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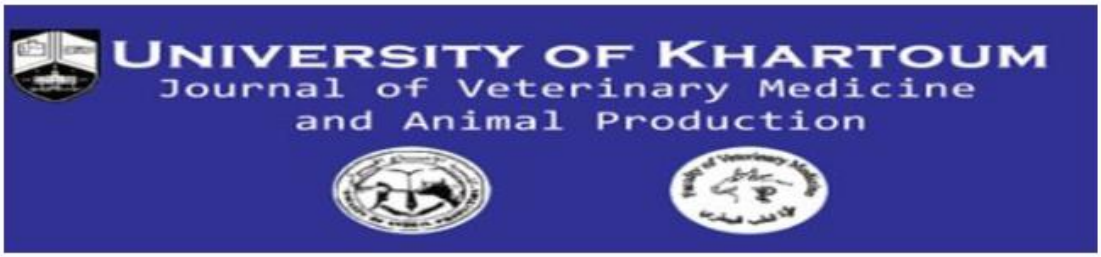

Small Scale Dairy Farms Integration in Competitive Value Chains in Khartoum- Sudan

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Abstract

This study aimed to analyze the dairy value chain to identify production potential, key sector constraints, opportunities and appropriate intervention, in order to identify policy and market based solutions that address the dairy industry. Farm owners in Mahlab (2) - Kuku in Khartoum North were the population of the sample; study was performed during 2013- 2014. A stratified random sampling procedure was adopted to select 75 producers as the sample of this study. The study was based mainly on primary data collected from the selected farms using a structured cross sectional questionnaire. Collected data was analyzed, using the statistical package for social sciences SPSS (Version 11.5), to obtain the frequency distributions. The study recommended that enforcement of developed standards in the dairy industry should be performed by policy makers that involves all players in this sector; support of managemental practices to develop human and technical capacity to develop local milk standards that could meet regional and international standards; strengthen partnership between private and public sector with a view to acquiring relevant technologies and capacity building and integration of small scale dairy farms in the dairy value chain through opening new marketing opportunities .

KEYWORDS: Value chain alue chain - integration - small scale farms - dairy**.**

المستخلص

هدفت الدراسة الى تحليل سلسلة القيمة للألبان لتعريف مقدرة الإنتاج والمعوقات الأساسية لقطاع الألبان والفرص المتاحة والوسيط الأمثل، بغرض تعريف الحلول القائمة على سياسة السوق والتى تعالج قضايا صناعة الألبان. مالكى المزارع فى محلب (2)- كوكو فى الخرطوم بحرى هم مجتمع الدراسة, تم إجراء الدراسة فى العام 2013 -2014. إعتمدت الدراسة على الطريقة العشوائية الطبقية لإختيار 75 منتج كعينة لهذه الدراسة . اعتمدت الدراسة على البيانات الاوليه التى تم جمعها من المزارع تحت الدراسة باستخدام استبانات صممت بطريقة علمية . تم تحليل المعطيات إحصائيا ببرنامج الحزم الإحصائية للدراسات الإجتماعية (Version 11.5) حتى يتم الحصول على التوزيع التكرارى. اوجدت الدراسة عدد من النتائج وهى: معظم المنتجين يمتلكون ابقار هجين (96%)، متوسط انتاج اللبن اليومى 30 طن / اليوم، أعداد صغيرة من المنتجين يستفيدون من خدمات التطوير والبحوث من المؤسسات (21.3%)، معظم المنتجين يقومون بتنفيذ الإجراءات الصحية داخل الحظيرة (69.3%)، معظم المنتجين لا يقومون بإستخدام التقنيات الحديثة فى سياستهم مع الحيوان (80%), معظم قنوات توزيع الألبان تتم بواسطة سيارات البكاسى (60%), الإستراتيجية المتبعة لتسعير اللبن تعتمد على سعر السوق السائد. توصى الدراسة بالاتى: تقوية المقاييس المتطورة فى صناعة الألبان بواسطة صناع السياسة والتى يجب ان تشمل جميع الممثلين فى قطاع الألبان، دعم الممارسات الإدارية لتطوير الطاقة التقنية والبشرية بغرض تطوير المقاييس المحلية للالبان بحيث تتوافق مع المقاييس العالمية، تقوية الشراكة بين القطاعين الخاص والعام لإكتساب تكنولوجيا ذات علاقة بالإنتاج وبناء القدرات، تكامل قطاع مزارع الألبان الصغيرة فى سلسلة القيمة للألبان من خلال فتح فرص تسويقية جديدة.

Introduction

The role livestock plays in developing countries, especially in rural livelihood improvement and augmenting livelihood of poor, is well recognized (Upton, 2004). Livestock and their products are estimated to compose a third of the total value of Agricultural Gross Output in developing countries and this share is rising from time to time (ILRI, 2005). Sudan is the first among the Arab countries and the second in Africa with respect to animal population. Milk production in the Sudan is estimated to be about 4424000 tons/ year (Ministry of Animal Resources and Fishery, 2015), of which 90% is produced by local breeds in the traditional sector and 10 % from cross bred by the modern sector (FAO, 2010). Livestock ownership currently supports or sustains the livelihoods of an estimated 70% of the world's rural poor population (PPLPI, 2001). The dairy cow is one of the most important investments a farmer can make to improve his standing (ILRI, 2003) because of their inherent value, the nutritional value of milk produced, the work they can perform, and the way it can help diversify farming activities. The importance of the dairy cow is expected to increase as food imports to sub-Saharan Africa (SSA) are projected to more than double by the year 2030 under business (World Bank, 2008). Not only does livestock currently contribute up to 80% of the agricultural gross domestic product in developing countries (ILRI, 2007), the World Bank classifies livestock as a high value market and reports this market is the fastest-growing agricultural market in most developing countries (World Bank, 2008). Livestock provides rural farmers with a way to increase assets, a method to diversify income and nutrition. Livestock is also an important tool to address poverty, enhance agricultural development, and create employment opportunities beyond an immediate household or smallholder dairy operation (ILRI, 2007). The value chain concept was first introduced and described in 1985 by the economist Michael Porter (Porter, 1996). It comes across firstly as a chain of activities that are operated in a specific industry in which products pass through all activities of the chain in order, and at each stage the product gains some value (Nga, 2013). The value chain is important because it increases competitiveness and efficiency of production which is necessary for penetrating the global market, sustains income growth and explains the distribution of profits particularly income (Kaplinsky and Morris 2000).The importance of this study arises from the concept that the Integration of small scale dairy farming in value chains can be looked upon as a new perspective in increasing dairy production potentiality that could lead to opening new local and global market opportunities that could lead to the welfare of small dairy producers and hence boost overall country's economy. The objectives of the study are to carryout dairy value chain analysis to identify production potential, key sector constraints and opportunities and appropriate intervention and to identify policy and market based solutions that address the dairy industry. The hypothesis of the study pivoted around the statements that**,** value chain analysis can lead to establishing competitive strength in the small sector dairy farms and Dairy value chain analysis identifies key factors that assist in high production profile.

Materials and Methods

The study was conducted in Khartoum state - Eastern Nile in Mahlab2 Dairy compound during the period of 2013- 2014. Mahlab2 is one of a total of eleven governmentally supervised Dairy compounds present in Khartoum state. The compound contained at the time of study 225 barns, with an average milk production of 30 tons/ day. Farm owners in the compound were the population of the study; they had varying socioeconomic characteristics and owned farms of different animal sizes. Due to the heterogeneity among producers a stratified random sampling procedure was adopted to select 75 producers to represent the sample of the study. The study was based mainly on primary data collected from the selected farm using a cross – sectional scientifically structured questionnaire based mainly on Likert scale, distributed to the selected sample. Since the variables of the study were qualitative in nature, collected data was analyzed with the aid of the Computerized Statistical Package for Social Sciences (SPSS, Version 11.5), to obtain the frequency distributions of the respondents with regard to the variables of the study.

Results and Discussion

Table 1 showed the milk production profile of the barns where 93.3% had more than 10 cows, while only 6.7% had between 5- 10 cows. This result indicated that producers in Mahlab2 have a large livestock resource and this may be due to the fact that the dairy cow is one of the most important investments a farmer can make to improve his standing. ILRI (2003), stated the dairy cow is one of the most important investments a farmer can make to his standing because of their inherent value, the nutritional value valuable milk produced, the work they can perform, and the way it can help diversify farming activities. PPLPI (2001) reported that livestock ownership currently sustains the livelihoods of an estimated 700 million rural poor, approximately 70% of the world's rural poor population. Most of the producers under study have crossbred dairy cows 96%, while local dairy cows were found in only 4% of the total studied barns. The result is in agreement with Mohamed (2006) who reported the upgrade of the *Bos indicus* breeds (tropical breeds) by using imported *Bos taurus* breeds with higher additive genetic performance for meat and milk production. The reason for this process of fast upgrading could be due to the fact that producers aim to increase milk production in response to high demand in urban areas. The farms that produced more than 150 Ib / day were 72%, whereas farms that produced between 50- 150 lbs. were 24%, while only 4% of the farms produced less than 50 lbs. This result could be explained by the effect of interaction of genetic and environmental attributes as quoted by Wheeler (2004) and Fawi (1994) who reported that the milk yield of dairy cow depends on four factors including genetic ability, feeding program, herd management and health; nutrition and management must be improved to allow the cow to produce her inherited potential and that milk yield is affected by the interaction between genetic and environmental factors. Most producers 97% handled their milk in stainless steel containers, while only 2.7% handled their milk in other containers. This result agrees with Karuga (2009) who indicated that metal (aluminum) can are recommended to keeping the quality of milk, plastic cans have a negative impact on the bacteria content of milk and particularly

because they have adhesive properties and therefore difficult to clean.

Table 1: Milk production profile of the milk sheds

Item	Frequency	Percentage (%)
Number of Animals		
< 5	**0**	**0**
5-10	**5**	**5.6**
>10	**70**	**93.3**
Types of Breeds		
Local breeds	**3**	**4.0**
Cross bred breeds	**72**	**96.0**
Milk production Lb./ day		
< 50Ib	**3**	**4.0**
50 – 150 Ib	**18**	**24.0**
> 150 Ib	**54**	**72.0**
Milk handling Utensils		
Stainless steel	**73**	**97.3**
Other containers	**2**	**2.7**
Rate of Sanitary procedures performance		
Once \ day	**52**	**69.3**
Once\ 2 days	**9**	**12**
Once\ week	**14**	**18.7**

The majority 69.3% of the producers performed sanitary procedures in the barn every day, while 18.7% performed sanitary procedures every other day, and only 12% performed sanitary procedures once/week. The performance of sanitary procedures on daily basis is important due to the fact that the dairy industry is faced with several problems including improper handling of the milk, transportation and distribution problems, high temperature, lack of quality control principles, poor husbandry practices and neglecting of sanitary standards by the distributors (Elmagli and El Zubeir, 2006). Furthermore the obtained results are in agreement with Barbuddhe and Swain (2008) who reported that absolute cleanliness of personnel is required specifically - milking should be carried out under good personal hygiene of the milker. Moreover, all cows in the milk yard were milked inside the pens under the shade where accumulation of dung and flies were found in large quantities. From the survey cooling of milk after milking was not practiced in the milk yard.

Table 2 shows that 86.7% of producers maintained their equipments on a daily basis while only 5.3% maintained their equipments on a monthly basis. This result indicated that producers pay high attention for equipments' maintenance thus ensuring the high milk quality. About 49.3% of producers had less than 3 laborers and 49.3% had 3-5. This may attribute to the high cost of employment such as, training, supervision, staffing, etc. (Ligro-Toro *et al*., 1990) revealed that managing labor is one of the most management problems as it involves recruitment, training, organization and supervision of manager and herd or family employees part-time and full time. Most of the producers (69.3%) fed their animals on roughages and concentrates whereas 29.3% of the producers fed their animals on roughages, concentrates and supplementary feed, while only 1.3% fed their animals on roughages only. This disagrees with Habeb Allah (1996) who found that the farmers of dairy cattle in Eastern Nile Khartoum fed their animals quantitatively and qualitatively according to

availability and price of food in the market, and they did not offer any concentrates to dry cows and heifers because of increasing prices of concentrate. Regarding vaccination most producers 74.7% vaccinated animals against diseases once/ year, while only 5.3% vaccinated animals once/ 6 month. This result indicated that producers pay considerable attention to the importance of animal health to increase production and thus dairy sector becomes profitable, this result agrees with Payne and Wilson (1999) who reported that to be profitable, animal production requires good management of healthy animals. Health depends on proper feeding and access to enough water of good quality as well as protection against environmental factors such as heat and health hazards.

Table 2: Husbandry activities in the dairy farm

Item	Frequency	Percentage (%)
Rate of equipment maintenance		
Daily basis	65	86.7
Once / 3days	6	8
Monthly basis	4	5.3
Number of laborers in the barn		
< 3	37	49.3
3-5	37	49.3
>5	1	1.3
Feeding programs		
Roughages	1	1.3
Roughages+ concentrates	52	69.3
Roughages + concentrates+ supplement	22	29.3
Vaccination programs		
Once\ year	56	74.7
Once\ 6months	4	5.3

Table 3 highlights that 80% of the producers did not implement modern technology such as milk cooling, ear tagging, etc. whereas 14.7% of them implemented modern technology with low level, 4% of the producers implemented modern technology with medium level, while only 1.3 implemented modern technologies with high level, this result clearly indicates that producers had low awareness of the importance of using modern technology to improve milk production as according to ILRI (2003) packaging technologies could enhance milk quality, sanitization, and increase distances traders are able to cover with milk products. About 69.3% of the producers kept animal records in the farms compared to 30.7% who had no records. Moreover 66.7% of the producers used paper records, while only 1.3% had electronic records. This result indicated that producers are in need of raising awareness of record keeping to upgrade the overall production of their animals and as quoted by Abegaz *et al*, (2008) keeping records is an essential part of good livestock and farm business management. With regard to research and development programs offered by the government, 78.7% of the producers stated they did not receive such services contrary to 21.3% who stated they received such services. This result calls for policy makers to intervene in research and development programs as a vital need to upgrade the dairy enterprise. Most of the producers depended on Intermediaries as a main marketing channel for their product with a total of 80% producers selling their milk via vendors and pick-up compared to 17.3% selling to dairy plants and only 2.7% selling directly to consumers who arrive at their farms. In regard to setting milk price 98.7% of the producers set their milk price according to

the prevailing market price, while only 1.3% set their market price according to the inputs cost.

Table 3: Administrative activities and marketing system in the dairy farms

Item	Frequency	Percentage (%)
Record keeping		
Have records	52	69.3
Do not have records	23	30.7
Type of records		
Paper records	50	66.7
Electronic records	1	1.3
Other	24	32
Modern Technology implementation		
High implementation	1	1.3
Medium implementation	3	4
Low implementation	11	14.7
None	60	80
Research and development services		
Receive services	16	21.3
Do not receive services	59	78.7
Marketing channels		
Vendors	15	20
Pick-up trucks	45	60
Dairy plants	13	17.3
Direct to the consumer	2	2.7
Pricing strategy		
According to market price	74	98.7
According to the inputs costs	1	1.3

Conclusion

Enforcement of developed standards in the dairy industry should be performed by policy makers via supporting managemental practices that develop human and technical capacity to develop local milk standards that could meet regional and international standards. In addition it is vital to strengthen partnership between private and public sector with a view to acquiring relevant technologies and capacity building which can assist in integration of small scale dairy farms in the dairy value chain, thus opening new local and global marketing opportunities**.**

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