CONTRIBUTION OF ESWATINI DAIRY BOARD IN ESWATINI (SWAZILAND): A CASE STUDY OF SMALL SCALE DAIRY FARMERS

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ABSTRACT

Dairy production is an important activity in Eswatini (Swaziland) as it is a source of income and employment generation for small and marginal farmers. For catalysing improved performance of the Dairy industry in Eswatini, Eswatini Dairy Board was established. This study aims at contributing to the scanty information related to the contribution of EDB on small-scale dairy farmers' performance. The study used descriptive and quantitative research design to analyse the contribution of Eswatini Dairy Board on small-scale dairy farmers' performance in Manzini, of Eswatini (Swaziland).The present analysis also highlighted the challenges faced by the dairy farmers. The present study was based on 88 dairy farmers. In those 88 dairy farmers, 67 were supported by EDB and small-scale dairy farmers and 21 were not supported by EDB dairy farmers (Non-EDB members). Results indicated that majority of the dairy farmers were male with mean age of 52 years and majority of these farmers had attained high school education. In terms of EDB contribution to farmers' productivity, results indicate that farmers supported by EDB were producing 2 more litres of milk per cow than non-EDB supported farmers, and the mean difference in milk output per cow was significant (P<0.01). The findings further showed that EDB supported farmers were earning significantly more profit (E1 649 per cow/month) compared to EDB non-supported farmers (E1 329 per cow/month), indicating a significant difference of E320 (P<0.01). It can be concluded that support from EDB had a positive and significant contribution on small-scale dairy farmer's productivity and profitability in Eswatini. Among major challenges faced by farmers included high feed costs, low milk prices, poor veterinary services, lack of financial resources. The study recommends that stakeholders in the industry including government, private sector, NGOs and CBOs need to develop more strategies that promote veterinary service subsidies and other dairy farm input subsidies, improve on dairy markets, and increased access to farm credit.

Keywords: Contribution**,** Small scale dairy farmers**,** Profitability, Eswatini Dairy Board

I INTRODUCTION

Agriculture is the backbone of the Swazi economy and is critical for achieving the overall development policy objectives of the country. Small-scale dairy farming is classified under a traditional agricultural sub-sector mainly based on communal grazing land located on Swazi National Land (SNL), (Ministry of Agriculture, 2013). The majority of the population in Eswatini live in farm households located on communal Swazi National Land (SNL) and most of them (70%) are engaged in low-productivity subsistence agriculture and animal husbandry [1]. Thus, agriculture plays an important key role in the lives of the majority of especially the rural population, where most households rely on agricultural output as a major source of income and food security [2]. Agriculture sector accounts for about 7.6% of the GDP and employs about 70% of the population [3]. The sector is also supporting the agro-based industries which contribute significantly to the country's GDP and export earnings. According to the 2007 Labour Force Survey report, the agricultural sector employs 9% of the country's labour force [4]. Although sugarcane production is the main export earn of the country, livestock production in Eswatini plays a role in reducing livestock and livestock products imports including dairy products.

The dairy industry in Eswatini is developed and regulated by the Eswatini Dairy Board (EDB). Dairy farmers in Eswatini are divided into three categories namely; smallholder farmers (herd size ranges from 1-10 cows), medium-scale farmers (herd ranges from 11-40 cows) and large-scale dairy farmers (herd size is more than 40 cows). In 2008, the annual demand for milk products was documented to be 56 million litres per year, whereas milk production from the national herd was 8.4 million litres, leaving a shortage of 47.6 million litres [5]. In 2009, dairy imports amounted to 44.3 million litres milk equivalents (LME). During the 2009/2010 financial year, the demand for dairy products became 52 million litres per annum in LME, while milk production from the national dairy herd was only 7.52 million litres per annum. The shortage in the same year was 44.48 million litres, closed the gap by imports of dairy products and milk from South Africa [6].

The dairy industry in Eswatini is made up of a number of actors that include milk producers (small, medium and large-scale), processor, distributors, retailers, as well as consumers. All these actors are regulated by the Eswatini Government mainly through the Eswatini Dairy Board which is a regulatory and statutory agent of government [7]. The EDB is a public enterprise wholly owned by the Eswatini Government. It was established in 1971 under the Dairy Act No. 28 of 1968. As provided in the Act, the Board's primary function is to develop and regulate the industry. Its' role is to complement the government's efforts through the provision of a supportive socio-economic environment for the development of the dairy industry aimed at achieving food security, poverty reduction, investment promotion, job creation and export promotion [8].

Despite this improvement in agriculture performance, Swaziland has remained a net importer of agricultural products (Swaziland Vulnerability Assessment Commition, 2010). Eswatini imports maize, wheat, dairy products and other food commodities from neighbouring

countries [9]. In a normal year, roughly 60% of the food consumed in the country is imported. Milk imports have been rising rapidly, mainly as a consequence of declining domestic production and increasing demand for milk and milk products [10]. To improve the socio-economic and nutrition status of the rural communities, the Swaziland Government established a poverty reduction fund and several agricultural projects [11]. Agricultural sector in Eswatini is perceived to be the most viable route to improve the socio-economic poverty situation.

The production of milk in Swaziland is under the auspice of the Eswatini Dairy Board (EDB) [12]. The mandate of EDB is to complement government in developing and promoting the production and consumption of quality products by coordinating and harmonizing all in the dairy industry through appropriate skills and technology [12]. The EDB was established in 1971 under the Dairy Act No. 28 of 1968 and it subsequently established a private milk handling plant in Matsapha which dominated formal milk marketing until 1999 when the plant was leased to a private company called Parmalat, in the same year, the EDB mandate became strictly regulatory rather than commercial [13].

According to the EDB report 2009, the dairy sub-sector has policy objectives to enhance dairy development programmes and reducing the country's dependence on the importance of liquid milk and dairy products. These include increasing milk production in Eswatini to a level of self-sufficiency in liquid milk supply and dairy products and possibly later to export the surplus; to promote and improve milk production by small scale dairy farmers in SNL areas; and to organize milk and milk products marketing through the EDB [12].

The EDB provides programmes such as training and services to milk producers; services to farmers which include among other things resource assessment for starting dairy farming, citing and construction of dairy structures, forage production and conservation, perennial and winter pasture establishment and management. Other services include procurement of cattle, production of hay bales, artificial insemination, dairy cow feeds and feeding, clean milk production and proper handling, calf rearing, record keeping, dairy herd health and its application, milk production activities for farmers group and management of communal milk production [13]. Despite these programmes in place in the dairy industry, their null implementation is not realised. The industry is facing constraints of delayed enactment of the national dairy policy and other policies that support the dairy industry like the land policies [14]. According to Kabuya (2007), policy and institutions are keys to economic development. In most developing countries, there is a need to enforce policies and institutions in order to achieve economic development and economic growth [15].

In the year 2017, the demand for milk and milk products rose to 53.53 million litres per year, whereas the raw milk production from the national dairy herd was 7.71 million litres per year [17]. Even though the market for milk is available in Eswatini, the milk productivity is still low and is attributed to the high production costs [17]. In spite of the efforts made by the Eswatini Government and EDB in improving milk production in the country, smallholder dairy farmers still face high input costs in milk production coupled with the low milk price

offered in the market, which together reduce their profit margins [17]. This could be due to inefficiencies in the dairy industry. Therefore, there is a need to assess the contribution of EDB on profitability of small-scale dairy farmers.

II   LITERATURE REVIEW

Dairy production in Eswatini:

Dairy production is an important activity in Eswatini as it is a source of income and employment generation for small and marginal farmers. In addition, it is a source of food for Swazis who traditionally consume a lot of milk in the form of sour milk and this provides a vibrant milk market. A great potential exists for dairy development in the smallholder sector due to the favourable climate for improved, high-yielding breeds, and the relatively disease-free environment with potential for improved animal feeding. Despite the potential that the dairy sector has, it is still largely underdeveloped. Milk production has not increased significantly in recent years although the population has continued to grow at an unprecedented rate. The low performance and underdevelopment of the dairy sector is attributed to the fact that smallholder farmers, who constitute a large percentage of the dairy industry, are still faced with serious limitations in accessing essential inputs and selling their output [18]. They are also constrained by shortage and fluctuation in quality and quantity of feed, poor service delivery, policy and institutional arrangements.

Dairy farming in Africa:

Traditional systems have donated milk production in Africa for several years and are still simply considerable amounts of milk today and they also account for above 90% of dairy ruminant population in Sub-Saharan Africa [19] [20]. Some studies have been carried out in East Africa for both peasant and large scale dairy producers. The peasant or subsistence farmers; who are a majority, only release surplus liquid milk for sale after meeting their own home requirements for milk and milk products. Indigenous groups like the Maasai, Borani, Fulani and Tuareg have a historic dairy tradition, share many customs and regard milk as a product of harmony that is offered free to relatives, friends and visitors [19].

Since cow management, marketing facilities and the milk yield potential of the indigenous cows are kept under poor conditions, the system is generally underperforming and dairy products from these systems are often of poor quality for human consumption [21]. However, as the standard of management among small milk producers improves and specialised cows are acquired, these small dairy farmers are thought gradually to become the backbone of the dairy industry in East Africa [22].

 Today, Africa is the least developed dairy market in the world with only 5% of the world milk production and the consumption level per capita is also very low. However, the dairy sector including milk production and the dairy market have developed dynamically in the last decade. The economic growth in the region in general has facilitated a growing demand for added value food including milk and dairy products [23]. In the year 2004, total cow milk production in Africa was about 21 million tons. This was produced from a total of 46 million dairy cows giving an average milk yield of 461 kg per cow over the year, which is only one fifth of the world average yield. The top five African milk producing countries in terms of

milk volume were Sudan, Egypt, Kenya, South Africa and Algeria. Meanwhile, the first four countries alone produce 52% of total African milk [19].

In the last 5 decades, the global dairy sector has seen major expansions in small scale dairy production in some developing countries bringing prosperity to millions while in some other countries it has stagnated. For every 1000 litres of milk produced per day, dairy activities are estimated to generate about 77 farm jobs and 13 jobs in the processing sector. The Dairy's role in some economies contributes to the livelihoods and nutritional wellbeing of its rural population. It has a huge potential for alleviation of poverty and improving food security and nutrition. Raw milk production is primarily practiced by smallholder farmers hence it is a major source of employment for the rural population [23].

Provision of Agricultural extension:
According to Food and Agricultural Organization (1990), the Global Consultation on Agricultural Extension has stated that farm people who receive non-formal education through extension programs generally increase their productivity and efficiency [24]. According to Vo Lam (2011), obtaining knowledge of dairying from annual short training courses provided by extension service contributes to faster growth of output [25].

The poor access to extension services and the limited knowledge and skills on animal husbandry among the household heads due to the high levels of literacy resulted in poor performance of the dairy stock. Dairying was not competitive due to high costs of production and the use of inappropriate technologies, and hence poor performance of the sector [26].

Dairy extension service is therefore expected to contribute to the well-functioning of the existing local information exchange by taking into account the diverse sources of information such as demonstrations, print and mass Medias and audio visuals. Agricultural extension studies play an important role in increasing the agricultural productivity and developing the sector. It is not easy to persuade the farmers about adopting practicing the proposals offered to them through extension activities. The production of knowledge and its perception and utilization by farmers take place in a cycle complementing each other. The SDB has four extension officers that work in collaboration with four dairy extension officer from the MoA; one in each administrative region [27].

Overview of dairy in Eswatini:
Cattle breeds commonly found in Eswatini are Nguni, Brahman, Simmental, drunken burger, Holstein-Friesian and Jersey. The Holstein-Friesian and Jersey are the major dairy breeds. The Holstein-Friesians comprise of 80% of the total dairy herds and are mainly favoured by large scale dairy producers. Jerseys are mostly found in the traditional sector on SNL where small-scale dairy farmers prefer them. It has been discovered that a lot of farmers are small-scale farmers and they raise their animals an SNL where other land is shared with other agronomic produce. Exotic breeds of cattle that were introduced in the country include; the Brahman and Simmental, Jersey, Holstein Friesian. Most of the Nguni cattle on SNL were crossbred with these breeds, owing to the communal grazing system practised, hence, a non-descript breed of the cattle emerged from the unplanned cross breeding. Inbreeding amongst the Nguni breed alone could also not be prevented under this grazing system, resulting in an

increasingly homogenous population of Nguni cattle. The homogeneity is undoubtedly expected to have had adverse effects on milk yielding capacity of the Nguni cattle. On the other hand, the cross breeding would have been expected to improve milk yield, perhaps if it were in an organised fashion. Vilakati (1994), reported that Nguni cattle crossbreeds have improved reproductive and martenal performance, indicating an improvement in milk yield as well [28].

A number of farmers want dairy cows to increase their herd size or replace culled or lost stock. The cost of a pedigree cow is often very high and most farmers cannot afford to buy more than one at a time. When the cows are imported, there are extra costs related to the quarantining of the animals of both countries before and after their importation, including feeding and transportation costs. The transportation costs are either borne by MoA or EDB, however, the quarantine costs are neither directly borne by an individual farmer or EDB. For farmers to receive the animals, they need to have already established a pasture, crush pen, milking parlour and received some education on dairy husbandry. It is upon meeting these requirements that farmers are registered on the EDB acquisition list and cattle and then sought from willing sellers in South Africa.

Milk Productivity:

According to Wadsworth (2013), the average productive lifetime dairy cow in intensive milk production is decreasing around the world [29]. Cows that start milking at a young age, have a short calving interval and are healthy enough to last several lactations will have a much higher Lifetime Daily Yield (LDY) than those who are older at first calving, do not get back in calf very quickly and have poor longevity. A high yielding cow that does not make it to the third lactation because of poor health or fertility will have a lower LDY than a cow that reaches fifth lactation but with lower average yield per day. A survey conducted on 47 farms in North-eastern Spain demonstrated the significant effects of both stall availability and maintenance on the productivity of dairy cows [30]. The mean stocking density of the study herds was 90% with a range of roughly 60 to 200%. There was a considerable amount of variation in productivity where herds ranged from 20 to 34 kg/d of milk per cow, despite cows being fed the same ration that was mixed at a common location.

Impact of Demographic characteristics of farmers in milk production:

Demographic profiling and characterising is essential an exercise in making generalizations about groups of people. With this background, price of milk that dairy farmers receive will always be affected by the population characteristics and by extension services. It is expected that dairy farms will move to areas with higher milk prices.

Across the years, a higher percentage of male-headed households kept improved cows to their female counterparts. On the other hand, more female- headed households kept local animals, indicating that had less access to improved dairy breeds and perhaps dairy technologies in general. Baltenweck & Staal (2000), found that female-headed households were more likely to have less access to information on new dairy technologies so the percentage of households keeping improved animals increased over the years [31].

Profitability measures:

Profitability is the return to working capital and capital invested in various productive assets including land [32]. In case of capital assets, profitability should ensure return of capital and also return to capital at rate equal to or exceeding the prevalent market rate of interest. The improvement and sustainability of agricultural production hinges on proper analysis of the factors affecting technical efficiency and profitability of the farmers. Relative profitability of different crops is essential for decision making of farmers about a particular crop. For financial analysis of different enterprises, it is necessary to compute costa and inputs, which need to be deducted from the value of output [33].

According to Downey & Erickson (1999), profitability ratios refer to several separate indicators that help determine a firm's profitability and performance record. Measurement of profitability through the use of ratios is important to farmers since ratios will indicate the relative performance of their farms [34]. These ratios help farmers in determining optimal level of production that will maximize profit. Farmers may be faced with constraints which when mitigated may improve the economic status of production but one must know by how much should farmers combine their resources to reach higher profit margins. Gross margins play an important role in indicating ability to meet its financial obligation during the production period.

Overview on profitability determinant models:

The basic thrust of economics of agricultural productions at the micro level is to assist farmers to attain their objectives through efficient farm allocation of resources over a given period of time. Profit maximization could be achieved by maximising output from a given resource or minimizing the resources required for a given output [35].

According to Olujenyo (2010), gross margin is the difference between gross income and variable cost and it is a positive step in the direction of measuring profit [35]. $GM_i = Y_i - \sum C_i$ Where; GM = gross margin from the enterprise Y = value of output and is derived by multiplying the physical output (Y) by the price i.e Y * Py, C_i = cost of the variable, i; and I; 1, 2, 3…n. Harb & Columba (2010), indicated that in order to evaluate whether a sugar industry would be economically and financially feasible, a Cost Benefit Analysis (CBA) is conducted [36]. The CBA measures the impact of an activity by taking into account the value of the resources involved in it at a given time, which can be estimated with projected incomes and costs using a discount rate that allows assigning them a present value. The value becomes comparable to the present values of alternative activities and/or resources that may be considered in an economic analysis.

Gross Margins:

According to Xaba and Masuku (2013), gross margins per hectare are used as a proxy for profitability as it measures relative profitability [37]. Furthermore, some of the independent variables in profitability include the level of education which has a positive relationship with profitability, the farm size which also has a positive relationship with profitability, the farm size which also has a positive relationship with profitability and the type of marketing agency which is however negatively related to profitability. Access to extension services also has a negative relationship with profitability.

Gross margin refers to the difference between the gross income and the total variable costs of growing a particular crop [38]. Total variable costs include those associated with crop production operations, harvesting and marketing. It can also be defined as the amount of contribution to the business after paying for direct-fixed and direct-variable unit costs, required to cover overheads and provide a buffer for unknown items. According to Dlamini (2011), when gross margin is calculated and considered properly; it provides farmers and prospective farmers with options of what to produce, when to produce and how to control input costs and increase profitability and sustainability of the enterprise. They also assist farmers in deciding on which crop commodity to venture into. It shows the relationship between gross profit and sales revenue [39].

Gross margin analysis is a tool used to calculate the profit or loss made by an enterprise;

Gross margin = gross income – variable costs.

Positive gross margins are profits and negative gross margins are losses.

Tsabedze (2015), used to measure the profitability of beekeeping in Swaziland in the Hhohho region [40]. She found that beekeeping is profitable in the region of study by using gross profit margin.

Profitability analysis:

Profitability is a state of yielding a financial gain. It is measured by price earnings ratio. Nhleko (2010) mentioned that profitability is the goal of all business ventures because without it, they will not survive in the long run [41]. A business that is highly profitable has the ability to reward its owners with a large return on their investment. Farm profitability refers to how well the farm manager generates positive profits, which is an excess of revenues over costs given the resource available.

Hofstrand (2013), stated that profitability is measured with income and expenses in an income statement [38]. Income is money generated from the activities of the business (farm) and expenses are the costs of resources used up or consumed by the activities of the business. He further mentions that an income statement is a listing of income and expenses during a period of time, usually a year, for the entire business. It is traditionally used to measure profitability of the business for the past accounting period. However, a pro forma income statement measures projected profitability of the business for the upcoming accounting period.

A budget may be used for projecting profitability for a particular project or a portion of a business. Partial budgeting allows you to access the impact on profitability of a small or incremental change in the business before it is implemented. When analysing profitability, the concern is not only with the absolute amount of profit but with the relative amount. Indirectly, it also measures the managerial ability of the farmer [42].

Overview of Challenges faced by dairy farmers in Eswatini:

There is a great potential for improved milk production by small-scale dairy farmers in Eswatini. However, milk production has not increased significantly in recent years; while on the other hand, the human population has continued to grow at an unprecedented rate, increasing the milk demand [6]. Most farmers in Eswatini under SNL do not have title deed and this is one of the factors faced by the dairy industry. The large scale farms have their own land where the cows graze and these areas are usually irrigated. In the SNL the dairy cows share grazing land with the indigenous cattle which leads to unplanned cross breeding and the genetics of the cows end up being spoilt and the cows suffer a lot of infections because of the way they graze [43].

III   METHODOLOGY

The study used descriptive and quantitative research design to analyse the Contribution of Eswatini Dairy Board on small-scale dairy farmers' performance in Manzini. Eswatini is a country with four administrative regions namely Shiselweni, Lubombo, Manzini and Hhohho. The study was carried out in the Manzini region. The Manzini is located in the centre-west of the country and it is in the Middle-veld with relatively moderate rainfall compared to other parts of the country. Activities of farming include livestock farming and crop production in this region. The Manzini region is the area has an area of 4 093.59 km^2 and a population of 319 530 and is divided into 16 tinkhundla. It is the most densely populated region compared to the other three regions.

The target population of this study included small-scale dairy farmers in the Manzini region. A sample of 67 registered small-scale dairy farmers receiving extension services from EDB in the Manzini region were selected randomly. A total of 21 small-scale dairy farmers not recognised and also not receiving extension services from EDB (Non EDB farmers) which made a total of 88 respondents. Primary data were collected by using self-designed, well-structured and pre-tested questionnaires. The questionnaire was pre-tested for data reliability and validity. Information of dairy farmers was collected through face-to-face interviews with the help of questionnaires and the collected data was analysed with the help appropriate of statistical tools.

Profitability:

A budgetary technique was used to compute costs and returns to selected dairy farmers, by estimating the revenue and gross margin. Gross margin is the difference between the total revenue and total variable costs. The total cost component is expressed as:

TC = TFC + TVC

Where TC = Total Cost; TFC = Total Fixed Costs; TVC = Total Variable Costs

Gross Margin = TR – VC

Where; TR = Total Revenue; VC = Variable Costs

RESULTS AND DISCUSSION

Demographic and socio-economic factors

Socio-economic characteristics studies of any society not only give an understanding of the type and nature of their livelihood but also understanding their qualities based on their gender, age, education and many other characteristics of the chosen population which distinguishes them from others.

Gender: As depicted by the Table-1, the dairy industry is dominated by males with 65.9% while females were only 34.1%. In both groups most of the dairy farmers were males, Non-EDB respondents had 57.1% males and 42.9% females while EDB farmers had 68.7% males and 31.3% females. Having more males being involved in dairy farming could be due to its cultural where cattle is mostly owned by males, and intensive management causing females to opt for office related jobs.

Table-1: Distribution of gender of dairy farmers

Gender	EDB	Non-EDB	Total
Male	46 (68.7)	12 (57.1)	58 (65.91)
Female	21 (31.3)	09 (42.9)	30 (34.09)
Total	67 (100%)	21 (100%)	88 (100%)

Source*: Field survey, 2018*

Age: Table-2 shows that in both Non EDB and EDB groups more respondents were between 45 and 54 years of age. Age is very important when it comes to innovativeness as young people tend to be accepting more innovative ideas when compared to older people. Results indicated that 64.77% dairy farmers below age 54 years.

Table-2 Age distribution of dairy farmers

Age (In Yrs.)	EDB	Non-EDB	Total
25-34	03 (04.5)	01 (04.8)	04 (04.54)
35-44	18 (26.9)	04 (19.0)	22 (25.00)
45-54	23 (34.3)	08 (38.1)	31 (35.23)
55-64	14 (20.9)	05 (23.8)	19 (21.59)
65+	09 (13.4)	03 (14.3)	12 (13.64)
Total	67 (100%)	21 (100%)	88 (100%)
Mean Age (Std. Dev.)	51.2 (10.9)	52.4 (9.7)	51.5 (10.8)
Difference: 1.2 yrs. Std. Error: 2.65 t-value= 0.451 and p value = 0.6529 No statistical significance in the mean age of small scale dairy farmers.			

Source: Field survey, 2018

Marital status: Marital status is an important factor as married couple are thought to have more finance and are responsible members whose views are mostly respected in their communities. Among the Non SDB respondents, 66.7% were married and in the SDB group 74.6% were married. Marital status could contribute more in production because of the combined efforts and being married may have advantages of sharing and coming-up with meaning farming decisions compared to the unmarried farmers. Also this may indicate presence of children who provide free labour, and this ease adoption of technologies that would otherwise need more manpower when applying them.

Table 3: Marital status of respondents

Marital Status	EDB	Non-EDB	Total
Single	04 (06.0)	03 (14.3)	07 (07.95)
Married	50 (74.6)	14 (66.7)	64 (72.73)
Divorced	05 (07.5)	02 (09.5)	07 (07.96)
Others	08 (11.9)	02 (09.5)	10 (11.36)
Total	67 (100%)	21 (100%)	88 (100%)

Source: Field survey, 2018

Education level: In Eswatini, the level of education is categorised into primary education, high school and tertiary education as illustrated in the Table-4. Educated people are assumed to be more enlightened and have more innovative ideas on how to improve businesses. Table 4 shows that in both groups, most respondents had attained High school education. Respondents who had obtained primary education in Non-EDB group were 33.3% and 19.1% had obtained tertiary education whilst only 25.4% EDB farmers had obtained primary education and 32.8% had reached tertiary level. The analysis revealed that most dairy farmers qualified to operate this business even those with minimum education level like primary school certificate holder. However, the study suggests that most educated dairy farmers are likely to seek advice from EDB. This result similar to the previous study (Masango et al. 2017) by which was stated that education may serve as a significant factor for starting a dairy business and can positively impact on the success of the small dairy businesses [44].

Table 4: Education level of respondents

Education level	EDB	Non-EDB	Total
Primary	17 (25.4)	07 (33.3)	24 (27.27)
High School	28 (41.8)	10 (47.6)	38 (43.18)
Tertiary	22 (32.8)	04 (19.1)	26 (29.55)
Total	67 (100%)	21 (100%)	88 (100%)

Source: Field survey, 2018

Household size: Household size is another important socio-economic factor that was observed. Household size is the total number of people staying together in a family. A larger householder size is associated with large availability of working power but creating more economic pressures. As illustrated in Table 5, in both groups, most dairy farmers had members less than 5 members. Dlamini et al. (2012) mentioned that high household members deplete resources meant for farming thus reducing farm productivity [45].

Table 5: Household size of respondents

Household Size	EDB	Non-EDB	Total
1-4	42 (62.7)	15 (71.4)	57 (64.77)
5-9	24 (35.8)	05 (23.8)	29 (32.96)
10 & above	01 (01.5)	01 (04.8)	02 (02.27)
Total	67 (100%)	21 (100%)	88 (100%)
Mean (Std. Dev.)	4.3 (2.4)	4.1 (2.6)	4.2 (2.4)
Difference: 0.2 Std. Error: 0.612 t-value= 0.327 and p value= 0.7447 No statistical significance in the mean household size of farmers			

Source: Field survey, 2018

Experience in dairy farming: Table-6 indicates that most of the dairy farmers (51.14%) had between 1 to 4 years' experience in dairy farming. Those with 5-9 year experience in dairy farming were about 23.9% of sampled population. Further analysis indicated that more EDB dairy farmers (about 49.3%) had between 1 and 4 year experience in dairy farming. This result show a sudden increase in the number of EDB dairy farmers over past 5 years, this indicated that EDB has engaged new idea and support strategies which have influenced more people to join the dairy farming.

Table-6: Distribution of Experience in dairy farming

Farming Experience (In Yrs.)	EDB	Non-EDB	Total
1-4	33 (49.3)	12 (57.2)	45 (51.14)
5-9	16 (23.9)	05 (23.8)	21 (23.86)
10+	18 (26.9)	04 (19.0)	22 (25.00)
Total	67 (100%)	21 (100%)	88 (100%)
Mean (Std. Dev.)	6.1 (3.9)	5.4 (3.7)	5.9 (3.9)
Difference: 0.7 yrs. Std. Error: 0.964 t-value= 0.726 and p value= 0.4697 No statistical significance difference in the mean of farming experience of small scale dairy farmers.			

Source: Field Survey, 2018

Milking Cows: The results presented in Table-7 indicate that most dairy farmers (about 67.1%) milked between 1 and 3 cows per day. Few dairy farmers milked more than 10 cows per day (about 4.5%). In comparison, the analysis showed that more Non EDB farmers (about 76.2%) milked between 1 to 3 dairy cows per day than EDB farmers about 64.2%. Further result indicated that more than Non EDB farmers (19.1%) milked above 4 cows per day compare to EDB dairy farmers (31.3%).

Table-7: Distribution of milking cows

Milking Cows	EDB	Non-EDB	Total
1-3	43 (64.2)	16 (76.2)	59 (67.05)
4-9	21 (31.3)	04 (19.1)	25 (28.41)
10+	03 (04.5)	01 (04.7)	04 (04.54)
Total	67 (100%)	21 (100%)	88 (100%)
Mean (Std. Dev.)	4.4 (2.7)	3.8 (2.6)	4.2 (2.7)
Difference: 0.6 Std. Error: 0.670 t-value= 0.896 and p value= 0.3727 No statistical significance in the mean of milking cows of small scale dairy farmers.			

Source: Field Survey, 2018

Distance to market:

The distance travelled by dairy farmers to sell dairy produce was of interest to highlight transport cost related to operate the dairy. The result in Table-8 showed that most of the dairy farmers (about 64.7%) travel less than 9 Km. to sell their produce. This constituted of about 64.2% Non EDB farmers and about 66.7% of EDB farmers. Few about 15.9% dairy farmers travelled more than 20 Km.

Table-8: Distribution of distance to market

Distance (In km.)	EDB	Non-EDB	Total
0-9	43 (64.2)	14 (66.7)	57 (64.77)
10-19	13 (19.4)	04 (19.0)	17 (19.32)
20+	11 (16.4)	03 (14.3)	14 (15.91)
Total	67 (100%)	21 (100%)	88 (100%)
Mean (Std. Dev.)	9.8 (7.3)	10.2 (7.6)	10.1 (7.5)
Difference: 0.40 km. Std. Error; 1.84 t-value= 0.217 and p value= 0.8287. No statistical significance in the mean distance to market of small scale dairy farmers.			

Source: Field survey, 2018

Table-9 indicates that most of the dairy farmers were using ICT. Female farmers were using more ICT in comparison to male farmers in both groups. Applications of ICT in dairy farming are very important in recent scenario. Results revealed that majority of the farmers using ICT for business purposes for both groups.

Table-9: ICT use

Gender	EDB		Non-EDB	
	ICT-Users	ICT-Users for business	ICT-Users	ICT-Users for business
Male	34 (73.9)	25 (73.5)	09 (75.0)	06 (66.7)
Female	17 (80.9)	13 (76.5)	07 (77.8)	05 (71.4)
Total	51 (76.2)	38 (74.5)	16 (76.1)	11 (68.7)

Source: Field survey, 2018.

Profitability of dairy enterprise among small-scale farmers

Table 10 shows that EDB farmers are more profitable than Non-EDB farmers. The EDB farmers had an average monthly profit of E1 649.82 while Non SDB had E1 329.78 profit per month per cow. Difference was statistically significant.

Table-10: Monthly profit Per cow

	Mean (E)	Std. Dev.	CV (%)	t-value & p-value
EDB	1649.82	345.07	20.92	3.158 & 0.0022
Non-EDB	1329.78	559.48	42.07	
Difference was statistically significant at 1% level of significance				

Source: Field survey, 2018

Mean comparison between productivity of Non SDB and SDB farmers:

Table 11 shows that EDB farmers' cows were more productive than Non-EDB farmers' cows with EDB producing 10 litres per day and Non-EDB producing 8 litres. Difference was statistically significant.

Table-11: Productivity Litre per cow

	Mean (E)	Std. Dev.	CV (%)	t-value & p-value
EDB	10.12	2.95	29.15	2.915 & 0.0045
Non-EDB	08.09	2.68	33.13	
Difference was statistically significant at 1% level of significance				

Constraints faced by small-scale dairy farmers;

Farmers face various constraints just like any business. Small-scale farmers are associated with high input costs when compared to medium or large scale farmers because of their production costs not being spread across their operations. Table 12 shows the various constraints faced by small-scale dairy farmers in the Manzini region; either EDB or Non EDB.

Table 12: Constraints faced by small-scale dairy farmers

Constraints	EDB	Non-EDB
Lack of grazing land	52.2	71.4
Lack of water supply	46.3	57.1
High feed costs	88.1	100.0
Suffering from diseases	26.9	66.7
Poor veterinary services	29.9	85.7
No government subsidies on veterinary services	86.6	85.7
Low milk prices	35.8	52.4
Lack of extension services	22.4	90.0
Lack of access to education on milk production	32.8	71.4
Lack of access to financial resources	71.6	61.9
Total	67 (100%)	21 (100%)

Lack of grazing land: Farmers pointed that the grazing land was not enough for their dairy cattle. That was characterized by their small farm sizes. 71.4% of Non EDB farmers characterised lack of grazing as a constraint while only 52.2 EDB farmers admitted to it being a constraint in dairy farming. They further explained that this constraint was an effect on them as they had to spend a lot of money buying feed.

Lack of water supply: Water is a very essential resource as it is needed by every living thing for survival. Many dairy farmers are found in the rural areas where are limited water resources so their dairy cattle do not receive enough water for survival and for them to produce more milk. Only 46.3% (which is less than half of the interviewed respondents) EDB farmers complained about lack of water supply while 57.1% Non EDB farmers pointed out lack of water supply as a constraint. The other 53.7% EDB and 42.9% Non EDB farmers did not have water supply problems.

High feed costs: High feed costs were one of the main constraints faced by small-scale dairy farmers. A higher percentage of both groups of farmers pointed that they grazed their dairy cattle because they did not have enough money to buy the necessary dairy feed that is required for the cows that is why the cows did not produce large amounts of milk. The high

feed costs can also be associated with profitability of the farmer as when more money is spent on purchasing expensive feed the less profitable the farmer will be.

Prevalence of diseases and poor veterinary services: Veterinary services are very important in dairy production. Dairy cattle should be treated with the required drugs and given appropriate vaccinations so that healthy and more milk is produced. During the survey, more Non EDB farmers complained about prevalence of diseases and poor veterinary services (66.7% for prevalence of diseases and 85.7% for veterinary services) while only 26.9% EDB farmers complained about prevalence services and 292.9% about veterinary services. Non EDB farmers explained they had not seen any veteran in their neighbourhood in their whole life. Both groups of farmers also complained about the government not paying them subsidies for veterinary services.

Low milk prices: Most Non SDB faced low milk prices in their areas as a constraint. They mentioned that this was due to the fact that their farms were located in the rural areas where consumers did not afford to buy milk at high prices and where a higher proportion of the population is unemployed meaning they do not earn much. EDB farmers, on the other hand, did not face low milk prices as a constraint with only 35.8% of them admitting low milk prices were a constraint and 64.2% of them saying it was not a constraint.

Lack of access to extension services: Extension support has also been viewed as a critical success factor in dairy farming operations. 90.5% Non EDB farmers admitted to lack of extension services being a constraint while only 22.4% EDB farmers admitted to that. Non EDB farmers also complained about the lack of extension services in their areas which means that they were not educated in dairy farming and milk production. Most of these farmers were located in the rural areas and did not know much about Eswatini Dairy Board and the kind of service the organization provides to farmers. EDB farmers also complained about the small number of extension officers and pointed that they received very few extension visits from the officers. Some said it was due to the poor roads and that lead to their cattle not being artificially inseminated. It is during extension services that farmers are educated about animal husbandry and milk production as a whole. So the lack of extension services was also seen as a constraint and cause of low milk productivity.

Lack of access to financial resources: Farmers were also asked if they found access to financial services a constraint and both group of farmers found access to financial resources a constraint with Non EDB farmers having 61.9% and EDB farmers 71.6%. When asked what the farmers needed finance for they said they needed it for vaccinations and other dairy cow procurement. They also pointed out that due to the expensive feed costs, credit from financial institutions would come in handy.

IV SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study used descriptive and quantitative research design to analyse the impact of Eswatini Dairy Board on small-scale dairy farmers' performance in Manzini, Eswatini. The target population of this study included 67 EDB recognised small-scale dairy farmers and 21 non-

recognised and also not receiving extension services from EDB (Non EDB farmers). The socio-economic factors used gender, age, marital status and education level. In this study also compare profitability and productivity of EDB and Non EDB farmers mean, standard deviation and coefficient of variation and with the help of inferential statistics (t-test) was used to test the significant difference. The results showed that the dairy industry is dominated by males with Non EDB farmers having 57.1% males and EDB farmers having 68.7% males. The results also showed that in both groups of farmers, most of the farmers were married and had attained high school education. The respondents' household size was less than five in both groups.

Comparing the profitability and milk productivity of EDB supported and Non-EDB supported farmers the researcher found that there was a significant difference in the two farmers' performance parameters (profitability-gross profit per cow/mother and productivity-milk yield/day) used in this study. The challenges faced by small-scale dairy farmers included high feed costs, low milk prices, poor veterinary services, lack of access to financial resources and no government subsidies on veterinary services. All the EDB-supported farmers complained about lack of access to veterinary services and no education in milk production.

Conclusion:

Base on the results presented in this study, Eswatini Dairy Board plays a significant role in improving farmers' performance in terms of increased productivity and more profits generated by dairy cattle small-scale farmers in the study area. This is reflected in the findings that indicated there was a significant difference in productivity and profitability among EDB supported and Non-EDB supported dairy farmers. In the other similar study in Masango et al. (2017) also indicated and supported this result [44].

Recommendations:

Eswatini Dairy Board expands its operation by increasing the number of extension officers to attend to the dairy farmers and ensure proper coordination among dairy farmers in Eswatini. Stakeholders in the industry including government, private sector, NGOs and CBOs need to develop more strategies that promote veterinary service subsidies and other dairy farm input subsidies, improve on dairy markets, and increased access to farm credit.

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