



2 Clyde Street, Woodstock 7925, Cape Town, South Africa  
PO Box 43311, Woodstock 7915, Cape Town, South Africa  
Tel +27 21 448 2058 Fax +27 21 448 0380 Email [info@developmentworks.co.za](mailto:info@developmentworks.co.za)  
Blog [www.developmentworks.co.za/blog](http://www.developmentworks.co.za/blog)



**Elsenburg: Dairy Unit**

**Final Evaluation Report**

**1/5/25 Format**

**Evaluation of the Research Information Needs of Dairy Producers in the Western Cape with a focus on producers in the Cape Winelands and Swartland regions making full or partial use of Total Mixed Rations (TMRs)**

**Western Cape Department of Agriculture**

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**CREATIVE CONSULTING AND DEVELOPMENT WORKS**

[www.developmentworks.co.za](http://www.developmentworks.co.za)

Email: [lindy@developmentworks.co.za](mailto:lindy@developmentworks.co.za)

Tel: +27 448 2058 / Fax: +27 448 0380

Address: PO Box 43311, Woodstock 7915, Cape Town



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### RESEARCH CONDUCTED BY

CREATIVE CONSULTING & DEVELOPMENT WORKS

### REPORT PREPARED BY

LINDY BRIGINSHAW - DIRECTOR

SUSANNAH CLARKE – RESEARCH AND EVALUATION MANAGER

NICOLA VAN DER MERWE – RESEARCHER

BARBARA TORRESI – PEER REVIEWER

MONICA DAVIES – LANGUAGE EDITING

## LIST OF ACRONYMS

### Acronyms

Black Economic Empowerment	BEE
Creative Consulting and Development Works	CC&DW
Department: Monitoring Performance and Evaluation	DPME
Department of Agriculture, Forestry and Fisheries	DAFF
Diary Management Consulting	DMC
European Union	EU
Milk South Africa	MSA
Milk Producers Organisation	MPO
Total Mixed Ration	TMR
Western Cape Department of Agriculture	WCDoA

In May 2016, Creative Consulting and Development Works was appointed by the Western Cape Government, Department of Agriculture (WC DoA) to conduct a diagnostic, formative evaluation of the Research Information Needs of Dairy Producers in the Western Cape Programme, with a focus on producers in the Cape Winelands and Swartland regions making full or partial use of Total Mixed Rations (TMRs). The evaluation was conducted between May and September 2016. The overall purpose of the evaluation was to examine research projects and information, dissemination and use of such research information that was relevant to dairy producers using or partially using Total Mixed Rations (TMR) in the Cape Winelands and Swartland regions of the Western Cape Province. This overall purpose additionally translated into exploring whether the Elsenburg: Dairy Unit and newly appointed successor of Dr. Muller should continue with the research portfolio (at the time of the evaluation) or change the direction based on the outcomes of this evaluation. The research team employed a diagnostic, formative evaluation. The evaluation followed a mixed-method approach, which combined qualitative and quantitative data analysis. Twenty-five dairy farms were sampled through convenience sampling; spread across the Cape Winelands and Swartland regions. The evaluation conducted 25 individual interviews with dairy farmers and 15 individual interviews with key stakeholders in the dairy sector. Key informants included representatives from Elsenburg: Dairy Unit, plant seed companies, feed manufacturing companies, semen distributor companies, Milk Producer's Organisation Western Cape, Agricultural Research Council, South Africa Studbook and milk buyers/dairy processors.

### **Key evaluation findings**

It is important to note that the key evaluation findings should be contextualised in terms of two important factors that were prevalent at the time of the evaluation. Firstly, at the time of the evaluation the relationship between dairy farmers in the Swartland and Cape Winelands regions (as well as the MPO) and the Western Cape Department of Agriculture, more specifically Elsenburg: Dairy Unit was estranged. In addition, the economic crisis at the time of the evaluation (including the contribution of the milk price, winter rainfall, expensive cow feed) faced by dairy farmers in these two regions, as well as in the country and globally, appeared to have negatively influenced farmer participants' opinions during the data collection for the evaluation.

#### **1. Dairy farmers were not aware of and/or did not access and read research conducted and published by Elsenburg: Dairy Unit**

It was found that just under half (n = 12) of participants were not aware of the research conducted and published by Elsenburg: Dairy Unit (specifically over the past five years; 2011 to 2016). In addition, most of the participants indicated they do not read or access academic literature published by Elsenburg: Dairy Unit, such as research published in academic journals and text books. Instead, the majority of participants (n = 22) indicated they were aware of and accessed relevant research and information on more practical and user-friendly platforms, such as the Internet and sector-specific magazines (such as the Milk Producers Organisation's [MPO] Dairy Mail).

#### **2. The dissemination, utilisation and practicality of Elsenburg: Dairy Unit research for dairy producing farmers appeared unsuitable for these farmers**

Based on the secondary data provided by Elsenburg: Dairy Unit to the evaluation team (more specifically Elsenburg: Dairy Unit's list of published research articles and reports over the past five years [approximately 2011 to 2016], progress reports of current research projects [2016] and training course materials) academic means and mediums have been the most used by Elsenburg: Dairy Unit to disseminate their research findings and new information. It was found that participating dairy farmers were more likely reached through face-to-face mediums, such as 'open days', dairy study groups, 'walk and talk' farm visits, and sector-specific meetings. In addition, participants indicated in general they did not have time to read lengthy research articles; instead, a condensed and visual depiction of the new information is more useful and more likely to draw their attention to the research conducted, such as short articles and infographics in sector-specific magazines and online brochures.

At the time of the evaluation, there was only one active dairy study group in the two regions in question. It was additionally found that this study group has become more informal than in the past. The initial core focus on new information sharing at this study group shifted and was replaced by a focus on farmers supporting each other in the difficult times experienced at the time of the evaluation (which predominantly included the economic crisis faced by farmers in the milk industry). It is important to note that this appeared to have resulted in no current, formal industry research forum and one study group which became informal. This has thus influenced the existing research (such as that conducted by Elsenburg: Dairy Unit over the past five years) to get alignment between its research and farmers needs. The overall perception of the evaluation participants was the research conducted and published by Elsenburg: Dairy Unit over the past five years has not been relevant, practical or useable to dairy producing farmers in the Cape Winelands and Swartland regions. Two of the 25 participants noted that there have been a couple of Elsenburg: Dairy Unit studies/articles that they would consider relevant, but that the majority thereof has not been relevant or useable to the target population. The main reasons noted for this included: a) doubt in the quality and characteristics of Elsenburgs: Dairy Unit herd; b) outdated research and information; and c) research and information specific to a geographical area other than the Cape Winelands and Swartland.

It is important to note the environment of Elsenburg's: Dairy Unit, in order to contextualise these three reasons listed by the farmer participants as to why Elsenburgs: Dairy Unit research was found to be irrelevant and unuseable. During the past five years Elsenburgs: Dairy Unit has faced significant challenges which have negatively impacted the type and nature of research it could undertake. These challenges included: a) a small research herd with 120 milking cows (if compared to the majority of dairy farmers from the target population); b) limited physical, human and financial resources and capacity; c) a predetermined research agenda with an element of research focussed on mixed-bread milk cows; d) a strong dairy research programme in Elsenburg: Dairy Unit's Outeniqua region; and e) no formal research structure in the Milk Producers Organisation (MPO) in the Cape Winelands and Swartland regions.

### **3. Demand for relevant research and information with regard to specific needs and challenges faced by dairy produce farmers**

The most common challenges and subsequent research needs identified by the farmers are discussed in sub-sections below. The key themes regarding these common challenges and research needs:

- a) Feed: the feeding and nutrition of dairy cows, as well as alternatives (or accompaniments) to the expensive nature of a TMR feeding system;
- b) Raising calves: the best way(s) to raise calves; avoiding high mortality rates, as well as (as early as possible) ensuring quality lactation and longevity;
- c) Cattle housing: with specific focus on affordability and cow comfort; and
- d) Reproduction: including effective heat observation, and successful cow pregnancies and gestation.

Of interest to note here is that farmer participants that had smaller herd sizes (approximately between 120 and 500 cows) were more likely to prioritise the first two of the below needs, namely feed and raising calves. While the farmer participants that had larger herd sizes (between 501 and 1800 cows) were more likely to prioritise the last two research needs listed below, namely housing and reproduction.

### **4. Alternative sources of information accessed by dairy producing farmers**

It was found that dairy farmers from the target population accessed numerous sources (other than Elsenburg: Dairy Unit research) to obtain relevant and practical information they could use to address their challenges, and/or increase their production and reduce their costs. The main sources farmers accessed for information and research at the time of the evaluation were found to be: 1) farm visits from consultants; b) sector-specific open/information days; c) local farms walk-and-talk visits; d) international farms walk-and-talks visits; e) sector-specific magazines; f) sector-specific e-newsletters/magazines; and g) the Internet.

## **5. Farmer participants' perceptions on what consists of 'reliable and valid' research; as well as what resources are necessary for such research**

It was found that there were mixed perceptions and expectations amongst farmer participants in terms of what reliable research would look like and how such research should be conducted. In addition, farmers similarly reported mixed perceptions in terms of what resources were necessary to conduct valid and reliable research. More importantly, farmers reported that they do plan ahead and have to project production and cost rates; as such they indicated they were willing to engage with Elsenburg: Dairy Unit in longer-term, more scientific studies (as long as such studies are ultimately relevant and practical). On the other hand, some farmers emphasised their need for survival and the current pressure they face to make ends meet, subsequently indicating they will take any information from Elsenburg: Dairy Unit (if there was at least some research done that showed results) and apply it to assist with the decrease of costs and the increase in dairy production. For example, farmer participants indicated they had large datasets available for Elsenburg: Dairy Unit to use; thus immediate findings and recommendations made by Elsenburg: Dairy Unit scientists and/or researchers should be possible.

It is important to note that even though in the true meaning of the words 'reliability' and 'validity' in research scientific principles have to be applied (which Elsenburg: Dairy Unit research is underpinned by), there were numerous opportunities identified for Elsenburg: Dairy Unit to have discussions with and produce useful/practical information for farmers from the target population, without focusing on the scientific meaning of reliable and valid research.

## **6. Training needs of dairy producing personnel and farm managers**

Overall, training was reported by more than a third of the farmer participants ( $n = 9$ ) as a need that Elsenburg: Dairy Unit can address through the Programme. However, it is important to note that in all these cases such training was not relating to dairy farming-specific skills (such as dairy production, livestock breeding, cow feeding, etc.). Instead, the farmer participants emphasised the need for personal development and social skills development amongst all staff on their dairy farms. Examples of these skills reported by the farmer participants included: a) work ethic; b) effective communication; c) personal hygiene; d) time management; and e) people skills.

## **7. Small holder and/or Black Economic Empowerment (BEE) dairy produce farming**

There were, at the time of the evaluation, no small holder and/or BEE dairy farms. Information regarding how many BEE dairy farms previously existed in these regions was not readily available, but it appeared that there were approximately three such farms. All three of these farms have, however, closed down due to bankruptcy. Areas in the Western Cape Province that were found to be more conducive for BEE dairy farmers included the Southern Cape and Eden Karoo. These regions have summer rainfall and grazing is subsequently available for dairy cows; which subsequently increased profit margins through bringing costs down.

## **Key evaluation recommendations**

Overall, two main recommendations were derived from the evaluation.

**Firstly**, it was recommended that Elsenburg: Dairy Unit and the newly appointed successor of Dr. Carel Muller focusses on establishing, rebuilding and/or enhance relationships and trust between the Unit, dairy farmers in the Cape Winelands and Swartland regions, as well as the key roleplayers in the dairy sector. It was recommended that this should initially be done through face-to-face engagements with the farmers and roleplayers (such as farm visits, informal 'round table' type meetings/discussions, as well as frequent attendance at events targeting dairy farmers). The evaluation found the farmer participants trusted (at the time of the evaluation) Elsenburg: Dairy Units Outeniqua-based scientist, Prof. Robin Meeske. As such, Elsenburg: Dairy Unit should leverage on this trust when introducing their newly appointed scientist, as well as when building relationships with dairy farmers and roleplayers. Through this process, Elsenburg: Dairy Unit can more effectively review and realign its research and information programme for dairy farmers in the Western Cape with a focus on producers in the Cape Winelands and Swartland regions making full or partial use of Total Mixed Rations (TMRs).

**Secondly**, it was recommended that Elsenburg: Dairy Unit should review and realign their dairy farm in order to be on par with the dairy farms in the Cape Winelands and Swartland regions making full or partial use of Total Mixed Rations (TMRs). This process should include ensuring the Elsenburg: Dairy Unit herd is pure bred and of similar quality than the dairy farmers. It is important to note that this does not mean Elsenburg: Dairy Unit must have a bigger herd, but rather a higher quality herd that produces daily average milk quantities in line with dairy farmers in the two relevant regions. In addition, reviewing and realigning its herd, Elsenburg: Dairy Unit should aim to reflect the setting and infrastructure of the regions' dairy farmers, for example: a) grazing versus TMR feeding systems; b) housing versus outdoor spaces for dairy cows; c) raising of calves in singular versus grouped camps; d) making use of online dairy cow management systems; and e) making use of dairy cow management technology, such as pedometers. This process is an important predecessor for Elsenburg: Dairy Unit research and information programme for dairy farmers from the Cape Winelands and Swartland regions making full or partial use of Total Mixed Rations (TMRs).

In addition, the evaluation derived the following recommendations:

**1. Increase farmers' awareness of and access to research conducted by Elsenburg: Dairy Unit**

One of the key observations made during the evaluation was the notion that Elsenburg: Dairy Unit and dairy farmers from the Cape Winelands and Swartland regions did not have a working relationship, particularly not in terms of generating and disseminating useable research and information. This appeared to have directly negatively influenced farmers' awareness of and access to research conducted by Elsenburg: Dairy Unit. Based on the evaluation findings it was recommended that Elsenburg: Dairy Unit increase farmers' awareness of and access to its research conducted and published leveraging on two key resources. These included: a) leveraging on existing relationships between farmers and role-players; and b) making use of appropriate platforms and mediums to disseminate research findings and information.

It is additionally recommended that, largely due to the lack of a formal MPO research grouping in the Western Cape and only one informal study group in the Cape Winelands and Swartland regions, Elsenburg: Dairy Unit should incorporate enhancing these structures during their engagements with existing relationships between farmers and key roleplayers.

**2. Relevant and crucial areas where research and information should be generated**

Four key areas for relevant and updated research were highlighted by the participating dairy farmers. These included research projects addressing the following:

- a) Alternative feed cultivars for regions where TMR systems are used;
- b) Secondary data review and analysis of existing farmers' dairy cow management datasets;
- c) Raising calves, with specific focus on feed and housing;
- d) Alternative housing options for dairy cows to increase milk production and efficiency; and
- e) Tailoring existing housing structures to increase cow comfort and efficiency.

**3. Aligning Elsenburg: Dairy Unit's research objectives with the needs of farmers**

For the purpose of this evaluation, CC&DW consulted the Western Cape Department of Agriculture Strategic Plan 2015/2016 – 2020/2021 (WCDoA, 2015) to inform recommendations for Elsenburg: Dairy Unit to align their research objectives with the needs of the farmers from the target population. More specifically, the following two objectives were considered:

- a) "Engage with stakeholders to determine relevant research needs"; and
- b) "Conduct agricultural research and technology development".

It was recommended that one of Elsenburg: Dairy Unit's first focus areas in the Programme are to embark on active engagement with the farmers from the target population, as well as the current key role-players in the dairy sector in the Western Cape. Elsenburg: Dairy Unit can engage through existing platforms, such as study groups and open days, as well as considering establishing a more focussed

platform for the purpose of achieving this strategic objective, such as a formal forum driven and coordinated by Elsenburg: Dairy Unit, including all the role-players and relevant farmers. It is important to note that Milk South Africa (Milk S.A.) and the MPO were (at the time of the study) in a process to formalise such forum; as such, it is additionally recommended that Elsenburg: Dairy Unit should liaise with the relevant key roleplayers who work towards this shared goal.

It was additionally recommended that Elsenburg: Dairy Unit keeps technology in mind when both conducting and disseminating research for and to the target population. This does not necessarily mean Elsenburg: Dairy Unit should research new technologies relevant to the dairy business. Instead, this means Elsenburg: Dairy Unit should be aware of how research that is conducted and disseminated is influenced by *The Fourth Industrial Revolution* (Schwab, 2016). In short, this refers to understanding the new technology revolution that is fundamentally changing the way we live, work, and relate to one another. It refers to considering the unlimited possibilities of having billions of people connected by mobile devices, giving rise to unprecedented processing power, storage capabilities and knowledge access (Schwab, 2016).

#### **4. Addressing the training needs of dairy producing farmers and staff**

The evaluation found a noteworthy low need for training of dairy farmers and staff in terms of dairy-farming specific skills (such as dairy production, livestock breeding, cow feeding, etc.). The main reason found for this was that all the dairy farmers belonged to the Milk Producer's Organisation (MPO), who has a specific mandate to provide training to farmers and their staff. Such training was found to be offered at no charge to members of the MPO.

However, more than a third of the farmers (n = 23) indicated that they have specific training needs on topics relating to personal development and social skills development amongst all staff on dairy farms. Examples of these skills included:

- a) Work ethic;
- b) Effective communication;
- c) Personal hygiene;
- d) Time management; and
- e) People skills.

It was additionally recommended that Elsenburg College considers two key findings in terms of the training needs of dairy producing farmers and staff identified in this evaluation:

1. Any training offered to dairy producing farmers and staff will most likely be accessed and effective if such training is done on the dairy farms, during working hours. This was reported to be important to the farmers, as it ensured practical/on-the-job training and workers were not disrupted during working hours.
2. Any training offered has to be done in the farm workers' mother tongue. It appeared that this has not been the case in past trainings provided to the target population.

CC&DW acknowledges that the above training topics may not be in Elsenburg: Dairy Unit's mandate or strategic focus; as such it is recommended that Elsenburg: Dairy Unit facilitates access to such training for the target population.

#### **5. Key opportunities for Elsenburg: Dairy Unit to improve their dairy needs and information research programme**

The evaluation identified and discussed five key opportunities for Elsenburg: Dairy Unit to leverage on and further explore in the immediate future, which may improve the research and information services the Programme provides to the target population (as discussed in the full evaluation report). These included: a) On-farm research at producers; b) Elsenburg: Dairy Unit Directorate: Plant Sciences, as well as private plant seed companies; c) The Malmesbury dairy study group; d) Farmers' online cow management data, in consultation with the consulting firm *Dairy Cow Management* (DCM); and e) The current evaluation.



## 1 INTRODUCTION AND BACKGROUND

"If we take into account South Africa has a population of around 55 million people and has 35 000 commercial farmers, then every farmer provides food for 1 571 people; it shows how important farmers are."

Henry Geldenhuys,  
TAU SA's safety committee for farmers, 2015.

The evaluation report contains the main findings, lessons learnt and recommendations of the external, diagnostic evaluation Creative Consulting & Development Works (CC&DW) conducted for the Western Cape Department of Agriculture (WCDoA). The evaluation titled: *Research Information Needs of Dairy Producers in the Western Cape with a focus on producers in the Cape Winelands and Swartland regions making full or partial use of Total Mixed Rations (TMRs)*, is hereinafter referred to as the Programme. For the purpose of this report 'Elsenburg: Dairy Unit' will be used when referring to the WCDoA.

### 1.1 PURPOSE OF THE EVALUATION

The overall purpose of the evaluation was to examine research production, dissemination and use of such research that was relevant to dairy producers using or partially using Total Mixed Rations (TMR) in the Cape Winelands and Swartland regions of the Western Cape Province.

The **objectives** of this evaluation were:

1. To assess farmers' level of awareness and access to research conducted by Elsenburg: Dairy Unit;
2. To identify relevant and crucial areas where research and information is lacking;
3. To align Elsenburg: Dairy Unit's research objectives with the needs of farmers; as well as
4. To determine the training needs of dairy producing farmers and staff.

The evaluation subsequently **aimed** to:

- Assess levels of awareness and access to research conducted and published by Elsenburg: Dairy Unit;
- Assess dissemination, utilisation and practicality of Elsenburg: Dairy Unit research for dairy producing farmers;
- Determine levels of demand for dairy relevant research and information with regards to specific needs and challenges faced by farmers;
- Identify other sources of information accessed by dairy producing farmers;
- To assess levels of perception and expectation held by farmers with regards to Elsenburg: Dairy Unit producing and disseminating research in the dairy sector; and
- Identify training needs of dairy producing personnel in order to improve profitability and sustainability.

In order to achieve the evaluation objectives and aim, CC&DW conducted a diagnostic evaluation consisting of individual (farmers) and stakeholder (key informants) interviews. In addition, CC&DW undertook a document review and comparative literature analysis using secondary data and existing research.

### 1.2 SCOPE OF THE EVALUATION

The scope of this evaluation included examining the dairy research and information needs, opinions and perceptions as per the identified evaluation participants (namely the sampled dairy farmers and key roleplayers). Relevant information to successfully conduct the evaluation was collected from primary sources (the dairy farmers and key roleplayers), as well as secondary sources, such as existing

literature in both the public (such as Elsenburg: Dairy Unit) and private (such as the Milk Producers Organisation [MPO]) sectors.

## 2 INTRODUCTORY DOCUMENT AND LITERATURE REVIEW

CC&DW conducted an introductory document and literature review during the inception phase of the evaluation, in order to ensure the evaluation was framed in an up-to-date and relevant context. A more detailed review of existing research and information was conducted during the data collection and analysis phases of the evaluation, through a comparative literature analysis.

### 2.1 THE CONTEXT IN WHICH DAIRY FARMERS OPERATE

The introductory literature review below provides a contextual background on the status of the dairy industry in South Africa and the Western Cape, as well as the challenges faced by dairy farmers in the Province. In addition, a brief overview of current and existing research conducted by Elsenburg: Dairy Unit is provided to give a synopsis of the information that formed a large part of the evaluation.

#### 2.1.1 THE DAIRY INDUSTRY: SOUTH AFRICA IN THE GLOBAL CONTEXT

Over the last 15 years, South Africa has undergone immense social and economic changes, with fundamental structural reforms resulting in an open, market-oriented economy. Some of these changes were intended, while others are the result of the country's integration into the global economy following the end of apartheid-era sanctions. The changes in policy were intended to remove the socialist control of agriculture prevalent under the Nationalist government, improve the lot of farm labourers, and redress land inequalities. Closing agricultural marketing boards, phasing out certain import and export controls and introducing certain import tariffs all converted a stagnant and state-controlled sector into a vibrant market economy. Dismantling state support to farmers combined with low import tariffs did, however, leave many South African farmers unable to compete in certain areas, such as wheat and milk, against farmers from developed countries who receive generous state subsidies and dump their products in South Africa (World Wide Fund for Nature South Africa [WWF-SA], 2014).

Along with the increase in the dairy products production in Africa, the South African dairy industry has also shown an annual upward trend in growth (Milk Producers Organisation [MPO], 2015:31). The relative contribution of milk production to the agricultural sector in South Africa makes it the "fifth largest agricultural industry in the world" (Department of Agriculture, Forestry & Fisheries [DAFF], 2012:5; Milk South Africa [MSA], 2014:13). However, in comparison to the other largest agricultural industries in the world, South Africa's contribution to milk production internationally remains relatively small. Regions and countries such as the European Union (EU) and New Zealand, where milk is produced at a lower cost to producers because of government subsidies, contribute 31% and 30% respectively to global milk production; making this is the highest contribution globally (DAFF, 2012:5).

Despite relatively higher milk production costs, South Africa remained a net exporter of milk products from 2012 to 2014, with the value of exports of dairy products, mostly to France and New Zealand, amounting to R38 million in 2011 (DAFF, 2012: 5-6, 18; MPO, 2015: 27; MPO, 2016: 7). The biggest importers of South African milk and dairy products are Zimbabwe and Mozambique, commanding 38% and 32% of total dairy exports respectively.

#### 2.1.2 THE SOUTH AFRICAN DAIRY INDUSTRY: A NATIONAL PERSPECTIVE

Along with exports, the dairy industry contributes significantly to South Africa's national Gross Domestic Product and the South African economy directly and indirectly (Gertenbach, n.d.). One area that is notable in its contribution to the South African economy is the creation of job opportunities due to the

labour-intensive nature of the industry. In South Africa in 2012, there were “400 milk producers employing 60 000 farm workers and providing 40 000 people with indirect jobs within the value chain milk processing and milling industry” (DAFF, 2012).

The dairy industry comprises two sectors: 1) commercial producers and large processors, and 2) small to medium size producer distributors and processors. Commercial producers generally sell milk to large processors to produce dairy products for distribution to retailers or for exports (DAFF, 2012). Small to medium size producer distributors typically sell their products directly to consumers. According to the Milk Producers' Organisation (MPO, 2015), 96% of the total milk produced nationally was sold in the formal market.

Although the gross value for fresh milk fluctuates, gross milk production values from 2001 to 2011 show an upward trend (DAFF, 2012). Raw milk purchases between 2011 and 2015 show a “steady linear upward trend” (MPO, 2015). However, the industry has recently begun to experience low and negative growth rates in milk production with a 4.9% decline in January 2016 production in comparison to January 2015 production (MPO, 2016). This can be attributed to the challenges that the dairy industry has consistently faced, as well as recent and new challenges dairy farmers in South Africa are facing.

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### 2.1.3 THE DAIRY INDUSTRY IN THE WESTERN CAPE

Since 1997, there has been a “movement of production from the central provinces to the coastal provinces” (Gertenbach, n. d.). According to the Department of Agriculture, Forestry and Fisheries (2012), coastal areas with mild temperature and rainfall patterns necessary for quality pastures are ideal for milk production. Evidence can be found in milk production statistics made available from the MPO from 2014, that the Western Cape contributed the most to milk production, contributing 26,8% nationally (MPO, 2015). This is the highest level of milk production across the provinces (DAFF, 2012). Gauteng was recorded as the biggest contributor to net exports of milk products (DAFF, 2012). This can be attributed to its location as an exit point to Sub-Saharan importers of South African milk and dairy products.

The Western Cape is the most challenging and expensive dairy producing region in South Africa, because the farmers in the province do not have access to the high quality grass/legume pastures as do farmers in the Southern Cape, Eastern Cape and KwaZulu-Natal (Burger, Meeske & Olivier, 2016).

Dairy farmers from the Swartland region to the Cape Winelands region (mainly fresh milk producers) mostly use total mixed rations (TMRs) to feed cows, as pasture production is not practical due to the region's strong seasonal rainfall pattern and a lack of water for irrigation. Winter cereal crops included in TMR diets, either as hay or silage, are of a lower nutritional feeding value than grass/legume pasture that is available for grazing in the Southern Cape or maize silage that is available in the summer rainfall areas of South Africa. Therefore, these farmers have to buy lucerne from north of Kimberley which incurs high transport costs. Moreover, the farmers who make use of TMR systems have to feed higher amounts and higher quality concentrates to complement cereal crops. The dairy farms near Cape Town are generally large, intensive operations; i.e. milking in excess of 500 cows. The intensive use of high quality concentrate feeds in these areas has led to farmers experiencing increasing pressure in producing milk at a profit. In addition, these cows are kept in open camps or intensive housing systems, which further add to costs for dairy farmers in this area. Moreover, rotary parlours are very expensive as is housing, which is essential in the Western Cape, as during the cold wet winters, cows get mastitis and lose energy when walking in mud (Burger et al., 2016).

Pasture-based dairy farming is practised in the Overberg region, extending to Plettenberg Bay in the Southern Cape. In some of these areas, especially on farms close to major rivers and mountain ranges where the rainfall has a more year-round pattern with storage facilities for irrigation, farmers utilize good quality grass/legume pastures for grazing their cows. They therefore do not need to complement the

pasture with as much or as high a quality of concentrates to balance the pasture's nutrient composition. However, TMRs are often also fed to increase farm output (Burger et al., 2016).

A major challenge that farmers face today is the high production cost affecting the profitability of dairy farming. This includes the feeding cost of lactating and dry cows, which may be as much as 65% to 75% of the total production cost of milk (Burger et al., 2016).

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#### 2.1.4 CHALLENGES IN THE DAIRY INDUSTRY

One of the main challenges faced by dairy farmers is the concept of low profit margins. The industry is characterised by low profit margins for both established and emerging dairy producers (DAFF, 2012). One of the significant contributing factors to low profit margins is the long-standing challenge of accessing and securing credit and sustainable finance packages suited to the specific needs of the farmers (DAFF, 2012). As a result, since 2007, the number of milk producers has declined. According to the MPO (2015), the number of milk producers showed a 53% decline, from 3 899 producers to 1 834.

Furthermore, biological, environmental and economic factors also pose a challenge to dairy producers. These include: the effect of cheaper imports that put downward pressure on the price of local products; issues related to varied size, dominance and bargaining power of market players; poor and unsustainable infrastructure; the number of skilled workers; levels of industry expertise; effective business management; rising electricity costs; and issues related to product shelf life and product diversification (DAFF, 2012; Gertenbach, n.d.).

One of the more pressing challenges is the availability of feed. Unpredictable weather conditions, a weaker South African Rand and low rainfall have affected the quality, quantity and prices of roughage and grain (Milk SA, 2009; MPO, 2016b; MPO, 2016). With feed cost as the "most important cost item for milk producers" (MPO, 2016), current constraints and challenges have resulted in the MPO (2016b) predicting a 3% decrease in production in 2016 due to grain price increases. Consequently, challenges related to the availability and price of feed have knock-on effects on animal health, the quality and quantity of milk production and the sustainability, efficiency and profitability of dairy farms (MSA, 2014).

#### 2.2 BRIEF OVERVIEW OF CURRENT RESEARCH BY ELSENBURG: DAIRY UNIT

For the evaluation, CC&DW accessed and reviewed secondary data provided by the Programme staff to gain an understanding of research conducted and published by Elsenburg: Dairy Unit over the past five years (i.e. approximately 2011 to 2016).

It was found that the Programme's research conducted and subsequent publications are disseminated and available through the following mediums:

- Relevant contact person listed on the Elsenburg: Dairy Unit website;
- The Programme's website;
- Academic journals;
- The WCDoA electronic (online) journal titled Agriprobe;
- Some sector magazines, such as The Dairy Mail;
- Presentations at information days
- Popular articles in agricultural media, such as Landbouweekblad
- Melkbeeshandleiding

Secondary data provided by Elsenburg: Dairy Unit to the evaluation team included:

- A list of published research articles and reports;
- Progress reports of current research projects;
- Existing questionnaires; and
- Training course materials.

In total, the evaluation reviewed and analysed 66 Elsenburg: Dairy Unit publications currently available in the mediums noted. A detailed analysis thereof and comparison to other sources of relevant information can be found in the full evaluation report.

## 2.3 LEGISLATIVE, POLICY AND GUIDELINES FRAMEWORK

CC&DW understands that the legislative and policy framework of an evaluation (especially the evaluation of governmental programmes) is an important guiding framework that helps the coordination of an evaluation and the implementation of the evaluation results. The table below depicts an overview of key guiding documents that underpin the work done by the WCDoA Directorate: Animal Sciences.

**Table 1: Legislative, policy and guidelines framework relevant to the evaluation**

Guiding document	Description
<b>Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No 54 of 1972)</b>	This Act stipulates the restrictions applicable to the using and/or selling of raw milk; more specifically the Act notes that no person shall sell any raw milk, raw cream, raw skimmed milk, raw reconstituted (prepared) milk, raw reconstituted (prepared) skimmed milk or raw milk that has become sour. In addition, the Act specifies the exact process of pasteurisation of milk.
<b>Agricultural Product Standards Act, 1990 (Act No. 119 Of 1990)</b>	The Agricultural Product Standards Act comprises the standards for primary dairy products, such as cheese and butter. In addition, the Act provides guidelines for the packaging of dairy produce containers, such as how these should be marked, approval of trademark designations; as well as additional particulars on containers, including indication of the packer and indication of the production lot.
<b>Western Cape Department of Agriculture Departmental Strategic Goals (DSGs)</b>	Firstly, DSG 3 is of importance, as it states WC DoA should support the sector (farmers and industries) to increase sustainable agricultural production (primary provincial commodities) by at least 10% over the next 10 years. In addition, DSG 4 emphasises the Department's goal to optimise the sustainable utilisation of water and land resources to increase climate smart agricultural production.
<b>Western Cape Department of Agriculture Service Delivery Charter</b>	Research and Technology Development Services: Cutting edge research to increase agricultural production as well as technology to address challenges of sustainability and climate change will be provided to all farmers and stakeholders on a continuous demand-driven basis. Appropriate, new and adapted technology and scientific information in the form of user-friendly information packages, popular and scientific publications, on-farm "walks and talks" and information days, will be presented to the agricultural and agri-business sector on a quarterly basis
<b>Western Cape Department of Agriculture Strategic Plan 2015/2016 – 2020/2021</b>	Programme 5: Research and Development Services; Sub-Programme 5.1 Research: To conduct cutting-edge research and technology development in the fields of animal sciences, plant sciences and research support services; 90 Research and technology development projects implemented to improve agricultural production; Number of research projects executed and needs identified through stakeholder engagements with commodity organisations and other industry partners. This objective will contribute to increase agricultural production and sustained competitiveness of all farmers

### 3. EVALUATION METHOD

CC&DW employed a formative, **diagnostic evaluation**, in order to answer the evaluation questions and achieve the overall evaluation aim. In the South African National Evaluation Policy Framework (NEPF) (Department: Planning, Monitoring and Evaluation [DPME], 2014) a diagnostic evaluation is described as "*preparatory research (often called ex-ante evaluation) to ascertain the current situation prior to an intervention, and to inform intervention design. It explores the current situation, the problems and opportunities to be addressed...*" (DPME, 2014).

Utilising the evaluation results, Elsenburg: Dairy Unit may be in a position to design a strategy to improve the relevance, accessibility, and impact of its research. The evaluation was conducted to gain insight into how the Programme is working and how it can be improved (Rossi, Lipsey & Freeman, 2004).

CC&DW conducted the diagnostic evaluation using three data collection techniques to establish the research and training needs of dairy farmers in the two identified Western Cape regions.

These three techniques included:

1. A document review and comparative literature analysis of a sample of existing information and research (dating no further back than 2010);
2. Individual interviews with dairy producing farmers; and
3. Individual interviews with key informants (namely relevant role-players in the dairy produce sector).

In addition, CC&DW conducted a brief **stakeholder mapping** exercise with the desktop and secondary data available. This may provide Elsenburg: Dairy Unit with an understanding of who the key role-players and stakeholders in the dairy production sector are, as well as where the opportunities for collaboration and improvement in relationships between such stakeholders may lay.

#### 3.1 EVALUATION DESIGN

A diagnostic evaluation design was appropriate for this evaluation as it provided the evaluation team with information that may assist Elsenburg: Dairy Unit to revise, better inform and produce more practical research outputs to support dairy farmers in the Cape Winelands and Swartland regions. The formative nature of this evaluation guided the evaluation team in gathering evidence to illustrate the reach and relevance of Elsenburg: Dairy Unit's dairy production-related research. Through the formative, diagnostic evaluation design, both the strengths and weaknesses of the current research services offered by the Programme were identified. The design allowed the evaluation team to identify the nature and cause of internal and external barriers (and enablers) of the Programme, as well as summarise lessons learnt and recommendations to improve the research services. CC&DW conducted the formative, diagnostic evaluation using a mixed method approach.

##### 3.1.1 MIXED-METHOD APPROACH

In order to gain a more in-depth understanding of the situation to be evaluated, a mixed methods strategy was utilised. This methodology incorporated both qualitative and quantitative methods that are inclusive and complementary. The most fundamental part of mixed methods research is that its eclectic nature provides the best chance to produce useful answers by contextualising data. The mixed methods approach allowed for engagement in multiple ways with stakeholders and beneficiaries in order to elicit multiple standpoints on what are important challenges, achievements and suggestions for individuals, organisations, institutions and government departments (Cresswell & Clark, 2011).

The evaluation team relied on both primary and secondary data sources for this evaluation. Primary data was collected through face-to-face interviews with individual farmers and key informants; while secondary data was collected through a desktop and literature review, and relevant documentation from Elsenburg: Dairy Unit.

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### 3.1.2 COMPARATIVE LITERATURE REVIEW AND ANALYSIS

One of the key outcomes of the evaluation was to analyse existing dairy-related research produced by Elsenburg: Dairy Unit, as well as that produced by other sources, in order to gauge its relevance and ability to address the sector's needs. As such, CC&DW conducted a comparative<sup>1</sup> literature analysis of a sampled selection of literature (due to time and resource constraints) for the purpose of this specific evaluation outcome. Sources such as academic journal articles, academic websites and related articles or reports were accessed and reviewed to obtain an understanding of research and information available on dairy farming.

The comparative literature review and analysis aimed to provide Elsenburg: Dairy Unit with an overview of relevant (to the dairy produce sector) research and information published by both Elsenburg: Dairy Unit, as well as other sources (such as sector magazines and articles), over the past five years (i.e. from approximately 2011 to 2016). This review and analysis was conducted to assist Elsenburg: Dairy Unit to have an understanding of what information and research are available to dairy farmers, from what sources, and how the Programme can ensure that its research conducted and published is relevant, accessible and properly utilised for the betterment of the dairy sector in the two regions.

Topics that were included in the document review and comparative literature analysis of a sample of work included (amongst others):

- Milk production;
- Feeding and diet;
- Reproduction;
- Breeding and fertility;
- Housing;
- Commercial dairy farming;
- Small-scale and Black Economic Empowerment (BEE)<sup>2</sup> dairy farming;
- Genetic and non-genetic factors relevant to dairy farming;
- Requirements and guidelines for reliable and valid dairy farming research information; and
- Dairy farming training.

For example, when the evaluation team looked at whether the research was accessible and relevant but farmers did not utilise the findings, was it perhaps because the recommendations were impractical or has the research been pitched and written for a different audience? Through such comparative literature analysis, the successes and challenges (internal and external barriers) of the research information services provided by Elsenburg: Dairy Unit were identified.

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<sup>1</sup> Comparison is a basic procedure of explanation and analysis. A comparison presents two or more objects, describes, and analyses their similarities and differences. Comparison usually makes us see the items under discussion more clearly and in a new light. In the comparative literary analysis, CC&DW not only explained the similarities and differences between the two (or more) sources of dairy information research, but also explained the significance of the comparison. A comparison intends to inform readers of something they have not thought of before (Literature of Science Fiction, 2003).



### 3.2 SAMPLING

A sample comprises the elements/characteristics of the population (in this study all role-players and stakeholders involved with Elsenburg: Dairy Unit dairy information research and training needs programme) considered for inclusion in the study. A sample is thus a subset of measurements drawn from the population in which we are interested (Strydom & Venter, 2002).

The sample for this evaluation consisted of 24 dairy farmers from the Cape Winelands and Swartland regions from a total of an estimated 45 existing dairy farms (at the time of the evaluation), as well as 1 dairy farm in the Cape Overberg region; additionally, 15 role-players in the dairy produce sector were included in the evaluation sample as key informants.

For the purpose of this evaluation, the **sample of key informants** included in the evaluation sample was selected through the non-probability, **convenience sampling method**<sup>3</sup>.

The **sample of dairy farmers** that were included in the evaluation was similarly selected through the non-probability, **convenience sampling method**. It is important to note that CC&DW additionally employed a **maximum variation sampling**<sup>4</sup> method (BetterEvaluation, 2014). Due to the small size of the overall dairy producing population in the Cape Winelands and Swartland regions (which was estimated at approximately a total of 45 dairy farms in these two regions), random selection could have led to an under-represented sampled population. In order to avoid this, maximum variation sampling was employed. The logic behind the maximum variation method was that by purposefully selecting farmers who were at the extremes of set criteria, a sample of dairy farmers that most likely reflected the characteristics of the entire target population of dairy farmers could be drawn. **Criteria** for the sample of dairy farmers included herd size, area within the two specific target group regions, and level of dairy produce. The sample of dairy farmers included in the evaluation is displayed in the table below.

**Table 2: Final sample framework of participating dairy farmers**

No of participants	Region	Area	No of milking cows	Level of produce
7	Swartland	Malmesbury	Approximately 650 to 1500	Commercial
2		Moorreesburg	Approximately 450 to 550	Commercial
6		Riebeeck West	Approximately 400 to 1200	Commercial
3		Phillidelphia	Approximately 500 to 1800	Commercial
4		Darling	Approximately 650 to 1500	Commercial
1	Durbanville	Plattekloof	Approximately 200	Commercial
1	Winelands	Franschoek	Approximately 600	Commercial
1	Cape	Elim	Approximately 200	Commercial
	Overberg			
<b>Total 25 farmers</b>				

<sup>3</sup> Convenience/availability sampling is a method of choosing subjects who are available, easy to find and/or conveniently available to participate in the study.

<sup>4</sup> A maximum variation sample contains cases that are purposefully as different from each other as possible. Choosing sites that vary as much as possible along each of the criteria will allow the evaluator to investigate the particularities of each case as well as patterns that are shared across the variation.



### 3.4 DATA COLLECTION

Data for the evaluation was collected using both qualitative and quantitative methods (described in more detail in Section 3.1.1). Both primary<sup>5</sup> and secondary data were collected, analysed and interpreted in the evaluation report. The data collection framework is displayed below.

**Table 3: Evaluation data collection framework**

<b>Informants</b>	<b>Data collection</b>	<b>Method for data collection</b>	<b>Type of data</b>	<b>Sample</b>
<b>Individual farmers</b>	Face to face interviews (telephonic interviews where necessary)	Semi-structured interview schedule (open and closed-ended questions)	Primary Qualitative Quantitative	25 respondents
<b>Key informants</b>	Face to face interviews (telephonic interviews where necessary)	Semi-structured interview schedule (open and closed-ended questions)	Primary Qualitative Quantitative	15 informants
<b>Sources of existing research and information relevant to the dairy produce sector</b>	Literature and document review Desktop review	Key word searches Specific criteria for inclusion and exclusion of data	Secondary Qualitative Quantitative	156 publications/documents from 2011 to 2016

Primary and secondary, qualitative and quantitative data collected were analysed with methods and tools appropriate to the specific data types; producing evaluation findings that were valid and useful.

### 3.5 DATA ANALYSIS

The CC&DW evaluation team worked on qualitative and quantitative data analysis methods in order to bring a useful and reliable set of findings to this evaluation. Data from the primary and secondary data collection was analysed using:

- Microsoft Excel<sup>6</sup> was for the quantitative data, as well as the data from the comparative literature review; and
- ATLAS.ti<sup>7</sup> was for the thematic analysis of the qualitative data gathered.

## 6 EVALUATION FINDINGS AND DISCUSSION

This section of the report provides the main evaluation findings which are subsequently unpacked and discussed. The findings were presented in line with the evaluation objectives.

### 6.1 COMPARATIVE ANALYSIS OF EXISTING RESEARCH AND LITERATURE

156 pieces of current research and literature from both Elsenburg Dairy Unit and other sources were analysed and compared. The **main criterion** used to either include or exclude existing literature from

<sup>5</sup> Primary data refers to original data collected by the researcher, whereas secondary data refers to data that was collected by someone other than the researcher.

<sup>6</sup> Microsoft Excel is a spreadsheet developed by Microsoft for Windows, Mac OS X, Android and iOS. It features (amongst others) calculation, graphing tools and pivot tables.

<sup>7</sup> ATLAS.Ti is qualitative research software. For more information see <http://www.atlasti.com/index.html>

the review and analysis included the date of the document. For the purpose of this evaluation a sample of literature between 2011 and 2016 was reviewed and analysed.

Key comparisons were made between pre-determined variables of the findings from the comparative literature review and analysis. Please see Annexure 3 of the full report for the full analysis. It was found that about a third (n = 55) of the literature documents analysed was published in the academic journal 'South African Journal of Animal Sciences. This highlights the notion that research and information relevant to dairy produce farming are published in and disseminated through mediums not being accessed by the target population, namely dairy farmers. One fifth of the articles (n = 30) were published in the MPO's magazine 'The Dairy Mail'; which is a medium more appropriate to the target population. In addition, the majority of articles analysed did not have a specific focus on the challenges faced by dairy farmers on a TMR system in the Swartland and Cape Winelands regions; but rather on dairy farming and milk produce in general. There were no articles/documents that focussed on specific challenges faced by the target population; specifically varieties in cultivars, and alternative feed options for farmers on a TMR system.

## 6.2 THE MAJORITY OF DAIRY FARMERS WERE NOT AWARE OF AND DID NOT ACCESS RESEARCH CONDUCTED AND PUBLISHED BY ELSENBURG: DAIRY UNIT

It was found that just under half (n = 12) of participants were not aware of the research conducted and published by Elsenburg: Dairy Unit (specifically over the past five years). In addition, most of the participants indicated they do not read or access academic literature published by Elsenburg: Dairy Unit, such as research published in academic journals and text books. It was concluded that there were 12 farmers who were aware of research conducted by Elsenburg: Dairy Unit, but subsequently did not access or read such information. Instead, the majority of participants (n = 22) indicated they were aware of and accessed relevant research and information on more practical and user-friendly platforms, such as the Internet and sector-specific magazines (such as the MPO's Dairy Mail).

Those participants (n = 5) who indicated they had some awareness of research conducted by Elsenburg: Dairy Unit explained that the Programme was stronger a few years ago (prior to 2011). According to these participants, they were aware of research conducted on topics such as breeding and health, and plant cultivars. However, these were described as 'not relevant' by the participants.

In addition, the participants who noted some level of awareness of the Programme highlighted two specific research resources, namely 1) the quarterly Elsenburg: Dairy Unit Journal that is published every quarter in Agriprobe), and 2) the National Milk Recording and Improvement Scheme of the Agriculture Research Council (ARC). The latter referred specifically to samples of milk collected by the ARC and tested at an Elsenburg: Dairy Unit laboratory that assists farmers with ensuring their milk is of high quality. As such, the work conducted by the ARC should not be included or confused with research conducted and produced by Elsenburg: Dairy Unit (as was found to have happened amongst the participating dairy farmers).

## 6.3 THE DISSEMINATION, UTILISATION AND PRACTICALITY OF ELSENBURG: DAIRY UNIT RESEARCH FOR DAIRY PRODUCING FARMERS

Based on the secondary data provided by Elsenburg: Dairy Unit to the evaluation team (more specifically Elsenburg: Dairy Unit's list of published research articles and reports over the past five years [approximately 2010 to 2016], progress reports of current research projects [2016] and training course materials) academic means and mediums have been the most used by Elsenburg: Dairy Unit to disseminate their research findings and new information.

It was found that participating dairy farmers were more likely reached through face-to-face mediums, such as 'open days', dairy study groups, 'walk and talk' farm visits, and sector-specific meetings. In

addition, participants indicated in general they do not have time to read lengthy research articles; instead, a condensed and visual depiction of the new information is more useful and more likely to draw their attention to the research conducted, such as short articles and infographics in sector-specific magazines and online brochures.

In addition, the overall perception of the evaluation participants was that the research conducted and published by Elsenburg: Dairy Unit over the past five years has not been relevant, practical or useable to dairy producing farmers in the Cape Winelands and Swartland regions. Two of the 25 participants noted that there have been a couple of Elsenburg: Dairy Unit studies/articles that they would consider relevant, but that the majority thereof has not been relevant or useable to the target population. The key reasons for this are displayed below.

Evaluation participants indicated that they did not consider Elsenburg: Dairy Unit's research to be relevant, practical or useable, mainly due to one or all of the below reasons:

1. Evaluation participants indicated they did not have confidence in the quality and characteristics of Elsenburg: Dairy Unit's herd of dairy cows, as well as the physical structure and set-up of its dairy in that the Elsenburg: Dairy Unit dairy was not on the same scale and did not represent the dairies of the target population (e.g. Elsenburg: Dairy Unit's dairy had no housing facilities and they milk with a smaller herd than most of the target population);
2. Evaluation participants noted that Elsenburg: Dairy Unit's research regarding dairy produce is largely out-dated; by the time Elsenburg: Dairy Unit published research and information, the dairy farmers have already accessed such information through the Internet or visiting international dairy farms; and
3. The evaluation participants were of the opinion that the research conducted by Elsenburg: Dairy Unit in most cases focused on geographical areas that do not have similar characteristics to that of the Cape Winelands and Swartland regions (e.g. summer and winter rainfall regions, as well as grazing and TMR dairy cows).

#### 6.4 HIGH LEVELS OF DEMAND FOR DAIRY RELEVANT RESEARCH AND INFORMATION WITH REGARD TO SPECIFIC NEEDS AND CHALLENGES FACED

Despite the (earlier discussed) notion that the research conducted and published by Elsenburg: Dairy Unit has not been accessed or utilised by the target population; the research was also found not to be relevant or practical to the target population. The evaluation participants currently do have pressing needs for relevant dairy research to be conducted by Elsenburg: Dairy Unit. Such research and information needs stemmed predominantly from the main challenges that dairy farmers in the Swartland and Cape Winelands regions were facing at the time of the evaluation. As such, as per its strategic plan and goals (as noted earlier in Table 1) Elsenburg: Dairy Unit should consider and include these research and information needs in its planning and services in the near future, in order to support farmers from the target population to survive the current challenging environment that dairy farming in the Province and globally face.

The most common challenges and subsequent research needs identified by the farmers are discussed in sub-sections below. The key themes regarding these common challenges and research needs included:

1. Feed: the feeding and nutrition of dairy cows, as well as alternatives (or accompaniments) to the expensive nature of a TMR feeding system;
2. Raising calves: the best way(s) to raise calves; avoiding high mortality rates, as well as (as early as possible) ensuring quality lactation and longevity;
3. Cattle housing: with specific focus on affordability and cow comfort; and
4. Reproduction: including effective heat observation, and successful cow pregnancies and gestation.

Of interest to note here is that farmer participants that had smaller herd sizes (approximately between 120 and 500 cows) were more likely to prioritise the first two of the below needs, namely feed and raising calves. While the farmer participants that had larger herd sizes (between 501 and 1800 cows) were more likely to prioritise the last two research needs listed below, namely housing and reproduction.

## 6.5 OTHER SOURCES OF INFORMATION ACCESSED BY DAIRY PRODUCING FARMERS

The above quote is an example of a source (other than Elsenburg: Dairy Unit) accessed by one of the dairy farmers in the Swartland region, which provided the farmer with up-to-date and practical information on setting up a cattle housing structure.

It was found that dairy farmers from the target population accessed numerous sources (other than Elsenburg: Dairy Unit research) to obtain relevant and practical information they could use to address their challenges, and/or increase their production and reduce their costs.

The sources accessed and considered to be useful by the evaluation participants were found to be from two main categories, namely a) written/formal sources, and b) verbal/informal sources. These are displayed below.

Most of these alternative sources accessed by farmers appeared to be opportunities for Elsenburg: Dairy Unit to leverage on and reach farmers for the purpose of support through relevant research and information (this is discussed in more detail in section 7 later).

## 6.6 FARMER PERCEPTIONS WITH REGARD TO PRODUCING RELIABLE RESEARCH

It was found that there appeared to have been mixed perceptions and expectations amongst farmer participants in terms of what reliable research would look like and how such research should be conducted.

In some instances it appeared that farmers were aware that reliable, valid and credible research was resource intensive (referring to both financial and human resources) and required time (over a period of years). However, as farmers do plan ahead and have to project production and cost rates, the farmer participants indicated they were willing to engage with Elsenburg: Dairy Unit in such studies irrespectively (as long as it is ultimately relevant and practical).

On the other hand, some farmers emphasised their need for survival and the current pressure they face to make ends meet, subsequently indicating they will take any information from Elsenburg: Dairy Unit (if there was at least some research done that showed results) and apply it to assist with the decrease of costs and the increase in dairy production.

## 6.7 TRAINING NEEDS OF DAIRY PRODUCING PERSONNEL IN ORDER TO IMPROVE PROFITABILITY AND SUSTAINABILITY

Overall, training was reported by more than a third of the farmer participants (9 of the 25) as a need that Elsenburg: Dairy Unit can address through the Programme. However, it is important to note that in all these cases such training was not relating to dairy farming-specific skills (such as dairy production, livestock breeding, cow feeding, etc.). Instead, the farmer participants emphasised the need for personal development and social skills<sup>8</sup> development amongst all staff on their dairy farms.

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<sup>8</sup> 'Soft skills' refers to personal attributes that enable someone to interact effectively and harmoniously with other people; subsequently completing work tasks satisfactorily.

Examples of these skills reported by the farmer participants included:

- Work ethic;
- Effective communication;
- Personal hygiene;
- Time management; and
- People skills.

## 6.8 SMALL-HOLDER AND/OR BEE DAIRY FARMING

At the time of the evaluation no small-holder and/or BEE farms existed. Information regarding how many BEE dairy farms previously existed in these regions was not readily available, but it appeared that there were approximately three such farms. All three of these farms have however closed down due to bankruptcy. Areas in the Western Cape Province that were found to be more conducive for BEE dairy farmers included the Southern Cape and Eden Karoo. These regions have summer rainfall and grazing is subsequently available for dairy cows.

## 7 EVALUATION RECOMMENDATIONS AND IDENTIFIED OPPORTUNITIES

The overall evaluation recommendations were structured in line with the four main objectives of the evaluation. In addition, opportunities that could be used by Elsenburg: Dairy Unit to improve their research needs and information programme for dairy farmers (with specific focus on dairy farmers in the Cape Winelands and Swartland regions, making use of full or partial TMR systems) were identified and discussed.

### 7.1 INCREASE FARMERS' AWARENESS OF AND ACCESS TO RESEARCH CONDUCTED BY ELSENBURG: DAIRY UNIT

Based on the evaluation findings it was recommended that Elsenburg: Dairy Unit increase farmers' awareness of and access to its research conducted and published leveraging on two key resources. These included: 1) existing relationships between farmers and role-players; and 2) making use of appropriate platforms and mediums to disseminate research.

It is important to note that research and new information in the dairy sector were found to be dynamic and evolving all the time. As such, planning and conducting research should be underpinned by the 'what works' principle, but also considering how these findings might change in the future (what worked a year ago, might not work now). Similarly, the dissemination of research findings is influenced by the rapid development of technology. The majority of farmers criticised Elsenburg: Dairy Unit's dairy and research Programme to be behind current technology, which negatively impacted the Programme's credibility and subsequent awareness and utilisation of such by the farmers.

### 7.2 RELEVANT AND CRUCIAL AREAS WHERE RESEARCH AND INFORMATION SHOULD BE GENERATED

This section addressed one of the main objectives of the evaluation, namely: What research projects should Elsenburg: Dairy Unit plan and embark on? And, should Elsenburg: Dairy Unit continue with its research and information programme for dairy farmers in the Swartland and Winelands regions?

**Table 4: Possible research projects for Elsenburg: Dairy Unit to embark on**

Possible project topic	research	Key stakeholder to engage with	Possible research outcome
Alternative feed cultivars for regions where TMR systems are used		Plant seed companies; Elsenburg: Dairy Unit Directorate; Plant Sciences; Dairy farmers from the target population (on-farm projects)	Types of feed that can be planted by farmers on a TMR system; Grazing fields that will yield efficient food in areas where a TMR system is used
Secondary data review and analysis of existing farmers' dairy cow management datasets		Dairy Cow Management (DCM) consulting Dairy farmers from the target population Quantitative data experts and/or statistician	Extended conclusions on current findings reported by DCM on a monthly basis to farmers Possible inferential statistical analysis (predictions, comparisons and correlations) between key information recorded in the DCM datasets, including: <ul style="list-style-type: none"> <li>- Herd compilation</li> <li>- Roughage production</li> <li>- Cow mortalities</li> <li>- Slaughtering data</li> <li>- Financial management</li> <li>- Components of farmers' systems that are not falling according to the rest of the target population group – which are outliers?</li> </ul> A standardised financial data collection and management system – to provide farmers with exact financial figures; showing exact costs and profits and how these influence each other
Raising calves, with specific focus on feed and housing		Dairy farmers from the target population (on-farm projects) Elsenburg: Dairy Unit Directorate; Animal Sciences (own dairy and own calves)	Conclusions on what milk (powder or cow) is best for what types of calves; Conclusions on what type of housing (including individual or group) are best for what type of calves
Alternative housing options for dairy cows to increase milk production and efficiency		Dairy farmers from the target population (on-farm projects) Elsenburg: Dairy Unit Directorate; Animal Sciences (It is important to remember Elsenburg: Dairy Unit does not have housing structures and as such cannot conduct this research at its own dairy)	Alternative options and affordable structures to house dairy cows, specifically for dairy farmers with smaller herds (120 – 500 cows) who require information on alternative options Increase in milk production averages (as variables such as mud-stress, severe heat and cold, and waste of feed are minimised)
Tailoring existing housing structures to increase cow comfort and efficiency		Dairy farmers from the target population (on-farm projects) Elsenburg: Dairy Unit Directorate; Animal Sciences (It is important to remember Elsenburg: Dairy Unit does not have housing structures and as such cannot conduct this research at its own dairy)	Conclusions on ways to increase cow comfort and milk production amongst cows who currently have access to housing structures, specifically for dairy farmers with larger herds (over 500 cows)

#### 7.4 ADDRESSING THE TRAINING NEEDS OF DAIRY PRODUCING FARMERS AND STAFF

The evaluation found a noteworthy low need for training of dairy producing farmers and staff in terms of dairy-farming specific skills (such as dairy production, livestock breeding, cow feeding, etc.). The main reason found for this was that all the dairy farmers belonged to the Milk Producer's Organisation (MPO), who has a specific mandate to provide training to farmers and their staff. Such training was found to be offered at no charge to members of the MPO.

However, more than a third of the farmers (n = 23) indicated that they have specific training needs on topics relating to personal development and social skills development amongst all staff on dairy farms. Examples of these skills included: work ethic; effective communication; personal hygiene; time management; and people skills.

CC&DW acknowledges that the above training topics may not be in Elsenburg: Dairy Unit's mandate or strategic focus; as such it is recommended that Elsenburg: Dairy Unit facilitates access to such training for the target population, from the Elsenburg training college.

#### 7.5 KEY OPPORTUNITIES FOR ELSENBURG: DAIRY UNIT TO IMPROVE THEIR DAIRY NEEDS AND INFORMATION RESEARCH PROGRAMME

The evaluation identified five key opportunities for Elsenburg: Dairy Unit to leverage on and further explore in the immediate future, which may improve the research and information services the Programme provides to the target population.

Firstly, **on-farm research** was found to be a key opportunity for Elsenburg: Dairy Unit to explore and take up in their research and technology development services in the immediate future. On-farm research refers to research and/or experiments done on portions of the farm, seldom on the entire farm. In addition, on-farm research also refers to conducting research of a farmer's farm and not at Elsenburg: Dairy Unit (and thus here not only a part of a farm). This approach to conducting research adds to the relevance and usability of new information, as farmers constantly experiment. They try new products, new methods, and new management styles, all within the domain of an ever-changing mother nature.

The value in on-farm research is gaining information you can trust. Effective on-farm research involves producers and researchers to work together on identifying the research need, method and implementation plan. Farmers have the opportunity to conduct or help conduct the research, providing a real-life setting in which to test their theories. Lastly, on-farm research, particularly if farmer-driven, can solve problems with solutions that keep more of the decision-making in the farmer's hands.

On-farm research was found to be an important opportunity for Elsenburg: Dairy Unit to further explore, specifically as the majority of the farmers (n = 22) indicated they would be willing to make their facilities available to Elsenburg: Dairy Unit to conduct joint and mutually beneficial research projects. Keeping in mind that such projects should disrupt the farmers' milk production as little as possible; and if there are disruptions, farmers should be compensated for such.

##### **Elsenburg: Dairy Unit Directorate: Plant Sciences, with plant seed companies**

It appeared that the Elsenburg: Dairy Unit Plant Sciences Directorate was (at the time of the evaluation) conducting valuable and practical experiments of alternative plant types, alternative cultivars and various silages and foliages. However, such experiments focus on the quality and volume of the crops and plant types. Elsenburg: Dairy Unit's Animal Sciences Directorate subsequently has an opportunity to build on these experiments and further focus their research on the nutritional value of these crops and plant types, as the findings of such experiments may directly assist dairy farmers from the population group with alternative and more affordable feed for their dairy cows.



In addition, the plant seed companies' representatives included in the evaluation indicated they would be more than willing to collaborate with Elsenburg: Dairy Unit in terms of experimenting with alternative plant types, alternative and more affordable cultivars and various silages and forages that can be grown in the Swartland and Cape Winelands regions, as well as provide the necessary nutritional value for cattle feed.

#### **Malmesbury dairy study group**

At the time of the evaluation, there was only one active dairy study group. It was additionally found that this study group has become more informal than in the past. The initial core focus on new information sharing at this study group shifted and was replaced by a focus on farmers supporting each other in the difficult times experienced at the time of the evaluation. It is important to note that this has appeared to have resulted in no current, formal industry research forum and one study group which became informal. This has thus influenced the existing research (such as that conducted by Elsenburg: Dairy Unit over the past five years) to get alignment between its research and farmers needs.

Nevertheless, the farmers who belonged to the study group at the time of the evaluation indicated they are more than willing to open the group up to Elsenburg: Dairy Unit. Specifically if Elsenburg: Dairy Unit uses the opportunity to build and maintain relationships with the farmers, as well as keep farmers updated on its research, interim findings and key recommendations generated from the research.

#### **Farmers' online cow management data, with the consulting firm Dairy Cow Management (DCM)**

Both the representative from DCM consulting who participated in the evaluation, and the farmers indicated they are willing to collaborate with Elsenburg: Dairy Unit on a research project that reviews and further analyses the large sets of data captured and stored in the farmers' online dairy cow management systems.

This was found to be an important opportunity for Elsenburg: Dairy Unit to have access to relevant and reliable data which could possibly be used to conduct rapid research; subsequently providing the farmers with new findings and guidance to assist with immediate relief in their dairy produce business.

It is important to note that the farmers emphasised such online data should be used ensuring anonymity of the farmers' names, as well as have a substantial benefit for the farmers (as the data costs the farmers money every month).

#### **The current evaluation**

CC&DW is of the opinion that the evaluation can assist Elsenburg: Dairy Unit in two particular ways moving forward with its research and technology development services offered to the target population.

**Firstly**, as a result of the evaluation and the data collection process (face-to-face farm visits) an opportunity for further engagement and relationship development was created. Farmers are thus aware of Elsenburg: Dairy Unit's intention to revise their Programme and align their research objectives with the needs of the farmers from the target population audience. It is recommended that this realisation is leveraged and not left to cool down, which may possibly result in increased mistrust and disconnect between Elsenburg: Dairy Unit and the target population.

**Secondly**, there is an opportunity for Elsenburg: Dairy Unit to use the evaluation findings to design a research development and dissemination strategy that considers the various audience members, the content that is relevant to them, the presentation medium (graphical, audio, written), and the context in which the audience receives the information (including whether the recommendations are practical at the time they are disseminated). As per the evaluation findings, there are ample opportunities for Elsenburg: Dairy Unit to reach the target population and disseminate its research results and related information to dairy farmers, specifically through making such information more accessible to farmers through non-governmental and private mediums or means.