

Chapter 6: Conclusions and recommendations

6.1 Introduction

The process of development contributed significantly to come to a better understanding of the information needs of dairy farmers, and how a web site should be developed to meet these needs optimally. Although much of the information was gathered while doing the literature review, much of it was not directly applicable and had to be adapted considerably. It was necessary to integrate and evaluate what was found for application within the scope of this study. A number of the hypotheses postulated in the research proposal, had to be changed or discarded. Some of the features of this web site cannot be changed at this stage, but what was learnt can serve as a guideline for future implementation.

In the first chapter, the following research problems were identified:

- the target group 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 presentation of the information;
- design of the web site for effective transfer of information;
- evaluation of the web site; and
- adaptations to the web site after evaluation.

In this study an attempt was made to arrive at a solution to these problems. Experience gained from the literature review and the building and evaluating of the web site, has shown that there are a number of issues remaining to which

future research can pay attention. These issues will be discussed in this chapter. Recommendations are mainly meant for implementation by Agrelek, because of their involvement with the development of this web site, and also because they are in the business of providing information to farmers. The Agricultural Research Council (ARC) and other organizations involved in agricultural development, can however also do much more to educate and inform farmers, and might also benefit from the results of this study.

6.2 The target group of this web site

6.2.1 Who is the target group of this web site?

The target group selected for this web site was not identified scientifically. Experience gained by Agrelek and its advisers were taken as a point of departure. Information on agriculture in South Africa in general and the dairy industry in particular was also taken into consideration when selecting a target group.

Dairy farmers, as well as those in other sectors of agriculture in South Africa, are currently faced with changing circumstances. The dairy industry, like many of the other agricultural sectors, is not regulated. Bulk buyers of milk set and control prices to the disadvantage of small to medium scale producers. A large number of dairy farmers no longer find it profitable to produce milk on a large scale and sell the raw milk they produce at low prices. Due to poor economic conditions, dairy farmers are ready to take almost desperate measures to ensure a regular income throughout the year by manufacturing products on the farm.

Even if they consider exporting dairy products, they cannot compete with European Union countries, where dairy products are heavily subsidized. The strict hygiene

requirements set by the European Union which are difficult and expensive to comply with, especially when using existing facilities, also puts this option beyond the reach of many.

Farmers with surplus milk can however consider processing milk themselves. Many home industries and so-called “farmers’ markets” offer opportunities for selling dairy products of a good quality directly to the public. Dairy farmers can even open their own small depots where milk and milk products can be sold to the public. Products can also be sold directly to retailers.

There are a variety of products farmers can make from milk. Raw milk has a very short shelf life but the shelf life of dairy products processed on the farm is considerably longer. Products that can be considered for web sites of this kind aimed at processing on the farm are: types of yoghurt, ice-cream, cultured buttermilk, caseinates prepared by roller drying, cultured milk (maas), kefir, hard cheeses like cheddar, processed cheese, cheese spread, semi-hard cheeses like gouda and feta cheese, cottage cheese, soft cheeses such as ricotta, cream, which can be whipping cream, whipped cream, dessert and coffee cream, and cultured or sour cream, butter and butter oil. Dairy farmers therefore have a large variety to choose from. After consultation with Agrelek, yoghurt was selected from the abovementioned as the best possibility for which a prototype web site can be developed, because a target group for information on yoghurt had already been identified.

6.2.2 Recommendations

To ensure that specific target audiences for future products are identified, a way must be found to do a survey of some kind before further web sites are developed. More information about products for which consumer demand exists or emerges, must also be collected as well as consumer preferences regarding specific tastes, colours and

other attributes. A list of priorities can then be compiled. It was also essential to make sure that the needs of the target audience were met by this web site, and if not, how it can be adapted to make future web sites more successful.

6.3 Information currently available to the target group

6.3.1 Which sources of information are currently available?

A number of sources are available to farmers, but there is no way to establish which sources are used and by whom and how useful information gained from these sources are. Many farmers read farming magazines, listen to the radio, watch television programmes and attend farmers' days. Some of them consult more official sources like agricultural extension officers. Agricultural advisers and extension officers are however often more concerned with correct farming practices, fertilization and soil preservation. They are seldom knowledgeable about the possible processing of raw products and can give no advice on matters of this kind. Textbooks and articles in scientific journals are also being bought or borrowed by farmers, but are mostly written in technical language. This is of little use to the majority of farmers.

As part of this study, two papers were presented in Durban and Cape Town at international conferences. As a result of the information on the prototype web site provided in these papers, a number of queries were received, asking for more information and showing interest in a web site as a possible source of agricultural information.

There is definitely not enough information available on processing on the farm. What is available is not easily understandable and cannot be applied by the average small to

medium scale farmer. Although information probably exists, it is not easily accessible for most farmers, and is seldom up to date.

Attempts were made to find out in what format what information on yoghurt making is actually available to farmers. Apart from technical books on dairy farming, articles in technical and popular journals and pamphlets compiled by the Animal Nutrition and Animal Products Institute of the Agricultural Research Council (ARC), it became clear that no suitable or complete source on yoghurt making is readily available to meet farmers' needs.

6.3.2 Recommendations

Information sources have to be specifically developed with the small and medium scale farmer in mind. Many of them have not achieved a high educational level and many emerging farmers, owning their own land for the first time, can hardly read or write. This has to be provided for by using simple language and pictures. Information on products suitable for making by this group of farmers also needs to be developed.

Methods included should also be within their reach as far as capital outlay and technology is concerned. Material can also be prepared to be used for group presentation by an instructor (for example Agrelek advisers and extension officers). Small to medium scale farmers can further be informed on ways they can cooperate and work together to achieve better results and farm more profitably.

Information sources must be marketed in as many ways as possible, for example: using radio and TV programmes, popular magazines, specialized journals, conferences, farmers' days and possibly also through agricultural or farmers' unions. All possible channels of communication with farmers must be explored and utilized. This will contribute to development, especially in rural communities.

6.3.3 Is information available in a suitable format for farmers?

Suitable information is seldom readily available when required, and is not up to date or in a format that is easy to use. Although many farmers prefer asking friends, family or neighbours, there is a real need for authoritative information, especially before any costs are incurred.

As the provision of electricity to rural areas expands, Agrelek receives many queries regarding the processing of products on the farm. Agrelek has a considerable database on products farmers can make themselves. This is available to farmers through Agrelek advisers. This database is available on the Intranet of Eskom. The Agrelek advisers are spread throughout South Africa and have access to the database.

Many farmers, however, do not contact Agrelek for advice and prefer to find their own information. They also seldom consult agricultural extension officers for advice. Upon request of specific queries, a relevant section of the Agrelek database can be printed for use both by the Agrelek advisers and farmers. The format in which this information is presented, is meant to be used by advisers, but was not developed with the farmers themselves in mind. It often encompasses a large amount of information, which takes time to work through. It is of a technical nature and comprehensive, but does not meet the needs of the farmer. Agrelek does not readily supply printouts to farmers, but even if they do, the format is not easy to use, even by advisers. Advisers are mainly trained in the effective use of electricity in agriculture, but often have no knowledge of product selection and processing and cannot assist farmers in a meaningful way.

Other instructors and advisers giving advice to farmers are also not trained in aspects of food products and processing. This is the domain of food technologists and home economists, who are seldom involved in advising farmers. The now defunct control boards gave demonstrations, supplied recipe books and gave general advice to farmers

on processing, packaging and marketing of farm products. This gap has not been filled.

6.3.4 Recommendations

There are electronic sources available on agricultural matters, but only a few are created and maintained for South African farmers. The Agrelek database can also not be regarded as available to farmers, because they have no online access to the database.

The interactive way in which the web site was developed for the purposes of this study, makes it an excellent format for farmers who have access to computers and are computer literate. The CD-ROM version, if available at a reasonable price, could also contribute significantly to making information readily available to more people.

It is necessary to provide all information needed for a particular purpose in a suitable format which can easily be accessed by the user, in this case the farmer. The information must be presented in a nonthreatening way broken down into manageable chunks and using nonscientific language.

This web site is currently available only in English, but can be made available in other languages as well. It can then be used at the new “telecentres” which are being built in rural areas of South Africa and which will be used to promote development in these areas.

Feedback can be provided and in this prototype web site an e-mail address (farmpro_1999@yahoo.com) is provided. This link is available on every screen of the document. Feedback in future web sites can also include other forms of assistance. These can range from on-line help to small tests included in the system if an EPSS

system is used. Users can also be referred to other sources of information that might be helpful or links can be provided.

6.4 Information needs of the target group

6.4.1 What are the information needs of the target group?

Due to changes in agriculture and in the dairy industry in South Africa, additional needs are at present experienced by farmers. On a national level changes occurred in the marketing structure previously controlled by the control boards, new labour legislation requiring minimum wages for farm workers and land restitution. On an international level more markets became available for South African products, with the signing of the Free Trade Agreement between South African and the European Union.

Within the scope of this study, it was not feasible or possible to establish what farmers really need to know about yoghurt making. An attempt was made to come to an understanding of information needs of farmers and of dairy farmers in particular by studying and comparing findings found in the literature, both printed and on the Internet. Deductions were made about general needs. Also using this data, it was deduced what the specific needs of dairy farmers would be. The prototype web site is an attempt to meet as many of these needs as possible.

Input from officers of Agrelek was also used. Information on products already included in their database, compiled to meet the needs of their clients as made known through the advisers, was taken as an indication that a need for information on those products exists among dairy farmers. From the dairy products in the database, yoghurt was selected. A wide variety of yoghurt types can be made. It is suitable for processing with small amounts of milk. Some can even be made in a microwave oven, making it

possible for a producer to experiment of a small scale before expanding. All aspects involved in the making of yoghurt on small and medium scale is included in the web site.

6.4.2 Recommendations

Possible sources should be identified that can be used to pinpoint the information needs of farmers more specifically, especially when developing web sites for other products in the future.

Channels already giving advice and information to farmers can be requested to gather information from farmers. A wide range of web sites and CD-ROMs could be developed and updated regularly. Web sites can also be developed on other helpful information, such as financing institution information, pricing of products, contact persons and suppliers of agricultural equipment. Agrelek, the Agricultural Research Council, farmer's unions and even agricultural journals can conduct surveys among farmers to establish which products they need information on.

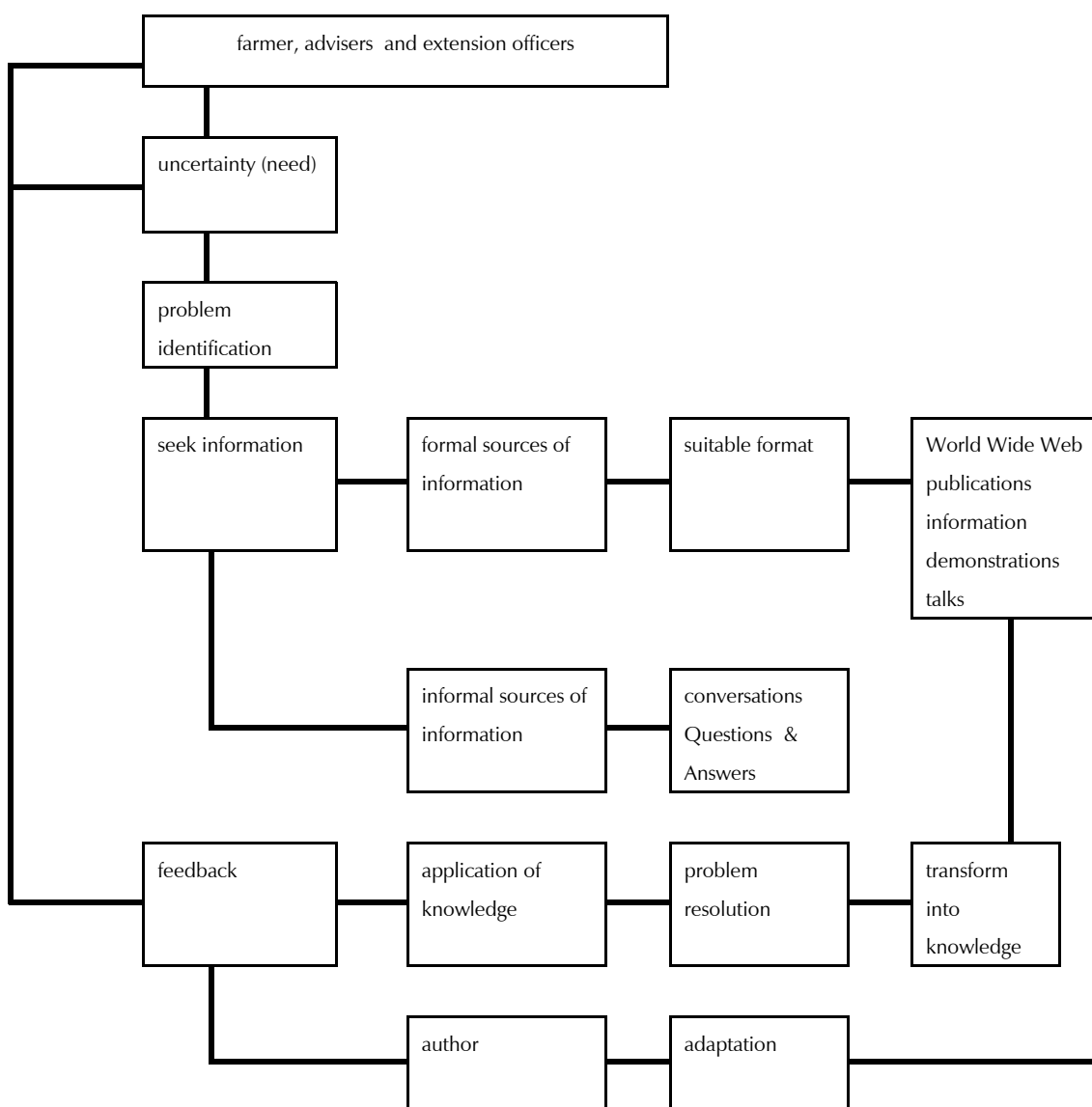
6.4.3 Can information seeking models be used to establish the design and development of information retrieval systems?

There are various models available for establishing the information behaviour of users. Two of these were chosen, describing information seeking behaviour. The models clearly indicate that the need for information is but one aspect of information seeking behaviour as a whole. These models highlight communication and the problem solving process and can help to understand how information is sought. Models can serve a useful purpose in the effective design of a web site to ensure that all aspects are provided for and a logical sequence is followed, ensuring effective use.

The models selected highlight the importance of allowing the user to search at his or her own pace. Feedback channels completing the circle are included. The models can also be related to the continuum of information seeking, where the user is initially in a state of uncertainty which leads to searching for information. It is only when this information is of value that knowledge is gained and the farmer moves to a state of certainty (knowledge). These models are ideally suited for describing the behaviour of the average users of a web site (mainly novice users seeking information in a technically complex environment).

6.4.4 Recommendations

Other models of information seeking behaviour can be considered and compared. Models available in general textbooks on information seeking behaviour have to be adapted for specific application. From a study of a variety of models, a new model (fig 6.1) was developed, specifically accommodating the identified target group.

Figure 6.1 Information seeking behaviour of South African farmers

6.4.5 How can the information seeking behaviour of the target group be described?

As mentioned previously, farmers mostly rely on either their own experience or that of previous generations. They remember what and how things were done in the past and

follow that example. When considering something new they might have heard about on the radio or television or by word of mouth, they ask friends, neighbours and family. Printed sources are seldom consulted and many farmers do not even know where to obtain printed information, except for popular journals available in shops. Even if copies of these journals are kept, it is usually very difficult to find information published in previous issues. The chance that information will appear in a popular journal at the exact time a farmer might need it, is very slight. It might however happen that something he does read in a journal, will give him an idea, which can then be pursued further.

Farmers following modern agricultural practices, are more knowledgeable about communication channels available to them and will utilize them by writing or phoning appropriate organizations or people and ask for information or advice. Those with access to the Internet, will most probably look at web sites available there, but often still need more local content than is currently available. There are sites available to them and if known to them, they will probably visit these sites and follow leads obtained there. They need usable, practical information that can readily be understood and applied rather than information of a scientific nature. Web sites created by organization overseas, do contain information, but South African farmers will attach more importance to locally created web sites, using familiar terms.

6.4.6 Recommendations

Provision has to be made for the different approaches to information seeking identified, in order to meet the information needs of different groups interested in processing farm produce to make products. It is not within the scope of this study to make deductions on the information seeking behaviour of members of the informal sector and recommendations on how it would affect their use of information, as well as how their specific needs can be established, Of necessity, feedback from this sector

will have to be channelled through those who come into contact with them. For the more formal sector, especially the users of web sites, feedback must be made possible and used by authors of web sites. It must correspond with the information seeking behaviour of computer literate farmers and advisers to farmers. Widespread advertising of the web site and encouraging feedback will lead to an understanding of possible target groups, what they need and how they go about finding it. An adaptation of existing web sites to meet their needs as effectively as possible can then be developed. Existing South African web sites, that these farmers come into contact with, can also be used to make them aware of what is available and where it can be obtained. Agrelek advisers can also promote use of available web sites. Agrelek has its own web site where information on available web sites and CD-ROMs can be given.

6.5 Information to be included in the programme to meet information needs

6.5.1 Which features will ensure that this programme overcome obstacles in meeting information needs?

When developing this web site, it was decided that it should consist of two distinct parts, to make provision for two approaches by users of the web site.

The first part is called “Quick tour”. It is in a linear format which compels the user to start at the beginning and work through all the information until the end. This is similar to Computer-based Training and it is not an interactive process. It is meant to give an overview to be scanned in the beginning of using the web site. It shows on which aspects information is given in the second part, which is called “Complete picture”.

The Complete picture part is fully interactive and allows the user to direct his/her own information seeking. Options are given and after a choice has been made, information

required is shown. An empirical structure was used, which is structured to allow access directly to all information. The empirical structure can be used by both experts and novices. It allows the user to work from a central point, which is the home page, to which the user can return at any given moment by using the link present on all screens. It is a logical structure that is familiar to most users of web sites. The use of a navigation bar on the left, also makes it easy to reach relevant information. Icons and colour are also used to make the site more interesting and by consistent use, it also helps the user to find information. For example the icon for the home page is a New Age farmhouse and the New Age mailbox leads the user to the address where the author of the web site can be contacted.

Information in the site itself, also follows a consistent structure, making the place where information can be found predictable. The same headings are used for all products. For example the headings: kind of yoghurt is given first, followed by manufacturing methods, flow diagram, energy requirements, and so forth.

Every heading for a type of yoghurt is followed by description of that kind of yoghurt. Other information such as labelling requirements and suppliers of equipment, is linked to specific kinds of yoghurt.

6.5.2 Recommendations

The prototype web site was constructed using two kinds of structures, namely linear and empirical. Future web sites can be constructed to include only the empirical structure with added features. During the evaluation phase it became clear that the inclusion of some computer-based instruction methods will make this web site an excellent information source, especially for the Agrelek advisers. Various alternatives are available and each of these have advantages and disadvantages. A careful study of the literature and available resources, showed that the inclusion of an Electronic

Performance Support System (EPSS) could be the ideal solution. Using an EPSS, the web site will still supply the main stream of information, based on responses given or choices made by the user. In addition to this, EPSS has the ability to select certain pieces of information and a sequence of information based on the answers to questions or choices made by the user. He will however still have the choice of accessing other information not directly related to the choices made or the answers given. This will result in an interactive web site which can be accessed from various points, for example: after making a selection of questions, which form part of the EPSS structure, or through an open door, where the user can browse at his/her own pace through the information.

Future web sites including an EPSS system will increase the quality and usability of such a web site, because the inherent structure of EPSS helps the user to find required information, by collating bits of information. If EPSS is not used, the user has to find his own way, which takes longer and might not provide all needed information.

The use of EPSS will also address the issue raised by some evaluators complaining about the time taken to get to specific information. With an EPSS they will be able to reach specific information much quicker. Creating an EPSS web site is much more complicated than then one created for the purposes of this study. Appropriate technology is required and much more time will have to be devoted to the creation of such a web site.

Future web sites can also be more instructional in nature for certain types of users, by asking questions to which answers must be given before the user can go on. Some users might prefer having their knowledge tested, to make sure they comprehend everything before continuing. Computer literate users will probably be irritated by this kind of approach, and it will have to be excluded from web sites aimed at this target audience.

6.5.3 What should the guidelines for selection of the content of the web site be?

It was quite difficult to decide what should be included in the prototype web site. It was not envisaged at the beginning that such a large amount of information was necessary. As the development progressed, it was realized that a simplified representation of information on yoghurt making would probably result in failure to produce quality products. Information had to include complete information on all aspects in order to be useful. All possible types of yoghurt that can be made and all processes and equipment are therefore included in the web site. Diagrams of equipment and energy flow were also added, following the advice of a number of agricultural engineers.

Because the farmer intends to produce a shelf ready product, it also has to conform to legal requirements. This information, quoting relevant regulations on labelling and the use of additives, such as flavourants, stabilizers, and preservatives are also supplied. A list of other laws and regulations affecting farmers indirectly, such as the Occupational Health and Safety Act is also included. Because the web site is aimed at helping farmers to process raw materials at a profit, it was decided to include an elementary business plan and feasibility study which can be done before any final decision is made. Possible sources of financing are also listed. A list of suppliers of equipment is also available.

6.5.4 Recommendations

Most evaluators were satisfied and enthusiastic about the content. More and continuous feedback by users should be encouraged to ascertain what more can be added, or what can be left out, to make this and future web sites more useful to more people.

Instead of including some of the information, it can be considered to link other relevant web sites for users of the Internet. On the CD-ROM a list of related sites can be provided, with their URLs. A list of printed sources that can be used will also be an added advantage. A list of organizations and individuals involved in development projects who could be approached for help of all kinds, will further improve the usefulness of the web site.

6.5.5 How can the level at which information should be provided be determined?

The best level of information supplied can only be determined once the web site is fully functional and made available to all interested parties. Only after it has been used extensively will it become clear if the level chosen for this web site is acceptable. The present web site is complete, supplying all available information in the Complete picture part. The Quick tour is on another level and is aimed at giving an overview from which a prospective user can decide if he will be able to make yoghurt and select the type of yoghurt he can make with resources available or which falls within his means. It can, however, not be used to make yoghurt, because it does not contain complete information.

6.5.6 Recommendations

When more feedback about the web site becomes available, it can be considered to spilt the contents into products that can be made without having to acquire expensive equipment. This level will be aimed at beginners, who want to experiment on really small scale in their kitchens, before embarking on a bigger venture. It will also be useful as a development aid for upcoming farmers and should help him to make products within his means. It can depict processes graphically to make it easier to understand. All steps in processing will have to be included however to ensure success.

The processes themselves cannot be simplified to represent a different level, but the way in which the information is presented can be simplified. Should it be considered to use a web site or CD-ROM for upcoming farmers of whom many are illiterate, a level using more graphics, not unlike material developed by the Agricultural Research Council at one time (Benza and Betty series), can be considered. It can be used under the direction of instructors, where information is projected on a screen and explained. Accompanying posters and leaflets can also be developed.

6.6 Suitable ways of presentation of information

6.6.1 What is the best delivery medium?

The World Wide Web was selected as the most suitable delivery medium for this type of information. By using the World Wide Web, the web site can be accessed easily by users who have Internet access.

The World Wide Web is regarded as an established platform for presenting information. More and more users are accessing the World Wide Web daily, although the use of the Internet in South Africa is still not extensive. It is also a relatively cheap method of delivering information. The only cost incurred by the user is the cost of the telephone call, provided that the required software and hardware are available.

It was also decided to make a CD-ROM version available, because it can be used for other purposes as well. It can be sold to prospective users at a nominal price, which might prove to be cheaper in the long run than being connected to the Internet while looking for appropriate information. A printed version is also possible, although the size of the web site will make it bulky and expensive. Parts of the web site can,

however, be printed if required, for example on specific types of yoghurt. It will of course not include linked information.

Multimedia is defined as the integration of both text, sound, animation, video and graphics for the presentation of a programme or web site. Taking the probable target group of this web site into consideration, where only a percentage have Internet access, it was not deemed the best solution for this project, although the use of the multimedia attributes of sound and inclusion of video, would have made the web site much more attractive. This web site was written as a desktop multimedia programme, where only text and graphics were used so as to ensure viewability by the majority of probable users.

The programming language of the World Wide Web is HTML and was used for the creation of this web site. The HTML editor *Dreamweaver* was selected for use in creating the web site itself. A number of possibilities are available that can be used when designing HTML documents. Some are available freely on the web while others are reasonably expensive. *Frontpage* is a product of Microsoft and was considered for the development of this web site. *Dreamweaver*, a product of Macromedia was also looked at. Although *Frontpage* is used by many authors, it has limitations in freedom when designing specific screens. It forces the author to use templates.

Dreamweaver was chosen as a better option, because it allows greater freedom when designing screens within the framework of the limits set by the developer of the web site. Many of the features of *Dreamweaver* are unfortunately only suitable for viewing on the most recently developed browsers. The web site has a function that allows testing of the web site for usability in browsers three and lower.

6.6.2 Recommendations

The use of the World Wide Web as an information tool is increasing daily. As more web sites are developed using HTML 4.0, with its improved capabilities, multimedia programmes will become increasingly user friendly and informative. Increasing use of web sites will inevitably lead to more web sites being developed.

Future web sites of the same type or in the same range as FARMPRO, can be enhanced by the inclusion of video, sound and animation to make it fully interactive multimedia. These must be included in such a way that even users with old machines will still be able to see the essential information even though video clips and sound will not be available to them. Video clips can include demonstrations of processes, show what a processing plant should look like, and, among others, give examples of finished products. The inclusion of sound may consist of interviews, rebroadcasts of radio programmes applicable to the specific product or commentary on agricultural matters. This will further enhance the value of the programme, where the user can hear other views and maybe even success stories. The inclusion of animation will serve a similar purpose as the video, where the flow diagram of any given process can be enhanced by actions suited to that process.

Dreamweaver has the ability to check browsers on the computer of a specific user, and select a branch of the web site for viewing on that computer. This will ensure that future web sites will be viewable by as many users as possible. Future web sites should also be written in *Dreamweaver* to ensure continuity with regard to interaction, basic outlay and general content, as well as familiarity to users.

The availability of a print version as part of the web site is also useful. The user will be able to keep this as reference work, without having to print screen by screen from the World Wide Web.

The format of the final product must be compatible with the technological capabilities and abilities of the potential users and their equipment. This format was chosen as more computers are presently being used in farm management. Internet usage and access by farmers are also increasing. Making the information available on a CD-ROM ensures that it can be distributed to farmers with CD-ROM players. Agrelek advisers can take their laptop computers with a CD-ROM to farmers and show them the information. Information on a CD-ROM can also be used for group instruction by projecting information on a screen and explaining the concepts and processes.

If this web site and CD-ROM are advertized, it might also encourage more people to get Internet access. Instructors attached to organizations interested in development may also use it for instruction purposes.

6.7 Design of the web site for the effective transfer of information

6.7.1 Which factors must be taken into account when designing a web site?

Because of considerations discussed elsewhere, which relate to the envisaged target group for whom this web site was designed, fully interactive multimedia could not be used in the design. It was decided to use desktop multimedia, including only text and graphics. This decision imposed a number of limitations on the design of the web site.

A number of aspects must however be carefully considered when designing any web site to ensure effective transfer of information. These aspects were discussed in detail in a previous chapter. Choices were made at the beginning of the development of the site. Adaptations were made in the design after every stage of the evaluation to get the best possible product. Design and the subsequent “look and feel” of a site, is a subjective matter. An author must be prepared to be criticized on the use of colour,

typeface and layout. In the end it is not possible to please everyone. Even if the author himself realizes at one stage or another that it could have been done in a more attractive or better way, it becomes impossible to make drastic changes to a web site of this size. The input of two different graphic authors was incorporated, but this does not guarantee customer satisfaction regarding design issues.

6.7.2 Recommendations

During the design of the web site many factors were taken into consideration to ensure a user-friendly usable web site making provision for the characteristics and preferences of potential users. Only continuous evaluation and comments by users will show whether it was successful. A balanced view of comments must be collected and those which can improve the web site must be incorporated. Once a web site with a distinctive appearance has become known, it might be advisable not to change it too much to ensure continuity. As technology advances more things become possible to improve the appearance of a site. Using fully interactive multimedia will also open up new possibilities for improving the web site.

6.8 Evaluation of the web site

6.8.1 How well is the web site working?

It was accepted from the beginning of this study, that the web site should have to be evaluated as thoroughly as possible, in order to determine how well the site is working. Decisions were made on guidelines from the literature, but only by using the web site will it become clear if the correct decisions have been made. Acceptability and usefulness for the purpose it was created have to be determined by people who are in

a position to give an informed opinion. The web site must prove to be fully functional. All links must work and the sequences of information have to be correct.

During the development process many changes had to be made on an ongoing basis, as errors were picked up or as better ways of doing things came to light.

After completion of the web site it was formally evaluated, as described previously. At each stage some changes were made in response to criticism and suggestions made by evaluators. The first round of evaluation was done by classmates, but the web site was in a very rudimentary form at that time and comments received did not prove very useful. A variety of evaluators were involved after completion of the first prototype and after every stage that followed. Some were to give an expert opinion on the content, others to give an expert opinion on the web site itself. A number of real novices were also included, to give an idea of how a farmer, who is not very competent with a computer and who is almost certainly not information literate, would use the web site. The opinions of all three groups were rated equally important, because each group used the site differently. A wide variety of comments were received. The correct questions should be asked as well as careful observations made (Alessi & Trollip, 1991:384; Collis & Verwijs, 1995a: 12-14; Hawkins, 1999:1; Petersen, 1999:1-2; Vaughan, 1994:24; Witt & Wager, 1994:23). By far most of them were favourable. A few snide comments also emerged. Because it is important to ensure that the evaluators give an honest opinion, all comments were in their turn evaluated and incorporated when possible. Evaluators were encouraged to give their ***honest*** personal opinion. Some of them were family or friends who might have wanted to say what they thought the author of the web site might want to hear, and not what they really thought.

The web site was evaluated by evaluators, ranging from novices to dairy farmers themselves and also including agricultural engineers. The majority of the evaluators

were people interested in or involved with processing of dairy products. The time allocated to the evaluation stage was not limited too strictly. Allowances had to be made for time constraints due to work or Internet access. The web site was evaluated over a period of time, with many evaluators returning time and again to look at the information. The web site is quite extensive and takes considerable time to work through. A language expert was asked to check for language and spelling errors. The consistent use of headings, font and typesize was also checked by someone who is knowledgeable on these matters.

Evaluators were asked to complete the evaluation form with a number of question listed and were also invited to make additional comments or suggestions. Many gave extensive comments on possible inclusions of other information or suggestions regarding layout, colour, and diagrams.

Feedback indicated that evaluators were able to access information and work through the web site at their own pace. Some complained that it took too long to reach what they called “essential” information.

6.8.2 Recommendations

The ideal would be to have the site evaluated under controlled conditions, but it was decided that this would not be good idea and would probably only work well for a homogeneous group of users, such as a group of dairy farmers. If a group of evaluators looked at the site simultaneously, as was the case with the classmates, people tend to influence each other, especially with negative comments. It also does not provide the opportunity for individuals to linger on a screen or to return to previous screens. Every individual has other preferences and looks at different aspects. For example, someone who is not really interested in making yoghurt, but would like to see how the site itself was designed, will want to skip the information on yoghurt making, while someone

interested in yoghurt making will probably not even notice design errors. Because the site was designed for use by individuals, it was deemed advisable to ask for volunteers to do the evaluation.

The evaluation stage of a web site must be planned carefully to ensure that it meets the needs envisaged as the reason for its creation in the first instance. It can also be useful to identify unexpressed and dormant needs which were not known at the beginning. It will also help to understand how the users actually use the information. Future web sites can then be adapted to make it acceptable to more users.

The groups of evaluators mentioned above, each evaluated the web site against their specific background, which is the ideal situation. The comments of some food engineers dealt mainly with the processing and with the energy flow diagrams, whilst some of the novices were not concerned so much with the details. They focussed on navigation through the web site, looking whether all links were working, and commented on problems with the font, colours used, and so forth. This underlines the importance of using a wide spectrum of evaluators for future web sites. The majority of evaluators must be from the intended target group, although experts able to judge other aspects of a web site must also be included to check the correctness of the information supplied and the way in which it is presented.

Ideally it should be possible to observe the human / information and human / computer interaction of the evaluators themselves. As objective evaluation is essential, the use of sound and video recordings might inhibit evaluators to give an unbiased opinion. Many people aim to please and might suppress unfavourable comments because the author of the web site is known to them. The best solution for objective evaluation, would be to have it done independently without the involvement of the developer of the web site. Questionnaires to be completed by evaluators can be extended and made more specific. If coded, it can be analysed statistically, giving more

specific results. Evaluators should also be selected using accepted methods of sampling to ensure that reliable information is obtained. The evaluation of this prototype web site was not done very scientifically, but it has shown which aspects can be improved when developing other web sites.

6.9 Adaptations to the web site

6.9.1 Which aspects touched upon by evaluators will be changed in the web site?

Many of the comments from the evaluators were valid. Some however clearly showed the inexperience of the evaluators regarding web sites and navigation. Comments and suggestions of merit were used to adapt the programme. The questions in the questionnaire dealt with:

- content;
- navigation;
- ease of use; and
- overall impression.

The comments were analysed using these categories. It was not possible to incorporate every suggestion or change everything that was criticized. Changes were made as far as possible, taking feasibility and time constraints into consideration. The developer of the web site made some decisions which could not be changed without doing everything over from the beginning. Valid comments and suggestions were implemented in the final web site as far as possible. Some comments reflected a personal preference for certain colours and graphics. The look and feel of the final web site reflects the personal preference of the developer, and although probably not

the best, could not be changed too drastically, especially in the later stages of development.

Many of the suggestions dealt with specific issues, such as a font that is too small, too many empty spaces and links which led nowhere. These changes were made.

6.9.2 Recommendations

From studying design considerations in detail it was learnt that text, screens and navigation design are crucial to the success of a web site. The target group and their specific needs must be established and accommodated as far as possible in the design. It was necessary to go through a series of evaluations to determine what the shortcomings of the web site are to know which improvements can be made. Evaluation is essential to show if the web site is actually working in the way it should be.

Feedback highlights the importance of listening to the users of the web site and accommodating suggestions as far as possible. The developer is too involved and too close to the actual product and cannot be truly objective. Evaluation must be heeded and not taken personally. Differences in preference will always exist. What is acceptable to one is not acceptable to another. Compromises are necessary to ensure that the final product is acceptable to the “**average**” user of the web site.

An EPSS system, a list of frequently asked questions and an on-line help function have been identified for inclusion in future web sites to make it more user orientated.

6.10 Conclusion

The development of this prototype web site showed that a remarkable amount of information is available that can serve as guidelines for development of a web site. Most information was found on the World Wide Web, indicating that there is much interest in this form of disseminating information on a wide front.

Experiences gained by the development of this web site has clearly shown that the relationship between the users of information and the presentation of this information in a web-based format, must be understood to ensure that a usable and useful source of information is created. Research has also shown that information on the manufacturing of products on the farm by small and medium scale farmers, can be provided using a web site, even though use of the Internet is still limited amongst farmers in South Africa. In a recent report it was estimated that South Africa has about 90% of the total Internet users in Africa and that only about one in three persons or households have access to the Internet. This is a clear indication that there is still a long way to go before web sites can be regarded as a general information resource for farmers.

According to Holt (1991:533) agriculture will definitely benefit from the functional integration allowed by computerization. Organizational paradigms and mindsets will affect the rate at which computer-integrated agriculture is achieved. The concept of people exchanging information on a network will replace the concept of some groups supplying information to others. The development of web sites providing information should form an important part in the envisaged benefits to agriculture.

Researching the information behaviour and information needs of the end users of web sites are, and will remain crucial to ensure that products are created to meet particular needs. Some possible users of web sites of this kind are difficult to reach, but all possible attempts must be made to know the proposed target audience when developing a product to fulfil their needs. It is essential to understand the information itself, the users of that information, how they interact with the information and what

they expect to gain from using that information. Only then can appropriate technology be developed to create information resources of value to as many users of information as possible.