

Exploring the Challenges Faced by the Small-Scale Dairy Farmers in Bojanala Platinum District Municipality in North-West Province, South Africa

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ABSTRACT

In developing countries, livestock in the form of small-scale dairy farming is often a primary source of food security and revenue for rural communities. Despite this, decreasing dairy production in rural areas is a great concern. This study explored the challenges of small-scale dairy farmers (SSDFs) in the Bojanala Platinum District of the North West Province, South Africa. A qualitative study was conducted using purposive and snowball sampling techniques among SSDFs in the district to uncover the challenges confronting them. Twenty-four in-depth interviews were conducted with farmers, and data were analysed using the thematic content analysis technique (TCA). Eight themes emerged from the data analysis: the high cost of feed and fertiliser, diseases and the high cost of medication, unpredictable weather patterns, power failure, high cost of electricity, cattle theft, lack of machinery and equipment and lack of support. SSDFs should be made aware and trained on identifying and managing livestock diseases, and prevention strategies for livestock theft should be developed and implemented. The study also recommends that local governments subsidise and support SSDFs to manage and sustain their businesses. Furthermore, the SSDFs should be exposed to agricultural funders in their localities, and access to educational services should be made available for local farmers to receive training

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towards proposal writing to apply for funds. In future, studies can look at the knowledge and literacy of farmers in sourcing funds to support their dairy farming business.

Keywords: Small Scale Dairy Farming, Thematic Content Analysis, Bojanala Platinum District, North West Province

1. INTRODUCTION

In developing countries, livestock is important to people's livelihood, particularly those in rural communities. This role may include the provision of meat and milk, which is a source of food security and income for SSDFs (Al-Atiyat, 2014; Mutea, Botazzi, Jacobi, Speranza, & Rist, 2019). Despite this, there is a decline in small-scale dairy farming in these aspects in rural areas (Jatwani & Swain, 2020). The reasons have been shrinking fringes, access to cattle feed, the limited interest of future generations, increased cost of cattle, and poor cattle health. Pahwa and Swain (2020) remarked that countries in the developing world, such as Nigeria, Ethiopia, India and Bangladesh, have nearly half (44%) of the world's poor livestock keepers. Knowledge and management of dairy farming are essential for producing safe and good quality milk for home use or commercialisation. However, the sustainability of dairy farming depends on multiple factors such as cattle welfare, farm resources, milk market and dairy products (Britt et al., 2021). SSDFs face several challenges, which include livestock sickness (Kibore, Gitao, Sangula, & Kitale, 2013; Tsotetsi et al., 2013; Hamoonga et al., 2014; Elnkave et al., 2015; Musallam, Abo-Shehada & Guitian, 2015; Mpahlele et al., 2021), poor understanding of livestock diseases (Lindhal, Sattorov, Boqvist, & Mangnusson, 2015) and unavailability of cattle medications. Further, other studies reported uncertain weather conditions (Bernades & do Rêgo, 2014; Maleko, Msalya, Mwilawa, & Mtei, 2018; Zwane, 2019), high cost of feed and fertiliser (Maleko *et al.*, 2018; Smitha, 2019; Zwane, 2019), power failures and high cost of electricity (Maluleke, Tshabalala & Tolla, 2021). Furthermore, many other studies report livestock theft (Kongolo & Dlamini, 2012; Clack, 2013; Bath, Penrith, & Leask, 2016; Aiyzhy et al., 2021; Diniso & Jaja, 2021), lack of machinery and equipment (Bernades & do Rêgo, 2014; Gianni, Gotzamani & Vouzas, 2017) and lack of government support (Mwakaje, 2008; Banda *et al.*, 2012; Rademaker et al., 2016; Maleko *et al.*, 2018; Smitha, 2019; Otieno, Muendo & Mbeche, 2020).

In South Africa, studies have been conducted to ascertain the challenges faced by dairy farmers in various provinces (Tsoetsi *et al.*, 2013; Zwane, 2019; Mphahlele *et al.*, 2021; Maluleke, Tshabalala & Tolla, 2021). However, in the Bojanala Platinum District (BPD) of the North-West Province (NWP), information is scarce regarding the challenges experienced by SSDFs. For small-scale dairy farming to be efficient in this region, it is crucial to understand the challenges in the province. Thus, this study explored small-scale dairy farmers' challenges in the BPD.

2. METHODS

2.1. Study Design

This study used a qualitative, exploratory and descriptive research approach. Given the lack of information on the challenges faced by SSDFs in the BPD, there is a need for exploratory qualitative studies. Thus, this exploratory study was conducted to explore the challenges faced by SSDFs. Kim, Sefcik and Bradway (2017) used systematic review research to show that qualitative description research offers a detailed textual description of respondents. This paper follows their approach.

2.2. Setting

The study was conducted in the BPD of the NWP, South Africa. The district is one of the four districts in the NWP. It is subdivided into five sub-regions (See Figure 1 below). The area of the district is 18 333 km² and by the census 2022, it boasted a population of approximately 1 507 505, of whom 52.7% are men and 47.3% are women (Population Census, 2011). The dominant ethnic group (55.3%) living in the area are Setswana-speaking people.

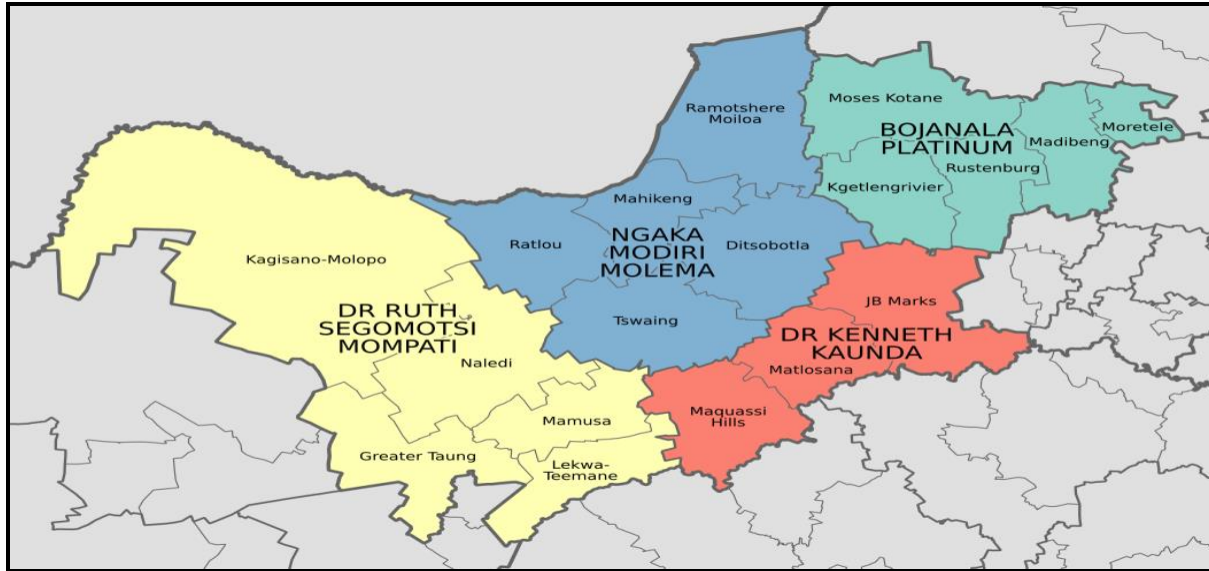


FIGURE 1: Map of NWP Municipality Districts (Wikipedia, 2022)

The research team first contacted the relevant senior staff at the Directorate of Agriculture in the BDP to obtain relevant information about the number of small-scale farmers and their regions around the BPD area. A list of stakeholders to be interviewed was provided. The local organisations and authorities were consulted to validate the list. This list contradicted the lists that other local authorities possessed. Despite the differences in the lists, some farmers were listed in all the lists. These were targeted to become the first to start the study interviews.

2.3. Population, Inclusion and Exclusion Criteria

The study population included all farm owners/managers/farm representatives of the registered small-scale dairy enterprises in the district. There are 1159 farmers in the BPD region, 44 in Kgetleng River, 488 in Madibeng, 148 in Moretele, 374 in Moses Kotane, and 105 in Rustenburg municipalities, respectively. Of these farmers, 43 were household vulnerable producers (producing primarily for household consumption and have limited skills to operate a market-oriented production), 311 were household subsistence producers (produce for household consumption, which makes a turnover of R50 000, from the surplus marketed), 741 small scale farmers, 13 medium scale farmers, 23 large scale farmers, and 28 mega farmers respectively across the different local municipalities (North West Report, 2021). The study participants aged

18 years and older with three or more years of working experience managing the farm, who also agreed to participate, were included in the study. Those who did not respond to the participation request or decided not to join for other reasons were excluded from the study.

2.4. Sampling Technique

As the lists provided by the Directorate and the local authorities were contradictory, the study adopted non-probability, purposive and snowball sampling techniques and recruited farm owners, managers and representatives who met the inclusion criteria. Althubaiti (2022) defines the sample size (n) as the number of subjects to be included in a study from a population. Qualitative samples usually require small samples (Indrayan & Mishra, 2021; Vasileiou, Barnett, Thorpe, & Young, 2018). Rosenthal (2018) states that the qualitative sample size should be large enough to address the study phenomenon but sufficient as dictated by saturation, which refers to the point in data collection when no additional insights are identified (Saunders et al. 2018). While Keshoofy et al. (2023) argue that there is no consensus on the minimum sample size for qualitative studies, the keystones for qualitative sample sizes are data adequacy and saturation. Data begins to repeat on saturation so that further data collection is redundant, signifying an adequate sample size is reached. Therefore, in this study, saturation at the data collection stage determined the sample size ($n = 24$). That is, the researcher continued interviewing the SSDFs until no newer useful data emerged.

2.5. Data Collection

The researchers travelled to the locations where the participants resided to conduct in-depth face-to-face interviews. Data were collected using a semi-structured interview guide. The guide included questions related to participant demographics such as participant age, gender, race, place of residence, level of education, farm role, whether participants had any experience in farming and number of years in farming, number of cows the participants have, number of years having these cows, the primary use for the cows and reasons for milking. To better understand a farmer's challenges, the following open-ended question was asked: "What are/were the challenges you are/were facing as a farmer?". Though straightforward as it sounds, the guide was given to experts in the field for content validation and piloted before the actual data was collected.

2.6. Data Analysis

The analysis was performed using the thematic content analysis technique, a descriptive presentation of qualitative data (Braun & Clarke, 2006). Firstly, the researchers read through the transcripts several times to identify emerging themes that provided an understanding of the challenges faced by farmers. After reading all transcripts, a list of similar topics was compiled and grouped per the theme.

2.7. Trustworthiness

Kyngäs, Kääriäinen, and Elo (2020) and Shufutinsky (2020) principles to ensure trustworthiness in the qualitative study were applied. Credibility was ensured through prolonged engagement with the farmers and member checks to enable them to correct or change what they viewed to be a wrong interpretation of their contributions. To ensure the dependability of the study findings, consistency was upheld in the detailed study methodology, such as data collection, which was checked for conveying a common message. Confirmability was confirmed by using multiple researchers to evaluate the results, interpretations, and recommendations.

2.8. Ethical Considerations

The ethical clearance for this study was obtained from Sefako Makgatho Health Sciences University Research Ethics Committee (REF: SMUREC/S/324/2021:PG). All participants were informed of their confidentiality, aim of the study, benefits, voluntary participation and the right to withdraw from the study without penalty. The participants gave written informed consent before participating in the interviews. The study adhered to the principles of fairness, privacy, confidentiality, anonymity, and participants' rights to voluntarily participate.

3. RESULTS

3.1. Demographic Characteristics

Twenty-four interviews were carried out among the SSDFs. The respondents were all black males with primary education, aged 23 and 82 years living in rural areas. Most respondents (65.2%) were farm representatives and had been farming for more than ten years. Half of the participants (50%) indicated that their main use for their cows was for dairy, and eight (33.3%)

said they milk for dairy/beef. One respondent said he was not involved in the market, and two (8.3%) said the cows were mainly for dairy in the past, but they had moved to the sorghum business. More than two-thirds (70.8%) of the participants said that the reason for milk production was to sell to the community. Table 1 summarises the socio-demographic characteristics of the study participants.

TABLE 1: Demographic Characteristics for Participants (n= 24)

	N (%)
Age (years)	
<30	6 (25.0%)
30-50	11 (45.8%)
>50	7 (29.2%)
Level of education	
Primary	14 (58.2%)
Secondary	5 (20.8%)
Tertiary	5 (20.8%)
Farm Role	
Owners	8 (34.8%)
Farm representatives	16 (65.2%)
Years of farming experience	
<5	2 (8.3%)
5-10	8 (33.4%)
>10	14 (58.3%)
Reason for milking	
Household use	13 (54.2%)
Sell to community	17 (70.8%)
Sell to other farmers	10 (41.7%)

3.2. Challenges Faced by SSDFs

The TCA of the data emerged with eight major themes, namely (1) the high cost of feed and fertiliser; (2) diseases and the high cost of medication; (3) unpredictable weather patterns; (4) power failure; (5) high cost of electricity; (6) cattle theft; (7) lack of machinery and equipment; and (8) lack of support, which are discussed below.

3.2.1. Theme 1: High Cost of Feed and Fertiliser

More than two-thirds (72.22%) of the participants expressed extreme concern about the high costs of feeds and fertiliser, which increases the burden on SSDFs in rural areas. A tractor driver supported these operational costs, saying, *“fertiliser and feeding these animals is very expensive”*. This concern was also noted by one farmer representative in the production, who said, *“We have a problem with high feed and fertiliser costs”*.

3.2.2. Theme 2: Diseases and the High Cost of Medication

Vaccinations are designed to mitigate the risks and protect animals from many diseases. All the participants reported that their livestock gets very sick too often, and it is sometimes difficult to identify whether the animal is ill. One of the farm owners supported this, *“tracking disease is challenging for us as small-scale farmers because we have to wait for the condition to be visible in some instances”*.

Another farm owner said, *“sores in the teats make it hard to milk the cows and diarrhoea in our cows is also another problem we are experiencing”*. Despite these challenges, the participants believed that some form of medication is necessary to maintain the health of the animals and control and prevent diseases. Still, the high costs of keeping animals healthy constitute a significant concern. The processor stated, *“Affordability of medication is our main problem”*. One farmer supported this statement and felt that *“medication for cows is too costly, that is why we sell few cows to afford for a longer period since we are not working.”*

3.2.3. Theme 3: Unpredictable Weather Patterns

Fifteen (62.5%) participants reported that seasonal fluctuations remain a concern in milk production, affecting the cows' health and daily activities, including milking and feeding the cows. The farm owner said, "*drought and irregular heat cause cows to die*". In contrast, the processor reported the impact of the changing weather patterns by saying, "*unpredictable weather conditions cost us severely as cow wheels get swollen as a result of heavy rainfall*". The impact of rainfall was supported by a tractor driver who said, "*when there is heavy rainfall, we cannot milk the cows and transportation of feed becomes more difficult*".

3.2.4. Theme 4: Power Failure

Eight participants (33.3%) reported blackouts hindering the farms' running. A participant in the processing section of one SSDF said, "*Load shedding . . . cripple us. Load shedding causes spoilage of milk due to temperature mismatch*". This concern was supported by another representative in the sanitation section who said, "*Frequent power failures cause milk spoilage*". These echoes by various respondents emphasise that power failures experienced by SSDFs result in high milk spoilage. This, in turn, leads to high revenue losses as spoiled milk cannot be used for commercialisation anymore.

3.2.5. Theme 5: High Cost of Electricity

The high electricity bills and frequent power failures experienced recently are major inhibiting factors in the dairy products supply chain. A participant remarked, "*High municipality bills (for electricity) cripple us*". Eight participants (33.3%) reported blackouts and the high electricity costs hindering the farms' running.

3.2.6. Theme 6: Cow Theft

In recent years, livestock theft has become common in South Africa. Some participants reported that cow theft by employees and foreign nationals in the community negatively harms their business. One farm owner highlighted this, saying, "*foreigners kill our cows at night and steal meat*". A farmer representation in the production supports this statement by saying, "*theft of cows by foreigners is a problem.*" Farmers also feared waking up in the morning to look for missing

cows or cows with incomplete legs and end up dying. One of the farm owners highlighted this by saying, *“employees and community members steal our cows.”*

3.2.7. Theme 7: Lack of Machinery and Equipment

To improve the efficiency of SSDFs, it is vital to invest in the right machinery and equipment, but the lack of the right tools is a major problem for many farmers. Fifteen (62.5%) participants indicated that lack of equipment in the plants affects the quality of milk produced due to quality issues, and maintaining the equipment is costly for small-scale farmers. One of the farm owners said, *“the quality of milk is low due to poor equipment. We end up using two-litre bottles because packaging equipment is costly”*.

Some of the participants reported relying on manual labour and using outdated types of machinery. This statement was supported by a respondent in the production section who said, *“Most of the work is done manually since there are not enough machines for us to use and the available machines are old and outdated”*. Another person in the maintenance section said, *“Tools we use are too old and outdated, and in some instances, manual operations are required to avoid machine failure and to affect production”*.

3.2.8. Theme 8: Lack of Support

The local government and agricultural extension officers' support was said by all participants to be not forthcoming as expected. Twenty-one (87.5%) participants indicated that the local government is not assisting the rural market adequately in terms of subsidies and agricultural extension services. As a result, small-scale farmers cannot improve in bridging the existing market gap due to a lack of access to essential information about the market and industry itself. One (4.2%) farm owner said, *“Government is not inclusively supporting and funding small scale market, initiatives happen in certain districts and us we are excluded in the initiatives”*. Another farm owner said, *“In our area, we lack empowerment. We rely on inherited or acquired knowledge and no access to market research”*.

Another respondent indicated limited access to the market. He said, *“No monitoring systems to accommodate all farmers entering the market, tighter rules for farmers to access the market, no*

milk vehicles in the rural areas, no research for rural farmers". Further, another respondent in the production said, "*lack of market information, management of animal health & poor access to extension service from the government*" to highlight the need and urgency of extension officers to safeguard the collapse of the rural dairy market.

4. DISCUSSION

This study explored the challenges SSDFs face in a rural district of NWP in South Africa. Its findings revealed that high costs involved, livestock sickness, weather patterns, power failure, cattle theft, lack of equipment, and lack of government support are the major challenges faced by small-scale farmers. This finding is consistent with many studies which found that livestock sickness is a common phenomenon (Tsoetsi *et al.*, 2013; Kibore *et al.*, 2013; Elnkave *et al.*, 2015; Hamoonga *et al.*, 2014; Musallam *et al.*, 2015; Mphahlele *et al.*, 2021) and has major economic implications for farmers (Knight-Jones & Rushton, 2013; Molla *et al.*, 2021). A study conducted in Tanzania found that many farmers in rural areas failed to follow their pre-planned treatment schedules for their livestock due to a lack of money and the unavailability of medication (Keyyu *et al.*, 2003). However, in contrast to the study findings, a study by Sazmand *et al.* (2020) reported that farmers who had adequate educational background and frequently consulted veterinarians with non-prescribed anthelmintic drugs preferred more expensive and foreign drugs to cure the helminth parasites in their livestock. Although the question about farmer knowledge drug usage was asked, Haakuria, Pyatt, & Mansbridge (2020) reported that farmers knew how to obtain veterinary medical products.

Regarding understanding animal diseases, in this study, the findings revealed that all farmers had poor knowledge of livestock diseases. Some studies have reported similar results (Lindahl *et al.*, 2015). In contrast, other studies (Molla, Fentahum & Jemberu, 2021; Namgyal *et al.*, 2021; Nyagutii *et al.*, 2019) showed that more than half of the farmers had a good knowledge of animal diseases. The low understanding of livestock diseases among dairy farmers in the present study, apart from poor education, could be a lack of workshops by the local government on awareness of animal disease burden and the importance of animal vaccinations. Although the usage of technology among the local SSDFs was not documented, other studies have shown that the usage

of technology in tracking diseases improves the efficiency of farming and boosts resilience and survival (Pavkin et al., 2021; Mesta, Nydile, Naveen & Kumar, 2023). Nyokabi et al. (2023) profiled the use of cameras by farmers in capturing cattle sickness among other livestock farming constraints.

Several studies (Bernades & do Rêgo, 2014; Maleko *et al.*, 2018; Zwane, 2019) have shown that weather conditions, particularly drought, have caused feed and seed shortages, resulting in high feed prices and unaffordable for small-scale farmers. Similarly, in this study, farmers reported seasonal fluctuations, especially droughts that affected livestock health, with many cows dying because of feed and water shortages. The impact of heat stress on the immune responses of dairy cows could be mediated through nutritional interventions and cooling management. Another weather pattern challenge that SSDFs face, regarding rainy weather, is that the cows' heels get swollen during heavy rainfall (see Theme 3). Moreover, it is difficult for farmers to milk their cows when their heels are swollen and in muddy conditions, and it is sometimes difficult to transport feed. The respondents also highlight that the high cost of feed and fertiliser compounds the challenges of SSDFs, affecting their production adversely. Other researchers (Maleko *et al.*, 2018; Smitha, 2019; Zwane, 2019) in other developing countries have identified similar challenges. These challenges are not under farmers' control and have several implications, including crippling the farmer's chances of surviving in the market. Contrary to the difficulties experienced by local SSDFs. Researchers (Ahular et al., 2014; Kholif et al., 2017; Johnston, & DeVries, 2018) showed that improved animal feed supply and diet modification increase milk production.

Power failure and high electricity costs are national crises experienced by all sectors in South Africa, affecting the supply chain and causing significant loss of profit. In this study, the participants felt that the high electricity costs and frequent power failures were major challenges they experienced daily, affecting their milk production. Similar results came from Matekenya (2013), who reported that power failures are challenges for SSDFs and cause machine breakdown resulting in milk spoilage. Huitu et al. (2020) also reported that the dairy industry incurred approximately 4.6% of the total monthly milk production loss due to load shedding. Daily (2021) also reports that load shedding affects milk production loss, storage facilities and returns and

proliferates cases of mastitis. Similarly, the food crisis and diesel costs for generators further constrain the farmers due to power outages, which compromise their sustainability.

In developing countries, livestock significantly contributes to people's welfare, mainly in rural areas. However, livestock theft (Diniso & Jaja, 2021; Kongolo & Dlamini, 2012; Bath *et al.*, 2016; Clack, 2013; Ben *et al.*, 2018) and predation (Merson *et al.*, 2019; Chinchilla *et al.*, 2022; van Eeden *et al.*, 2018) are major challenges, especially in areas along the borders of neighbouring countries. Although few farmers complained about livestock theft in this study, most said community members, employees and foreign nationals kill their livestock at night, affecting their production and earnings loss (see Theme 6).

In Botswana, a study conducted to determine the causes of livestock theft found that the high unemployment rate, absence of police in the area and readily available market for stolen livestock contributed to stock theft (Ben *et al.*, 2018). Though the causes of livestock theft in the BPD are unknown, a study in two provinces of South Africa found that a lack of appropriate preventative measures led to the rise in stock theft (Maluleke *et al.*, 2021).

Various machinery and equipment are needed for small dairy farming, including shelter (i.e., a cowshed that protects cows from rain or cold winter weather), feeding, milking, cooling and storage equipment. Dairy farmers, especially in small-scale milk production, experienced challenges with most of these tools. Studies have shown that SSDFs encountered barriers such as a lack of equipment and human resources (Bernades & do Rêgo, 2014), a lack of plant automation (Gianni *et al.*, 2017) and a lack of microbial food safety programs (Njage *et al.*, 2017). This study found that the participant's lack of equipment in the plants affected the quality of their milk production, and they sometimes used two-litre bottles of soda or fruit juice drinks due to costly packaging equipment. The use of advanced milking tools and plant automation was observed in other studies involved in intensive dairying (Alekseeva, Garmaev, Khoroshailo, & Serdyuchenko, 2021; Bhoj, Trarafdar, & Gaur, 2022; Muralie *et al.*, 2022). Also, the availability of storage facilities, infrastructure and cooling systems was reported by (Correa-Valencia, Ramírez-Vásquez & Hatmi, 2022; Purwaningsih, Nurhikmat, Wirasti, & Gunawan, 2023).

Another finding of the present study was the lack of local government support and agricultural extension officers, which the study participants reported as a major constraint. Previous studies have also shown similar findings. The lack of interaction and priority setting between agricultural extension services (Otieno, Muendo & Mbeche, 2020; Rademaker *et al.*, 2016), the lack of information concerning agricultural activities (Otieno, Muendo & Mbeche, 2020; Rademaker *et al.*, 2016; Banda *et al.*, 2012; Mwakaje, 2008) and lack of subsidy by the local government (Maleko *et al.*, 2018; Smitha *et al.*, 2019; Otieno, Muendo & Mbeche, 2020) are major problems faced by dairy farmers. In contrast, Xulu (2019) has reported that access to government services and agricultural extension officers improved the KwaZulu Natal farming activities and farmer participation.

5. LIMITATIONS OF THE STUDY

This study has several limitations. Firstly, only twenty-four SSDFs in just one district of the North-West province participated in the study. Hence, the findings report only the experiences in this district. Secondly, most participants did not disclose the cattle they own and the years they have had these cows. Another limitation of the study was the time constraint and lack of resources for data collection.

6. CONCLUSION

This study provides an in-depth analysis of the challenges experienced by SSDFs in rural areas of South Africa. The challenges include the high cost of feed and fertiliser, diseases and the high price of medication, uncertain weather conditions, power failure and high cost of electricity, livestock theft, lack of machinery and equipment, and lack of support. Thus, this study concludes that the farmers should be made aware and trained in identifying and managing livestock diseases. Local SSDFs should be made aware and trained on identifying and managing livestock diseases, and prevention strategies for livestock theft in these rural areas should be developed and implemented. In addition, the study recommends that local governments subsidise SSDFs to manage and sustain their dairy business. Furthermore, the SSDFs should be exposed to agricultural funders in their localities. Also, access to educational services should be made available for local farmers to receive training towards proposal writing to apply for funds. In

future, studies can look at the knowledge and literacy of farmers in sourcing funds to support their dairy farming business.

7. FUNDING

There was no funding for the research study.

8. CONFLICT OF INTEREST

For this study, there was no conflict of interest.

9. DATA AVAILABILITY STATEMENT

The study data was obtained from different participants in the Bojanala Platinum District and will be available upon request and authorisation by the local district, who agreed for the study to be conducted at the respective farms.

10. AUTHOR CONTRIBUTION

Oratilwe Penwell Mokoena was responsible for problem identification, writing the paper, and collecting and analysing data, Sam Thembelihle Ntuli was responsible for the methodology section, Tshepo Ramarumo was in charge of literature review and analysis data and Solly Matshonisa Seeletse was responsible for proofreading, the background of the study and discussion of the study.

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