Chapter 1: Introduction

1.1 Introduction

This thesis reports on the development of a prototype web site for small to medium scale farmers who are interested in making yoghurt on the farm. This web site should enable them to consider a variety of yoghurt products, as well as requirements for production, before any costs are incurred. The prototype web site can also serve as an aid to the advisers of Agrelek.

Agrelek as part of Eskom, the national electricity provider in South Africa, was established in 1988. It is an advisory service assisting the agricultural sector in the cost-effective and efficient use of electricity. Agrelek Electrotechnology Centre, situated at the Glen Agricultural College near Bloemfontein, was established as a demonstration centre for the latest electrotechnologies applicable to farming (Agrelek, 1999:1).

In consultation with Agrelek, the manufacture of yoghurt was selected for this prototype web site, because quite a number of farmers have surplus milk available on their farms. A HTML document for use on the web as well as a CD-ROM of the proposed prototype web site, was developed. As far as can be determined no product of this kind is currently available in South Africa. It is envisaged that similar web sites for other products that can be made on the farm, will be developed in the future.

In the past few years, many changes affecting farming activities, have taken place in South Africa. These changes are, among others, the abolishment of control boards regulating the marketing of agricultural products, the opening of world markets for agricultural products from South Africa and accelerated land reform, enabling more people to own land and farm on a small scale (Jordaan, 1999:45).

In order to adapt to these changes and to survive and prosper, many farmers are compelled to turn to a variety of small-scale operations, using available resources. They can no longer afford to put in only one crop per year. Producing a variety of products throughout the year can ensure a regular cashflow and income. It enables more people in the agricultural sector to remain productive and also provides employment to others.

It can however be a costly experience to experiment making new different products, before finding a viable solution. Small and medium scale farmers need usable information to be able to consider a variety of possibilities and make an informed decision on which product to select. This information should also be suitable for application under South African conditions.

A number of sources of agricultural information are presently available, but as far as can be established, the Internet has not yet been utilized to a significant extent as a method of supplying of information specifically to South African farmers. Many farmers presently have access to the Internet, and if applicable information is available, it can prove to be a useful source of information.

Before the development of the web site is discussed, a brief overview of the current state of agriculture in South Africa should be given. Against this background the needs of dairy farmers are discussed and the steps in the development of the web site and its evaluation described.

1.2 Aim of the study

The aim of this study is to arrive at an understanding of the relationship between users of information and the presentation of such information in a web-based format. The

web site for making yoghurt on the farm, is called FARMPRO. It consists of information integrated from a large variety of sources. It is presented in a format suitable for the target group, which consists of farmers who want to make yoghurt on a small or medium scale, as well as the Agrelek advisers who have to advise them on suitable processes to achieve this aim.

The information on the web site should be adequate to meet the needs of both groups. The information is also adapted to local conditions, taking both legislative requirements, as well as the constraints experienced by the South African farmer into consideration. The web site gives information on possible kinds of yoghurt that can be made on small or medium scale. As an additional aid, farmers can also obtain information on how to put together a business plan and do a feasibility study. Sources which can help to obtain financing for such a venture are also suggested. A quick tour which can be scanned as an overview, is available to users of the web site, as well as a complete picture with all the necessary information on yoghurt making.

FARMPRO provides information on the following aspects of yoghurt production:

- product description;
- legal requirements;
- processes;
- equipment;
- packaging;
- storage / shelf-life;
- energy requirements; and
- suppliers.

In consultation with Agrelek, it was decided to develop a web site on the manufacture of the following types of yoghurt:

- set yoghurt – low fat and fat free;
- set yoghurt – high and full fat;
- stirred yoghurt – low fat and fat free;
- stirred yoghurt – high and full fat;
- long life yoghurt dessert – set;
- long life yoghurt dessert – stirred;
- drinking yoghurt; and
- frozen yoghurt.

The success of this web site should be an indication of the demand for more information products of this kind. In the design of this web site, the needs of farmers should be established and taken into consideration. Understandability and ease of use should be prime considerations. Surveys have shown that almost two thirds of the 50 000 commercial farmers in South Africa use computers regularly and this should increase (Van Zyl, 1998:14). It is envisaged that this web site will be made available on the Internet as well as on a CD-ROM.

1.3 Agriculture in South Africa

Conditions present in the agricultural sector in South Africa, differ to a large extent from those in other countries. These unique characteristics form the background to farming practices and the information needs of farmers. The following characteristics need to be considered:

1.3.1 Extent of agriculture in South Africa

Agriculture forms an essential part of the South African economy. Not only does it provide food, but also employment in areas where few if any job opportunities are available (Holt, 1991:533; Jordaan, 1999:46, 47, 48; Improved, 1999:3; Kirsten et al., 1998:54; Pickering, 1987:68; Promote, 1999:6; Van Niekerk, 1993:19).

The contribution of the agricultural sector to the Gross Domestic Product (GDP) for 1998 is estimated at **3,3%,** amounting to R673153 million (Contribution, 1999:10). Although this is a relatively small contribution, it provides income for a considerable number of people. If productivity can be increased, the income from farming can also be increased significantly.

The average productivity level of major crops and livestock enterprises in South Africa are only about 50% of their potential (Agricultural, 1999:2; Agricultural policy, 1999b:5; Improved, 1999:3; Jordaan, 1999:50; Kirsten et al., 1998:54; Pickering, 1987:79; Van Niekerk, 1993:19). The improvement in productivity levels to meet the demand of an ever-increasing population, is essential. A gap exists between theory and practice regarding optimal efficiency in production. Van Niekerk (1993:19) indicates that this gap between available knowledge and what is actually practised, seriously hampers effective farming practices. This problem has to be addressed by providing information effectively.

1.3.2 Natural factors

Farming in South Africa is influenced by extreme climatic conditions which are not favourable for optimal production. Land and water resources are deteriorating and depleted as result of, among others poor farming practices, land erosion and droughts. Rural areas are increasingly depopulated because farmers and farm workers leave

farms to seek employment elsewhere (Jordaan, 1999:46). Information on farming under various and adverse conditions and in all regions, should probably enable farmers to stay on their farms.

1.3.3 Human factors

The agricultural sector in South Africa consists of two distinctive sectors, namely a first and a third world sector. The first world sector is characterized by a post-industrial, or information society supported by highly mechanized, commercial agricultural practices. The third world sector consists of subsistence farmers, where low productivity and poor farming practices prevail (Van Niekerk, 1993:19). The per capita income in rural areas is also generally lower, leading to poor economic conditions of the inhabitants (Jordaan, 1999:46-50). Information should be provided for both sectors in a format most suited to their particular needs.

1.3.4 Regulatory factors

Farm workers increasingly insist on farming their own land, instead of working for others. Farmers are faced with new labour legislation, where minimum wages have to be paid to workers. Finding trained and motivated workers becomes increasingly difficult. The productivity level of labour available on farms is not adequate, and is very much lower than in other countries.

Increasing deregulation offers less protection to farmers. The phasing out of the control boards for most agricultural products in order to achieve a free market system in South Africa, has also led to increased uncertainty among farmers regarding the future of agriculture. Information previously supplied by the control boards, have to be found elsewhere.

In an attempt to increase exports of South African products to Europe, the Government is presently negotiating to be included in the agreement between European Union (EU) countries and developing countries, where restrictions on imports are lifted. This has not as yet been successful. Requirements laid down by the free trade agreement between member countries of the World Trade Organisation (WTO) also have to be met. South Africa and the European Union are both signatories to this agreement. This agreement of the World Trade Organisation requires that 90% of all trade between countries should be liberalised and free from customs duties (Uncertainties, 1999:4). It is envisaged that the European Union should liberalise 96% of imports from SA and SA should liberalise 86% of imports to South Africa (Claassen, 1999:1; Jordaan, 1999:47: Klein, 1999:1; SA-EU deal, 1999:1; SA/EU, 1999:5; Uncertainties, 1999:4; Willemse, 1999:1). The most important effect of this agreement should be savings on customs duties. Products excluded from this agreement are beef, mutton, maize, and sugar (Klein, 1999:1; Claassen, 1999:2).

1.3.5 Economical factors

There is a marked decline in incentives for food production because of the availability of cheap imported products into South Africa from other countries where production costs are lower. It is regulated by trade agreements between these countries and South Africa (Agricultural, 1999:2; Agricultural policy, 1999a:5; Agricultural policy, 1999b:5; Farmers, 1999:15; Jordaan, 1999:47-50; Kirsten et al., 1998:54; Pickering, 1987:83; Profit by small..., 1998:43; Promotion, 1999:1; Van Zyl, 1998:13). Information on which products can still be produced profitably under these circumstances is essential.

1.3.6 Technological factors

Lack of appropriate technology available to farmers has an adverse effect on production and profits (Jordaan, 1999:27, 28, 50, 60; Pickering 1987:68, 77; Strengthen, 1999:12; Van Zyl, 1998:12-18). Most technology available does not meet the requirements of small to medium scale farmers, who often do not have the financial resources to take risks on unfamiliar innovations. The development and implementation of low-cost technologies and how to use them should benefit these farmers (Agricultural, 1999:2; Collaboration, 1999:11; Jordaan, 1999:46-48; Pickering, 1987:82, 83, 87; Promote, 1999:6; Small-scale, 1999:10; Strengthen, 1999:12). Information on effective use of technology on the farm should be available.

This brief overview of some of the agricultural conditions existing in South Africa, forms the background against which the provision of information of farmers should be discussed.

1.4 The South African dairy industry

The factors mentioned in the previous section apply to the agricultural scene as a whole. The dairy industry in particular is characterized and influenced by some more specific factors.

1.4.1 Extent of the dairy industry

The South African dairy industry is complex and specialized, which requires high capital investment and intensive managerial input (Cronjé et al., 1999:237; Jordaan, 1999:60). It is estimated that the dairy industry contributed almost R11 billion to the

GDP in 1998 (Van Burick, 1999:4). The number of dairy producers in South Africa has however declined from more than 23 000 at the end of the1970's to only 5 797 in 1999 (Cronjé et al., 1999:240). This drastic decline is also reflected in the dairy industry, where a few big concerns keep the buying price of raw milk down, to the disadvantage of the farmer. More and more farmers are diversifying into either other areas of farming, or are looking at alternatives for the processing of milk on the farm.

1.4.2 Regulatory factors affecting the dairy industry

The dairy industry in South Africa has had to make the transition from a rigid and controlled marketing system to complete deregulation (Jordaan, 1999:60; Kirsten et al., 1998:54; Van Zyl, 1998:12). With the disbanding of marketing and control boards for dairy products, such as the Dairy Board, subsidies for various products were abolished. This made production less profitable (Agricultural, 1999:2; Agricultural policy, 1999a:5; Jordaan, 1999:46, 47, 60; Klein, 1999:1; Kirsten et al., 1998:54; Uncertainties, 1999:4; Van Zyl, 1998:12). Presently only five major buyers buy 77% of the milk produced (Cronjé et al., 1999:237). This practice tends to discourage small to medium scale farmers from continuing to produce milk.

The dairy industry should benefit the most from exporting to the European Union, because about R200-million in customs revenue can be saved as result of a duty-free quota for 5,000t cheese (Claassen, 1999:2; Klein, 1999:1; Uncertainties, 1999:4). Substantial investments should however have to be made to comply with European Union sanitary requirements, a factor also detrimental to the involvement of small to medium scale farmers in making products for export (Klein, 1999:1; Uncertainties, 1999:4). At present facilities on dairy farms are substandard. It is envisaged by Bertus de Jongh of the Dairy Producers' Organization that exports of milk powder, butter, cheese and yoghurt should increase to the European Union, but also to the South African Development Community (SADC) countries and Indian Ocean Islands

(Jordaan, 1999:60). Small to medium scale farmers can however exploit the local market as well and need information on the best way to achieve this for profit.

1.4.3 Economical factors relating to the dairy industry

Milk can be sold in pasteurized or in processed form. Under the current economic conditions, farmers are considering value adding to raw milk themselves. Instead of selling raw milk to large manufacturers of dairy products, it can be more profitable to make products on the farm (Co-ordinated, 1999:3; Cronjé et al., 1999:248; Kirsten et al., 1998:54; Profit by small..., 1998; Small-scale processing, 1999:25). Negative factors inhibiting ventures of this kind are finding trained staff, lack of suitable technology, competition in the marketplace and the seasonality of raw materials. Farmers trying to develop products if they do not have previous experience or adequate knowledge, are also hampered by a lack of information suitable for their particular requirements.

World markets for dairy products are controlled by the USA, Australia, New Zealand and the European Union, where the industry is heavily subsidised (Van Burick, 1999:4). These subsidies enable farmers in these countries to keep on producing dairy products, but in South Africa no subsidies are available, making prices less competitive on the local market as well as the export market. Dairy products can be imported and sold at a lower price than those produced in South Africa.

Because the South African dairy farmer cannot expect any assistance from the state, they should increase productivity to remain competitive (Jordaan, 1999:60; Van Burick, 1999:4). An increasing number of small and medium scale farmers specialize in making one or at most two products, because investment needed for the infrastructure to produce more products is not feasible. Farmers need information on

the most cost effective production methods, mechanisation of processes and the production of specialized products.

1.5 The value of information

1.5.1 What is information?

Information can be described according to Prasad (1992:9) as:

- an aggregation or processing of data to provide knowledge and intelligence;
- empowerment playing an important role in development and process;
- something that should be organised and disseminated timeously for optimum use;
- subjective; and
- that of which the value depends on the recipients' inclination.

Kaniki (1992:83), quotes Faibisoff & Ely, as defining information from the psychological approach as "that which reduces uncertainty". Kaniki (1992:83) also quotes Krikelas defining information as: "that which can be thought of as a stimulus that creates uncertainty, makes a person aware of need .... [and] creates a change in one's level or degree of certainty". Kaniki (1992:83) himself defines information as: ideas, facts, imaginative works of mind and data of value, potentially useful in decision making, question answering, problem solving, and that which can reduce uncertainty.

People can only use information if it is available. Too much information may lead to information overload and can cause confusion (Kunz et al., 1976:9). Information, of mixed or unknown quality may even be worse than no information at all (Malcolm, 1998:5).

1.5.2 Types of information

Information can be divided into different types:

- procedural - which is data of investigations which are obtained, manipulated and tested;
- methodological - derived from scientific attitude;
- stimulatory - which is motivated by oneself / environmentally derived;
- policy - which is focussed on the decision making process; and
- directive - which is used for coordination and for enabling effective group activity (Prasad, 1992:12-13).

Information has no value in itself, but should lead to human action (Shannon, according to Sveiby, 1994:1-10). Information is what users ought to have to do their jobs effectively, solve a problem satisfactorily or pursue a hobby or interest happily (Nicholas, 1996:7; Prasad, 1992:1). Information is also essential in the decision making process.

Table 1.1 Continuum of decision making (Prasad, 1992:6-8)

Data (letters, numbers, lines, graphs, symbols) are:

- Events and their state.
- Organised according to formal rules and conventions.

Information is:

- A cognitive state of awareness given representation in physical form.
- A physical representation which facilitates the process of knowing.

Knowledge is:

- A cognitive state beyond awareness.
- Implied active involvement and understanding.
- The ability to extend the level of understanding to meet all contingencies.
- Organised records of human experience given physically.

Wisdom is:

- Application of knowledge as contained in human judgement, centred around criteria or values that are generally accepted by culture and society.

This table gives an indication of the value of information if it is used correctly. Many farmers are still at the first stage. This study aims to help farmers by also providing information based on data. Using this information, they can make an informed decision, applying the information. If they are successful in a new endeavour they have gained wisdom, based on the knowledge gained by evaluating information. It is therefore of the utmost importance to ensure that the information supplied to the farmers should be understandable, be on a level with their field of experience and presented authoritatively and correctly.

1.6 The changing face of agricultural information

The changing situation in agricultural structures and management worldwide, has brought about changes to both the suppliers of information, the information supplied and the sources of information (Klair et al., 1998:1). Some of these changes can be attributed to the structural, technological, social and market changes. There is also a direct positive link between the provision of information and development in any community (Leach, 1999:71). Information is regarded as a critical resource for both urban and rural communities (Leach, 1999:71). According to Kaniki (1992:84) there is a lack of extensive studies on the information needs relating to agriculture in the USA as well as in Africa.

A fundamental shift has taken place from the mere supply of primary information aimed at helping producers to control production costs, maximizing production and profits, to a need for educational web sites on all aspects of farming such as accounting, financial projections and analyses, tax management, budgeting, marketing alternatives and resource acquisition (Klair et al., 1998:1; Marcella & Baxter, 1999a:171; Nicholas, 1996:7).

1.6.1 Structural changes in agricultural information

The modern agricultural environment is dynamic and changes quickly (Boerdery ..., 1999:1; Van Zyl, 1998:12). These changes can be economical, market-related and technological. To ensure survival and success, farmers should react to the changing environment (Boerdery ..., 1999:1). To make correct decisions farmers have to rely on information (Lagrange, 1995:1; Collaboration, 1999:11; Boerdery ..., 1999:1).

1.6.2 Social changes affecting agricultural information

According to Kaniki (1992:83), agricultural development is the key to general development in a country and especially on the African continent, where the majority of the population is part of the agricultural and rural sector. Information enhances agricultural development, and therefore also the general development of a country. This statement is based on the assumption that a country can generate appropriate technology and information through quality research. If this knowledge is applied, productivity can improve significantly.

Available information is often focussed on policy makers, researchers, and those who manage policy decisions. Scant attention is paid to the information needs of the targeted beneficiaries of a particular programme. The absence of agricultural information aimed at farmers themselves, is a key factor that has greatly limited agricultural development in developing and even some developed countries (Klair et al., 1998:1; Ozowa, 1995:1).

Agricultural information is often not integrated in development programmes and does not address numerous others but related problems that face farmers (Klair et al., 1998:1). Information is however an essential ingredient of agricultural development programmes. Farmers seldom experience the possible impact of agricultural

innovations, either because they have no access to information about it, or because they do not have the inclination or willingness to change to something new. The attitude of prospective producers can also be changed, possibly by keeping them informed on new developments in farming practices and technology. Many still follow in the steps of their forefathers or prefer the way things were done in the past. They do not accept change readily. A large component of education is often needed to change this attitude.

Agricultural information is often not disseminated effectively, because of inadequacies in extension programmes. Some programmes are conceived without planning and launched in a hurry. Farmers at which they are aimed, and whose attitude should be changed to make them successful, are not involved in the planning of projects. Agricultural information of this kind can neither interest the farmers nor effect the desired changes. Most agricultural innovations are made known in English only, putting it beyond the reach of many. To be effective and make a difference information should be on a level with the abilities and capabilities of those at whom it is aimed (Ozowa, 1995:1-3).

1.6.3 Information about market changes

To ensure success, it is important that the prospective producer gather appropriate information before starting a new venture. Many sources of information are available, but they are often not on an understandable level or adapted to local conditions. There is a gap between theory as written about and what is actually usable in practice.

After the disbanding of the control boards this gap became even wider, because information and statistics on production, prices and marketing are no longer made available to farmers through these organizations. This hampers production and marketing decisions, (Van Zyl, 1998:12). In an attempt to fill this gap, many

processors, cooperatives and industries are using the Internet, providing web screens with information on agricultural issues (Van Zyl, 1998:12). Examples can be found at http://www.sagis.org.za - The South African Grain Industries Services, and http://www.agriinfo.co.za - Agricultural Information. Paper-based information is also available such as LANVOKON reports up to 1997 and annual reports published by most of the producers' organisations, industries and cooperatives.

1.6.4 Information about technological changes

Technology plays an important part in modern agriculture. Suitable information on the contribution technology can make towards more profitable farming is essential. Production in the agricultural sector can be improved by using technology, again bridging the gap between theory and practice (Frank, 1987:320; Letshela, 1999:1). Technology can also be a valuable conduit in the communication of information. Theory and practice can come closer together if the correct methods of communication of information are used (Klair et al., 1998:1; Letshela, 1999:1; Van Niekerk, 1993:19).

Communication can be both direct and indirect. Direct communication takes place where feedback is inherent, for example: farmers' meetings, farmers' days and correspondence with organizations involved in agriculture (Letshela, 1999:1; Van Niekerk, 1993:19). Indirect communication is where feedback is difficult or impossible, and takes place when the generator of the information is removed from the user, for example: information as found in books, pamphlets, articles, circulars and papers at conferences (Letshela, 1999:1; Van Niekerk, 1993:19).

In the past no medium could offer an opportunity to utilise both ways of communication in a cost-effective, user-friendly way. The emergence of the Internet and more specifically the World Wide Web (WWW) has brought positive possibilities in terms of combining the two methods of communication (Letshela, 1999:1).

Information from various sources can be accessed. Problems can also be addressed to experts for prompt response (Letshela, 1999:1, 5). Some information on agricultural issues is currently available on web sites but can be expanded significantly to increase availability of suitable information to those who need it.

1.7 Sources of information currently available to South African farmers

At present there are a number of sources of agricultural information available to the South African farmer. These sources can be obtained with relative ease. Information is however not always suitable and the information on the World Wide Web is often untested and ephemeral. The prospective producer has to make a judgement as to the applicability and value of information he can find.

Much of the scientific literature is not written for the layman and can be confusing. Information supplied by manufacturers and suppliers of equipment and ingredients, favouring their own equipment or products and does not present a balanced view. Information supplied by advisers may also not be impartial. They can personally favour a certain process, piece of equipment or suppliers. The prospective producer himself should gather as much information as possible to get an objective overview before taking any decisions. This is not always possible, because of limited time available. Farmers are not always aware of possible sources and is often unwilling to read through a lot of information, most of which he cannot understand easily.

Though the accessibility to agricultural innovations to small scale farmers is often limited by unfavourable economic, socio-cultural and institutional conditions, they can achieve some level of efficiency, as result of intuitive knowledge they possess. If provided with the right input, feasible technology and relevant information, they can transform traditional agriculture (Ozowa, 1995:1).

1.7.1 External and internal sources of information

Farmers can utilize both external and internal sources, if they experience a need for information to improve their agricultural practices (Boerdery ..., 1999:1).

External sources of information include the following:

- farming magazines such as *Farmer's Weekly, Landbouweekblad, Agricultural News;*
- farmers' days;
- newspapers;
- circulars by agricultural unions, manufactures and suppliers;
- consultants for specialized assistance and information, such as agricultural engineers;
- producers' organisations such as NAMPO, SAGIS;
- financial institutions such as Land and Agricultural Bank, ABSA;
- scientific journals;
- conference proceedings;
- theses;
- information supplied by agricultural advisers of the Department of Agriculture and Agrelek;
- courses offered by the Agricultural Research Council;
- foreign pamphlets; and
- information leaflets of the National Department of Agriculture and agricultural unions. (Boerdery ..., 1999:1; Jordaan, 1999:48; Van Niekerk, 1993:23).

Farmers often do not have the means to buy sources to stay informed about available information. They should be encouraged to keep abreast of new technologies in as

many ways as possible and ways should be found to disseminate appropriate information as widely as possible.

Internal sources, providing information on actual practices, experiences and results achieved by the farmer himself, can be invaluable for planning and decision making. Internal sources of information include:

- the farmer's own records, notebooks, journals;
- financial statements; and
- budgets (Boerdery ..., 1999:1).

Although these internal sources are valuable, it is often neglected and ignored. Many farmers still do not have good record keeping systems. Records are kept but not organized for effective retrieval. Farmers rely on memory and intuition for figures and statistics. Farmers should be encouraged and guided to keep records up to date and easy to find.

1.7.2 Information provided by Eskom

Agrelek, as a part of Eskom, supplies information via their advisers about the use of electricity on the farm (Lagrange, 1995:1). All these advisers are computer literate and have access to computers (Lagrange, 1995:2; Lagrange, 1998:1). There are 86 advisers, mostly with a background in electricity.

They handle enquiries about value adding and processing of raw products (Lagrange, 1995:1). They also give advice on the utilisation of energy to ensure effective production (Lagrange, 1995:1). The advisers also visit farmers to give specific advice on problems or prospective ventures.

At present the advisers have access to a database, available through the Eskom Intranet. It contains information on processing methods for various agricultural products. The information in the database is in a linear format, which provides data in a systematic way for finding the optimal plan for a given set of conditions (Upton, 1987:161). This way of presenting data allows for a limited choice, where fixed constraints affect choices in a linear relationship (Upton, 1987:161, 178).

The organization of the database is not very effective. Sometimes as many as thirty different products can be prepared from one kind of raw material. The adviser has to print information on all products or access it linearly on-line. This can be very time consuming. The interest of the prospective producer can diminish when he or she has to work through a lot of documents. Presenting data in an interactive way, as can be done on the World Wide Web or a CD-ROM, should greatly facilitate the finding of suitable information.

1.7.3 Other informal sources of information

A recent survey done by Marcella & Baxter (1999a:172; 1999b:117) shows a tendency by people to prefer advice of family and friends as a source of information. Only if not satisfied, do they contact other sources such as public libraries, professionals, advice agencies, and others. Users, especially those below the age of 35, however indicated a preference for using a computer to access information as an alternative to help from family and friends (Marcella & Baxter, 1999a:173; Marcella & Baxter, 1999b:117). The more mature users showed a clear preference for radio, newspapers, and other printed sources for obtaining information (Marcella & Baxter, 1999a:173; Marcella & Baxter, 1999b:119).

1.8 Summary

The farmers in South Africa, and especially the dairy farmers, are faced with a number of challenges, ranging from deregulation of the dairy industry to new labour legislation. They have to adapt by changing their farming practices, as well as considering processing of products on the farm to ensure a steady income. Farmers who are considering making changes, need information before any choices can be made. Various sources of information are available to farmers, both formal and informal. The formal sources of information are fragmented and often not complete or applicable to small and medium scale processing. Agrelek has attempted to render a service by developing a database, which is available on-line to Agrelek advisers only. Farmers who request data are given a printout from the database. It is time consuming to read through this information, which is also not very user friendly. Informal sources of information are also important. As indicated above, many people still prefer word of mouth to scientific information.

1.9 Research problems

Table 1.2 Research problems identified

• The target audience of this web site.
• Information which is currently available to the target group.
• Information needs of the target group.
• Information to be included in the web site to meet the information needs.
• Suitable ways of presenting the information.
• Design of the web site for effective transfer of information.
• Evaluation of the web site.
• Adaptations to the web site after evaluation.
• Future of web based sources aimed at the target group

1.10 Research questions

Table 1.3 Research questions

Research problems	Research questions
The target audience of this web site.	– Who is the target group of this web site?
Information currently available to the target group	– Which sources of information are currently available? – Is it in a suitable format for farmers?
Information needs of the target group	– What are the information needs of the target group? – Can information seeking models be used to establish the design and development of information retrieval systems? – How can the information seeking behaviour of the target group be described?
Information to be included in the web site to meet information needs	– Which features should ensure that this web site overcome obstacles in meeting the information needs? – What should the guidelines for selection of the content of the web site be? – How can the level at which information should be provided be determined?
Suitable ways of presentation of information	– What is the best delivery medium?
Design of the web site for effective transfer of information	– Which factors should be taken into account when designing a web site?
Evaluation of the web site	– How well is the web site working?
Adaptations to the web site	– Which aspects touched upon by evaluators should be changed in the web site?

1.11 Limitations of this study

This study was done in conjunction with Agrelek. Much of the information on yoghurt was taken from the Agrelek database. It was not possible to do a needs analysis specifically aimed at the manufacturing of yoghurt on the farm. Information needs were deduced by studying available literature. Yoghurt was identified by Agrelek as a possible application, but no attempt was made to establish whether information on another product would have been more useful.

The development of the web site was also limited by technological considerations. Many farmers do not have computers or Internet access. The availability of suitable hardware was also a limiting factor. Many of the "older" machines, such as 286 SX, are not compatible with some of the newer browsers, software and available web sites. Many of the potential users of this type of web site are also not computer literate.

Another limitation is the language in which the web site is written. English was chosen as the most universal, but might result in making usage difficult for people who only have English as a second language.

1.12 Summary of chapters

Chapter 1: Introduction

This chapter provides the background to the development of the prototype web site. It gives an overview of current trends in the South African agricultural sector and in the dairy industry in particular. These trends force farmers to find other way of earning money. Many of them consider making products on the farm, using available resources. To be able to do this effectively, they need information. There are a

number of information sources available to farmers, but it is often not suitable for small to medium scale processing.

With the cooperation of Agrelek, a provider of information to farmers on the effective use of electricity in farming, yoghurt was selected as a product suitable for small to medium scale processing by farmers themselves. The development of this prototype web site and CD-ROM on yoghurt making, can be seen as an attempt to provide appropriate information in a suitable format on one product. If successful, the range can be expanded. The web site is called FARMPRO.

Chapter 2: Information needs

This chapter provides a theoretical background for determining the information behaviour and information seeking behaviour of farmers. The information needs of farmers are listed as well as aspects on which dairy farmers might need information. A framework for assessing information needs is applied to the information needs of dairy farmers who might be interested in making yoghurt on the farm. Determining their needs is a prerequisite for developing an information resource that will fulfill these needs.

Chapter 3: Considerations when designing and developing a web site

Before attempting to design a web site, a number of aspects have to be considered. This chapter gives an overview of choices that can be made. A brief look is taken at the suitability of using multimedia and the World Wide Web to make information available to the target group, namely dairy farmers. Structures which can be used for the construction of a web site are discussed and compared in order to select the most suitable. The possible use of HTML and *Dreamweaver* for the construction of a web site is described. The use of an Electronic Performance Support System (EPSS) in

developing the web site is considered. Due to mostly technological and time constraints, it could however not be used for this particular web site.

All aspects relevant to the design of web site are discussed. It includes matter relating to text design, such as length of lines, formatting, typeface and language to be used. Design of the screen or interface, including arrangement of information on the screen, use of white space, menus, tables, colour, icons and graphics as well as the size of the screen is described in detail. Navigation issues such as the design of the web site as a whole, the home page, the use of links and feedback are also included.

Chapter 4 Development of a prototype web site for making yoghurt

This chapter describes in detail how the actual web site was developed in three phases. After each phase changes and improvements were made. The information included in the web site was also expanded and a few other sites of possible interest to farmers making yoghurt was added.

Chapter 5: Evaluation of the prototype web site

Chapter 5 describes the summative evaluation after completion of the third development phase. A questionnaire was compiled and a panel of evaluators assembled. These evaluators consisted of food scientists, agricultural engineers, dairy farmers and novices. Experts on design and language usage also made comments on the web site. Overall comments were favourable. Where possible, changes were made to accommodate suggestions made by the evaluators. The final version of the prototype web site was put on a CD-ROM and will eventually be made available on the World Wide Web.

Chapter 6: Conclusions and recommendations

In Chapter 6 a number of conclusions are drawn and recommendations made. The process of the development of the particular web site made it clear that many improvements can be made in possible future web sites aimed at farmers. It made it possible to come to an understanding of the characteristics and information needs of a particular target group and the best way to meet these needs. Ways have to be found to establish what their needs really are. Content suitable to meet these needs should be supplied. The most suitable way of presenting information should be selected and future web sites should reflect the most effective way of transferring information.