* (1999) indicate that livestock ownership in the communal rangelands is skewed and complex. It appears to be biased in favour of the more economically and politically powerful members of communities. In the free access system, it is a common scenario to find that a few wealthy farmers own most of the livestock. Those farmers, therefore, derive greater benefits from the common resource, without making a corresponding contribution to its management or maintenance, than the poorer people who, perhaps, depend more on the free resources. To avoid the further devastation of the natural veld and excessive grazing pressure, communally grazed land must be developed and properly managed. Only through the involvement of the community can proper management structures be implemented and be expected to function.

Cousins (1995) and Scogings *et al.* (1999) assert that the multiple uses of livestock (for example: animal traction, investment, milk) make them important in different ways to the various social groups of people. Scogings *et al.* (1999) is of the opinion that existing institutions provide neither adequate representation of farmers nor adequate extension, veterinary, marketing or financial services, and are unable to regulate the numbers of livestock, should such regulation be desired. As a result of the increasing human population, herd sizes per person are declining and grazing areas are being lost to housing, especially in the semi-arid and sub-humid areas. Given that livestock numbers appear to be remaining fairly constant, grazing pressure on the remaining rangelands will increase.

1.2.2.2 The role of livestock

Livestock herds on communal lands are multipurpose in character and yield reasonable rates of economic return per hectare when all their functions are valued. Multipurpose herds make sound economic sense compared to a single-purpose stocking rate among small-scale farmers (Cousins, 1995). According to Catizzone (1995), in all forms of livestock

(backyard animals, small ruminants or large livestock animals) farming is one of the most important components of agricultural production. The improvement of livestock farming covers three complementary fields:

- ◆ The protection of animals by strengthening natural resistance or tolerance to disease or parasites, by the improvement and development of vaccines, and through support for cost-efficient animal health care systems;
- ◆ The exploitation of the genetic potential of the indigenous breeds to increase their productivity under local conditions; and
- ◆ Finally the quantitative and qualitative improvement of food resources for livestock by better management of natural pastures and integrated production systems while having concern for conservation of the environment and stressing the recovery of deforested or otherwise degraded areas.

Dillon (1999) concluded that livestock production is an important component within the agricultural activities of the emerging sector. The time has passed when cattle, sheep, goats, horses and donkeys, were considered to be "men's animals" according to Basotho tradition. This implies that the money generated from selling livestock or livestock produce now belongs to the entire family. Therefore, the family has some incentives by investing in livestock. However, men's livestock is valued for more than its potential to generate income (Sirur & Van den Brink, 1995).

1.2.3 Dairy enterprise management

1.2.3.1 The dairy industry

According to Stewart (1995(a)), management is the Achilles' heel of successful dairying. As a result of the diversity of skills required, successful dairying puts more demand on management than does any other farming enterprise. Stewart (1995(a)) stresses the fact that dairy farming may be conducted as a sideline to some other main enterprise or enterprises, or as a single enterprise by the specialist dairy farmer who has no other enterprise. Several approaches exist in the field of resource management. At a broad level, resource management studies take the

physical environment as one basic departure point, the human attributes as the other, and the controls on the interaction between physical and human attributes as the third basic departure point. Claassen (1998) notes that for organisational convenience the human or managerial attributes are frequently grouped under the ethnological approach. The ethnological approach stipulates that cultural differences influence the way people perceive and use the resources of their environment. The use of a resource is therefore related to specified cultural themes and the perception of resources. Management is a farmer's understanding of what to do and when to do it. Sanitation, ventilation, feeding, treatment, close observation and the provision of adequate space for water, feed, rest and exercise are all important management practices (Stewart, 1995(a)).

In South Africa the dairy industry represents one of the largest agricultural sub-sectors in the country. It provides job opportunities for more than 60 000 people and accommodation for more than 360 000 dependants (Nqodi & Hagen, 1998). A statutory body called the "Milk Producers' Organisation" serves both commercial and small-scale dairy producers in the Republic of South Africa.

Establishing and selecting the type of dairy enterprise is largely a matter of personal preference. There are highly successful dairy enterprises representing all breeds and herd sizes varying from 25 to several hundred, grades and pure-breds, in nearly all parts of South Africa. This allows individuals and groups the flexibility to choose the type of operation best suited to available resources, personal interest and goals (Matthee, 1997).

The reasons for dairy farming being such a successful industry is that it is a stable business, relatively immune to drought, and an enterprise with a steady monthly income. Production costs and profits can also be budgeted monthly in advance (Maree & Casey, 1993). The demand for milk is continuously increasing, as more people in rural areas become aware of the nutritional value of milk. Milk is highly valued as part of a balanced diet and as a source of quality protein for man (Kohls & Uhl, 1990). For milk production to keep pace with the expected population increase over the next 10 years (that is to say, if the current pattern of consumption remains the same), the production of fresh milk should increase substantially to

meet the expected demand for dairy products (Nqodi & Hagen, 1998). However, the possibilities for territorial expansion remain limited, because areas ecologically suitable for dairy farming have already been exploited, and an increase in dairy herds at the expense of other livestock is not feasible. The solution therefore lies in the application of sound practices in breeding, nutrition and management of the dairy herd (Nqodi & Hagen, 1997).

1.2.3.2 Personal challenges to dairy farmers

Entering an environment of dairying without assets, managerial experience and skills was not only frustrating, but also affected the level of production and as a result proved to be impossible (Claassen, 1998). Barnard & Nix (1973) as well as Gordijn & Whitehead (1995) stated that adequate management and management ability are key factors in making a profit in dairy farming. Management skill, knowledge and familiarity with livestock raising, especially feeding and veld management practices, are essential among small-scale farmers. As emerging farmers have little experience with commercial livestock raising, especially in feeding and veld management practices, most adaptable breeds are more suitable (Krause, 1997). Dixon (1973) and Keele (1997) indicate that the whole idea of producing milk from grass is to obtain a better profit. The production cost of milk also needs to be reflected in as much detail as possible. Matthee (1997) concluded that the challenges facing potential new dairymen could be categorised into three general areas, namely:

- (1) The challenge of developing the personal characteristics needed for success in the dairy business;
- (2) the challenge of acquiring the resources needed to establish a dairy enterprise; and
- (3) the challenge of raising the average milk yield per cow by intensification of feed production.

Profitable cows have to be well selected, well fed (according to the milk produced) and comfortably housed (Slater, 1991). Barnard & Nix (1973) state that the attitudes to the uncertainty of farming operations and the willingness or otherwise to accept risks (which may be contingent on the relative availability of capital) are important in this context. The farmer who is prepared to take risks may adopt a system that would be quite

unacceptable to another who is more cautious and whose aim is a stable and reasonably assured income from year to year.

1.2.3.3 Farm management

Among others, Barnard & Nix (1973), Boehlje & Eidman (1983), Buckett (1988) and Van Reenen & Marais (1992) asserted that each farmer has objectives for his business. Management is concerned with ensuring that these objectives are attained. Farm management may be regarded as the process whereby a farmer organises, plans, motivates, co-ordinates and controls all the production factors of his farm business, namely land, labour, crop, stock, machinery and capital, in order to achieve certain objectives such as maximum profit, growth and an improved standard of living. Environmental factors, which can be physical, economic, political and sociological, may influence the production factors and the way in which the management processes are applied to them. This involves forecasting both the performance of the production factors and the influence of the environment. Thus there are five main processes, namely: (i) forecasting; (ii) planning; (iii) implementation (which is allied to operation); (iv) recording; and (v) controlling. According to the definition, the most important elements of management are:

- ◆ Objectives of the farm business;
- ◆ Decision-making in the farm business; and
- ◆ Farm management tasks.

Farm management is classified as a science, an art or a profession. Science involves systematic knowledge related to management functions (planning, implementation and control) and management resources (information, techniques, and principles). An art is a talent linked to certain personality traits, e.g. communication, negotiation, motivation, self-discipline and leadership. A profession, on the other hand, is a specific type of work that is done. Every profession requires certain knowledge and specific personality traits, involving elements of scientific ability as well as an art talent. The farm manager can evidently acquire certain aspects and develop others (The Standard Bank of South Africa Limited, 1988).

1.2.3.4 Labour management

Barnard & Nix (1973), Boehlje & Eidman (1983) as well as Stimie (1999) point out that with regard to labour the main distinctions are between family and hired labour, the latter includes both regular, casual and all categories, from general to specialist labour. Although hired labour consists mainly of regular workers, casual labour may still have an important part to play by supplementing the regular labour force at peak periods, and it may enable reductions in the level of the latter. The distinction between general and specialist labour is necessary because, while the former is a shared resource that is competed for by more than one enterprise, the latter is specific to a single enterprise. No farm can succeed without a team of dedicated farm workers. Without their hard work and their knowledge of how to prepare the soil and to care for the crops, there will be no progress. It is important that management consults with the farm workers, and respects their skills. Management and workers should work as a team. Helping people to help themselves is the only development approach that has long-term benefits in terms of increased production and wealth creation. However, Van Reenen & Davel (1991) and Van Reenen *et al.* (1995) noted that labour relations must be seen as one of the functions of an industrial society. The agreements entered into by means of contracts are then legally binding on all parties involved. After a farmer has entered into an agreement with his farm worker, the following aspects should also receive attention.

- ◆ The contract should be put in writing and the contents communicated to the farm worker.
- ◆ If the farm worker is not literate, the contents of the contract should be explained to him/her. The farm worker's confirmation (in the form of his/her thumbprint or signature) that the contents of the contract have been explained to his/her should also be obtained.
- ◆ Any subsequent amendments to such an employment contract should be added as annexures.
- ◆ The farm foreman and other interested parties should also note the contents of an employment contract.

Van Reenen & Davel (1991) as well as Van der Westhuizen & Viljoen (1998) argue that in South Africa there is presently a lack of training for farm workers. However, there are training centres all over South Africa, for example at Potchefstroom and at Elsenburg, where farm labourers are trained in various technical aspects such as tractor driving and maintenance, bricklaying and fencing. However, these facilities are inadequate. Apart from the formal training courses offered by agricultural institutions, much can be done on the farm by means of training classes (for example, one afternoon per week) to equip farm labourers with theoretical knowledge and practical skills.

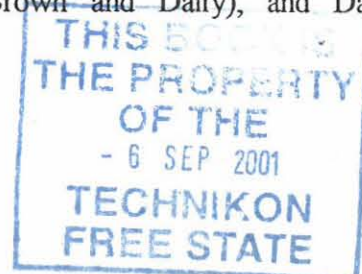
Kotsokoane (1999) further argues that lack of knowledge and skills among resource-poor producers and farm workers emphasises the need for education and training. Both farmers and workers need basic education (literacy and numeracy) to increase the level of comprehension and improve technical efficiency. This means investment in people to improve productivity. Kotsokoane (1999) reports that training should derive from a company's strategic plan and is intended to improve the trainee's performance. It should be job oriented, practical, and designed to develop human potential and talent.

1.2.4 Dairy cattle breeds

1.2.4.1 Importance of cattle breed

Maree & Plug (1993) assert that the indigenous breeds have provided cow's milk, an important part of the traditional diet of rural communities, since the earliest days of pastoralism. Fresh and sour milk is still a popular animal protein throughout Africa. This indigenous herd was not selected for milk production and is not suitable for intensive, high-volume systems. Nevertheless, the importance of the herd's role in sustaining rural communities cannot be ignored.

In South Africa, at least six breeds of cattle are recognised as being "dairy breeds". These are Holstein-Friesland, Jersey, Guernsey, Ayrshire, Swiss (Brown and Dairy), and Dairy



Shorthorn. Other breeds, such as Simmentaler, Red Poll, Dexter and South Devon, are occasionally seen in the milking parlour (Gertenbach, 1995). Gravert (1987) reported that where land is expensive, dual-purpose breeds are preferred, although there is no exact borderline between dairy and dual-purpose breeds as demonstrated by the Frieslands and Brown Swiss cattle. Maree & Plug (1993) conclude that high-quality pasteurised milk is readily available in all urban areas, and large regions of Southern Africa are well suited for intensive or semi-intensive systems of milk production.

1.2.4.2 Adaptation and acclimatisation

The traits of indigenous breeds can be combined with exogenous breeds to produce a suitable milk cow for rural regions. Jersey and Nguni crossbreeds hold much promise for subsistence agriculture in large, developing regions (Maree & Plug, 1993). According to Casey & Maree (1993), environmental adaptability may be defined as all factors that exert an influence on the ability of the animal to thrive in a specific environment. This includes its ability to utilise available feed, to walk long distances to its feed and water, and to thrive in both summer and winter conditions. The adaptability of animals is of cardinal importance to the cattle farmer. Should the animal not be adapted to its environment it will maintain a low level of productivity, which will result in indirect loss for the farmer. Stewart (1995(a)) and Conradie (1990) found that the environmental factors could be conveniently separated into three distinct subdivisions:

- ◆ the way in which the cow interacts with her herd mates;
- ◆ the interactions with the farmer and his labour, which can be referred to as stockmanship; and
- ◆ the physical environment, which includes the farm's facilities, climate and weather.

High temperatures and particularly high humidity are more stressful than the cold (Smith *et al.*, 1993). Muller (1990) found that rainfall significantly reduced the milk production of cows in the housing unit (from 15,23 to 14,79 kg per day) and in the open camp from 14,40 to 13,82 kg per day. A temperature above 27°C reduces the milk production of cows significantly from 16,05 to 15,83 kg per day. This reduction may be attributed to a high heat load. Conradie (1990) also confirmed that the milk productions of cows in camps were not significantly

affected by high temperature. The entire amount of milk produced by a cow is, to a large extent, controlled by environmental factors such as temperature, humidity and rainfall.

1.2.4.3 Animal housing and milking facilities

A well-planned farm with roads, buildings and fences that are properly sited is far easier to manage than a badly planned farm (Stewart, 1995(a)). Allen & Kilkenny (1980) and Smith *et al.* (1993) suggested that the design of buildings needs to take into account the number of cattle in each group, whether the floor will be slatted or bedded with straw, feeding arrangements, and the provision of drinking water. Water troughs should be on the opposite side of the pens to prevent crowding. One metre of watering space per 30 cattle is sufficient. Flexibility in the use of the building is always important, especially the ability to change to a different feeding system. On many farms all over the world milking is still done by hand in the same way as it has been done for thousands of years. On medium-to-large farms with large herds, the usual practice is to milk cows by machine.

Slater (1991) reports that for milk production to be carried out successfully on farms, certain items of equipment are essential, namely:

- ◆ Accommodation for the cow and young stock (where rearing is undertaken) including feeding arrangement and bulk feed stores;
- ◆ equipment for milking the cow and for the subsequent handling of milk;
- ◆ fixed equipment in respect of solid and liquid manure storage; and
- ◆ cattle handling facilities.

Stewart (1995(a)) concluded that all dairy farmers have a large investment in complex milking, which must be well maintained in order to meet the needs of the cows, the workers, the health authorities and the consumers. Amongst others, the regulations require that there must be a suitable and sufficient water supply on the dairy farm and adequate precautions must be taken against the risk of the water supply becoming polluted (Slater, 1991).

1.2.4.4 Herd health

According to Murray (1994), it is essential to integrate health care with production. Effective heat detection and sound Artificial Insemination (AI) practices, combined with a herd health programme, lead to reproductive efficiency. Regular herd health checks identify and eliminate potential conception-preventing conditions and problems. Blowey (1995) concluded that getting the cow in calf is one of the key priorities of a herd health programme. Healthy cattle are productive and it is the duty and the aim of dairy farmers to ensure that their cattle are fit, healthy and productive. The erosion rate in intensively fed dairy herds is high. The average productive life span of a dairy cow is in the order of 3.5 lactation and the most common reasons why dairy cows are culled are poor fertility, low milk production and mastitis. These conditions are interrelated in the sense that they are directly related to management. Various diseases in dairy cows are related to metabolic disorders due to high levels of feeding and milk production, intensification, stress and poor management (Smith *et al.*, 1993).

Herd health programmes, as recommended by the veterinarian, must include a way to avoid metabolic disorders and prevent or control infectious disease. Frequently with the increase in metabolic disease, opportunistic infection also increases. Stress from metabolic problems may decrease the cow's resistance and compromise the immune system's function. Cattle performance can be severely depressed if parasitic worm larvae, which infect the alimentary system, contaminate pastures (Rice & Grant, 1999). Bourne (1996) suggested the following criteria to be used by farmers to determine animals that should be included in a routine herd health check.

- ◆ All animals bred 35 days or longer, not previously checked pregnant.
- ◆ All cows calved 10 days or longer, and those not bred.
- ◆ Any animal that has required more than two inseminations.
- ◆ Any cow fresh longer than 42 days and which has not been observed in heat.
- ◆ Any animal cycling abnormally and showing evidence of heat more frequently than every 19 to 22 days or at intervals greater than 23 days.
- ◆ Any animal previously checked pregnant that has since showed abnormal discharges or



behaviour.

- ◆ Any animal the veterinarian asked to re-examine from a previous visit.

Results concerning mastitis prevention and control policies suggest that a large number of producers are applying ineffective mastitis control measures (Conradie, 1990). Some problem areas in this regard are a lack of hygienic calving facilities, unsatisfactory milking procedures (udder preparation, milking hygiene, teat dip), unskilled milking operators and insufficient experienced supervision (Conradie, 1990). According to Bickert (1996) sub-clinical mastitis costs money in terms of lost milk production. Failure to manage mastitis influences dairy producers from three directions, namely: (1) reduced milk production, (2) treatment costs, and (3) reduced milk quality. Bourne (1996) concluded that if a producer reduces his bulk tank Somatic Cell Count (SCC) from 500,000 cells per millilitre (ml) to 200,000 cells per ml, the producer would recover 5 percent of the milk production cost at the higher SCC. According to Bickert (1996) the management areas that affect SCC are:

- ◆ Milking Procedure;
- ◆ Milking Equipment;
- ◆ Housing and Environment;
- ◆ Nutrition; and
- ◆ Genetics.

Whatever milking system is used, the milk produced must be as clean as possible. Letuka (1999) reported that it is essential to have an adequate supply of clean water, access roads, and electricity for the milking and cooling equipment. Milk and milk products should be safe (not harmful), sound (free of spoilage, no objectionable taste and odour, etc.) and wholesome (have nutritional value). Milk should be cooled as soon as possible after milking. Bulk tanks must cool milk down to 7°C within two hours. The aim of pasteurisation is to destroy pathogenic micro-organisms (and most spoilage organisms) without making noticeable changes to the nutritional value of the milk. Farmers must meet the legal requirements for producing raw milk with respect to the health of the cows, the milking equipment and storage.

1.2.4.5 Breeding and selection

Breeding soundness through the examination of bulls, or "fertility testing" as it is often incorrectly called, is well recognised as an essential step on the ladder to efficient cattle breeding. Breeding soundness examinations should firstly be done at the time of sale or purchase of a bull. Investing in a breeding animal without checking his ability to function is like taking one's chances in a lottery. Examination should be done a few weeks prior to the beginning of the breeding season, whether the animals are youngsters being bred for the first time or adult bulls that have been used in previous seasons. One single infertile bull can wreak havoc on a farmer's calf crop and his bank balance (Irons *et al.*, 1997). When buying a new bull, the bull should be brought to the farm well before the mating season and tested for fertility by a veterinarian. As with AI, this method, which is used mostly by stud breeders, requires strict observation. Successful AI depends entirely on effective and accurate oestrus observation (Allen & Kilkeny, 1980; Ferreira, 1990; Smith *et al.*, 1993). It is also advisable to conduct a fertility test on all bulls prior to the commencement of the mating season. Nieuwoudt (1998) reported that in most cases farmers use AI in conjunction with the services of a bull. The reason for this is that the bull is used on the cows that have problems in conceiving as well as on heifers. Some farmers use only the bull on all the cows. Whether the bull is used as a backup, or as the only means to get the cows pregnant, it is better to practice hand-mating because it permits the following:

- ◆ Accurate record keeping of mating date, calving date and reproduction problems;
- ◆ A greater number of cows can be served this way; and
- ◆ Calving intervals can be controlled.

The advantage of AI and hand-mating is the detection of heat in both the mature dairy cows and heifers. It is impossible to tell with certainty how many cows a bull can serve, because the bull's ability to impregnate depends on a great variety of local, environmental, nutritional and other factors. Generally speaking, it can be stated that a bull is able to serve 100 to 200 times a year, when hand-mating is applied. The bull should then be allowed to serve a cow on heat only once during the heat period. Bull calves reach sexual maturity at the age of seven to nine months, but they should not be used before the age of about thirteen months, and then

occasionally, not more than once or twice per week until the age of two years (Nieuwoudt, 1998).

According to Korver & Van Arendonk (1988) and Letuka (1999) selection is one of the most important aids that farmers can use to improve their dairy herd. The genetic mean of the population must, however, be maintained or improved when selecting male or female animals. A study of an animal progeny, measurable merits or traits of the production records must be looked at when doing selection. Unless a breeder (whether he is a stud breeder or a commercial breeder) follows a sound breeding policy, he will have little chance of bringing about something of permanent value. The chances of success are limited and the chances of remaining in the breeding business are very slim if the Breeder does not follow a sound breeding policy. The breeder who believes in buying a herd bull solely because the bull has won a prize at a show or has come from a well-known breeder irrespective of adaptability to management or breeding policy, may well become a disillusioned and very disappointed producer.

1.2.4.6 Managing reproduction

Ferreira (1990) sees management as playing an important role in the average calving interval of a dairy herd. It is essential for cows to calve regularly. The ideal is for a cow to calve once a year, which will give a calving interval of 365 days. Ferreira (1990) reported that reproduction in a dairy herd is important for the following reasons:

- ◆ It indicates the milk-production phase; and
- ◆ It ensures the birth of calves of which the heifers can be reared as replacement animals.

The average calving interval of dairy herds participating in the Dairy Cattle Performance and Progeny Testing Scheme is 396 days (Nieuwoudt, 1998). The most economical production cycle of the cow is 360 days. In practice it means that the cow is served 60 days after calving, dried off at 300 days, steamed up from 320 days, and re-calves at 365 days (Ferreira, 1990; Nieuwoudt, 1998). An attempt to keep the cycle as near as possible to 360 days is seldom successful.

Bourne (1996) found that most animals exhibit heat signs every 21 days, with a range of between 18- and 24-day intervals. The average length of standing heat is 18 hours. Ovulation occurs 24 to 30 hours after the onset of standing heat. The correct time to inseminate is towards the later stage of the heat cycle. Ideally, one should inseminate 12 to 30 hours from the beginning of standing heat (Martin, 1998).

1.2.4.7 Feeds and feeding

Bourne (1996) and Rice & Grant (1999) asserted that nutrition, management and selection should not be overlooked. Nutritional imbalances, deficiencies, or erratic management of feeding programmes for dairy cows can create large numbers and various types of health problems generally categorised as metabolic diseases. Compounding the problem are the ever-changing nutritional needs of the cow, her lactation/dry period needs, feed quality changes, and producer's personal management practices. Bourne (1996) believes that after lead feeding, cows should be challenged for higher production by feeding for 110 to 115% above their current level. Once peak milk has been achieved (6 to 8 weeks) cows can be fed according to production and body condition. The cows' ability to produce milk outruns their ability to eat in early lactation. Farmers must maintain at least 40:60 forage-to-concentrate ratio and take advantage of body reserves.

In small-scale operations a large amount of the daily feed and nutrients that the animal requires to produce milk is obtained from the natural pastures (Krause, 1997). Moteka (1999) reports that the amount of concentrate needed to feed cows is governed by the quality of the pasture or roughage. Production from grass is not simple, although it forms the cornerstone of the livestock's production systems. Decisions on grassland management and veld-burning management play a key role in the operation of the systems, and decisions on grassland management are complex, involving the integration of grazing and conservation. Also, management must cope with variations in grass growth during the season and from one season to the next (Allen & Kilkenny, 1980). Knowing the rate of herbage production and the nutrient requirements of cattle makes it possible to establish guidelines for stocking rates, which will ensure that grass is utilised efficiently. The growth

stage at which fodder crops are cut has a substantial influence on the nutritional value, feed intake, digestibility and ultimately also on milk production (Allen & Kilkenny, 1980). To compensate for the nutrient deficiency, more concentrates must be used in order to maintain milk production at an acceptable level (Ferreira, 1990).

Feed cost is the single biggest item in a milk-production unit. Feed could constitute as much as 70 percent of expenditure. Feed costs could therefore have a major influence on the economics of a milk-production unit. The use of good-quality roughage could play an important role in economic milk production. In any dairy feeding programme, dairy farmers aim to use as much roughage as possible. However, if the roughage is not of high quality, then there is a limit to the amount that can be fed profitably (Hall & Mortenson, 1956; Dixon, 1973; Ferreira, 1990; Klug & Webster, 1993; Matthee, 1997).

Ferreira (1990) and Smith *et al.* (1993) seem to believe that the following factors affect feed intake by dairy cows.

- ◆ The breed of dairy cow: different breeds not only differ in size but also in production, for example Jerseys are small in size but produce a higher percentage of butter fat than Frieslands.
- ◆ Age of animals: younger animals need more protein than fully grown animals.
- ◆ Body size and body weight are positively related to feed intake.
- ◆ Milk production: dairy cows must be fed according to their milk production.
- ◆ Palatability of feed components and wholesomeness: the feed would be useless if it did not taste good, and then animals would refuse to feed on it.
- ◆ Digestibility of feed is positively related to feed intake, especially in the case of roughage, and is also affected by feed composition (for example fibre content and protein content) and feed preparation.
- ◆ Feeding frequency is positively related to feed intake.
- ◆ Physical form of feed: grinding or chopping decreases the digestibility of roughage, but increases the intake.

In all livestock farming situations it is essential to build up reserves of fodder to counter

droughts and other calamities such as hail, fire and army worm. The fodder bank is a store of conserved fodder (hay or silage), which is deliberately accumulated above normal seasonal requirements for use in unpredictable, lean times (Klug & Webster, 1993). A fodder bank is not a permanent or separate store in the sense that a particular silo or hay shed is the fodder bank. Rather, fodder is built up year by year, one part being for dry-season feed and the other part for reserve. The oldest stored fodder is always fed first, whether for normal use or for emergency, and fodder in stores will seldom be more than two to three years old. This is especially significant for hay, which deteriorates far more rapidly than silage does (Klug & Webster, 1993). Part of the fodder bank may consist of a rested veld, but this is inadequate in many situations. Research has shown that conserved grass in the form of hay and silage is the cheapest source of starch and protein available for winter-feeding. Grassland can make an increasing contribution to the economics of dairy farming (Slater, 1991).

1.2.4.8 Care and handling of dairy cattle

A dairy cow performs well when treated with care. It is essential for the dairyman to be in personal contact with the animals in order to learn the peculiarities and requirements of each individual cow. The dairy animal's environment has profound effects on her productivity, by affecting her growth rate while young, and on her reproduction and milk production as a cow (Stewart, 1995(b)). The care and management that the parturient cow receives will subsequently have an important influence on the health and viability of the calf. In a dairy herd a certain number of the cows have to be replaced each year. Replacements are necessary as a result of disease, infertility, age or death (Stewart, 1995(b)).

Niewouldt (1998) reported that the dairy cow must use most of the energy and nutrients for the production of milk. Cows must be kept free of disease, internal and external parasites, flies and anything that might cause them discomfort. Shelter against heat, cold, rain and wind must be provided. The ideal temperature for a milk cow lies between 4.4°C and 18.3°C. Other important points are:

- ◆ Cleanliness of surroundings;

- ◆ Clean, cool water that is well situated;
- ◆ Good nutrition;
- ◆ Comfortable milking conditions;
- ◆ Trimming of feet;
- ◆ Adequate ventilation without troughs;
- ◆ Control of "boss" cows; and
- ◆ Dehorning of cattle and control of flies, ticks and other parasites.

1.2.5 Record keeping

A comprehensive internal farm management information system consists of the respective records and financial statements, as well as analyses and interpretations of the results (The Standard Bank of South Africa Limited, 1988). Ferreira (1990) asserted that effective management depends on accurate record keeping. Without records it is not possible to manage any milk production unit effectively. A high level of management can be maintained in a herd by keeping proper and complete records. Barnard & Nix (1973) state that records need to be kept for three main purposes, namely to check on performance, to guide future decisions and to provide planning data.

Venter (1997) states that inadequate records lead to inadequate information for sound management decisions. Record keeping has the following advantages, listed below:

- ◆ It gives a clear but concise picture of the whole enterprise.
- ◆ It calls attention to weak links and problems throughout the entire enterprise.
- ◆ It invariably leads to increased production.
- ◆ Its analysis makes it possible to estimate the profitability of the enterprise. Records are indispensable for selection purposes.
- ◆ It increases the sale value of breeding stock.
- ◆ It stimulates interest.

The following records should be considered important: milk recording, herd register, reproduction records and calving dates (Venter, 1997).

To obtain a complete picture of the entire farming enterprise, the farmer must also record physical information concerning his various branches of production. The following are some of the most common records used (Van Reenen & Davel, 1991):

- ◆ Land records: In these records the land or size, soil potential and soil fertility are recorded.
- ◆ Livestock records: These records are used to reflect all essential information concerning the livestock branches. The initial as well as end values of livestock are recorded and also the feed and remedies used per group during the year. For this purpose the livestock must be grouped into meaningful groups such as breeding bulls, heifers under two years of age, and steers between 1 and 2 years. Where there is a dairy enterprise, the yields of individual cows are also recorded in these statements.
- ◆ Miscellaneous records: In addition to the above statements, the farmer could also develop and use the following:
 - A farm map,
 - Mechanisation records,
 - Records of fixed improvements and equipment.
- ◆ Labour records: Labour records are used to keep track of all matters concerning the labour force. Information usually recorded here includes the number of labourers, service contracts, salaries and leave, and advances and debts. Where an enterprise is very labour-intensive or where labour could present a problem, it is recommended that an accurate record be kept of the duties performed by individual labourers.

1.2.6 Dairy product marketing

The milk marketing system has been influenced by the characteristics of the production process and the products. The resources used in dairy farming are highly specialised, with few alternative uses. High capital costs and long biological lags are involved in expanding or contracting the dairy cow herd. As a result, farm resources are slow in adjusting into and out of milk production. Eventually, the marketing system and consumers must adjust to the available milk supply (Kohls & Uhl, 1990). Small manufactures often run into marketing problems. The solution proposed to remedy these problems is generally the provision of training in marketing

skills. However, small manufactures (and small farmers) generally do not market their products themselves, but rely on middlemen and traders for information about the demand side of the market. Hence, to promote the marketing of small business products, initiatives other than training in marketing techniques should be considered (Sirur & Van den Brink, 1995).

According to Kohls & Uhl (1990) milk marketing methods have changed considerably over the years. In the 1930s, over 75 percent of all milk was home delivered, seven days per week, in quart-sized glass containers. During World War II, as an economy measure, delivery was cut to every other day. In the 1950s, only 50 percent of milk was delivered to the home, three times per week, and disposable containers were introduced. By the 1970s, 90 percent of all milk was sold in grocery stores, most milk containers were disposable, and a wide variety of container sizes were available. These trends illustrate that delivery of milk is more costly than sale through stores and it is more profitable to market milk in larger packages. Nutritionally speaking, milk has a lot going for it. However, in today's marketplace, it takes more than a great assortment of vitamins, minerals and amino acids (such as proteins) to move the product from the farm to the consumer (Tutt & Tripician, 1999).

Boehlje & Eidman (1983) have suggested that in addition to production and financial planning, farmers must develop marketing plans. With the increased variability in commodity and input prices and the higher risk faced by many farmers, market planning is much more important than it has been in the past. Developing a marketing plan requires answers to six basic questions, namely (1) when to set the price, (2) where to price, (3) what form, grade, or quality to deliver or purchase, (4) what services to provide or acquire, (5) what method to use in pricing, and (6) when and how to deliver.

Ortmann (1999) also reported that farmers in South Africa have various opportunities to reduce price risks for commodities not yet produced, or for inputs needed in the future, through various marketing arrangements such as co-operative marketing with price pooling, forward contracts for product sales or for input delivery, and hedging on futures markets. However, collecting relevant market information is an important risk management strategy.

MATERIALS AND METHODOLOGY

Each province needs to establish its own philosophy of agricultural extension, which tells extension workers what purpose their work serves, why they are directing resources into given programmes, and how they should determine priority and target groups. It also establishes the rationale for analysis, problem diagnosis, decision making, action and evaluation. Steps in the Farming System Research and Extension (FSR/E) model for development and extension of new agricultural technology were looked into, as outlined by Bembridge (1991) during the survey process among small-scale dairy farmers. A multidisciplinary approach is particularly useful and best suited for documenting the experiences and problems of small-scale dairy farmers. The Participatory Rural Appraisal (PRA) shopping basket, zigzag transect and temporal information (seasonalities and timeline) approach, as outlined by Chambers (1990) and Van Zyl (1999), were also employed in the survey processes during the data-gathering process.

2.1 OBJECTIVES OF THE STUDY

The overall objective of this study is to evaluate the management practices of the small-scale dairy farmers in the North-Eastern Free State Region.

The specific objectives are listed below.

1. To evaluate and to understand the core activities and services rendered by the small-scale dairy farmers in the North-Eastern Free State.
2. To assess the efficiency and the effectiveness of those activities and services.
3. To understand the needs and the aspirations of small-scale dairy farmers.
4. To ascertain how support rendered to small-scale dairy farmers can be improved.
5. To examine the key constraints and opportunities of small-scale dairy farmers.
6. To modify the existing system or to change to an entirely different one. Either way, it is

necessary to evaluate both the existing and the proposed situation.

2.2 DESCRIPTION OF THE STUDY AREA

2.2.1 Background

The research was conducted in the former self-governing territory of Qwaqwa, which is situated in the north-eastern corner of the Free State. The Qwaqwa Transitional Rural Council (TRC) area of jurisdiction represents the whole of the Qwaqwa magisterial district, excluding the area of jurisdiction of the Phuthaditjhaba Transitional Local Council (TLC). The Qwaqwa TRC consists of mostly peri-urban communities. The area is divided into five agricultural wards. The total surface area of Qwaqwa comprises 1,45 million hectares. This area of jurisdiction does not include the state land adjacent to Qwaqwa that is presently being redistributed to former Qwaqwa residents (Van Zyl, 1998).

Lesotho and Kwazulu-Natal surround the study area. The study area includes the whole district of Witsieshoek as well as parts of the Harrismith, Kestell and Bethlehem districts. For the purpose of this study the new area incorporated in 1984 in terms of proclamation R 181 (First Consolidated Area), including land purchased in terms of proclamation R 131 and R 216 (1984 Consolidation Area) for agricultural production purposes, and the Tribal Area through which the Qwaqwa government has transferred 16 000 hectares and 34 000 hectares of land to the Batlokwa and Bakwena tribes respectively, are included (Claassens *et al.*, 1991). The geographical location of the sample area is shown in Appendix B.

2.2.2 Topography and drainage

The study area's topography is characterised by its mountain landscape. This relates to the geology of the area, with the Drakensberg series to the south, as the most prominent relief aspect. Well-defined drainage patterns have also been established through erosion. They drain mainly in a northerly direction and many rivers or streams have their spring within the study area. This area falls within the catchment area of the Vaal River and no major water schemes

occur within the Qwaqwa area, except for the Fika Patso and the Metsi-matsho dams. The general characteristic of the topography is an uneven landscape with complex drainage systems. Large parts of the area are inhabitable and fall within floodline areas. The existence of high areas, namely the Lesotho Highlands, as the southern boundary of the area, has a definite influence on both the climate and the drainage pattern (Free State Department of Agriculture, 1998).

2.2.3 Population

Data on rural areas are presently very scarce and it is necessary to rely on surveys done in the old political dispensation (Ntsane, 1999). The current survey done by the Qwaqwa Transitional Rural Council (TRC) in collaboration with the Central Statistical Service in 1999 reveals that the current estimated total population for the Qwaqwa area of jurisdiction, representing the whole of the Qwaqwa Magisterial District, excluding the area of jurisdiction of the Phuthaditjhaba TLC and the state land adjacent to Qwaqwa, is 366 616, making use of the national average compound growth rate of 2,06% to project this figure from the 1991 census statistic. Qwaqwa has a high population density, few natural resources, few agricultural opportunities and low economic potential. Most of the people rely for survival on migrant workers sending money home. A survey conducted by Van Zyl (1998) estimated the total rural population for 1995 to be 498 059 while the population for Phuthaditjhaba was estimated at 123 550. Projected at the compound growth rate of 2.06% the estimated rural population for 1998 is therefore 540 385. The population estimated for 1998 for Phuthaditjhaba is 134 049. These figures represent an urban : rural ratio of 1:3.

2.2.4 Overview of surveyed area

Qwaqwa is one of the few rural areas that shows a resemblance to an urban area. Influx has been experienced since 1994, although the urbanisation rate might have decreased in recent years due to fewer job opportunities in the area. However, the unemployment rate for this area is still estimated to be 42% (Van Zyl, 1998). In the Qwaqwa area individuals are granted crop production land on a traditional basis, whereas grazing rights are allocated and utilised on a

communal basis. Agricultural production usually takes place on a small scale. Mainly beef cattle, dairy cattle, sheep, goats, grains such as maize and beans, broiler chickens, eggs, vegetables and fruit are produced. Farming areas, as indicated in Appendix B, were identified and surveyed, as they have the largest concentration of developing dairy farmers with different farming systems and management practices in the North-Eastern Free State.

2.2.5 Agricultural sector

The ex-homeland areas of Qwaqwa and Thaba-Nchu predominantly practice backyard farming. Mainly grains, broiler chickens, eggs, vegetables and fruit are produced. Stockfarming is done with beef cattle, dairy cattle, sheep and goats. Grazing takes place on a communal basis, where good soils and water and the pleasant climate of the North-Eastern Free State stimulate interesting new farming ventures (Claassens *et al.*, 1991).

Vegetation: The North-Eastern Free State is characterised by the palatable climax species. Around communal lands palatable climax species are depleted due to persistent defoliation. Unpalatable pioneer species replace these grass species, i.e. veld retrogression takes place. The veld has deteriorated and this makes soil more prone to erosion and the formation of gullies. Inadequate grazing forces cattle to overstep the boundaries of neighbouring farms. Such cattle are impounded and this results in social conflict between the two parties (farmers on state land and those on communal lands). As in the tribal areas of, amongst others, Kwazulu-Natal, the crop production land in Qwaqwa is under-utilised, whereas the grazing is over-utilised (Claassen, 1999).

Climate: Qwaqwa is in a summer rainfall region with an average annual rainfall of about 800mm between October and March. The average maximum summer temperature is around 26°C with the minimum winter temperature between -3°C and -6°C. Snow is also present during the winter months. Research has shown that the climate in the North-Eastern Free State is not regarded as an obstacle to any agricultural or industrial development. The area has a flourishing industrial area and has exceptionally good agricultural potential. No prominent prevailing winds are prevalent in the region, but katabatic and anabatic flows from the higher

lying Lesotho can be present which causes a drop in temperature and can be aggravated when snow has fallen on the Drakensberg Mountains. The latest statistics regarding the direction and speed of winds in Qwaqwa, as supplied by the Weather Bureau Office of the Department of Environmental Affairs, show that the highest average speed is 4,3 metres per second. The highest direction frequency (15,7 percent) is from the west with an average speed of 4 metres per second (Free State Department of Agriculture, 1998).

2.3 DEVELOPMENT OF THE QUESTIONNAIRE

In order to satisfy the objectives of the study, a questionnaire was developed for specific use among small-scale dairy farmers (See Appendix A). The questionnaire contains structured questions. The related research project from the economic services division of the Department of Agriculture of the Free State Province in 1998 was used as a guideline in compiling the questionnaire, and it followed a logical and appropriate sequence. The wording has been carefully selected, taking care that there are no ambiguities. The spaces provided on the questionnaire for recording information were arranged appropriately so that the data would be readily accessible for analysis.

The questionnaire was divided into four sections. Section 1 asks respondents to give personal data such as age, level of education and household composition. Section 2 consists of questions related to farming practices. Section 3 focuses on farm management. Section 4 reflects marketing actions and the level of success of the farmer. The level of success was measured with the aid of a five-point systematic differential scale ranging from very low to very high. In the questionnaire provision was made for comments by farmers by means of open-ended questions. Four small-scale dairy farmers were identified for the pilot study with the questionnaire. Minor corrections were made before the questionnaire was finalised.

2.4 SAMPLING METHODS

A random sampling was employed throughout the survey to select the respondents.

2.4.1 Method of surveying

The collection of the relevant data was done using three techniques adopted from Dillon & Hardarker (1993).

(a) Desk research - the use of secondary data:

- ◆ This has been done by reviewing the available secondary data, that is, information already collected by others and from available publications, reports in the files of the Department of Agriculture and other relevant agencies.

(b) Qualitative data collection:

- ◆ Personal communication with farmers as a group and as individuals.
- ◆ Informal talks with individuals in the field of agriculture.
- ◆ Brief notes were taken and informal talks were held after interviews, and the information was added to the formal data bank.

(c) Quantitative data-gathering farm surveys:

- ◆ Farmers complete the questionnaire (Appendix A).
- ◆ Project and farm records were used to strengthen the survey (informal observation and systematic observation).

Data collected in this manner provided valuable information.

2.4.2 Criteria

During the process of selecting respondents in each area, the following groups of farmers were selected:

1. Dairy projects with a group of two to six farmers, on the land allocated by a chief;
2. Dairy farmers farming as individuals on the land allocated by a chief, or farmers on a cattle post near the mountain, as well as those using any open space near and away from (1 to 10 kms) the villages;

3. Individuals and groups of farmers on state land farms;
4. Non-commercial farmers;
5. Urban and peri-urban farmers; and
6. Those producing surplus milk.

2.5 DATA CAPTURING

Data collection and interviews took place between May and July 1999. All the respondents interviewed were black small-scale dairy farmers. The areas were identified and in each agricultural ward at least 6 small-scale dairy farmers were identified and interviewed. The selection ranged from farmers on cattle posts, those practising backyard farming, respondents farming at project and farm level as a group or as individuals, and individuals farming on communal land and state land, adhering to certain quantifiable criteria as shown in paragraph 2.4.2. It was ensured that each member of the sampling population had the same probability of being chosen. The sample size selected was 80 respondents. It was expected that approximately 15% of the total number of questionnaires would be spoiled during the compilation process.

The interviews were held with individual farmers at their respective farming areas. Due to of the qualitative, descriptive nature of the research, the interview schedule was structured and included several issues, with mainly open-ended questions to allow for probing and in order to give farmers the opportunity to supply elaborate, detailed answers. The questionnaire was not handed to the farmers to fill in but was only used by the interviewer. The language used in the interviews was Sesotho. The researcher personally conducted all interviews and the completion time varied between 60 and 120 minutes. Small-scale farmers were co-operative. Areas in Qwaqwa where small-scale dairy farming is actively practised and where the research was conducted are given below in Table 2.1.

Table 2.1: Sample size of different types of small-scale farmers on communal land

PROJECT/FARM ON COMMUNAL LAND	NUMBER OF SMALL-SCALE DAIRY FARMERS INTERVIEWED
Group farming:	
1. Qwaqwa Makeneng Agricultural Ward (Makeneng dairy project)	4
2. Qwaqwa Tsheseng Agricultural Ward (Dinkoeng dairy project)	4
Qwaqwa Makoane Agricultural Ward (Delville dairy project)	2
Individual farming:	
Qwaqwa communal land	26
TOTAL	36

The research was also conducted in the Qwaqwa 1984 consolidated areas, namely the Harrismith, Kestell and Bethlehem areas where the land is made available for ownership to developing farmers. Selected farmers obtain utilisation rights on 114 farm units by means of a lease with the Department of Agriculture and the Department of Land Affairs, with the option to buy through land reform programmes. On the state land three types of farming enterprises were approved by the former Qwaqwa Cabinet, namely individual, partnership and syndicate farming (Claassens *et al.*, 1991). A summary of the small-scale dairy farms and projects on the state land involved in this research is given below in Table 2.2.

Table 2.2: Sample size of different types of small-scale farmers on the state land

PROJECT/FARM NAME ON STATE LAND FARMS	NUMBER OF SMALL-SCALE DAIRY FARMERS INTERVIEWED
State land project (Group farming):	
1. Humewood project	5
2. Werda project	3
3. Land Bank farm	2
Individual farmers:	
1. State land-114 farm units at Harrismith, Bethlehem and Kestell magisterial district.	27
TOTAL	37

The sample was representative of small-scale dairy farmers farming at different areas. These areas are sufficiently representative of the practices in the North-Eastern Free State. Questionnaires were completed with the 36 farmers on communal land and 37 questionnaires were completed with farmers on state land. In total 73 questionnaires were completed with small-scale dairy farmers in the North-Eastern Free State. A summary of respondents interviewed in this study is given below in Table 2.3.

Table 2.3: Percentage distribution of the respondents as a group and as individuals on communal and state land

RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
13,7%	35,6%	13,7%	37,0%	100%

The n-value represents the number of respondents.

The availability of the respondents for the interviews was as follows:

- **Individual farmers on 114 farm units:** most of the farmers on the 114 farm units reside

in Qwaqwa. The most suitable time to collect data or to interview farmers was before 09h00 in the morning and after 16h00 in the afternoon. The availability was very low on Fridays and Saturdays as most of the farmers market their produce on these days.

- **Individual farmers on communal land:** the most suitable time to collect data or interview farmers was before 08h00 in the morning and at 16h00 in the afternoon, when their cattle return home.
- **Group farmers on communal and state land farms:** Farmers farming as a group on projects and farms work according to a weekly programme with certain duties to perform. It was difficult to get the exact figures and records from those who were not responsible for dairy cattle. Interviews were held on separate dates.

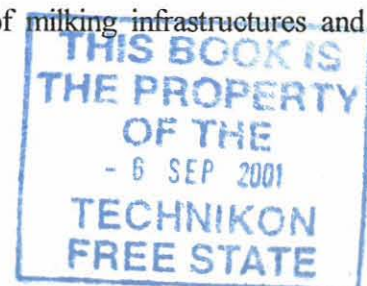
2.6 DATA ANALYSIS

The Computer Centre did data analysis at the Technikon Free State. The captured data was checked against the original questionnaire before the final calculation of frequencies, averages and percentages was done.

2.7 STRUCTURE OF THE REPORT

Chapter 3 of the report discusses the results and reports on the discussion of the survey among small-scale dairy farmers. Key issues included in this chapter are:

- **Personal data:** focus mainly on the farmer's age and experiences, level of education, household composition, income sources, non-farm activities and method of allocation of land to respondents, optimal farm size, farm income, availability of machinery, and individual and group farming.
- **Farm management practices:** focus mainly on the farmer's priority problems, objectives of respondents, dairy project management process, types of cattle breeds, management of reproduction, feed sources, production levels, availability of milking infrastructures and facilities, and labour requirement and management.



- Marketing strategies: focus mainly on alternative farming enterprises, marketing of milk and the pricing of milk, promotion, marketplace and channels, and record-keeping methods.

- Preferences regarding different needs and management: focus mainly on the farmer's future needs and aspirations, agricultural training needs and extension services, the role of the government, the role of other farmers and neighbours, the small-scale dairy farmer's opinion regarding the management of a dairy project and farm, and the farmer's level of success.

Chapter 4 of the report gives a summary and conclusions of the findings as well as some endnotes.

CHAPTER 3

RESULTS AND DISCUSSION

3.1 GENERAL PROFILE

The main findings of the research project among small-scale dairy farmers in the North-Eastern Free State will be discussed in this chapter. This study allows for a broad overview of the farmer's perceptions, needs, aspirations and activities. The data do not reflect any serious variations between farmers in the territory of Qwaqwa and in parts of the Harrismith, Kestell and Bethlehem districts where newly settled land-reform beneficiaries are concentrated. The findings should be seen as indicative of some trends that perhaps require further investigation in order to ensure an in-depth and comprehensive profile of the issues in question. This chapter commences with a description of the small-scale dairy farmer's biography. Problems related to management practices, access to markets, livestock productivity and support services, based on a survey carried out in 1999, are identified and discussed in this chapter.

3.1.1 Age and experience

Many studies have shown that the farmers in the developing rural areas of Southern Africa tend to be too old to farm effectively (Williams, 1994). Claassen (1998) reports that most of the farmers in the Qwaqwa area (53%) are older than 50 years of age.

The age of respondents in this study was determined by means of a closed-ended question in which respondents were asked their age. Table 3.1 gives the results.

Table 3.1: Age structure of the farmers in the sample (n=73)

AGE GROUP (years)	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
< 30	0 (%)	2 (7,7%)	0 (%)	2 (7,4%)	4 (5,5%)
30-39	1 (10%)	4 (15,4%)	1 (10%)	1 (3,7%)	7 (9,6%)
40-49	1 (10%)	6 (23,1%)	2 (20%)	11 (40,7%)	20 (27,4%)
50-59	2 (20%)	8 (30,7%)	1 (10%)	10 (37,0%)	21 (28,8%)
60-69	6 (60%)	2 (7,7%)	3 (30%)	1 (3,7%)	12 (15,0%)
≥ 70	0 (%)	4 (15,4%)	3 (30%)	2 (7,4%)	9 (13,7%)

The average age of the individual respondents farming on state land farms is 49,3 years and that of individual farmers farming on communal land is 52,0 years. In a group situation the average age of farmers farming on state land is 60,6 years while that of farmers on communal land is 57,5 years. In this case it is important to measure the meaningful age difference between the farmers farming as individuals on the state land and communal land, and group farmers on state land and communal land. The z-test was used to measure the meaningful differences between the average age of the farmers in the sample (Melville & Goddard, 1996; Wright, 1997). The results were justified by use of the following formula:

(Testing of $H_0 : \pi_1 - \pi_2 = 0$, outgoing from two independent large samples).

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{S_1^2/n_1 + S_2^2/n_2}}$$

Alternative hypothesis:

$H_1 : \pi_1 - \pi_2 = 0$, accept H_0 if $|z| < z_{\alpha/2}$

$H_1 : \pi_1 - \pi_2 > 0$, accept H_0 if $z < z_{\alpha}$

$H_1 : \pi_1 - \pi_2 < 0$, accept H_0 if $z > -z_{\alpha}$

95 % significant ($\alpha = 0,05$): $z = 1,645$

99 % significant ($\alpha = 0,01$): $z = 2,326$

99,5 % significant ($\alpha = 0,005$): $z = 2,576$

State land and communal land individual farmers: $z = 0,773$

State land and communal land group farmers: $z = 0,510$

State land individual and group farmers: $z = 2,100$

Communal land individual and group farmers: $z = 18,110$

The z-test shows that there is no meaningful difference (at a 95% test level) between the average age of individual farmers on state land and on communal land, between group farmers on state land and communal land. However, a meaningful difference was found (at a 95% test level) between the average age of individual farmers on state land and group farmers on state land.

3.1.2 Management of project

Respondents were asked whether they wanted somebody with the necessary skills to manage the project on their behalf, or whether they wanted to manage the project with them, or whether they wished to manage it themselves. The result shows that the majority of the farmers (93,2%) wanted to manage their projects themselves. This was a relatively young group of farmers (40 to 59 years) who are experienced and trained (level of education above Grade 10). Some farmers (6,8%) in the age group above 70 years and those farmers that have health problems want somebody with the necessary skills to manage the project for them, in order to increase milk production.

Comments obtained from the farmers reveal that a few farmers under the age of 30 years (5,5%) are inexperienced, are not settled in farming and are looking for other jobs. Other farmers who worked in factories, mines and informal businesses or as casual labourers had little or no farming experience. Some farmers (9,6%) in the age group of 30 to 39 years are willing to learn and expand their dairy farming knowledge. The farmers older than 50 years (28,8%) are experienced in farming, settled and not willing to change their farming careers. Most of them have gained experience while working for commercial farmers on farms for a minimum period of 10 years. Less than 10% of the respondents were the sons of farmers and more than 90% were the sons of farm workers.

3.1.3 Level of education

Persons with less than four years of schooling are usually considered to be illiterate. In another study it was found that this group had difficulty in understanding the guidelines of financial planning (Williams, 1994). Williams (1994), Sirur & Van den Brink (1995) and Claassen (1998) agree that education status and poverty are negatively correlated, that is, people with less education are much more likely to be poor. Williams (1994), Claassen (1998) and Mukhala (1999) report that there is strong evidence that many educated farmers are more successful than those less educated and that those better-educated farmers outperform those with a lower levels of education. The level of education was obtained from the respondents in a coded question. Table 3.2 below shows a summary of the result.

Table 3.2: Levels of education of small-scale dairy farmers in the sample (n=73)

HIGHEST LEVEL OF EDUCATION	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
No School	5 (50%)	12 (46,2%)	6 (60%)	12 (44,4%)	35 (47,9%)
Grade 1-6	0 (%)	6 (23,1%)	1 (10%)	7 (25,9%)	14 (19,2%)
Grade 7-11	4 (40%)	6 (23,1%)	1 (10%)	7 (25,9%)	18 (24,7%)
Grade 12	0 (%)	1 (3,8%)	1 (10%)	1 (3,7%)	3 (4,1%)
Grade 12 plus	1 (10%)	1 (3,8%)	1 (10%)	0 (%)	3 (4,1%)

Some respondents (35) had no school training and 38 respondents had passes between Grades 1 and 12, while 3 farmers had attained further qualifications and certificates (Table 3.2).

No meaningful difference (at a 95% test level) was found between the average level of education of any of the four groups.

3.1.4 Level of literacy

Most of the respondents (64,4%) can read and write, while (35,6%) of the respondents cannot

read. It is true that some respondents cannot write but can read. Farmers who can read and write have attended various training institutions like Boskop, Agri-Eco and Glen Agricultural College for non-formal training courses in an attempt to empower their management skills and their technical know-how and to improve their farms' milk production. This internal support is mainly in the form of training assistance and a call upon specialist advice. Some farmers indicated that they had never used these services before or were unaware of the existence of internal support services. Those who made use of these services overwhelmingly expressed satisfaction with the quality of service.

3.1.5 Use of experts

People were asked whether they are prepared to pay experts to help them do certain tasks on the farm (for example, artificial insemination, dosing, and castrating calves). The majority of the farmers (80,8%) are prepared to remunerate experts for training. These farmers are making a profit out of milk. On average these farmers sell 1734,2 litres of milk per month and milk 4 to 8 cows per milking cycle. The rest of the farmers (19,2%) are not prepared to pay for these services. Some farmers believed they were well trained to manage dairy enterprises, and have attained certificates in dairy courses.

3.1.6 Position in household

Households headed by an older person are especially vulnerable to poverty unless the household heads have access to pension income from past employment in the mines or other formal-sector jobs (Sirur & Van den Brink, 1995).

In a closed-ended question farmers were asked what positions they hold in the households. It is commonly known that in the Basotho culture, men are the heads of the household. This is justified by the fact that in this study it was found that 98,6% of household heads are men and 1,4% of household heads are women (widows).

3.1.7 Dependants residing with and depending on farmers

Larger families tend to put a lot of pressure on the heads of the households to provide for their most basic needs. Other researchers found that important aspects such as the education of the children often suffer first (Claassen, 1998; Mukhala, 1999).

In the questionnaire, farmers were asked to give the number of people residing in their households and the number and age of people directly dependent on them. These results are summarised in Tables 3.3 and 3.4.

Table 3.3: Number of dependants per respondent (n=73)

NUMBER OF DEPENDANTS	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
None	1 (10%)	1 (3,8%)	1 (10%)	0 (%)	3 (4,1%)
≤ 3	3 (30%)	8 (30,5%)	5 (50%)	6 (22,2%)	22 (30,1%)
4-6	5 (50%)	12 (46,1%)	3 (30%)	13 (48,1%)	33 (45,2%)
7-12	1 (10%)	4 (15,8%)	1 (10%)	7 (25,9%)	13 (17,8%)
≥13	0 (%)	1 (3,8%)	0 (%)	1 (3,7%)	2 (2,7%)

The n-value in Table 3.3 reflects the frequency of responses by farmers. On average individual farmers on state land have 5,8 people directly depending on them, while individual farmers on communal land have 4,7 dependants. In a group situation farmers on state land have 3,3 dependants, while those on communal land have 4,2 dependants.

The z-test shows that there is no meaningful difference (at a 95% test level) between the average number of dependants of individual and group farmers on state land and communal land respectively.

It can be assumed that stress and pressure are greater on those farmers with more people depending on them. As a result of low income generated from milk sold, farmers cannot satisfy their needs for survival and wellbeing. However, this does not adequately cover certain human

poverty indicators.

Table 3.4 represents a further analysis of the age of people residing with and directly dependent on the farmers. It is expected that the n-value will be more than 73, because most of the respondents had more than one dependant.

Table 3.4: The age of people residing and directly depending on the farmers (n=176)

AGE OF THE DEPENDANTS (Years)	COMMUNAL		STATE LAND		TOTAL (n=176)
	GROUP (n=26)	INDIVIDUAL (n=63)	GROUP (n=11)	INDIVIDUAL (n=76)	
≤ 4	4 (15,4%)	10 (15,9%)	1 (9,1%)	14 (18,4%)	29 (16,5%)
5-9	3 (11,5%)	11 (17,5%)	1 (9,1%)	14 (18,4%)	29 (16,5%)
10-18	6 (23,1%)	15 (23,8%)	5 (45,4%)	24 (31,6%)	50 (28,4%)
19-44	9 (34,6%)	23 (36,5%)	3 (27,3%)	21 (27,6%)	56 (31,8%)
≥ 65	4 (15,4%)	4 (6,3%)	1 (9,1%)	3 (4,0%)	12 (6,8%)

In this study 68,0% of the dependants were 10 years and older. For obvious reasons the stress and pressure are even greater on those farmers with people aged 19 years and above depending directly on them. It is important to note that the family size of the households is, in most cases, increased by other family members staying with the farmers. On the positive side the large family could supplement the labour force.

3.1.8 Successors

With the life cycle of the farmer and farming activities in mind, farmers were asked whether they have successors or not and to describe their relationships with them. Most of the farmers (69,9%) in this study indicated that their sons, daughters and family members would continue with dairy farming in future. The rest of the farmers (30,1%) were uncertain about who would take over in future and had to rely on the entire family to manage the dairy project in future. The role of the successors in the projects was not investigated. Kitching (1994) also reported that in the Qwaqwa area successors are somewhat involved in the running of the dairy project so as to gain knowledge on and practical experience in, dairy farming.

3.1.9 Other sources of income

With a poor resource base coupled with low income and a high rate of unemployment, small-scale dairy farmers realise that farming alone will not produce all the income that the household needs. Reports from the Free State Department of Agriculture in 1998 have proved that the temporary nature of income generation from dairy projects results in a very low annual income which, in isolation, could not sustain the household. Due to the fact that respondents have a diversified income source ranging from livestock sales to sharecropping, the responses (n-value) will be more than 73 (Table 3.5).

Table 3.5: Other sources of income of dairy farmers in the Qwaqwa area (n=83)

SOURCES OF INCOME	COMMUNAL LAND		STATE LAND		TOTAL (n=83)
	GROUP (n=11)	IND. (n=25)	GROUP (n=10)	IND. (n=37)	
None	3 (27,3%)	12 (48,0%)	4 (40%)	10 (27,0%)	29 (35,0%)
Pensioner	4 (36,3%)	6 (24,0%)	5 (50%)	1 (2,7%)	16 (19,3%)
Government employees	0 (%)	4 (16,0%)	0 (%)	0 (%)	4 (4,8%)
Chief	1 (9,1%)	0 (%)	0 (%)	0 (%)	1 (1,2%)
Shop owners	1 (9,1%)	3 (12,0%)	0 (%)	0 (%)	4 (4,8%)
Sale of crops	1 (9,1%)	0 (%)	1 (10%)	9 (24,3%)	11 (13,3%)
Sale of small stock: Sheep and goats	0 (%)	0 (%)	0 (%)	6 (16,2%)	6 (7,2%)
Sale of large stock: Beef	1 (9,1%)	0 (%)	0 (%)	9 (24,3%)	10 (12,0%)
Poultry: Broilers and layers	0 (%)	0 (%)	0 (%)	2 (5,4%)	2 (2,4%)

Livestock production in the North-Eastern Free State can be considered equally important to crop production. Poverty is greatest among households whose main income source is only farming or livestock production under a communal farming system. Many of the poor respondents indicated farming and livestock as their main income source. As shown in Table 3.5, the principal source of income to aged respondents is pensions (19,3%). Households claiming pensions and wage work also have a relatively low incidence of poverty. From the

results small-scale dairy farmers on communal land are, at best, prepared to engage in farming part time, still hoping for some alternative occupations should they prove to be more profitable than dairying. This also shows that a wide range of income disparities exist among farmers.

3.1.10 Alternative farming enterprises

Barnard & Nix (1973) as well as Fourie *et al.* (1999) assert that economic planning involves the manipulation of limited resources among alternative opportunities in order to satisfy the bounded objective of maximising profit. It follows that any planning procedure must contain three essential elements, namely:

- ◆ an objective;
- ◆ scarce resources; and
- ◆ alternative ways of using the resources to attain the objective.

McVeigh (1999) believes that diversity is important for overall sustained profitability, as it spreads the risk and ensures an income throughout the year. The study addressed the issue of diversification of farming enterprises. The n-value will be more than 73, since most of the farmers in the Qwaqwa area are engaged in mixed farming enterprises (Table 3.6).

Tables 3.6: Alternative farming enterprises of farmers (n=110)

ALTERNATIVE FARMING ENTERPRISES	COMMUNAL LAND		STATE LAND		TOTAL (n=110)
	GROUP (n=15)	IND. (n=24)	GROUP (n=16)	IND. (n=55)	
Large stock: Beef cattle	5 (33,3%)	3 (12,5%)	5 (31,2%)	8 (14,5%)	21 (19,1%)
Small stock: Sheep & goats	6 (40,0%)	14 (58,3%)	8 (50,0%)	10 (18,2%)	43 (34,5%)
Beans	0 (%)	0 (%)	0 (%)	2 (3,6%)	2 (1,8%)
Maize	0 (%)	0 (%)	1 (6,25%)	6 (11,0%)	7 (6,4%)
Wheat	0 (%)	0 (%)	0	19 (34,5%)	19 (17,3%)
Fodder	2 (13,3%)	1 (4,2%)	1 (6,25%)	6 (11,0%)	10 (9,1%)
Potatoes	0 (%)	0 (%)	0 (%)	1 (1,8%)	1 (0,9%)
Sunflowers	0 (%)	0 (%)	0 (%)	1 (1,8%)	1 (0,9%)
Poultry: Broilers	2 (13,3%)	3 (12,5%)	1 (6,25%)	2 (3,6%)	8 (7,3%)
Piggery	0 (%)	2 (8,3%)	0 (%)	0 (%)	2 (1,8%)
Horses	0 (%)	1 (4,2%)	0 (%)	0 (%)	1 (0,9%)

The following are the highlights from results in Table 3.6:

- ◆ Many farmers (34,5%) farm with small stock, mainly sheep and goats. Farmers believe that the market is good in Qwaqwa and that the prices are good, coupled with the high demand for sheep and goats in Qwaqwa on weekends. However, farmers do not want to farm with sheep and goats on a large scale because of the high rate of livestock theft.
- ◆ Some farmers (19,1%) are also farming with beef cattle, because cattle production is less labour intensive and suits the areas along the hills and mountains. The impression from the respondents is that the demand for beef is good in Qwaqwa on weekends for ritual functions.
- ◆ A significant portion of the farmers (36,4%) farm with crops, such as maize, beans, wheat and sunflowers. Mainly to generate more income and to feed cattle the residues.
- ◆ A few farmers (7,3%) farm with broilers and layers to generate income within a short

period of time (seven weeks), because the demand for broilers and eggs is high and the price of live chickens is good in Qwaqwa.

A number of farmers (26,0%) do not want to farm with anything except dairy cattle. This is more so for farmers farming on the land allocated by the chiefs, because there is no security of tenure on communal land. A marketplace is mainly seen as the limiting factor that restricts farmers from farming with other enterprises on a larger scale. Where farmers are unable to sell their products at a reasonable price, they attempt to sell their produce at a lower price, sell on credit, or give the products away to friends and family due to lack of storage facilities.

3.1.11 Non-farm activities

Farmers were asked whether they slaughter and sell livestock on the farm as a means of increasing income from dairying, and what they did with the skin and meat. Farmers were also questioned regarding the selling of cattle dung. The results reveal that the majority of the farmers (81,4%) do not sell cattle skin, because they preferred to keep cattle skin for various reasons, for instance as ornaments in the house, to be used as mats and for further processing. The rest of the farmers (18,6%) prefer to sell cattle skins on an open market. It was found that these farmers generate less than R100,00 per year from the skins sold in order to supplement their income generated from milk.

The results reflect that the majority of the farmers (86,3%) do not sell cattle dung, but give it away free of charge to people who need it. Farmers (13,7%) that sell cattle dung do so at prices ranging from R0,10 to R0,20 per kilogram. These farmers indicated that the income generated from the sale of cattle dung is too little to make mention of, as a means of supplementing their dairy income.

3.2 ALLOCATION OF LAND

3.2.1 Methods of allocation

In the Qwaqwa area the allocation of sites is presently a function residing with the District Chiefs of each Tribal Council (village). The District Chiefs issue "Permission To Occupy" (PTOs) permits for residential and business sites, as well as permits for grazing to be utilised on a joint and communal basis. The government allocates state-administered land to small-scale farmers around the Qwaqwa area. The majority of the farmers (90%) are interested in having their own pieces of land to farm on, while some farmers (10%) do not want to have their own or additional land. In the questionnaire, farmers were asked who allocated the land to them. Table 3.7 gives an indication of the way land was allocated to respondents.

Table 3.7: The way land was allocated to respondents (n=73)

ALLOCATION OF LAND	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	IND. (n=26)	GROUP (n=10)	IND. (n=27)	
Allocated by government	0 (%)	0 (%)	10 (100%)	8 (29,6%)	18 (24,6%)
Allocated by chief (Communal)	10 (100%)	24 (92,3%)	0 (%)	0 (%)	34 (46,6%)
Allocated by Government and rented	0 (%)	0 (%)	0 (%)	7 (26,0%)	7 (9,6%)
Allocated by government or legally purchased and owned	0 (%)	0 (%)	0 (%)	12 (44,4%)	12 (16,4%)
Municipality (Communal land)	0 (%)	1 (3,8%)	0 (%)	0 (%)	1 (1,4%)
Rented (Communal land)	0 (%)	1 (3,8%)	0 (%)	0 (%)	1 (1,4%)

As shown in Table 3.7, most of the farmers (46,6%) in the Qwaqwa area used the

communal land that was allocated by the District Chiefs of the Tribal Council. The areas allocated by the chiefs to group farmers on dairy projects and individual farmers on communal land are near the mountains and sloppy, which is not conducive for dairy farming.

The area where cows graze is about 3 km from the milking areas. Research has shown that for every 1 km a cow has to travel it loses 1 litre of milk (Ntsane, 1999). That implies that farmers lose approximately R4,50 per cow per day. Respondents farming in the group scheme on communal land have planted pastures on the arable lands next to the projects as a means of generating fodder and to prevent cows from travelling long distances from grazing areas to the milking parlours.

The farmers utilising the land allocated by the government (24,6%) have obtained the utilisation right on state land by means of three-year lease contracts with the Department of Agriculture (DoA). The utilisation right cannot be traded or transferred. The farmer must obtain special permission for the subleasing of a unit or for the erection of fixed capital assets. Some farmers (16,4%) have legally purchased land from the government through the land reform programme, while 9,6% of the farmers lease the land allocated by the government.

3.2.2 Optimal farm size and farm income

Some researchers view farm income as a major incentive in the settlement of farmers (Claassen, 1998). The approach to farm planning should, however, not be to fix a farm size according to a standardised income (Van Rooyen & Botha, 1994). Dixon (1973), Klug & Webster (1993) and De Waal (1997) agree that the objective of fodder planning is to match the feed production capabilities of the farm to the animals' requirements in order to obtain the greatest margin over feed costs, within safe limits of natural resource utilisation. Fodder planting is essential to enable farmers to grow protein (in the form of grass) at about a third of the cost of purchasing it. Secondly, farmers will have surplus grass from which silage can be made, to bridge periods of low grass production. In the Qwaqwa area, the ability to generate income is closely linked to the household's capacity to productively use the natural resource



base. The productive assets that small-scale dairy farmers own are their own labour, some land and livestock. Table 3.8 below gives an indication of the sizes of the arable lands.

Table 3.8: Size of the arable land respondents have on communal and state land (n=73)

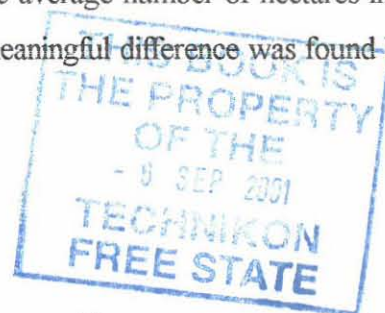
ARABLE LAND SIZE (Hectares)	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
None	2 (20%)	26 (100%)	3 (30%)	5 (18,5%)	36 (49,3%)
1- 89	4 (40%)	0 (%)	4 (40%)	11 (40,7%)	19 (26,0%)
90-179	4 (40%)	0 (%)	3 (30%)	8 (29,6%)	15 (20,6%)
180-269	0 (%)	0 (%)	0 (%)	3 (11,1%)	3 (4,1%)
270-359	0 (%)	0 (%)	0 (%)	0 (%)	0 (%)
≥ 360	0 (%)	0 (%)	0 (%)	0 (%)	0 (%)

Among small-scale dairy farmers, concentrates are the biggest single expense. The advantage of having arable lands is that farmers can establish pastures and produce fodder in order to increase the nutrient intake of grazing animals. A good fodder flow will allow the livestock enterprise to run smoothly through the year, and by using pastures to push up production, expenditure on concentrates can be reduced. On average farmers on state land had 104,8 hectares of arable land, while group farmers on communal land had 48,3 hectares of arable land. Individual farmers on communal land do not have arable land since the utilization right is mainly for grazing.

The z-test was used to measure the meaningful differences between the average number of hectares respondents are farming on (Melville & Goddard, 1996; Wright, 1997). A meaningful difference was found (at a 95% test level) between the average number of hectares individual and group farmers on state land are farming on. No meaningful difference was found between individual or group farmers on communal land.

3.2.2.1 Availability of machinery

To establish pastures successfully farmers must have machinery to execute the task. The



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whole cultivation action must receive attention in order to increase fodder production.

Based on the background, farmers were asked whether they have implements to plough and plant their arable land. This study reveal that obtaining sufficient capital to purchase needed resources is a major challenge for aspiring dairymen, as 25,4% of the farmers do not have implements to plough and plant the lands, while 24,6% have tractors, 9,4% have planters, 21,0% have ploughs and 13,8% have a disc plough to cultivate lands. It is important to note that where mechanical implements were available, they were either not in working condition (mostly on communal land) or the implements were not fully equipped (on the state land farms). The general concern amongst the farmers was the lack of funds to operate tractors.

3.3 INDIVIDUAL AND GROUP FARMING

Ministry of Agriculture and Land Affairs (1998) and Shackleton *et al.* (1998) felt that land under group ownership features prominently in South Africa, with some 15 million hectares of land (12,25%) in the ex-homeland areas occurring under some form of communal tenure. This is expected to increase considerably as community groups successfully acquire ownership of land through the land redistribution and restitution processes, facilitated by the Communal Property Association (CPA) legislation (Act number 28 of 1995), which provides the framework for the establishment of acquiring, holding and managing property on a communal basis (Shackleton *et al.*, 1998). However, Mathivandlela (1999) believes that there is a need for a switch in policy from group ownership to individual land ownership.

3.3.1 Types of ownership

The results in this study indicate that the majority of the respondents (72,6%) on communal and state land farms are farming as individuals. This finding corresponds with a recent survey conducted for the Department of Land Affairs by Van Zyl (1998) who reveals that there is a huge power struggle in the Qwaqwa area and that the community would like to obtain full ownership of their sites in future.

Although most of the respondents in this study (72,6%) farm as individuals, group formation has been encouraged among small-scale farmers with the hope that farmers can gain through the sharing of facilities and consequently can achieve what individuals cannot do on their own (Sebina & Düvel, 1999). To operate a joint farming enterprise successfully, a written agreement in which the rights and commitments of each participant are clearly defined is usually a prerequisite (Van Reenen & Davel, 1991). Farmers farming in group schemes have a constitution that guides them to execute the activities taking place at project level. Each farmer is allocated with responsibilities to perform on a daily basis. However, the constitution drawn up by the farmers does not clearly spell out individual entry and exit rules for farmers farming as a group. The implication is that farmers and policy makers must develop constitutions, management structures and guidelines for farmers farming in groups. Farmers must commit themselves and adhere to constitutions in order to conduct their farming business in an orderly fashion. Appendix C shows the legal bodies that the group has entered into in the Qwaqwa area and in South Africa as proposed by Venter (1998).

Farmers farming as a group have a committee responsible for the selling of milk, control of the finances, and the day to day activities taking place at the project. The committee holds meetings regularly. Members have grouped themselves into groups of two to ensure that every day members are present at the project to deal with problems that may occur, and to give supervision to labourers. Members also milk cows and are responsible for the maintenance of the milk-shed, equipment and fences. Members also look after cultivated fields and actively partake in the harvesting of fodder.

From the farmer's point of view, where farmers are farming as a group, non-active members were found to create problems and conflict among other active members. Less active members demand the same share as actively involved participants. On a comparative basis this result resembled those of Du Plessis & Schalkwyk (1997), Dillon (1998) and Olivier (1999) who reported that the policy in the Eastern Free State should be to settle farmers on an individual resource base and steer away from settling especially big

groups on a farm, as the practice has shown that amongst members of groups, the extension support revolves around sorting out differences amongst members. Due to differences between members of a group starting a project, some projects never get to a level of being economically viable on a sustainable base.

3.3.2 Farming experience

The practical ability to do the on-farm work is required if dairy farmers want to work their way up the farming ladder (Slater & Throup, 1981). The report by Claassen (1998) shows that farmers with less than 6 years' experience as independent farmers lack managerial experience. The practical farming experiences of independent farmers were obtained in a closed-ended question. Table 3.9 gives an indication of the practical farming experiences of respondents.

Table 3.9: Number of years respondents have spent farming on the particular piece of land (n=73)

FARMING EXPERIENCE (Years)	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
≤ 3	1 (10%)	3 (11,5%)	2 (20%)	8 (29,6%)	14 (19,2%)
4-7	9 (90%)	7 (26,9%)	6 (60%)	10 (37,0%)	32 (43,8%)
8-11	0 (%)	6 (23,1%)	2 (20%)	9 (33,3%)	17 (23,3%)
≥ 12	0 (%)	10 (38,5%)	0 (%)	0 (%)	10 (13,7%)

The fact that 38,5% of the individuals farming on communal land have 12 and more years of farming experience, justifies the fact that farmers are experienced in farming. Judging by the number of farmers with less than 7 years of experience, those farming as individuals have reasonable experience and some managerial skills. On average farmers had 7,51 years of farming experience. This correlates with the information indicated under the level of education above and underlines the fact that farmers with specific managerial shortcomings should undergo appropriate formal or informal training. The z-test was used to measure the

meaningful differences between the average number of years respondents have spent farming on the pieces of land independently (Melville & Goddard, 1996; Wright, 1997).

A meaningful difference was found (at a 95% test level) between the average number of years of individual farmers on state land and group farmers on state land. No meaningful difference was found between individuals and groups on communal land.

3.4 FARM MANAGEMENT PRACTICES

3.4.1 Major problems identified by the small-scale dairy farmers

In the Eastern Free State area, between R2,5 million and R4,5 million would be needed to upgrade the water supply and sanitation on commercial farms during the next eight years. Rural councils are already spending substantial sums of money on water and sanitation for farm workers. National statistics show that about 50% of households have access to electricity, but that this accounted for only 17% of total household use (Republic of South Africa, 1999). Wilson (1995) found that the mixed farm systems of Latin America have many features in common with similar systems in Africa. Human population density is high, pressure on land is intense, and cultivation on steep slopes leads to severe degradation of resources. Holding sizes are small but not so fragmented as, for example, in the Kikuyu areas of Kenya.

Based on the background, respondents were asked to name, in order of preference, the most important management problems they faced. Table 3.10 gives the most serious management problems farmers are encountering in their respective working situations. Due to the fact that respondents have mentioned more than one problem the n-value will be more than 73.

Table 3.10: Small-scale dairy farmers' priority problems (n=228)

PRIORITY PROBLEMS	COMMUNAL LAND		STATE LAND		TOTAL (n=228)
	GROUP (n=30)	IND. (n=84)	GROUP (n=33)	IND. (n=81)	
Lack of water	3 (10,0%)	15 (17,9%)	6 (18,2%)	10 (12,3%)	34 (15,0%)
Veld burning	1 (3,3%)	8 (9,5%)	5 (15,2%)	8 (10,0%)	22 (9,6%)
Livestock theft	1 (3,3%)	3 (3,6%)	4 (12,1%)	5 (6,2%)	13 (5,7%)
Lack of arable land	5 (16,7%)	10 (11,9%)	5 (15,2%)	6 (7,4%)	26 (11,4%)
Lack of grazing land	1 (3,3%)	4 (4,8%)	0 (%)	6 (7,4%)	11 (4,8%)
Electricity	6 (20,0%)	0 (%)	1 (3,0%)	7 (8,6%)	14 (6,1%)
Vandalism and theft of fencing	1 (3,3%)	8 (9,5%)	3 (9,1%)	4 (5,0%)	16 (7,0%)
Lack of a reliable marketplace	1 (3,3%)	1 (1,2%)	1 (3,0%)	1 (1,2%)	4 (1,8%)
Lack of access roads to farms and marketplaces	0 (%)	3 (3,6%)	1 (3,0%)	3 (4,0%)	7 (3,1%)
Lack of management skills	1 (3,3%)	5 (5,8%)	1 (3,0%)	10 (12,3%)	17 (7,4%)
Lack of a corporation (among groups)	6 (20,0%)	1 (1,2%)	1 (3,0%)	1 (1,2%)	9 (4,0%)
No security of tenure (ownership)	2 (6,7%)	10 (11,9%)	0 (%)	1 (1,2%)	13 (5,7%)
Lack of or no financial assistance	1 (3,3%)	4 (4,8%)	1 (3,0%)	6 (7,4%)	12 (5,3%)
Not healthy	0 (%)	1 (1,2%)	1 (3,0%)	1 (1,2%)	3 (1,3%)
Disease widespread on communal land	1 (3,3%)	4 (4,8%)	0 (%)	6 (7,4%)	11 (4,8%)
Medicine too expensive to treat cattle	0 (%)	6 (7,1%)	3 (9,1%)	6 (7,4%)	15 (6,6%)
Feed too expensive for cattle	0 (%)	1 (1,2%)	0 (%)	0 (%)	1 (0,4%)

There are many constraints in the communal farming system including, among others, small farm size, population pressure, land tenure problems, distance from markets, and poor transport and infrastructure. Due to the fact that small-scale dairy operations are inside the rural areas and not near any large town or city, those farmers have certain constraints that need to be addressed. Also to be blamed for failure of the projects was the non-availability

of land (16,2%), annual veld fires that affect grass sward (9,6%), poor management (7,4%) and a lack of disease control (4,8%). The study reveals the following facts:

- ◆ **Reliable water supply** is a limiting factor, as 15,0% of farmers are concerned about the lack of reliable water sources in their working areas. The existing windmills, taps, pipes, hand-pumps and boreholes need to be repaired. Existing dams and water points for livestock should also be upgraded. The management of water in the communal areas and in the state lands where newly developing farmers are settled is not good.

- ◆ **Electrification** is needed on dairy farms, as small-scale dairy farmers interviewed (6,1%) on the land allocated by chiefs and on state land have shown that the unavailability of electricity in their farming areas has prevented them from implementing technological innovations that need electricity.

- ◆ **Fencing** of the grazing areas on communally grazed lands and state land farms is poor. From the extension point of view extensively grazed lands need to be rested and used in rotation, and thus fencing is needed to ensure that rotational grazing is employed. Fencing on farms is poorly developed. The farmers (7,0%) felt that communally grazed lands must be properly developed, managed and fenced, and that camps must be developed.

In the Qwaqwa area water is the most limiting factor, as there are no overall plans to utilise water on communal land and state land, despite the high rainfall in the area. The watering taps for household consumption in the area are correctly placed for home consumption but not for cattle. Cattle have to travel \pm 3km to the streams and rivers for water. Boreholes need to be repaired and properly placed. Ferguson & Hamilton (1996) also reported that cows drink 30% of their water within an hour of milking, so it is important to have water readily available for cows as they exit the parlour. It is essential to provide one water trough per 25 cows, and no fewer than 2 troughs in the barn where they don't interfere with cow flow. A large, open, float-controlled tank that can be easily drained and cleaned is preferable. In naturally ventilated barns, pipes must be buried and troughs insulated and heated. On a comparative basis, these results therefore correspond

with those of Walker (1999) who found that in the Leliefontein community area of Namaqualand, water is the major limiting factor, and fencing of the grazing areas is a major issue in the land ownership and usage debate.

Roads, transport and rural road maintenance is a matter of concern to small-scale dairy farmers, especially in the light of recent budget cuts. The access route to the main towns is reasonably well maintained but looks very bad in winter and during rainy seasons. The roads to the state land farms and communally grazed lands around the mountains are bad. However, markets are not critical in winter, because the production is low and milk produced is not transported over a long distance. To reach the marketplace, farmers farming on the communal land have to travel up to 5 kilometres, whereas farmers farming on state land have to travel up 15 kilometres. Transport is an expensive part of the marketing margin, as milk needs to be distributed from village to village. Farmers selling their milk at project level do not have any transport costs. If the milk produced turns sour it is sold to the local community at the same price as fresh milk, since the demand for sour milk is good.

3.4.2 Objectives of respondents

Some researchers feel that the first task of the farm manager is to identify and set objectives for the farm business. Objectives give direction to the farm business, they facilitate planning and they enable the farmers to determine their direction. Objectives should therefore be realistic, make provision for the short, medium and long term, and be specific to facilitate monitoring. An objective can therefore be defined simply as that which one strives to attain (Barnard & Nix, 1973; Boehlje & Eidman, 1983; Van der Westhuizen & Viljoen, 1998).

Individual farmers have to formulate objectives to suit their specific requirements and the environment under which the farmers operate, taking into account the age of the entrepreneur and his financial position. With the above-mentioned background in mind the respondents were asked to state their objectives regarding their dairy projects or farm. The

result is summarised in Table 3.11. It will be expected that the n-value will be more than 73, as farmers have more than one objective.

Table 3.11: Objectives of the respondents regarding dairy projects or farms (n=119)

FARMERS' OBJECTIVES	COMMUNAL LAND		STATE LAND		TOTAL (n=119)
	GROUP (n=19)	IND. (n=43)	GROUP (n=18)	IND. (n=39)	
To buy land and have ownership	3 (15,8%)	4 (9,3%)	2 (11,1%)	3 (7,7%)	12 (10,1%)
To be successful in farming	2 (10,5%)	2 (4,7%)	4 (22,2%)	3 (7,7%)	11 (9,2%)
To expand dairy project	3 (15,8%)	5 (11,6%)	5 (28,0%)	7 (17,9%)	20 (17,0%)
To produce milk and generate income	4 (21,0%)	11 (25,6%)	1 (5,5%)	7 (17,9%)	23 (19,3%)
To be a full-time dairy farmer	1 (5,3%)	0 (%)	1 (5,5%)	1 (2,7%)	3 (2,5%)
To farm with quality dairy cattle breeds and sell other cattle breeds	0 (%)	6 (14,0%)	0 (%)	5 (12,8%)	11 (9,2%)
To create job opportunities and combat hunger and poverty	2 (10,5%)	4 (9,3%)	1 (5,5%)	1 (2,7%)	8 (6,7%)
To feed the nation	3 (15,8%)	4 (9,3%)	1 (5,5%)	2 (5,1%)	10 (8,4%)
To make a living out of milk sold (dairying)	0 (%)	4 (9,3%)	1 (5,5%)	1 (2,7%)	6 (5,0%)
To make a dairy model where other farmers and youth will learn	0 (%)	1 (2,3%)	1 (5,5%)	1 (2,7%)	3 (2,5%)
To have enough infrastructures and implements	0 (%)	1 (2,3%)	1 (5,5%)	3 (7,7%)	5 (4,2%)
To farm with dairy cows semi-intensively (feedlot)	0 (%)	0 (%)	0 (%)	2 (5,1%)	2 (1,7%)
To increase milk production in the Qwaqwa area and surrounding areas	1 (5,3%)	1 (2,3%)	0 (%)	3 (7,7%)	5 (4,2%)

Achieving these objectives (Table 3.11) requires the acquisition of needed resources

(capital, cattle, land, and others) to establish a herd that is of sufficient size and quality, so as to stand a good chance of generating sufficient income to meet financial needs. It is also essential to provide the management skills needed to maximise the probability of success in meeting the above-mentioned objectives, taking into account that farmers (19,3%) want to generate sufficient income so that they can feed their families and generate financial reserves. Some farmers (17,0%) acknowledge the fact that it is through expansion that they would be able to generate enough income to enable them to satisfy their needs.

Farmers in the Qwaqwa area indicated that they are angry and frustrated by the lack of land tenure and the unfulfilled promises by politicians from the 1994 general election. The gap between what farmers on communal land have now and what they expect seems intolerable. Farmers on state land farms are better off than they were while farming on communal land in relation to what they anticipated. Farmers on communal land revealed that they were expecting an improvement in their socio-economic position after the 1994 general election, and the situation seemed to be promising. Their lives would be improved if they no longer had to be preoccupied with daily struggles and they would be able to meet their needs and aspirations. This is, in fact, what all the farmers in the study reported.

3.4.3 Dairy project management process

John & Van Arendonk (1988) and Van der Westhuizen *et al.* (1999) defined management by the farmer as being directed towards maximisation of total profit from the farm and this, among other factors, is reflected in the criteria for replacing cows. Measures (1990) believes that management is the way in which the breeding, rearing, feeding and housing aspects of cow husbandry are fitted together, how the herd fits into the farm and how the herdsman relates to the cows. Rice & Grant (1999) believe that the herd health management programmes recommended by the veterinarian must include a way to avoid metabolic disorders and prevent or control infectious disease. Frequently when metabolic disease increases, opportunistic infectious disease also increases.

In the Qwaqwa area management practices continue to be traditional. With the aid of this

background, farmers were asked whether they have a specific programme they use or follow to run their dairy projects or farms. Table 3.12 further elaborates on the main programmes the respondents followed to run their dairy projects or farms. It is expected that the n-value will be more than 73 due to the fact that some of the respondents have more than one management programme.

Table 3.12: Main programmes identified by farmers to run dairy projects or farms
(n=105)

MAIN PROGRAMMES	COMMUNAL LAND		STATE LAND		TOTAL (n=105)
	GROUP (n=22)	IND. (n=32)	GROUP (n=22)	IND. (n=29)	
No specific programme.	4 (18,2%)	11 (34,4%)	4 (18,2%)	9 (31,0%)	28 (26,7%)
Milk cows twice a day (in the morning and in the afternoon).	4 (18,2%)	9 (28,1%)	3 (13,6%)	5 (17,2%)	21 (20,0%)
Milk cows once a day in the morning.	2 (9,1%)	4 (12,5%)	1 (4,5%)	5 (17,2%)	12 (11,4%)
Milk cows once a day in the afternoon.	0 (%)	1 (3,1%)	1 (4,5%)	0 (%)	2 (1,9%)
Check and treat mastitis.	0 (%)	1 (3,1%)	1 (4,5%)	0 (%)	2 (1,9%)
Call a vet to inspect and treat cattle every 1 to 2 years.	1 (4,5%)	1 (3,1%)	1 (4,5%)	1 (3,4%)	4 (3,8%)
Implement herd health programmes.	0 (%)	1 (3,1%)	1 (4,5%)	0 (%)	2 (1,9%)
Feed according to the milk each cow produces.	1 (4,5%)	0 (%)	1 (4,5%)	1 (3,4%)	3 (2,9%)
Call Animal Health Technicians to inspect and treat their cattle.	1 (4,5%)	1 (3,1%)	2 (9,1%)	1 (3,4%)	5 (4,8%)
Group cattle accordingly: Calves, heifers, cows in milk, and dry cows.	1 (4,5%)	0 (%)	0 (%)	1 (3,4%)	2 (1,9%)
Every farmer has a task to do.	2 (9,1%)	0 (%)	3 (13,6%)	0 (%)	5 (4,8%)
Feeding is done semi-intensively and intensively.	1 (4,5%)	0 (%)	0 (%)	3 (10,4%)	4 (3,8%)
Rotational grazing.	0 (%)	0 (%)	0 (%)	1 (3,4%)	1 (0,9%)
Train labourers in cleanliness and ensure cleanliness before and after milking.	2 (9,1%)	2 (6,3%)	3 (13,6%)	0 (%)	7 (6,7%)
Rest cows for 15 minutes before milking.	1 (4,5%)	0 (%)	0 (%)	0 (%)	1 (0,9%)
Time mating to ensure a continuous flow of milk throughout the year.	1 (4,5%)	1 (3,1%)	1 (4,5%)	1 (3,4%)	4 (3,8%)
Cull and sell male calves.	1 (4,5%)	0 (%)	0 (%)	1 (3,4%)	2 (1,9%)

In the communal farming system the uncontrolled management of these communal grazing lands is not only unproductive, but also leads to poor livestock performance. Individual holdings of cattle in the Qwaqwa area are usually herded by day by a young family member or a farmer on communal land, and kept in a small enclosure or communal kraal close to the house at night. According to Table 3.12, (11,4%) of the farmers milk their cows once a day, in the afternoon or in the morning, due to the scarcity of feed in winter. While (20,0%) of the farmers milk their cows in the morning at 08h00 and in the afternoon at 15h30. Farmers spend most of the time looking after the cattle and maintaining and upgrading facilities, especially those farmers who market their milk on contract to Thaba Dairies and to private contractors.

Farmers on state land farms have access to the animal health care and production programmes that include routine vaccination, dosing for internal parasites, dipping or spraying against external parasites, and dehorning of calves. These farmers receive animal health programmes from Animal Health Technicians of the Department of Agriculture and the State Veterinarian at Harrismith. Farmers also use their own experiences to determine the causes of disease and the possible remedies to apply. Controlling parasites and ensuring constant grazing on communally grazed lands is difficult. The fact that farmers (26,7%) do not have a specific programme that they follow to manage their dairy projects could lead to poor administrative and managerial practices and ultimately affect production.

In the Qwaqwa area feeding management consists mainly of free-range grazing. Integration between animals and crops takes place on a number of farms. Cattle spend time feeding on crop residues, and mainly maize stalks and other by-products are fed to cattle in the winter months. Lactating cows are given lucerne hays, but are still grazed on poor veld on communally grazed land. Calves are weaned throughout the year, because mating takes place on a continuous bases. Currently, almost all the dairy farmers rear female calves until they come into the production stream. It takes a minimum of twenty-four months before farmers can see a return on their investment in calves. Meanwhile, this has a negative impact on the proceeds from the lactating dairy cows. Likewise the bull

calves are raised for a minimum period of twelve months before being marketed. The rearing costs have reduced the net return, especially where farmers do not have large tracts of grazing land to raise the steers.

3.4.4 Types of cattle breeds

As discussed in Chapter 2, the word "type" refers to the conformation of the animals, which indicates or suggests the purpose it serves (Gravert, 1987; Casey & Maree, 1993; Gertenbach, 1995). Gravert (1987) reports that dual-purpose breeds are preferred where land is scarce or expensive for dairying. Respondents were asked to give the types of cattle breeds with which they farm, and the results are shown in Table 3.13. The n-value will be more than 73, because most of the respondents have more than one type of cattle breed with which they farm.

Table 3.13: Types of cattle breeds with which farmers are farming (n=106)

TYPES OF CATTLE BREEDS	COMMUNAL LAND		STATE LAND		TOTAL (n=106)
	GROUP (n=10)	IND. (n=33)	GROUP (n=16)	IND. (n=47)	
Dairy breeds: Holstein-Friesland	9 (90,0%)	9 (27,3%)	9 (56,2%)	17 (36,2%)	44 (41,5%)
Jersey	0 (0%)	0 (0%)	0 (0%)	2 (4,3%)	2 (1,9%)
Ayrshire	0 (0%)	1 (3,0%)	0 (0%)	2 (4,3%)	3 (2,8%)
Indigenous: Afrikaner	0 (0%)	12 (36,4%)	0 (0%)	1 (2,1%)	13 (12,3%)
Drakensberger	0 (0%)	0 (0%)	0 (0%)	9 (19,1%)	9 (8,5%)
Mix/Non- descriptive	1 (10,0%)	10 (30,3%)	7 (43,8%)	8 (17,0%)	26 (24,5%)
Dual-purpose breeds: Shorthorn	0 (0%)	0 (0%)	0 (0%)	3 (6,4%)	3 (2,8%)
Beef breeds: Brahman	0 (0%)	1 (3,0%)	0 (0%)	1 (2,1%)	2 (1,9%)
Nguni	0 (0%)	0 (0%)	0 (0%)	4 (8,5%)	4 (3,8%)

Using data in Table 3.13, cattle breeds used by small-scale dairy farmers in the North-Eastern Free State can be classified into five types: Dairy type (Holstein-Friesland

(41,5%), Jersey (1,9%) and Ayrshire (2,8%)), Dual-purpose type (Shorthorn (2,8%)), Beef type Drakensberger (8,5%), Brahman (1,9%)), Indigenous type (Nguni (3,8%), Afrikaner (12,3%)) and Mix/non-descriptive (24,5%).

Among small-scale dairy farmers the purpose of cattle production is mainly to produce milk and, to a lesser degree, meat of high quality with the lowest possible input of food and labour cost. The social and economic importance of livestock production to people in the Qwaqwa area should be recognised since the reasons for keeping livestock may differ from those of commercial farmers.

Respondents were asked in the questionnaire whether they milk all lactating cows with which they farm, and to name the breeds that they milk and indicate the number of cows in milk.

Most of the farmers (79,4%) milk any animal in lactation irrespective of breed, while 20,6% only milk cows from dairy breeds.

On average farmers milk 10,8 cows per day. Of which 16,4% of farmers were found to milk less than 3 cows per day, 45,2% milk 4 to 8 cows, 19,2% milk 9 to 13 cows, and 8,2% of farmers milk 14 to 18 cows.

3.4.5 Reproduction management

As most experienced dairymen know, a cow makes nearly all the profit above feed costs during the first four or five months of lactation. Getting the most milk from any herd, as well as the greatest return, is closely related to cows freshening at yearly intervals (Mbele, 1999; Letuka, 1999). Wilson (1995) further argued that there is no control of the breeding season, as it is essential to have a continuous supply of milk for human consumption under traditional pastoral systems.

In the Qwaqwa area the free use of bulls by everybody is perceived by the respondents on

communal land to be advantageous. On the negative side is the uncontrolled breeding and poor grazing management, and with this background in mind farmers in this study were asked what they use for mating cows and, if a bull, whether it is a state-registered bull or not. Figure 3.1 gives the different ways farmers use to mate cows.

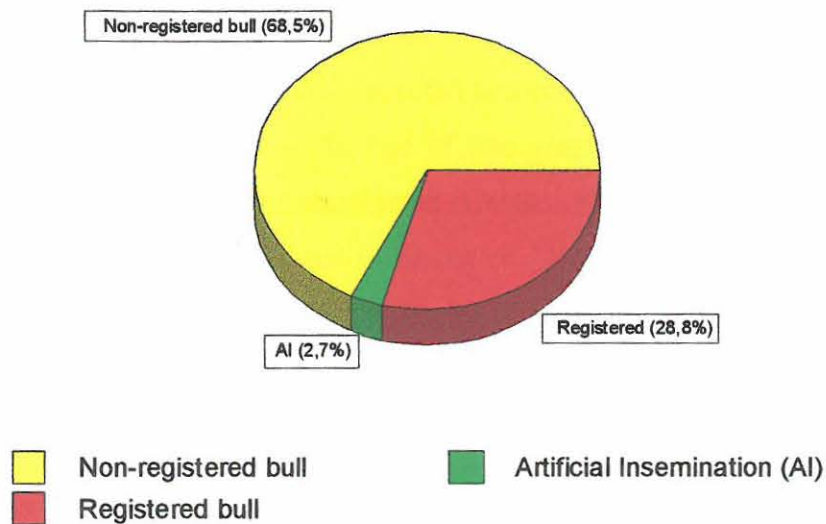


Figure 3.1: Use of a bull and Artificial Insemination (AI) to mate cows (n=73).

A good bull would produce roughly 60% superior progeny and 40% average or inferior progeny. A poor bull will give roughly 40% improved and 60% average to poor progeny (Martin, 1998). This shows the importance of having a good bull when farming with livestock.

Figure 3.1 shows that some farmers (28,8%) use a registered dairy bull to improve the fertility in the herds and most of the farmers (68,5%) use a bull that farmers have raised to mate cows. Farmers who purchased state-registered dairy bulls from the government do not rotate them among the projects. Farmers leave the bull to travel and graze with cows daily. As a result mating takes place on continuous bases. Calving rates are low, but the

aim is to keep sufficient cows so that only about two out of three of those lactating are milked for the household and the surplus is sold. Mbele (1999), Moteka (1999) and Letuka (1999) report that the optimum time for mating cows in oestrous is early in the morning at 08h00. This should be done on a daily basis for cows in oestrous. Other times may be after 12h00 or late in the afternoon at 16h00. They claim that bulls turn lazy, relax and seek shade during the day.

Farmers employing Artificial Insemination (AI) must have a young sire, home-bred and used as a "catch" bull, and carefully selected according to its dam's production and type. Young sires can be used from the age of one year until they start to show signs of aggressiveness, then be sold or slaughtered (Gittens, 1997). Only a few farmers (2,7%) in the Qwaqwa area employ Artificial Insemination (AI) to improve breeding material. The tendency among small-scale dairy farmers in the Qwaqwa area is to home breed young sires to become future bulls and not "catch" bulls. Therefore small-scale dairying is encouraged with the use of crossbred and high-grade cattle, mostly Holstein-Frieslands.

3.4.6 Production level and feed sources

Research has shown that milk production depends on many things, including the type of breed, feeding, health condition of the cow, stages of lactation (1 or 2) and general care of cows (Kitching, 1994). However, food consumption per unit of milk is strongly correlated to yields of milk, milk fat and milk protein (Gravert, 1987). Dixon (1973), Smith *et al.* (1993), as well as Rice & Grant (1999) assert that nutritional imbalances, deficiencies, or erratic management of feeding programmes for dairy cows can create large numbers and various types of health problems generally categorised as metabolic diseases.

According to Bembridge & Tapson (1993) poor feed levels are the major cause of poor livestock production in communal systems. Wilson (1995) reported that in coastal Benin in West Africa, by-products from plantation crops have long been used as livestock feed, often in countries far away from the source, because processing has been concentrated in the major industrialised countries. Kadzere *et al.* (1995) further argue that the more an

animal takes in feed, the more nutrients there will be available for growth and production. Wilson (1995) states that many by-products are now being used and that there are attempts to use new and unconventional ones. Some of these have poor nutritional value unless they are specially treated, but modern technology such as treatment with ammonia compounds or the use of radiation can improve feed value.

In the Qwaqwa area a large proportion of dairy production is raised from the communal farming systems and state land farms. Animals contribute to improved agriculture, mainly through the provision of power and by the supply of kraal manure. In turn animals benefit from agriculture by their use of forages and crop residues or by-products as a source of feed in addition to grass. In the questionnaire respondents were asked how much milk they sell per month (in litres). The result is shown in Table 3.14 below.

Table 3.14: Level of milk production (n=73)

LITRES OF MILK/MONTH	RESPONDENTS ON COMMUNAL LAND		RESPONDENTS ON STATE LAND		TOTAL (n=73)
	GROUP (n=10)	INDIVIDUAL (n=26)	GROUP (n=10)	INDIVIDUAL (n=27)	
< 300	0 (0%)	6 (23,1%)	3 (30%)	4 (14,8%)	13 (17,8%)
300-600	0 (0%)	10 (38,4%)	2 (20%)	2 (7,4%)	14 (19,2%)
600-900	0 (0%)	4 (15,4%)	1 (10%)	2 (7,4%)	7 (9,6%)
900-1200	1 (10%)	2 (7,7%)	1 (10%)	6 (22,2%)	10 (13,7%)
> 1200	9 (90%)	4 (15,4%)	3 (30%)	13 (48,2%)	29 (39,7%)

On average individual respondents on state land farms sell 2273,08 litres of milk per month, while individual farmers on communal land sell 869,6 litres of milk per month. In group situations farmers on state land sell 5763 litres of milk per month and farmers on communal land sell 1734,2 litres of milk per month.

The situation in the communal farming system was affected by demand and supply in that an increase in milk production resulted in a drop in income, because surplus milk had to be sold at a lower price to Thaba Dairies and other private contractors than what the community would have paid per litre of milk. Therefore it is not a wise idea to encourage

small-scale dairy farmers to produce more milk than they can afford to sell. Although the seasonality of milk production is less than it used to be, milk output still varies over the year. Production peaks in the late spring when cows are on green grass, and reaches a low during winter. Milk consumption, on the other hand, is highest in midsummer and in midwinter when schools are closed and children are at home

Respondents were asked whether they have a specific feeding programme that they follow when feeding dairy cattle at different levels of production, and to explain how they feed their cattle. Data on feed intake of different genotypes are inconclusive, probably due to the different diets. The results reveal that most of the farmers (67%) feed cows the same amount of feed despite the difference in milk yield of each cow. A further analysis shows that these cows yield on average 3,38 litres of milk per day. The rest of the farmers feed according to milk production, even though supplementing with minerals and trace elements is difficult for farmers due to financial problems.

Some farmers still supplement feeding in order to increase the milk production, and maintain the condition of the animal with hay (86,3%), concentrate (63,0%) and licks (94,5%). Farmers buy hay, concentrates and licks from different suppliers, namely Afrikaskop, Central East Co-operative Harrismith, other farmers and Nolko. These cows were found to yield 6,4 litres of milk on average per day. It is important to note that most of the farmers milk three of the four quarters for home consumption and sales, while the fourth quarter is left for the calf to suckle.

At some stage in the Qwaqwa area farmers exposed hay and maize stalks to weather conditions such as rainfall and sunlight until the winter period, without providing protection it against such conditions. There is a possibility that when the cattle are fed the nutrient content might have diminished. The implication is that ensilage is the cheapest method of preserving roughage for more than 3 years.

3.5 AVAILABILITY OF MILKING INFRASTRUCTURES AND FACILITIES

3.5.1 Infrastructure

It was evident from the survey that the infrastructures farmers are using are poor. The infrastructure at communal lands near cattle posts and for the newly settled farmers on state land farms is poor. However, the Department of Agriculture, through the Community Project Fund Support Programme (CPF-SP), has made some progress in addressing some specific problems regarding infrastructure. Farmers in this study were asked whether they have sufficient infrastructures to run dairy projects or farms. There was a severe lack of infrastructure as the majority of the farmers (78%) use communal kraals to hand-milk dairy cows, while 22% of the farmers use the milking parlours. The milking parlours used by the farmers can accommodate 6 to 20 cows per milking period and they are equipped with milking machines, but due to a shortage of electricity the milking machines are not operating.

3.5.2 Facilities to store milk

An attempt was made in this study to find out from the farmers whether or not they have facilities to store milk, and the results are summarised below. Respondents have more than one way to store milk, namely:

- Ordinary plastic milking buckets (57,7%);
- Cooler tanks (14,1%);
- Ordinary tanks (12,8%);
- Milk cans: 5 to 45 litres (7,7%);
- Deep-freezers (3,9%); and
- Cooler tanks plus plastic containers (3,9%).

The study reveals that farmers (57,7%) are experiencing losses in summer due to inadequate storage facilities and the fact that farmers are using ordinary plastic containers to store the milk before marketing. The losses are also caused by poor quality as a result

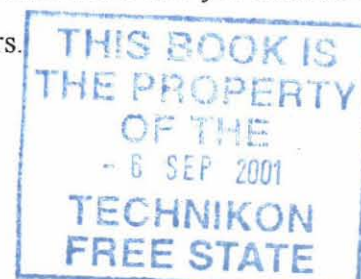
of spoilage. The major constraint is due to poor planning of storage facilities and a lack of electricity. Only 14,1% of farmers have cooler tanks to store milk before marketing and few farmers (3,9%) have both the cooler tank plus containers. To avoid heavy losses, other farmers sell all milk directly after milking in the morning and in the afternoon to the local community and on contracts to private persons.

3.6 LABOUR REQUIREMENTS AND MANAGEMENT

To function efficiently, the farming enterprise, depending on its size and nature, must have a specific labour force. However, be it formal or informal, task analysis is important (Van Reenen & Davel, 1991). Peak labour and machinery requirements of the selected enterprises must be determined and checked to ensure that there is sufficient labour and machinery to meet the requirements. If not, the question must be asked as to whether the timing of operations can be adjusted or whether extra labour or equipment is justified (Klug & Webster, 1993).

Farmers in this study were asked how many women and men the project employs permanently and temporarily, and how much they pay permanent labour per month and hired labour per day. Farmers farming with crops and animals employ on average 1,96 men as general labour (permanently) and pay them on average R237,00 per month. Farmers also pay for food and protective clothing. Farmers employ one woman permanently and pay R100,00 to R250,00 per month. Most of the activities done by women revolve around the cleaning of milking facilities and other dairy equipment.

Among others, Van Reenen *et al.* (1995) believes that a contract should be established between farmers and the farm workers to regulate the interaction between them over time. Certain principles are relevant, such as the competence of the parties to draw up the contract, as well as the elements that come into effect should the relationship be terminated. Both parties have certain rights and duties to maintain the contract. Informal interviews reveal that small-scale farmers in the Qwaqwa area have not yet entered into any written agreements or contracts with their farm workers.



The majority of the dairy farmers (76,7%) on communal and state land farms are actively involved in most of the activities taking place at project or farm level. Farmers are involved in milking, as well as maintenance of the milk-shed, equipment, water points and fences, since most of the activities around dairying are labour intensive. Labour requirements for most of the farmers are not high, and farmers attend to the animals every day by performing feeding and milking duties themselves. Using only hired or temporary labour for this work would not be economically viable among most small-scale dairy farmers in the Qwaqwa area. Some farmers (23,3%) use hired or temporary labour during peak periods and to look after cattle while they are absent, and such workers are paid an average wage of R23,86 per day.

3.7 MARKETING STRATEGIES

3.7.1 Promotion

For an assessment of the importance of promoting produce, respondents were asked in an open-ended question how buyers that buy from them know about their milk. As the most important means of promoting produce (milk), the majority of the farmers (74,7%) rely on other farmers, neighbours, meetings and friends as opposed to (25,3%) of the farmers who make use of own means of promoting their produce and the use of a shopping complex to market milk.

3.7.2 Marketplaces and marketing channels

Madolo & Venter (1998) report that the demand and supply principle plays a major role in controlling the marketing of milk by small-scale dairy farmers. In the Qwaqwa area marketing is localised as much as possible. Taking into account that many hawkers, buy milk in bulk at Thaba Dairies and sell the milk in the area, limit the marketing share in the adjacent villages (Table 3.15). It is expected that the n-value will be more than 73, as some respondents use more than one marketplace and channel.

Table 3.15: Marketplaces used by respondents to market their milk (n=77).

MARKETPLACES	COMMUNAL LAND		STATE LAND		TOTAL (n=77)
	GROUP (n=11)	IND. n=28)	GROUP (n=10)	IND. (n=28)	
1. Local community	10 (90,9%)	20 (71,4%)	6 (60,0%)	14 (50,0%)	50 (64,9%)
2. Thaba Dairies	0 (0%)	4 (14,3%)	1 (10,0%)	13 (46,4%)	18 (23,4%)
3. Private contractors: Clinics, other farmers, police station, shop owners, crèches, and others.	1 (9,1%)	4 (14,3%)	3 (30,0%)	1 (3,6%)	9 (11,7%)

According to Table 3.15 a large group (23,4%) individually transport their milk to Thaba Dairies where it is assembled for further processing. The milk is pumped directly into tanks at Thaba Dairies. The bulk milk system by individual farmers is laborious and causes unnecessary loading and unloading of milk cans at the project or farm and at Thaba Dairies. Due to the problem of poor infrastructure on farms and at project level, the system has permitted farmers to deliver milk on a daily basis instead of allowing milk to accumulate until it turns sour.

The challenge facing Thaba Dairies presently is the penetration of milk suppliers from Bethlehem, Harrismith and Kestell into the Qwaqwa area. Consumers purchase most of the milk during the week.

The Free State Development Corporation (FDC), Agri-Eco and the 45 emerging dairy farmers who comprise the Dairy Farmers' Investment Company (DFIC) currently own Thaba Dairies. The pricing of milk is influenced by several factors, including:

- ◆ The consumer demand for milk;
- ◆ The dairy farmers' co-operative; and
- ◆ The cost of production and domestic supply of milk.

The majority of the farmers (64,9%) in this study market their milk to the local

community. This finding correlates with the findings of Kitching (1994) and Claassen (1998) who agree that at project level in the Qwaqwa area, farmers rely on the community to buy their milk willingly at a price accepted by members.

3.7.3 The marketing and pricing of milk

The Government recognises that one of the legacies of apartheid policies is missing or incomplete markets in areas where black farmers are located. This results from, among other things, unequal access to marketing information. The government will ensure that appropriate institutional arrangements are in place for collecting, analysing and disseminating information to small and medium-scale farmers. The focus will be on information enabling farmers to make better decisions regarding what to produce, when to harvest and sell, and where to sell. This will include information on (Ministry for Agriculture and Land Affairs, 1998):

- ◆ Product requirements, quality and presentation;
- ◆ Market size;
- ◆ Input and producer prices and trends;
- ◆ Supply and demand trends; and
- ◆ Marketing costs, including transport costs.

Market centres are very important for the survival of the project. The current conditions surrounding the marketing of milk are very uncertain and can change at any time and affect the entire project. Farmers in this study were asked the price at which they sell a litre of milk and a litre of sour milk. The results are summarised in Table 3.16 below.

keep adequate records. The daily entry of income and variable cost transactions forms the most important part of record keeping because of the profitability analysis that can be conducted at the end of the financial or production year.

Farmers in this study were asked whether they keep records of the activities taking place at project level, and were requested to explain how they take records. The results reveal that half of the respondents (50,7%) interviewed keep records on a daily basis. Most of these farmers market their milk to Thaba Dairies and some sell their milk on contract to private bodies, while 49,3% of the respondents do not keep records of the activities taking place on a farm.

In order to estimate the profitability of the enterprise, farmers must keep detailed records. The majority of farmers (66,0%) take records every day, while 29,8% take records after purchasing agricultural inputs and after selling milk, and 4,3% of the farmers take records once a month. Most respondents (57,5%) were found to use notebooks for keeping records, while 8,5% of the farmers use notebooks plus a computer, and some farmers (34,0%) keep cash slips and invoice slips as their record-keeping method. Farmers on communal and state land farms use a record-keeping format as suggested by the former Qwaqwa Department of Agriculture in 1994 and shown in figure 3.2.

DAILY MILK PRODUCTION AND FEED RECORD KEEPING

Date	Cow number/name	Litres/cow/day		Total litres/day	Feeding programme		Total feed/day	Amount generated/cow/day
		a.m	p.m		a.m	p.m		

Figure 3.2: Daily milk production and feed record keeping

Inadequate records lead to inadequate information for sound management decisions. These records of both the physical and the financial situations should enable the farmer to do spot checks on the performance of the dairy herd and to analyse the financial records that relate solely to the dairy enterprise. The gross margin system of analysis can be used for this purpose. The high level of management can only be kept by keeping proper and complete records. Farmers' recording system have certain shortcomings that have a negative influence to the project or farm if not investigated and remedial action put into place. Appendix D shows the suggested dairy cattle record-keeping format suggested by Venter (1997) to be used among developing dairy farmers.

3.8 PREFERENCE REGARDING DIFFERENT NEEDS AND MANAGEMENT

3.8.1 Farmers' future needs and aspirations

The satisfaction of human needs and aspirations is so obviously an objective of productive activity that it may appear redundant to assert its central role in the concept of sustainable development (Brundtland *et al.*, 1986). Brundtland *et al.* (1986) and Sirur & Van den Brink (1995) felt that the satisfaction of human needs and aspirations is the major objective of the development. The essential needs of vast numbers of people in developing countries - for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life.

3.8.1.1 Farmers' needs

Too often poverty is such that people cannot satisfy their needs for survival and wellbeing even if goods and services are available. At the same time, the demands of those not in poverty may have major environmental consequences. With their background in mind, farmers in this study were asked what they would like to see happening on their projects or farms. The answers to the question reflect perceptions from the respondents and therefore results may be biased. Farmers on state land farms and communal land stated the

following as what they would like to see happening on their farms over the next five years (n=87):

- ◆ Finance: to buy a farm (23,0%).
- ◆ The subsidy on agricultural inputs (14,6%).
- ◆ Specialisation in dairy farming and livestock production (13,8%).
- ◆ Fencing, access roads and water points to enable expansion and save money (13,8%).
- ◆ Well-developed infrastructures (8,1%).
- ◆ To be known as highly successful and to be recognised (8,1%).
- ◆ Developing to meet set targets and implement ideas and farming knowledge, as well as good marketing conditions (5,8%).
- ◆ Well-electrified farm (3,5%).
- ◆ Equipped with dairy facilities (3,5%).
- ◆ Well equipped with implements (3,5%).
- ◆ Irrigation system (2,3%).

Although farmers (23,0%) like to be credited on a large scale, this should be avoided because it has caused the downfall of many agricultural developing projects. The level of credit must match the level of production and the potential ability of production. The Department of Agriculture's objective was to end their involvement in the dairy projects by 1994. Nevertheless, farmers still felt that without the involvement of the Department, their chances of survival if hit by disaster such as drought or fire are reduced. It would seem that the Department did not explain clearly to the farmers that it would move out and the high subsidies would be ended when group dairy projects were established in 1994 by the former Qwaqwa Department of Agriculture.

3.8.1.2 Farmers' aspirations

The aspirations regarding dairy projects vary significantly between the different dairy farming categories. The group and individual farming respondents all, with a single exception, want to be well known, successful, recognised and organised and to generate income (Table 3.17).

Table 3.17: Farmers' future aspirations (n=98)

FARMERS' ASPIRATIONS	COMMUNAL LAND		STATE LAND		TOTAL (n=98)
	GROUP (n=14)	IND. (n=32)	GROUP (n=22)	IND. (n=30)	
Not sure	1 (7,1%)	4 (12,5%)	1 (4,5%)	2 (6,7%)	8 (8,2%)
To be developed, known, successful, recognised and organised.	5 (35,7%)	15 (46,9%)	6 (27,2%)	21 (70,0%)	47 (47,9%)
Financed by the government.	3 (21,4%)	2 (6,2%)	1 (4,5%)	2 (6,7%)	8 (8,2%)
Out of debt.	0 (0%)	0 (0%)	1 (4,5%)	0 (0%)	1 (1,0%)
Generate income.	3 (21,4%)	3 (9,4%)	1 (4,5%)	0 (0%)	7 (7,1%)
Electrified project.	1 (7,1%)	7 (21,9%)	12 (54,6%)	4 (13,3%)	24 (24,5%)
Good marketing conditions.	1 (7,1%)	1 (3,1%)	0 (0%)	1 (3,3%)	3 (3,1%)

According to Table 3.17, the largest group of small-scale dairy farmers (47,9%) indicated their future aspirations as being to develop, grow, be known, be recognised, be successful and be well organised in farming. This is due to the fact that farmers are concerned about the lack of respect and recognition from the government and other commercial farmers. The government is accused of not fulfilling their promises to the small-scale dairy farmers since 1994, after the general democratic elections. The commercial farmers are accused of not supporting the concept of small-scale farming by allegedly accusing small-scale farming of being unproductive and detrimental to the environment.

3.8.1.3 Agricultural training needs and extension service

Government and donor efforts to promote small business have so far focused mainly on credit schemes and training. Skills training predominantly focused on small-scale manufacturing and general "entrepreneurship training" aimed at teaching basic business skills and motivating participants to start small businesses (Sirur & Van den Brink, 1995).

Training is one of the most important methods to overcome restraining cultural influences. It also brings about a marked change in black people's differentiation of thought and leads to increased productivity. A lack of skill is often due to a lack of training (Van Reenen & Davel, 1991).

It should be noted that the list of training needs to be identified is comprehensive and extremely diverse. Respondents on state and communal land require access to a wide range of support services and professional advice (Table 3.18).

Table 3.18: Agricultural training needs (n=149)

AGRICULTURAL TRAINING NEEDS	COMMUNAL LAND		STATE LAND		TOTAL (n=149)
	GROUP (n=19)	IND. (n=46)	GROUP (n=24)	IND. (n=60)	
Dairy cattle management and feeding	1 (5,3%)	8 (17,4%)	1 (4,2%)	14 (23,3%)	24 (16,1%)
Cattle management	2 (10,5%)	8 (17,4%)	4 (16,6%)	8 (13,3%)	22 (14,8%)
Financial management	0 (0%)	4 (8,7%)	0 (0%)	4 (6,7%)	8 (5,4%)
Veld management	1 (5,3%)	0 (0%)	2 (8,3%)	2 (3,3%)	5 (3,3%)
Record keeping	2 (10,5%)	0 (0%)	1 (4,2%)	3 (5,0%)	6 (4,0%)
Crop production	5 (26,3%)	7 (15,2%)	7 (29,1%)	7 (11,7%)	26 (17,5%)
Farm management	4 (21,0%)	15 (32,6%)	3 (12,5%)	10 (16,7%)	32 (21,5%)
Management of labour	0 (0%)	1 (2,2%)	1 (4,2%)	3 (5,0%)	5 (3,3%)
Land use planning	0 (0%)	0 (0%)	1 (4,2%)	2 (3,3%)	3 (2,0%)
Artificial insemination (AI)	0 (0%)	0 (0%)	1 (4,2%)	2 (3,3%)	3 (2,0%)
Marketing	1 (5,3%)	1 (2,2%)	0 (0%)	1 (1,7%)	3 (2,0%)
Mixing of rations (feed)	1 (5,3%)	0 (0%)	0 (0%)	0 (0%)	1 (0,7%)
Maintenance equipment	0 (0%)	0 (0%)	1 (4,2%)	0 (0%)	1 (0,7%)
No training needed (well trained)	0 (0%)	2 (4,3%)	2 (8,3%)	4 (6,7%)	8 (5,4%)
Not available	2 (10,5)	0 (0%)	0 (0%)	0 (0%)	2 (1,3%)

With particular reference to Table 3.18 it would seem that the most frequently mentioned type of training or assistance and/or support required by respondents relates to cattle management (16,1%), and 17,5% of respondents on state and communal land need training and/or assistance on crop production. The implication is that farmers perceive training on livestock management and feeding to be very important.

The field staff of the former Agri-Eco provided an extension service to the 96 farmers on 114 state land farm units before the company was declared liquidated in 1999. Agricultural Extension Officers are providing extension services to farmers on communal lands and at project level. Integration of service providers is essential to enable service providers to provide extension services to small-scale dairy farmers on state land farms.

3.8.1.4 The role of the government

A stronger commitment from government and its agencies is needed to tackle policy issues on land ownership and thereby increase agricultural production and assure greater equity and self-employment in agriculture (Greyling, 1999; Mathivandlela, 1999). As stated in the Agricultural Policy in South Africa in 1998 the role of the government in agriculture is to create an enabling environment for the development of the sector in such a way that the overall economic, social and environmental objectives can be achieved. There are three aspects to this approach (Ministry for Agriculture and Land Affairs, 1998):

- ◆ Establishing principles for government support for agriculture;
- ◆ Building partnerships with the private sector and farmers' organisations; and
- ◆ Establishing accountability for services.

Based on the background farmers were questioned regarding their expectations from the government concerning their project or farm and their own situation on the project. The results are further summarised in Table 3.19 below.

Table 3.19: The role of the government as seen by the respondents with regard to their projects (n=149)

ROLE OF GOVERNMENT	COMMUNAL LAND		STATE LAND		TOTAL (n=149)
	GROUP (n=20)	IND. (n=47)	GROUP (n=17)	IND. (n=65)	
Financial assistance: CPF-SP infrastructures and security	9 (45,0%)	15 (31,9%)	6 (35,3%)	22 (33,8%)	52 (34,9%)
Extension services	4 (20,0%)	10 (21,3%)	2 (11,8%)	4 (6,2%)	20 (13,4%)
Subsidies to buy land: R16000,00 (grants), to buy medicine for livestock, and to buy agricultural inputs and implements	3 (15,0%)	12 (25,5%)	5 (29,4%)	14 (21,5%)	34 (22,8%)
Electricity	0 (0%)	0 (0%)	0 (0%)	5 (7,7%)	5 (3,4%)
Access road construction	1 (5,0%)	1 (2,1%)	3 (17,6%)	7 (10,8%)	12 (8,0%)
Water for drinking (household and livestock)	0 (0%)	2 (4,3%)	0 (0%)	3 (4,6%)	5 (3,4%)
Land care: construction of contours, and soil-erosion prevention	0 (0%)	0 (0%)	0 (0%)	2 (3,1%)	2 (1,3%)
Drought relief funds	0 (0%)	0 (0%)	0 (0%)	1 (1,5%)	1 (0,7%)
Training	2 (10,0%)	4 (8,5%)	1 (5,9%)	3 (4,6%)	10 (6,7%)
Recognition farmers' needs	1 (5,0%)	1 (2,1%)	0 (0%)	1 (1,5%)	3 (2,0%)
Assistance and support to developing farmers: dipping and prevention of veld fires	0 (0%)	2 (4,3%)	0 (0%)	3 (4,6%)	5 (3,4%)

An essential function of the government will be to supply "public services" such as basic agricultural research, market information, appropriate legal regulation and environmental

protection. The government will also seek to strengthen the efficiency of service provision by targeting those most in need of support, principally the resource-poor and emerging farmers (Ministry for Agriculture and Land Affairs, 1998).

The majority of farmers felt that the government should play a leading role in kickstarting the process of streamlining the marketing process, development of infrastructures, financial assistance, training and extension services to developing dairy farmers. The government is seen as playing an important role in providing financial assistance to expand current activities, purchase machinery and implements and increase the quality of the products, as well as subsidising farmers to purchase inputs and veterinary services.

All farmers have an interest in an effective drought risk management strategy. Only one farmer saw the government playing a major role in assisting with drought relief funds. However, as stated in the Agricultural Policy in South Africa in 1998, the government will no longer provide drought relief as in the past. Instead it will promote other options for reducing risk.

These results reveal that farmers (34,2%) feel that the government can play a major role in financing their projects through the Community Project Funds Support Programme (CPF-SP), in an attempt to address the infrastructure problems among farmers. The Department of Agriculture has made R10 000,00 in non-refundable grants available to each household, to address some specific problems regarding basic infrastructures like fencing, water reticulation and roads. This is mostly applicable to the newly settled farmers on state land farms, for example Weltevrede and Humewood farms and projects in Qwaqwa. The grants exclude individual farmers on the 114 farm units and small-scale dairy farmers on the land allocated by chiefs. To access the funds the policy required people to form groups of at least five households.

Additional funds for purchasing the farms will be obtained from the Land Bank as long-term loans. The Land Bank also assisted backyard farmers with a "Step-up" micro-lending scheme for a short-term period. A 15% bond for first-time buyers of agricultural land for a

period of eighteen months is also available, and thereafter it is reviewed with the intention of keeping it at this level. The maximum loan amount is R250 000,00 (Land Bank, 1998). A land acquisition and settlement grant of R16 000,00 will be issued to small-scale farmers on state land to purchase the farms from the Department of Land Affairs (DLA).

3.8.1.5 The role of other farmers and neighbours

The relationships between farmers, farm workers and the consumers in most cases range from highly unequal and exploitative relationships to mutually beneficial relationships. Within the context of a "farmer to farmer" approach, farmers in this study express the following expectations as the role other farmers and neighbours can play to ensure the success of dairy projects in the North-Eastern Free State (n=84):

1. Corporations: neighbourhood and good working relationship (58,3%).
2. Technical advice from experienced farmers (14,3%).
3. Assist with implements and grazing lands to landless farmers (13,1%).
4. Respect from commercial farmers and recognition (3,6%).
5. Form associations: fight stock theft, veld burning and others (2,4%).
6. Exchange implements with other farmers at reasonable prices (2,4%).
7. Exchange registered dairy bulls (1,2%).
8. Buy their milk (1,2%).
9. Development in farming, technically and financially (1,2%).
10. Regular meetings with other farmers to share farming experiences (1,2%).

The role of co-operatives can also be expanded, especially in relation to small-scale dairy farmers. Appropriate incentives should be provided by the DoA to enable co-operatives to shift to new roles that will accommodate small-scale farmers. Co-operatives should be encouraged to assist farmers with marketing, advice and maintenance. Co-operatives should become the channel for local micro-finance, and should make inputs available by means of well-located sale points. This is in fact what the farmers reported. The fact that 58,3% of the participants felt strongly that co-operation is the key to success shows that farmers know that it is through a mutual understanding between them and the consumers

that their business can operate economically and be sustainable and that other important objectives can be achieved when approached as a multidisciplinary team. Farmers also recognise the fact that co-operation encourages the dissemination of information from one farmer to another.

3.8.1.6 Farmers' opinions regarding the management of dairy projects or farms

Due to population pressure and overgrazing in the Qwaqwa area environmental degradation is taking place on a large scale. Even households with land and livestock struggle in the face of land shortages and the high costs of ploughing, planting and harvesting. Households typically make ends meet by engaging in multiple livelihoods, and these livelihood strategies will need to be supported by sensitive and clearly defined and targeted programmes. In an attempt to implement measures to prevent risks associated with small-scale farming, especially in the first few years, the involvement of farmers is of paramount importance. The answers registered through the process are categorised as follows.

- ◆ Arable land to plant fodder and crops (16,1%).
- ◆ Dairy cattle feed semi-intensively (12,8%).
- ◆ Well-trained farmers and labourers to operate dairy projects or farms (12,8%).
- ◆ Adequate infrastructures: milking parlours, well-fenced camps (10,7%).
- ◆ To have good quality dairy breeds (10,1%).
- ◆ Cleanliness: hygienically kept milking parlours, equipment and facilities (10,1%).
- ◆ Adequate water (9,4%).
- ◆ Must be able to generate income and produce more, as well as keep records (8,0%).
- ◆ To have a farm (7,4%).
- ◆ Dairy cattle must be comfortably housed and treated with care (2,7%).

Farmers are of the opinion that training (12,8%), infrastructure development (10,7%) and water supply (9,4%) services provided by the Department of Agriculture are worthwhile and in line with their opinion regarding the management of dairy projects, but need to be improved. Suggestions from the farmers regarding the improvement include dairy courses

and retraining of farmers and labourers. From the results above, farmers view dairying as the future investment for their children. Farmers have a clear understanding of the fact that good management is the key to success and to profit-making. Farmers acknowledge the fact that farming with pure dairy cattle breeds and good feeding will pay in the long run. In general farmers felt that their self-image had been boosted since their involvement in dairy farming.

3.9 LEVEL OF SUCCESS

Various indicators were used to rank small-scale farmers' level of success, namely standard of living, income, consumption, access to information, finance, training, and factors such as freedom or political and human rights (Sirur & Van den Brink, 1995). Among the indicators for the level of success of the dairy projects or farms were:

- ◆ the management level of funds;
- ◆ the gross income generated off the project;
- ◆ the level of training of respondents;
- ◆ co-operation between parties in general; and
- ◆ the availability of markets for the milk.

The level of success of the dairy projects is summarised in Table 3.20.

Table 3.20: Farmers' opinions of their own level of success

		Level of success				
		Very-low	Low	Average	High	Very high
RESPONDENTS ON COMMUNAL LAND	GROUP (n=10) %	0 (0%)	2 (20,0%)	8 (80,0%)	0 (0%)	0 (0%)
	IND. (n=26) %	2 (7,7%)	13 (50,0%)	9 (34,6%)	2 (7,7%)	0 (0%)
RESPONDENTS ON STATE LAND	GROUP (n=10) %	0 (0%)	4 (40,0%)	4 (40,0%)	2 (20,0%)	0 (0%)
	IND. (n=27) %	0 (0%)	9 (33,3%)	13 (48,1%)	5 (18,5%)	0 (0%)
TOTAL (n=73) %		2 (2,7%)	28 (38,4%)	34 (46,6%)	9 (12,3%)	0 (0%)

The n-value reflects the successful projects and is not necessarily an indication of the responses of the sample. In response to a question to respondents asking them to rank the level of success of their projects in respect of their own farming situation, 46,6% of the farmers ranked their level of success as average. Compared with only 7,7% of the farmers on communal land, more of the individual farmers on state land farms (18,5%) ranked their level of success as high.

Large proportions of respondents were uncertain about the outcomes of the eventual success of dairy projects, since most of the projects on communal and state land farms are still running. However, the majority of the respondents rated the outcomes of the projects as reasonable. Most of the farmers in the North-Eastern Free State were found to depend mostly on the subsidies from the Department of Agriculture. It is difficult to detect whether or not they will function independently in the long run. It seems unlikely that small-scale dairy projects can survive if hit by a sudden disaster such as fire or drought. The most common reasons for the failure of the dairy project were:

- ◆ a lack of funds;

- ◆ a lack of water;
- ◆ a lack of land;
- ◆ a lack of farming know-how and skills;
- ◆ a lack of reliable marketplaces;
- ◆ security of tenure that hinders expansion or development; and
- ◆ a lack of infrastructures in general.

Other stumbling blocks that seem to erode the success of dairy projects on communal and state land farms are the shortage of veterinary surgeons and unrealistic expectations of the new dairy farmers on the state land farms (for instance to expect the DoA to pay for monthly expenses resulting from their farming practices).

CONCLUSIONS AND RECOMMENDATIONS

4.1 A GENERAL PROFILE

The main findings, conclusions and recommendations of the research project among small-scale dairy farmers in the North-Eastern Free State are summarised in this chapter.

Small-scale dairy farmers vary from old to young farmers, highly qualified to uneducated, highly skilled to totally unskilled, new entrants to farming to well-established dairy farmers, farmers farming intensively with poultry and pigs to farmers farming extensively with sheep and cattle, and from farmers with adequate land and capital farming as individuals on legally purchased state land farms, to farmers with a lack of land and capital farming on the communal land.

- a) The average age of small-scale dairy farmers is 52,9 years, which is high. Most of the small-scale dairy farmers (50,7%) had no formal school training and a large proportion are illiterate. Aged people (> 52 years) and pensioners farming with no education have problems implementing long-term plans and programmes.
- b) Households in this study are mostly headed by men with many dependent children and elderly people.
- c) The level of basic technical knowledge and skills in agriculture and livestock is high amongst those farmers who are involved in dairy farming, because most of the farmers have been working as farm labourers. However, there is an important need to upgrade their level of specific knowledge and to adapt it to the requirements of managing a small dairy farm, for example in the spheres of farm management, marketing and record keeping.

Farming guidance should not only be given to the household heads but also to spouses and children. The involvement of wives and successors in decision-making will ensure the success of the project and the implementation of long-term plans and programmes.

A low level of educational qualifications and a lack of independent experience impede the managerial skills and farming know-how of farmers. To overcome this shortcoming it is recommended that farmers should undergo managerial training and receive technical assistance.

- d) Small-scale dairy farms are labour intensive. It is cost effective for small farmers to use family labour, and they often use labour-intensive techniques instead of the capital-intensive techniques used on larger dairy farms.

It is recommended that a good working relationship among dairy farmers, other farmers and neighbours should be encouraged. Farmers should form organised bodies to fight stock theft, veld fires and crime. Farm watch organisations should be promoted. Rural safety networks should be established with the assistance of the government and the private sector. The networks should include rural councils, farmers' associations and non-governmental organisations involved in farm welfare.

- e) Land tenure arrangements in the Qwaqwa area are insecure. In the Qwaqwa area land rights are still vested in traditional authorities. The land conflict, which can be viewed as a power struggle between the chief (or headman) and his subjects, is the major issue. Without setting aside this conflict, no land reform, service standards, provision of infrastructure planning, management of grazing, or cultivation of land and natural resources will be possible. In the absence of a rapidly implemented tenure reform programme, the potential for conflict will continue to exist.

Small-scale dairy farming presently takes place along the mountains just outside the residential areas within the Qwaqwa rural area. Small-scale dairy farmers and community

members who need access to grazing and cultivated land on communal land must be part of grazing committees at a local level. This is equally true with respect to the use of land-based natural resources, most notably firewood, water, wild vegetables and medicinal plants.

The areas presently used for farming activities should be reserved for that purpose. Tenure reform is particularly important in the Qwaqwa area and on peri-urban land that falls under local government control, in that it is designed to improve the security and the tradability of individual rights to land. This encourages responsible management. De facto rights to production, which could include land security and contracts, are essential.

4.2 FARM MANAGEMENT PRACTICES

As could be expected from the respondents, improved funding, as well as more extensive and intensive training were the two main suggestions for the improvement of dairy projects, since these two aspects were directly related to the failure of some dairy projects on communal and state land farms. All farmers have an interest in effective drought risk management strategies.

- a) The major constraints of small-scale dairy farmers are primarily a shortage of land, a lack of investment and working capital, and limited access to markets, as well as the restricted security of tenure of land, a high stocking rate (mainly on communal land), and the seasonal nature of feed supply in the Qwaqwa area. Farmers experience problems and frustrations with regard to the allocation and administration of the Community Project Fund Support Programme (CPF-SP).

It is essential that access to finance should also be facilitated via private financial institutions and not only via the government. It should be mentioned that financial institutions mostly give financial assistance only to entrepreneurs with sound financial records, growing assets and a history of business development. An intensive publicity campaign to introduce the

CPF-SP project idea is essential, taking into account that the DoA has limited experience with the support programmes and approach to the clients, as well as limited financial resources.

- b) In the Qwaqwa area, the majority of the households farming on communal and state land farms lack agricultural resources such as land, agricultural inputs and water. A lack of infrastructure and subsequent conflict over the use of existing resources has greatly hampered agricultural development in these areas. Due to the high population and lack of a grazing system, environmental degradation is taking place at an increasing rate.

It is therefore important that communal land is thoroughly planned and used in an orderly fashion and that the control of these areas be assigned to a specific local or tribal authority. For those people who hold cattle for production purposes, it is recommended that a commonage grazing system be introduced and the number of animals per household be restricted.

- c) Among small-scale dairy farmers in the North-Eastern Free State many farming operations are still based on the traditional way. The poor management practices experienced among farmers is due to the high level of poverty, lack of support services to prospective farmers regarding the realities of a dairy enterprise or industry, limited feed and finance, poor herd health management, and uncontrolled management on communal farm land.

Animal management is essential and consideration should be given to practices that have to conform to the desired stock flow, such as breeding season, culling and marketing policy. Veld management, stocking rates, and burning and resting policies should be checked by the planners, implementers and policy-makers in the Eastern Free State.

Special attention should also be given to relevant topics such as heifer rearing, selection policy, marketing arrangements and herd health programmes. Good

procedures and the necessary techniques to ensure good quality conserved feeds must be adopted.

Peak labour and machinery requirements of the dairy enterprise must be determined and checked to ensure that there is sufficient of both to meet the requirements.

Drought management needs to be built into farming systems to ensure that climatic risks are minimised within the agricultural sector in the Free State.

- d) Poor extension services, inadequate veterinary support, lack of financial assistance and a lack of market information have resulted in low animal production among small-scale dairy farmers in the North-Eastern Free State.
- e) The Holstein-Friesland dairy breed is the breed most preferred by a large number of developing dairy farmers (41,5%) because of its potential if managed correctly, to produce more milk and meat compared with other dairy breeds, namely Jersey and Ayrshire. Some farmers keep dual-purpose breeds that produce a fair amount of milk. Several farmers (26,5%) keep beef breeds mostly for meat and milk. Beef breeds are milked once a day. Other farmers (24,5%) keep mixed or non-descriptive breeds for both meat and milk production. Indigenous, cross-and beef breeds and other local breeds are relatively well adapted to the environment, they spare grazing, have a low rate of infection by ticks and parasites, and most probably would outperform other types of stock under similar levels of management. The local breeds are well integrated into the overall use of crop residues.
- f) For communal farming system, breed choice is influenced by the fact that grazing is generally over-utilised due to a lack of access control. The best choice is therefore a low-maintenance, easy-care and disease-resistant animal with the ability to utilise roughage with very little or no supplementation.
- g) Almost all dairy farmers rear female calves until they come into the production stream.

It is a minimum of twenty-four months before farmers can see a return on their investment in calves.

It is therefore recommended that calf rearers should specialise in raising calves to maturity. A separate group from dairy farmers can undertake this aspect on farms that have been specially set aside and planned for calf rearing. When milk producers have sold female calves to calf-rearers, they should have the first option to buy back the progeny of their cows when they reach points of calving stages. However, it is only natural and sensible that those dairy farmers who do not want to part with the offspring of their quality producing cows, should build up the history of the dairy and sustain the interest.

- h) The tendency among small-scale dairy farmers (68,5%) is to home breed young sires to be future bulls, and not to buy registered bulls. This tendency might result in a low yield.

It is recommended that farmers form "Dairy Bull Projects" whereby all registered dairy bulls will be used to improve the fertility in the herds. Farmers who purchased dairy bulls from the government should rotate these among other farmers in order to improve the fertility of the herd in the greater Qwaqwa area.

- i) Smallholder mixed farmers and other traditional groups own dairy cattle breeds in the Qwaqwa area for various reasons. The priorities of the small-scale and traditional livestock owners in the study area are:
- ◆ Generating income;
 - ◆ Producing milk and finally meat;
 - ◆ Fulfilling social, cultural and religious requirements and obligations;
 - ◆ Generating and accumulating capital;
 - ◆ Providing status within the community; and
 - ◆ Providing power and fuel.

Unless small-scale dairy farmers on communal land and state land farms are well equipped with good management practices and skills, their cattle may prove to be unprofitable.

- j) In the Qwaqwa area a large proportion of the dairy production is raised from the communal farming system and state land farms. From the communal farming system uncontrolled management of communal grazing lands is unproductive and has resulted in poor livestock performance. As much as 76,9% of respondents farming as individuals on communal land sell less than 900 litres of milk per month, compared with 29,6% of individual farmers on state land.

It is essential that a comprehensive policy be introduced to reduce overstocking and therefore arrest soil degradation. Such policy must raise the private cost of livestock ownership to something approaching the social cost, whether through the development of commonage grazing fees or by other means. The formulation of local by-laws to regulate the number of stock per household will enable cattle farmers to be productive. Decisions on stocking rates have to be taken at grass-roots level by the local community and the grazing committees under the guidance of government extension services. The government needs to move away from its role as a regulator to one of a facilitator, empowering communities to manage their own resources in a responsible and sustainable way.

4.3 MARKETING STRATEGIES

Apart from marketing and pricing problems, several technical factors affect the development of small-scale dairy farming in the North-Eastern Free State. These include (1) limited access to credit; (2) the unavailability of veterinary services; (3) inadequate training and extension services to compensate for the limited experience of farmers with the relatively complex activities involved in dairy farming; and (4) the frequent undernourishment and the variable genetic quality of milk, the latter being the result of poor breeding practices.

- a) Small-scale dairy farmers often run into marketing problems. Marketing channels and services catering for all aspects relating to storage, packaging and transport pose major problems to small-scale dairy farmers.

The solution proposed to remedy these problems is generally to provide training in marketing skills so as to gain valuable information on demand, supply and price. However, initiatives other than training in marketing techniques should also be considered, such as value adding and product presentation. Value-adding activities are very popular among small-scale dairy farmers. It is therefore recommended that this farming division be further investigated, especially amongst the dairy sections involved in the selling of vegetables and live animals.

- b) Milk is sold or marketed in an open market at an average price of R1,47 per litre. Co-operatives are formed in this industry; farmers sell unprocessed fresh milk to Thaba Dairies and on the open market to consumers. Thaba Dairies is the largest milk processor to add value in the Qwaqwa area, which can also be associated with the findings of Claassen (1998) who reported that training courses in processing and direct marketing should be a priority, together with the provision of a proper infrastructure, such as market stalls, electricity and water.

Extension can play a supportive role in informing farmers of the availability and accessibility of such services. It must be emphasised that a dependable and viable market for milk sales is very important for the economic viability of the project. Market opportunities should be identified to allow for off-loading during drought periods.

- c) Farmers' record-keeping systems have certain shortcomings that might have a negative impact on the financial implication of the project and the productivity of the cows.

It is therefore recommended that a more reliable record-keeping format be developed for

sound management decisions. It is important for farmers to note that the high level of management can only be maintained by keeping proper and complete records. Appendix D gives a standardised record-keeping format that can be used by emerging dairy farmers.

For small-scale dairy farmers to be successful and reach the goal of production, namely profit, it is recommended that farmers make the right decisions regarding the cost of production, reproduction, culling rate, dry-cow and heifer management, herd distribution, housing and environment, feeds and feeding, as well as somatic cell count. Farmers must be able to formulate objectives, have thorough plans and be able to implement them. The implementation strategy must include a timetable of events to identify priorities, and enable the farmer to set goals and target dates for development needs. The following must be borne in mind: finances, overhead costs, capital development expenses, labour and machinery, cash-flow budget, livestock flow, and other factors such as the availability of markets, transport facilities, and restrictions such as quotas.

4.4 PREFERENCE REGARDING DIFFERENT NEEDS AND MANAGEMENT

Addressing the problems and the needs of small-scale dairy farmers in the Qwaqwa area requires detailed and lengthy community facilitation and negotiation. Problems of limited natural resources and unresolved land tenure systems require widespread investment in local capacity building.

The vision of most dairy farmers, primarily directed towards gainful employment farming, is more or less limited to men older than 49 years and women (widows), especially those who are running households.

- a) Farmers on communal and state land farms need an extremely diverse range of training to facilitate the development of managerial and technical skills.

Key information on managing risks is essential to farmers and farm workers.

Training directed at small-scale farmers should basically focus on helping them towards self-reliance and economically and environmentally sound practices. According to Berliner (1999) the level of risk acceptance may depend on many factors, including the willingness to provide supplementary feed, the desired level of production, and the inherent sensitivity of the area to degradation.

b) The types of assistance or support respondents require from the government can be summarised as follows:

- ◆ financial assistance;
- ◆ training;
- ◆ technical advice;
- ◆ marketing of milk and advice on marketing;
- ◆ continued assistance on existing dairy projects; and
- ◆ assistance in obtaining a farm or more land.

c) The services those small-scale dairy farmers mostly require are as follows:

- ◆ training in farming principles;
- ◆ financial assistance; and
- ◆ assistance in the marketing of milk.

d) The two main stumbling blocks apparently limiting the farming success of the small-scale dairy farmers are their lack of skills with regard to financial planning and management, as well as mobility to successfully manage dairy projects.

The success of the dairy projects might be enhanced by emphasising training and ensuring the availability of funds.

e) From the respondents' point of view they believe that the living conditions in their communities have improved as a result of dairying. However, a large proportion of respondents (newly settled farmers on state land farms and individuals on communal

land) are unable to indicate their positions. Respondents who view their living conditions as improved since the introduction of dairy projects, quantified their opinion by mainly referring to the increased food security and the fact that farmers can sell their surplus milk, thereby creating an income and job opportunities.

For small-scale farmers, government assistance required in commercial farming should not primarily be in the form of a subsidy, but rather effective extension work assisting farmers to diversify crops, identify markets, improve labour management practices and enhance environmental conservation. The government can play a major role in establishing linkages between formal channels of marketing and small-scale producers through small farmer groups. It can also encourage the development of local markets and informal marketing systems. Access to markets should be fair and adequate, and provision for specific arrangements, if required, must be made. However, for the market to function effectively, land tenure arrangements should ensure security for land use and the tradability of land rights.

To improve the success of small-scale dairy projects in the North-Eastern Free State special attention should be given to proper training of small-scale dairy farmers, proper management of funds and good co-operation between parties in general.

The ratings of respondents' working relationships with various institutions display much uncertainty, most probably because many farmers never had any prior contact with these institutions. The working relationships are even worse with non-governmental organisations, community-based organisations, technikons and universities. The working relationships are better with the Department of Land Affairs, the Department of Agriculture, banks (Land Bank and Development Bank of South Africa), co-operatives (Central East Co-operative) and the private sector. This working relationship with various institutions is one of the most notable aspects of the informal findings that need to be given attention.

The knowledge of farmers should be utilised properly and they should be encouraged



to be responsible for their own destinies. The concept that "the government will do" among small-scale dairy farmers on communal and state land farms must be dealt with systematically.

The service delivery system should grow to be more responsive to the needs and aspirations of small-scale dairy farmers. Development activities directed towards small-scale dairy farming operations should therefore be based upon sound technical, financial and administrative procedures. Needs and aspirations of the farmers should be identified and prioritised by means of a uniform needs analysis.

4.5 END NOTES

1. The productivity of the production factors, namely land, labour and capital, mostly depends on the management of the dairy farmer.
2. Before starting a dairy enterprise, it is essential to do some forward thinking and develop some plans of how the objectives will be achieved. The first task of a dairyman is to set some objectives. Objectives must be clarified and perhaps adjusted in priority as planning takes place. It is essential to note that circumstances differ from one another and decisions should be made accordingly. Aspects to be considered include the following:
 - ◆ Marketing opportunities;
 - ◆ Sources of feed;
 - ◆ Labour required;
 - ◆ Business skills;
 - ◆ Capital required;
 - ◆ Availability and purchase of equipment;
 - ◆ Productivity of animals; and
 - ◆ Other facilities.
3. Technological information and science must be translated into accessible information,

enabling farmers to embark on the creation of awareness and wisdom. The old styles of deciding what is good for black farmers are no longer applicable. Local knowledge and materials must be encouraged as much as possible, since research has shown that farmers are reluctant to implement international trends.

4. The structure that will present an opportunity to small-scale dairy farmers to learn and be fully aware of the physical, sociocultural and socio-economic environment of their farming areas should be developed by farmers themselves and by policy makers, planners and implementers.
5. When planning and implementing dairy projects, investment in rural and peri-urban infrastructures that makes more use of local knowledge, management, labour and local contractors will have a poverty alleviation effect on its own during the implementation of projects. The participation of farmers in such planning exercises will be crucial, and will require effective representation of the farming community in local government.
6. To make extension effective, staff at provincial and regional level will in future co-operate with farmers' representatives such as farmers unions', farmers' associations, commodity organisations, university groups and non-governmental organisations to determine the target of the extension. This will in fact determine what support the different groups of farmers need. Departments will then decide the kind of extension service for the various groups. Emerging and small-scale farmers will then be the main target of extension.
7. It is essential for extension workers, in developing a strategic management plan for the farmers, to bring farmers into common thought to identify a starting point for a programme of improvement. Time and energy need to be devoted to achieve desired short-, medium- and long-term objectives and the needs of the small-scale dairy farmers.
8. Multidisciplinary teams at ward level must work systematically with small-scale dairy

14. Major changes are required in agricultural research and extension if South Africa's agriculture is to be sustainable and productive. Given the current need to develop sustainable livelihoods and small farming systems in South Africa, attention must be paid to strategies that will reorientate research and extension policies to better redress the needs of small-scale farmers who are farming in a relatively complex, diverse and risk-prone environment.

15. It is acceptable that profit maximisation is an important farm management objective, especially if it contributes to the potential attainment of other objectives such as growth of financial survival of the dairy enterprise. Natural resources (land, water and veld) should always be left in such condition as to permanently ensure satisfactory results. Technical assistance is needed in identifying conservation problems and supporting small-scale farmers to work together to solve the problem.

16. It is essential to have a strategic plan for developing and implementing extension plans and programmes for agricultural improvement. This is mainly by drawing up scientifically based plans and programmes that will successfully focus on the short-, medium- and long term objectives or needs and problems of small-scale dairy farmers and their families. Provision of regular on-farm extension support on production technology and farm management advice is essential to small-scale dairy farmers, and this will enable multidisciplinary teams to identify the needs of the farmers.

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APPENDIX A

QUESTIONNAIRE USED AMONG SMALL-SCALE DAIRY FARMERS

QUESTIONNAIRE ON MANAGEMENT PRACTICES AMONGST SMALL DAIRY FARMERS IN THE NORTH- EASTERN FREE STATE

Compiled by: TJ MASITENG
April 1999

DEPARTMENT OF AGRICULTURAL MANAGEMENT
TECHNIKON FREE STATE
BLOEMFONTEIN

OVERHEAD OBJECTIVES OF THE QUESTIONNAIRE:

- To determine the current management practices by small-scale dairy farmers in the North-Eastern Free State.
- To determine the marketing practices currently used for running dairy projects.
- To determine the marketing channels currently utilised for milk.
- To determine the specific needs of dairy farmers.

The questions included will be stated under the following categories;

- Classifying questions.
- Specific questions related to management.

NB: Anything you tell us will be kept in strict confidence.

Mark applicable options (yes/no) with a “X” or encircle your answer.

1. PERSONAL

- 1.1 Name: 1
- 1.2 Surname: 2
- 1.3 Age: (years) 2
- 1.4 Postal Address:
.....
.....
- 1.5 What is the last grade or highest level of education passed?..... 3
- 1.6 (a) Can you read? Yes/No. (b) Can you write? Yes/No. 4-5
- 1.7 What is your position in your household? (Mark applicable options with a "X").
1. Head: _____ 2. Wife: _____ 3. Child: _____ 4. Relative: _____ 6
5. Others, specify: _____ 7
- 1.8 How many people are residing in your household?..... 8
and how many are directly dependent on you? 9
Household composition (Fill in applicable space with the number of dependants):
Children: ≤ 4 yrs. _____ 5-9 yrs. _____ 10-18 yrs. _____ 10-12
Females/Males 19-44 yrs. _____ Females/Males ≥ 65 yrs. _____ 13-14
- 1.9 Date of interview:..... 15-16
- 1.10 Interviewer:..... 17

2. FARM SPECIFICATIONS

- 2.1 Project/farm name:..... 18
- 2.2 What is the size of the land that you are farming on? (Actual size:..... ha). 19
Size of arable land?hectares 20
Size of natural grazing land?.....hectares 21
- 2.3 Who allocated the land that you are farming on? (Mark applicable options with a "X"). 22
1. Allocated by a chief:..... 2. Allocated by government:.....
3. Municipality property:..... 4. Legally purchase and owned:.....
5. Rented:..... 6. Unauthorised occupation:..... 7. Other:.....
- 2.4 Are you farming as part of a group or as an individual? 23
and if a group, how many are you?..... 24
- 2.4.1 If farming as a group, how is your group organised? (Mark possible options with a "X").
1. Closed Corporation (CC):..... 2. Trust:..... 3. Company:..... 25
4. Others:.....
- 2.5 Do you have a constitution? Yes/No. 26
- 2.6 Are you satisfied with the size of your farm? Yes/No. 27
- 2.7 If "No", why?:..... 28
..... 29
..... 30
..... 31
- 2.8 Are you satisfied with the location of your farm? Yes/No. 32

2.9	If not satisfied, what are the main reasons?.....		33
	.....		34
	.....		35
2.10	Would you like to own your own small piece of land and farm with whatever you like? Yes/No.		36
2.11.1	How long did you stay on a farm as a farmer/farm worker?.....		37
2.11.2	How long have you been farming yourself, in total?.....		38
2.11.3	How long have you been farming on this piece of land?.....		39
2.12	Name the type of cattle breeds you farm with and/or you own, and the number of animals?		
	Breed:..... Number:.....		40-41
	Breed:..... Number:.....		42-43
	Breed:..... Number:.....		44-45
	Breed:..... Number:.....		46-47
2.13	Do you milk them all? Yes/No.		48
	If "No", name the breeds that you milk:.....		49
	.....		50
	and how many cows do you milk presently?.....		51
	and how many cows do you have in total?.....		52
2.14	How many dairy cattle do you farm with in total?.....		53
	how many of these are cows?....., heifers?.....,		54-55
	bulls?....., female calves?.....		56-57
	and male calves?.....		58
2.15	How many litres of milk do you produce from your dairy cows per day on average?..... (l/cow/day)		59
2.16	What is your objective for your dairy project or farm?.....		60
	.....		61
	.....		62
	.....		63
	.....		64
2.17	Would you like to farm with something other than dairy? Yes/No.		65
2.18	If "Yes", what would you like to farm with and why?.....		66
	.....		67
	.....		68
2.19	.....		69
2.20	Do you stay on the farm? Yes/No.		70
	Who looks after the cattle and the infrastructures during the day and during the night?.....		
	.....		71
	.....		72
	.....		73
3.	<u>MANAGEMENT SPECIFICATIONS</u>		
3.1	Do you have a specific programme that you follow to run your dairy project? Yes/No.		74
	If "Yes", Describe your programme:.....		

.....		76
.....		77
.....		78
.....		79
3.2	Do you want somebody with the necessary skills to manage the project on your Behalf? Yes/No or to manage the project with you? Yes/No or do you want to manage it yourself? Yes/No .	80-81
3.3	Are you prepared to pay some expert to help you do certain tasks on the farm (e.g. AI)? Yes/No .	82
3.3.1	How much are you prepared to pay the expert?.....	83
3.4	Are you prepared to pay some expert to train you to improve your own skills and do certain tasks like artificial insemination on the cows to ensure better quality? Yes/No .	84
3.4.1	How much are you prepared to pay for training?.....	85
3.5	How many women does the project employ permanently?..... and Temporarily?.....	86
3.5	How many men does the project employ permanently?..... and temporarily?.....	87
3.6	How much do you pay permanent labour per month?..... and how much do you pay temporary/hired labour per day?.....	88
3.7	What do you expect from the government concerning this project and your own situation on the project?.....	89
.....		90
.....		91
.....		92
.....		93
3.8	What do you expect from fellow farmers and neighbours?.....	94-95
.....		96-97
.....		98-99
.....		100-10
.....		102-10
.....		106-10
.....		108-10
.....		110-11
3.9	What type of agricultural training would you like to receive?.....	112-11
.....		114-11
.....		116-11
.....		118-11
3.10	Do you have a specific feeding programme that you follow when feeding dairy cattle at different levels of production? Yes/No . Explain how you feed them:.....	122
.....		123-12
.....		125-12
.....		127-12
.....		129-13
.....		131
3.11	Do you have sufficient infrastructures to run the dairy project? Yes/No . Name the infrastructures you have:.....	132-13
.....		134-13
.....		136-13



193-194
195-196
197-198
199-200
201-202

4. MARKETING SPECIFICATIONS

4.1	Do you have any other source of income? Yes/No. If "Yes", explain the source of income:.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					203
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					204-205
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					206-207
4.2	Do you produce more milk than your family can consume? Yes/No.	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					208
4.3	If "Yes", do you sell the surplus milk that you produce? Yes/No. If "Yes", how much do you charge for a litre of fresh milk?.....(cents) and how much for a litre of sour milk?..... (cents)	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					209
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					210
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					211
4.4	To whom do you sell your milk?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					212
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					213
4.5	How much milk do you sell per month (in litres)?..... and how much money do you generate per month?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					214
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					215
4.6	How do the buyers that buy from you, know about your milk? (marketing of produce).....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					216-217
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					218-219
4.7	Do you have facilities to store milk? Yes/No. If "Yes", name them:.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					220
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					221-222
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					223-224
4.8	Do you have any other produce you sell on the farm? Yes/No. If "Yes", name the produce?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					225
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					226-227
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					228-229
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					230-231
4.9	Do you keep records of the activities taking place on the farm/project? Yes/No.	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					232
4.10	If "Yes", what do you use to record activities on the farm/project?..... and how often do you take record?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					233
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					234
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					235
4.11	Do you slaughter and sell animals on the farm? Yes/No. If "Yes", what do you do with the skin and meat?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					236
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					237
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					238
4.12	How much do you generate from selling meat per year?..... and how much do you generate from selling skin per year?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					239
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					240
4.13	Do you sell cattle dung? Yes/No. If "Yes", how many kgs?..... for how much?..... (c/kg)	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					241
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					242
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					243
4.14	How many dairy cattle did you buy in 1998?..... and how many did you sell in 1998?.....	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					244
	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					245
4.15	How much do you get from the farm/project per month for private use?	<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					246



4.16 What do you need to see, or will you see, happening on this farm?

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4.17 What are your aspirations for the future regarding your dairy farm/project?

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General comments from interviewer:

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Impressions from the interviewer after the interview (Mark applicable options with a "X").

	Level of success (very low)	Level of success (low)	Level of success (average)	Level of success (high)	Level of success (very high)
Impression got by Interviewer					

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Remarks:

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APPENDIX B

**MAP SHOWING THE GEOGRAPHICAL LOCATION OF THE SAMPLED AREA
IN THE NORTH-EASTERN FREE STATE**



Map showing the geographical location of the sampled area

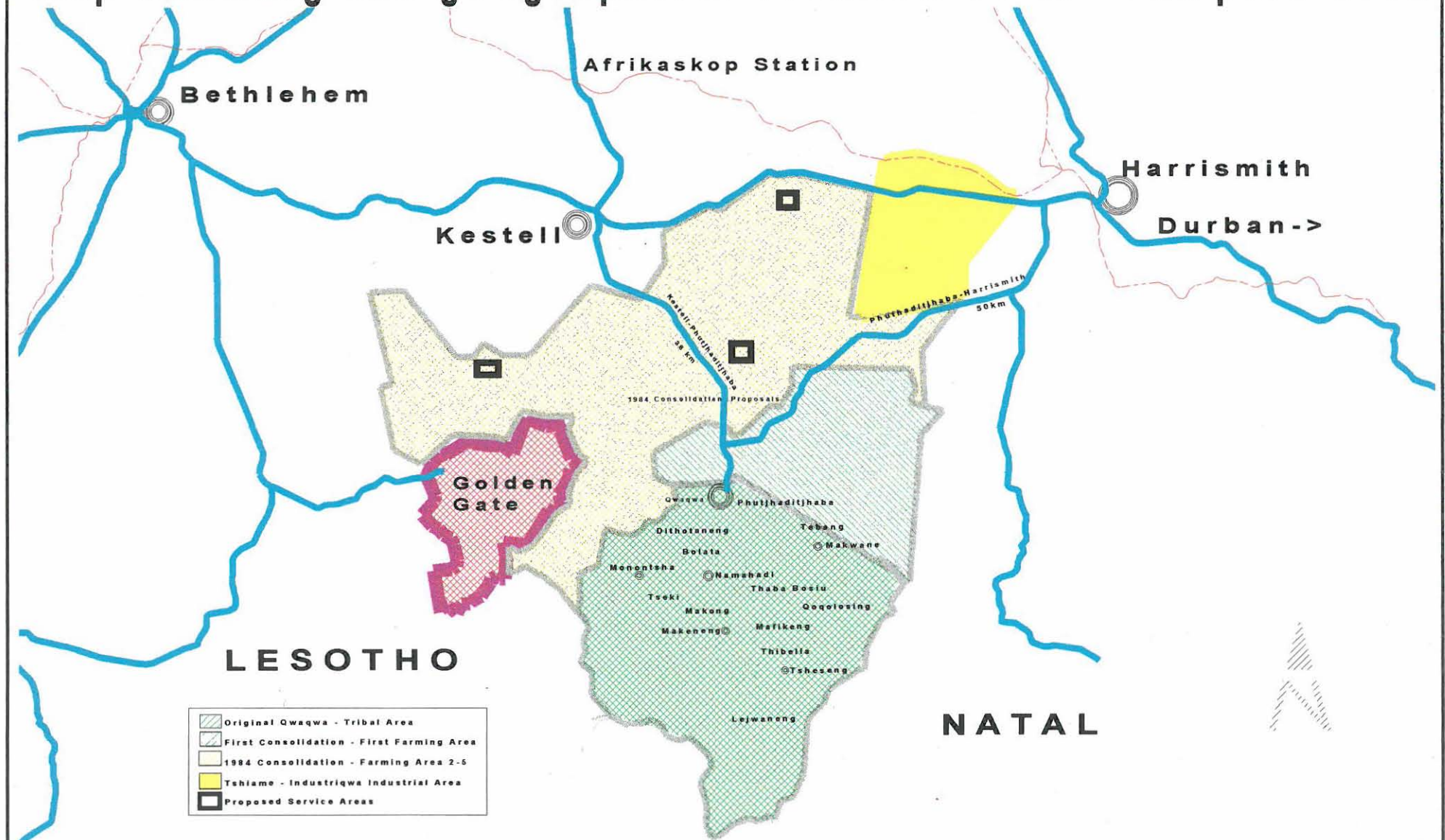


Figure 1.1: Areas included in the survey amongst small-scale dairy farmers in the North-Eastern Free State

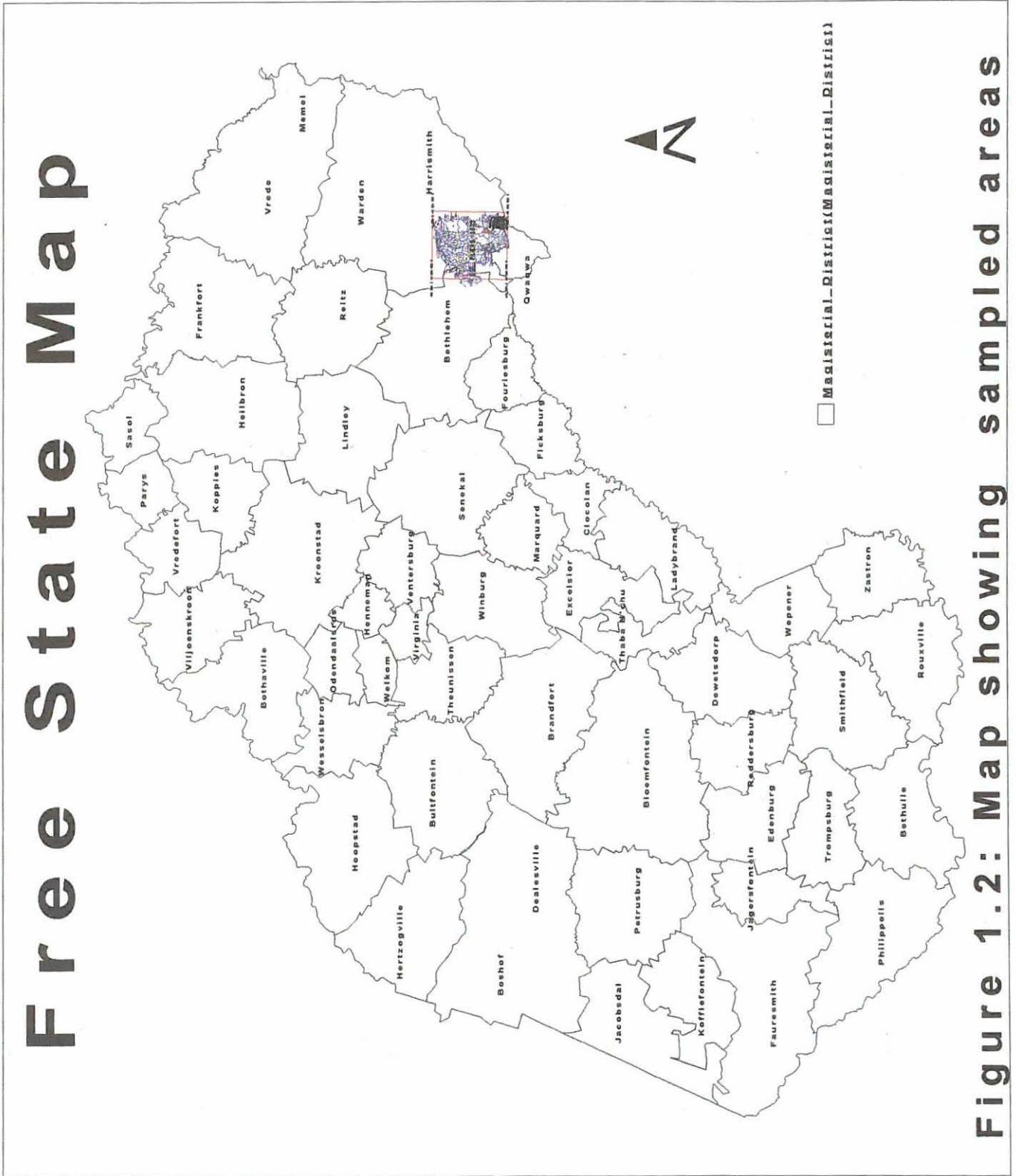


Figure 1.2: Map showing sampled areas

APPENDIX C

COMPARATIVE TABLE: LEGAL BODY # 1

COMPARATIVE TABLE: LEGAL BODY # 1 (Venter, 1998)

LEGAL BODY	TRUST	AGRICULTURE CO-OPERATION	SECTION 21 COMPANY	SHARE BLOCK	COMMUNAL PROPERTY ASSOCIATION
MEMBERSHIP	no limitations	at least 2 persons	no limitations	no limitations	no limitations
FOUNDING	<ul style="list-style-type: none"> ▶ with the help of an attorney ▶ founding document is registered 	<ul style="list-style-type: none"> ▶ with the help of an attorney ▶ founding documents is registered 	<ul style="list-style-type: none"> ▶ with the help of an attorney ▶ founding documents is registered 	<ul style="list-style-type: none"> ▶ with the help of an attorney ▶ 3 founding documents are registered 	<ul style="list-style-type: none"> ▶ member draw up constitution ▶ constitution is registered
STRUCTURE	trustees + beneficiaries + founder members	shareholders directors	members - directors	shareholders - directors	equal members + committee
PURPOSE	aimed at specific purpose	Focus on profitable agricultural activities	focus on specific interests in community	purchase land and give shareholders right of occupation	retain and manage communal land
WEAKNESSES	<ul style="list-style-type: none"> ▶ beneficiaries have little say in management ▶ trust may only be changed by court 	<ul style="list-style-type: none"> ▶ aimed at agriculture only ▶ shareholders have little say 	<ul style="list-style-type: none"> ▶ property never belong to beneficiaries 	<ul style="list-style-type: none"> ▶ complicated founding process 	<ul style="list-style-type: none"> ▶ members have to learn democracy
STRENGTH	trust has very specific purpose	works well in agriculture	interest have unlimited lifetime	give shareholders right of occupation	<ul style="list-style-type: none"> ▶ founding is simple ▶ members have much control
LATER POSSESSION OF PROPERTY	possible	possible	possible	possible	possible

LEGAL BODY	SECTION LITTLE SCHEME	PRIVATE COMPANY	CLOSED CORPORATION	VOLUNTARY ASSOCIATION
MEMBERSHIP	NO LIMITATION	2 TO 50 PERSONS	1 TO 10 PERSONS	NO LIMITATIONS
FOUNDING	<ul style="list-style-type: none"> ▶ with the help of an attorney + other acquaintances ▶ local authority approves ▶ founding document is registered 	<ul style="list-style-type: none"> ▶ with the help of an attorney ▶ 3 founding documents are registered 	<ul style="list-style-type: none"> ▶ with the help of an attorney ▶ founding document is registered 	<ul style="list-style-type: none"> ▶ members draw up constitution ▶ copy of constitution is kept at bank ▶ no registration is necessary
STRUCTURE	members become part of governing body	shareholders - directors	equal members with interests	members + committee
PURPOSE	to sell property	focus on profitability	focus on profitability	focus on specific aim or period
WEAKNESS	<ul style="list-style-type: none"> ▶ complicated founding process 	<ul style="list-style-type: none"> ▶ limited membership ▶ complicated founding process 	<ul style="list-style-type: none"> ▶ limited membership 	<ul style="list-style-type: none"> ▶ not always democratic ▶ sometime too informal
STRENGTHS	suitable for townhouses and block of flats	shares cannot be sold to the public	size makes it easy to manage	Founding is simple
LATER POSSESSION OF PROPERTY	possible	possible	possible	possible

APPENDIX D

DAIRY CATTLE MANAGEMENT REPORT

MONTHLY OPERATIONS

MONTH/YEAR:.....

REVENUES:	TOTAL PREVIOUS MONTH	TOTAL THIS MONTH
Milk revenue		
Cattle sale		
Subsidy		
Hides and skin		
Farm use		
Other		
Gross Production Value (GPV)		
EXPENSES:		
Total health expenses (Veterinary)		
Feed		
Transport		
Casual labour		
Marketing		
Breeding		
Replacement animal purchase		
Other		
Gross Margin (GM)		

MONTH-END CATTLE INVENTORY:

	OPENING STOCK VALUE			CLOSING STOCK VALUE		
	Stock number (A)	Average value per unit (B)	Total value (R)=(AxB)	Stock number (A)	Total value (C)	Value (R)=(AxC)
Number of Milk cows						
Number of Dry cows						
Number of Replacement Animals						
Bulls (3 yrs & older)						
Heifers (7 months to 2-tooth)						
Calves (unweaned up to 7 months)						
Cows (2-tooth & older)						
Oxen (7 months & older)						

APPENDIX E

PHOTOGRAPHIC ILLUSTRATION OF THE RESEARCH PROJECT



Photo 1: Example of a dairy bull raised by farmers.

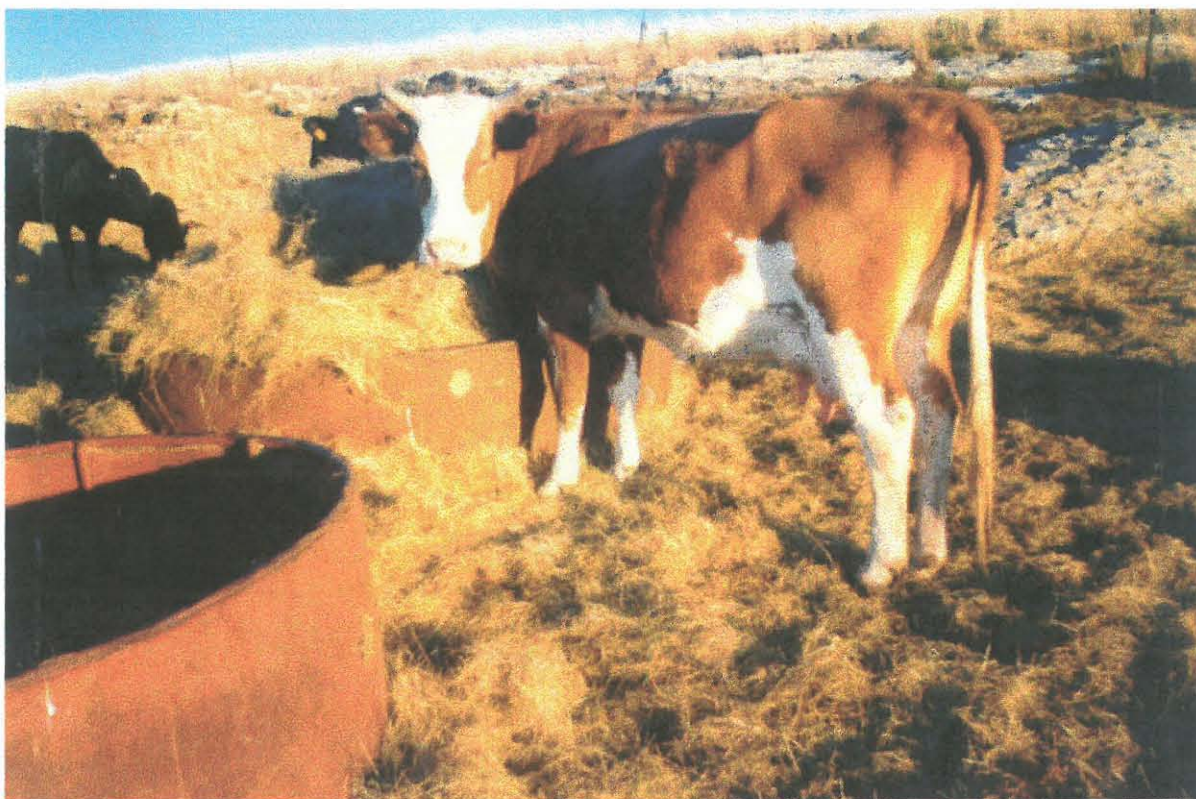


Photo 2: An example of a dairy cow. Farmers feed cows during milking and after milking.



Photo 3: An example of a communally grazed area. Cattle are driven to a nearby river, stream or fountain to drink.

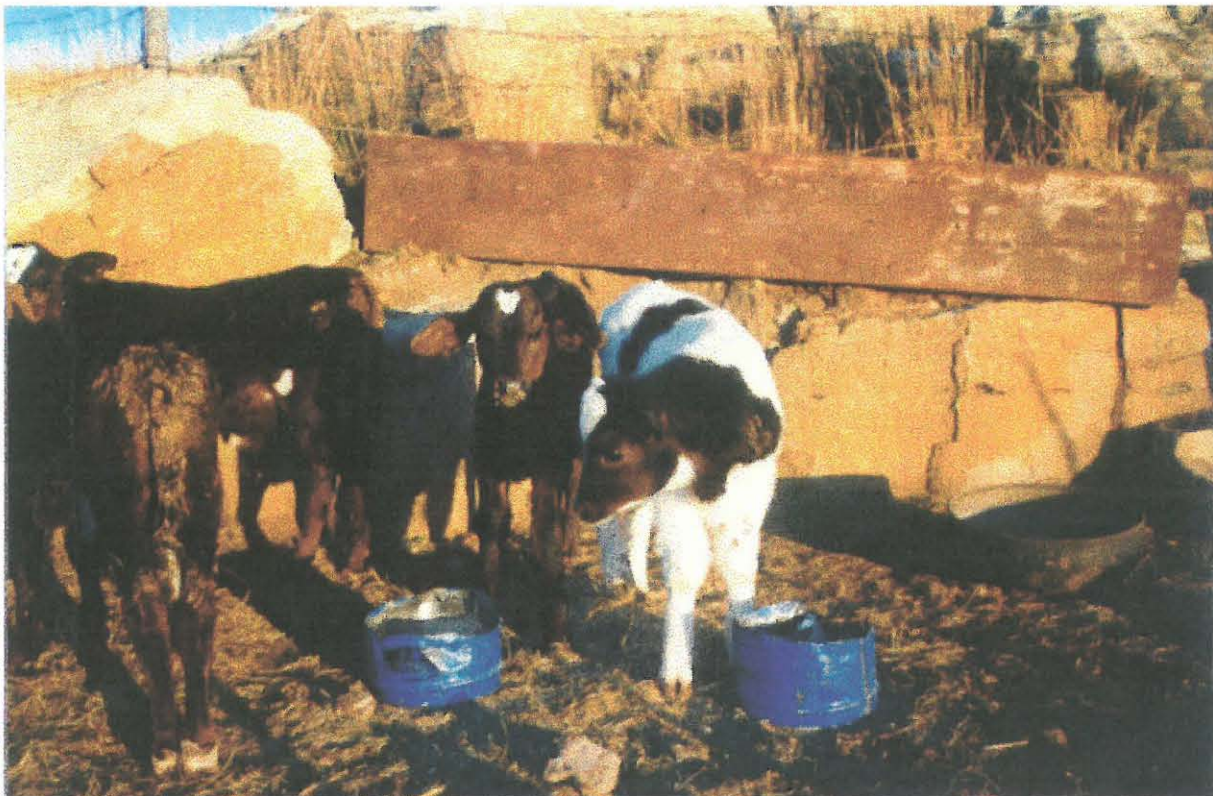


Photo 4: Calves raised by farmers on a cattle post.



Photo 5: At Raohang Makeneng Dairy Project, dairy cows are left for 7 minutes to rest before being milked.

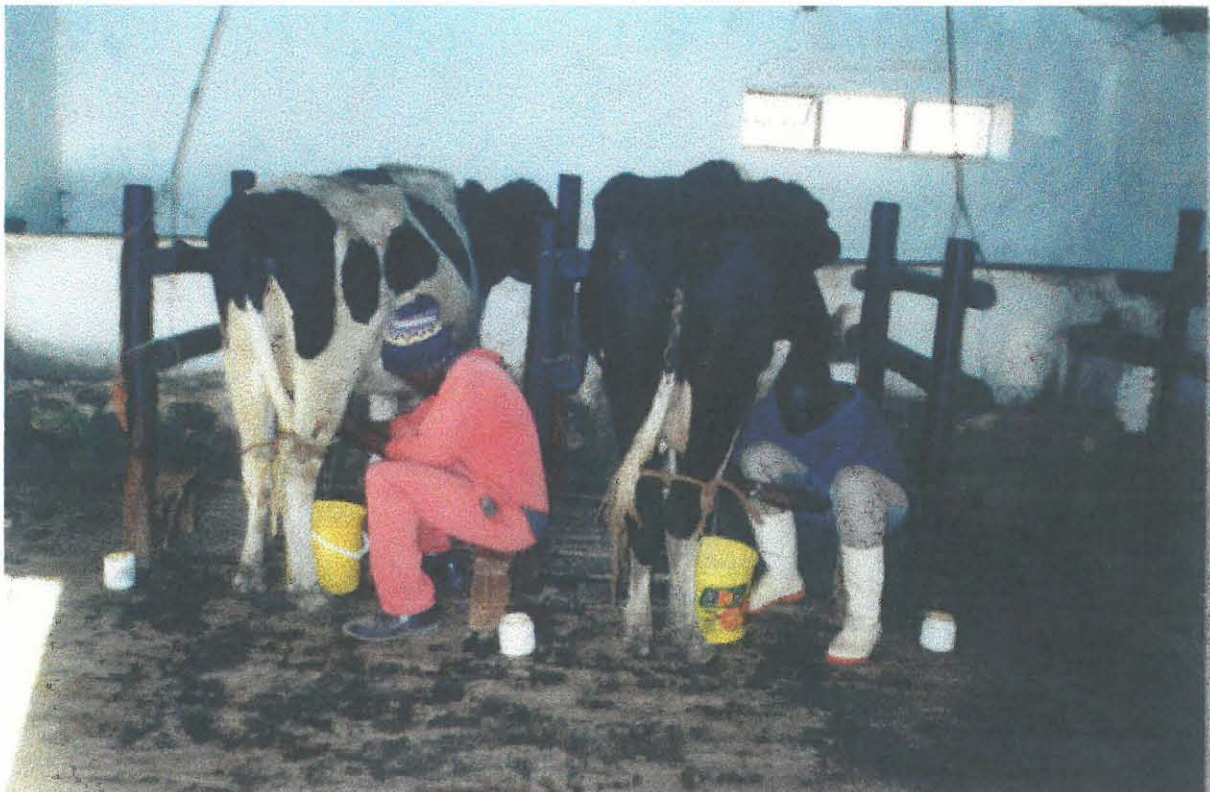


Photo 6: At Raohang Makeneng Dairy Project, farmers and workers milk dairy cows.

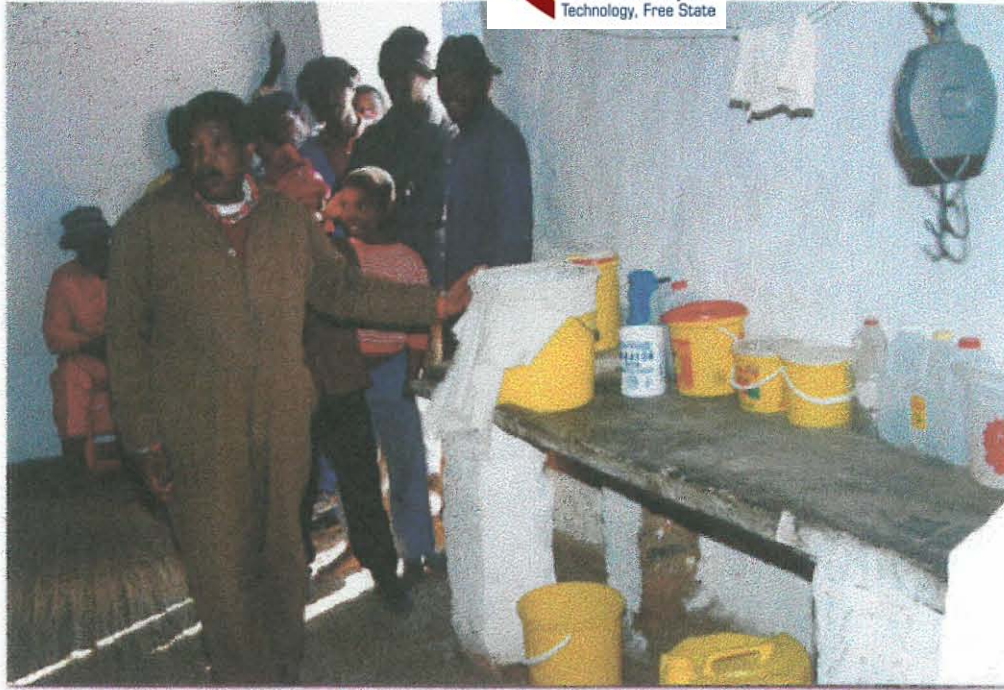


Photo 7: At Raohang Makeneng Dairy Project, the community buys milk at the project.



Photo 8: Farmers farming on communal and state land farms transport their milk to the community around the villages.



Photo 9: Example of a backyard dairy project.



Photo 10: One of the participants who participated in answering the questionnaire during the surveying process.