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Management, Husbandry and Milk Production in Dairy Farms in Khartoum State

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Abstract

This study was designed to assess current situation of dairy farms in Khartoum State – Eastern Nile area. Sixty dairy farms were selected randomly and the owners were directly interviewed using structural questionnaire during the period of March to June 2010.

High significant (P<0.001) differences were obtained in the educational levels of farm's owners, which showed significant positive correlation (P<0.05) with the number of labours (r=0.264) and veterinary supervision (r=0.273). The majority of the farms were constructed on private basis without conducting feasibility study (r=-0.369; P<0.01) and managed by unprofessional owners (r= -0.275; P<0.01), who don't insure against their herds and received little extension services. Specialized dairy farming represent 38.33% of dairy farming followed by diversified (36.67%) and integrated farming (25%). The predominant herds were cross cows (95%). Record keeping was practiced in 36.33% of the farms. The natural mating (48.33%) was the common method for herds' insemination and all farmers (100%) practiced hand milking twice a day. The building materials consist of wooden roof (66.67%), zink fences (35.59%) and sandy floor (93.33%). Regarding the application of preventive measurements and control of the diseases, only 18.33% of the farms had resident veterinarian and rarely (28%) vaccinate their herds against diseases. Positive

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correlation was found between each of veterinary supervision and farm management (r=0.337; P<0.01) and udder examinations (r=0.547; P<0.001). General hygiene and sanitation during milking process were low in the majority of farms and the culling strategy do not consider the appropriate principles, the need for cash was found as one of the main reasons for culling (43.33%). Green fodders and concentrates (96.67%) were found as the main
feeding protocols that offered twice a day without the consideration for the productivity of the cows (55%).

Most of dairy producers face many constraints such as high ration price (78.67%), spread of epidemic diseases (25%), labours problems (18.33%) and difficulties in milk marketing (16.67%). It's concluded that most of farms investigated are not specialized dairy farms or operated in traditional basis.

المستخلص

في ولاية الخرطوم منطقة شرق النيل. تم إختيار ومسح ستون مزرعة ألبان عشوائياً في عدة مواقع مختلفة خلال الفترة مابين مارس حتى يونيو 2010 واعتمد في هذه الدراسة على أسلوب الإستبيان المكتوب والمقابلات الشخصية المباشرة مع أصحاب تلك المزارع.
أظهرت الدراسة وجود فرق معنوي (P<0.001) عالي في المستوى التعليمي للمربين والذى أوضح ارتباط موجب معنوي (P<0.05) مع أعداد العمال (r=0.264) والإشراف البيطري (r=0.273). كما وجد أن الغالبية العظمى من المزارع قد تم إنشاؤها ذاتيا دون إجراء دراسة جدوى مسبقة (r=-0.369; P<0.01) كما تدار تلك المزارع بواسطة ملاك غير متخصصين (r =- 0.275; P<0.01) لا يهتمون بتأمين قطعانهم وهم يتلقون قدر ضئيل من الخدمات الإرشادية. لقد وجد أن مزارع الألبان المتخصصة تشكل 38.33% تليها المزارع المتنوعه (إنتاج حيواني- 36.67%) ومن ثم المزارع التكاملية (25%). أظهرت طبيعة الإنتاج ارتباط سالب معنوي (P<0.01) قوي مع سعر اللبن (r=- 0.329). رصدت الدراسة وجود فرق معنوي (P<0.001) عالي في أنواع سلالات الأبقار التي تتم تربيتها, حيث أن القطعان السائدة تتكون من أبقار هجين (95%). يمارس الإحتفاظ بالسجلات في 36.33% من المزارع, التلقيح الطبيعي (48.33%) هو الاكثر شيووعآ. كل المزارعين (100%) يقومون بحلب أبقارهم يدوياً مرتين في اليوم. رصدت الدراسة استخدام العديد من مواد البناء مثل الأسقف الخشبية (66.67%) والأسوار المصممة من الزنك (35.59%) والأرضيات الرملية (93.33%). فيما يتعلق بالإجراءات الوقائية والتحكم في الأمراض فقد وجد أن 18.33% فقط من المزارع يوجد بها طبيب بيطري بصورة دائمة, هذا بالإضافة الى أنه نادراً ما يكون هناك برنامج خاص لتحصين الأبقار ضد الأمراض حيث أنه يمارس فقط في 28% من المزارع. علاوة على ذلك, رصد ارتباط موجب معنوي عالي للإشراف الصحي مع القائم بإدارة المزرعة (r=0.337; P<0.01) وفحص الضرع (r=0.547; P<0.001). من خلال الزيارات الحقلية لم يلاحظ اهتماما" بالصحة العامة وبرامج النظافة مثل إزالة الروث والتطهير والحفاظ على الحد الأدنى للتلوث خلال عملية الحلب في أغلب المزارع. أيضا لا تراعي استراتيجية استبعاد الأبقار من المزرعة الأسس الصحيحة حيث وجد أن السبب الرئيسي للإستبعاد هو الحوجة للمال (43.33%). وجد أن الأعلاف الخضراء والمركزات تقدم مرتين في اليوم كنظام أساسي للتغذية (P<0.001) بالرغم من أن 55% من المزارع لم تراعي انتاجية الأبقار عند التغذية.
أتضح من نتائج الدراسة أن هناك العديد من العقبات التي تواجه غالبية منتجي الالبان مثل إرتفاع أسعار العلائق (78.67%) وانتشار الأمراض الوبائية (25%) ومشاكل العمالة (18.33%) وصعوبات في تسويق اللبن (16.67%). خلصت الدراسة الى أن معظم المزارع قيد الدراسة إما مزارع غير متخصصة أو يتم تشغيلها على أسس تقليدية.

Introduction

Despite the large numbers of dairy-animals in the country, yet the potential of this sector is not fully exploited, especially in terms of the need for further business-oriented integration of its production and supply activities in the economy. This implies the importance of directing dairy-producers towards efficient utilization of their limited resources with ultimate goals of boosting efficient functioning of this sector (MARF, 2007).

The general standard of hygiene applied for milk production in developing countries is poor and hand milking is almost a common practice in developing countries (Chye *et al.*, 2004). Abdalla and El Zubeir (2007) reported

that introduction of hygienic principles for milk production and handling, improvement of management practices, extension programs to the owners and establishing of standers and grades of raw milk should be initiated to ensure good quality of milk. Biosecurity, employee management, housing, bedding, feed delivery, manure removal, stocking density, animal restraint, heat abatement, and fresh cow management were reported as predictors of animal health, milk production and overall owner satisfaction (Caraviello *et al.*, 2006).

Milk supply and marketing are influenced by many factors such as environmental (season), location of the farm with regards to marketing points and the availability of means of transportation (Mustafa *et al.,* 2011). The most important constraint to dairy production raised by farmers was the lack of adequate market to milk (Bayemi *et al.*, 2005a). Milk production excess to the calves' needs is taken to the nearest town or dwellings to be sold as a source of cash (Yousif and Fadl El-Moula, 2006).

Habeeballa (1996) found that in Eastern Nile Khartoum dairy farm's, the educational status of the owners had no effect on dairy production, although the farmers did not offered concentrate to dry cows and heifers because of increase price of concentrate and the labors did not stay long in farm. Also he mentioned that the farmers did not practice the drying off for cows, which affected milk yield in the subsequent lactations.

The objective of this study is to highlight the major features and constraints facing dairy production in Eastern Nile, Khartoum State and to recommend some interventions for the problems that facing owner's of the farms.

Materials and methods

The study area

The present study was carried out in Eastern Nile locality, Khartoum State. It is located at Eastern bank of the Blue Nile to the North of Khartoum Province. This study was conducted during the summer season 2010 (March to June) in some selected farms. The state lies within the semi desert ecological zone between latitude 15° and 16.45° North, longitude 31° and 34.4° East (Ministry of Agricultural, Animal Resources and Irrigation of Khartoum, 2005).

Metrological data showed that the average rainfall in the study area was 0.0 mm for the period from March to June. The mean average temperature in the study area was 40.6 °C, with extremes over 42.9 °C during May. Temperature recorded lowest degree during March. The lowest relative humidity recorded during April and the highest during June.

The dairy farms

Sixty milking herds of varying sizes, adopting traditional management systems were chosen to cover Eastern Nile, Khartoum State. The farms were chosen on the basis of willingness of herd owners to cooperate and release information needed by the researcher and included in the extensive questionnaire.

Data collection

For the purpose of this study, a questionnaire was designed. The questionnaire as an instrument has direct and open-ended questions. In open-ended questions, respondents can express their own ideas and views in a free way from multiple-choices characterized direct questions.

The questionnaire includes detailed queries pertinent to the following aspects: particulars of the farm owners including the education, fund source and feasibility studies; farms information and it include location, water and electricity supply farm manager, nature of production and building materials; herd structure and size and type of insemination used; milk production and milk marketing and price; system of feeding adopted in the different farms; veterinary services, vaccination, diseases control, culling strategies, cleaning and sanitation practices; farms labours information including their education, numbers, and experience, extension details including existence of extension sources, application of extension information and follow up of application from sources; and insurance of livestock and problems that facing farmers.

Statistical analysis

The collected survey data were coded and analyzed using SAS (1997) system computer program. All the data were analyzed statistically by using the frequency procedure and Chi-Squire Test to describe performance and characteristic of dairy farms in Eastern Nile, Khartoum State.

Results and Discussion

The result of this study revealed high significant differences ($P<0.001$) in the

educational levels of farms' owners in Eastern Nile, Khartoum State (Table 1), high percent of illiterate were recorded among farms owner's (16.67%) and labours (40%).

The present data showed that the education level was higher among the dairy farmers in Khartoum when compared to the previous reports by El Zubeir and Mahala (2011) and Ahmed and El Zubeir (2013) who reported that the illiteracy among the dairy farms owners were 36% and 26.67%, respectively.

who reported that 100% of households in Halfaya region employed long-term labours and only 47% of household employed casual labours. Moreover, Hossain *et al.* (2005) reported that only 16.7% of farmers had training on dairy farms management. Many farms in this study showed lack of labours health certificate. This was in agreement with Karakök (2007) who reported that certification is another solution method for the employee training for a certain interval for dairy farmer. Some farms included in this study showed the lake of knowledge about water quality laws, as about 80% of farms used channels as a source of water (Table 2), which might create some health hazards due to contamination.

Specialized dairy farming represents 38.33% of the studied farms and their owners didn't practices any agricultural activities (Table 2). This might be due to small land size, while the integrated dairy farms with crops represents 25% of total farms so as to reduce feeding cost as was mentioned by the farmers. This supported Mustafa *et al.* (2011) who reported that 24% and 8.9% had mixed farms with fodder and fodder and crops, respectively. Diversified farms as a type of farming were found to represent 36.67% of farms in area of study. Furthermore, goats, sheep and camels as additional dairy animals were found to be reared. This might be done for economic reasons or farmers try to optimize and diversifying the use of existing resources. This result goes in line with Mustsfa *et al.* (2011) who reported that the preferences in term of livestock species people would like to keep dairy cattle as first choice followed by goats, sheep, poultry and camels.

Table 1: General information about dairy farms' owners and labours in Eastern Nile

Farm owner		Labours	
Measurement	**Frequency**	**Measurement**	**Frequency**
Education level:		**Education level:**	
Illiterate	**10 (16.67%)*****	**Illiterate**	**24 (40%) ^{Ns}**
Khalwa	**4 (6.67%)*****	**Khalwa**	**13 (21.67%)*****
Primary	**18 (30%)*****	**Primary**	**30 (50%)*****
Secondary	**10 (16.67%)*****	**Secondary**	**2 (3.33%)*****
University	**13 (21.67%)*****	**University**	**0 (0%)**
Post graduate	**5 (8.33%)*****	**Upper university**	**0 (0%)**
		Number of labor:	
Fund source:	**51 (85%)*****	**1-2**	**38 (63.33%)*****
Private	**2 (3.33%)*****	**3-4**	**12 (20%)*****
Bank lone	**7 (11.67%)*****	**<4**	**10 (16.67%)*****
Co-operative			
		Type of labours:	
		Long- term	**45 (75%)*****
Done feasibility study:	**11 (18.33%)*****	**Casual**	**15 (25%)*****
Self effort	**7 (11.67%)*****	**Training for labours:**	
Local team	**0.0**	**Practiced**	**19 (31.67%)***
Specialized	**4 (6.67%)*****	**Not practiced**	**41 (68.33%)***
Livestock insurance:	**1 (1.67%)*****	**Labours health card:**	
		Present	**28 (46.67%) ^{Ns}**
		Absent	**32 (53.33%) ^{Ns}**
Dairy producer association member:	**13(21.67%)*****		

Interest in joining:	**12 (23.53%)*****			

In this and the following tables:
^{Ns} : Non significant.
* : Significant different at (P < 0.05)
** : Significant different at (P < 0.01)
*** : Highly significant different at (P < 0.001)

feasibility study (r=0.369). This could be attributed to high percent of illiteracy and low education level among farms owners. Livestock insurance in the area of study was found to be unsatisfactory since 98.33% of the herders do not insured for their herds. This might be due to unacceptability of livestock insurance concept as stated by farmers.

Table 1 show that most of farms' owners (78.33%) were not joining any dairy association (P<0.001), and 74.46% of them have no interest in joining association. This because they believe and think that this association doesn't serve their real needs. The high significant differences observed in the numbers of labours per farm (Table 1) might be due to wide differences in farm activities, herd size and the rent of long-term labours. This supported Mustafa (2008)

housing system constructed from iron bars, corrugated iron sheets and other local materials such as wood and hay is common. They added that the houses are partially shaded to accommodate animals and to protect lactating cows from excessive sun and rain. Small herd owners may keep their animals in yards surrounded with fences made of wood and hay only (locally called Zareebeh). Results indicated that concrete floor was found to be used in 3.33% of the farms; the obtained numbers were less compared with 10% reported by Ahmed and El Zubeir (2013).

Poorly designed farm buildings were observed during the survey and ideal building materials were found to be seldom used in the studied areas. Hence the traditional roof (Rakoba) was commonly used in most of farms (66.67%) followed by zink roof (23.33%), while fences of the pens were made of red bricks (44.07%), iron pipes (35.59%), zink (35.59%) and Miskeet (*Prospis Julifora*) stems (5.08%). In other studies indicated that most of pens were poorly designed (Ahmed and El Zubeir, 2013). Also this result goes in line with the findings of Yousif and Fadl El-Moula (2006) who stated that a traditional

High significant (P<0.001) differences were obtained between the sources of fund used to construct the farms (Table 1), it was observed that most of farmers constructed their farms based on private capital and only two farms were constructed by bank loan. This was in agreement with Mustafa (2008) who reported that 92% of all respondents stated that they don't like to deal with banks for cultural and religious reasons. However, this result was lower than that reported by Hossain *et al.* (2005) who reported that for establishing dairy farms, 7% of dairy farmers were dependent on bank loan. High percent of farmers do not conduct the feasibility study before establishment of the dairy project. Moreover the education level of the farm owners reveled highly significant positive correlation (P<0.001) when compared with conducting

Table 2: Locations, types of farming and facilities of dairy farms in Eastern Nile

Farm site	Frequency	Measurement	Frequency	Percent
Shambat	**6 (10%)*****	**Water sources:**		
Al-Halfaya	**4 (6.67%)*****	**Water pipes**	**9**	**15.00*****
Al-Kadaro	**2 (3.33%)*****	**Water wells**	**49**	**81.67*****
Um El-Qura	**1 (1.67%)*****	**Water channels**	**2**	**3.33*****
Al-FakyHashim	**2 (3.33%)*****			
Al-Ahamda	**3 (5.00%)*****	**Power sources:**		
Al-Hasaniya	**2 (3.33%)*****	**No power**	**28**	**46.67^{Ns}**
Al-Tibna	**7 (11.67%)*****	**Net power**	**10**	**16.67*****
Al-Silit	**2 (3.33%)*****	**Generator**	**7**	**11.67*****
Kafori	**1 (1.67%)*****	**Net+ Generators**	**15**	**25.00*****
Kuku	**2 (3.33%)*****			
Al-Giref	**1 (1.67%)*****	**Farm manager:**		
Al-Shigla	**20 (33.3%)*****	**Specialist person**	**4**	**6.67*****
Al-Kiryab	**5 (8.33%)*****	**Specialist owner**	**7**	**11.67*****
Om Doom	**1 (1.67%)*****	**Un specialist owner**	**49**	**81.67*****
Ed Babiker	**1 (1.67%)*****			
		Nature of production:		
		Specialized$^{\#}$	**23**	**38.33^{Ns}**

		Integrated[# #]	**15**	**25.00[***]**
		Diversified[# # #]	**22**	**36.67 [Ns]**
		Other animals		
		Goats	**16**	**26.67[**]**
		Sheep	**4**	**6.67[***]**
		Camels	**2**	**3.33[***]**

[#]Specialized dairy farming, [# #] Integrated with crops and [# # #]Diversified animal production.

variations in duration of dung removal. These variations could be attributed to differences in herd size, hence farms with large numbers of herds were found to dispose manure on daily or 2-3 days basis, whereas, farmers with small numbers of herds were found to dispose manure on weekly basis. All owners give attention for dung removal because they sell it as an extra source of cash.

As shown in Table 3, the majority of the farms were found to have no dipping area and calving pens. Most of farms owner's stated that cows give birth inside the pens and calves allowed to stay with their dams for the first three days of the calving then separated in isolated pen. Inadequate and irregular animal waste disposal observed during this study, which can cause health and environmental problems, even in small-scale enterprises. Table 3 shows wide

Table 3: Housing of dairy animal in the farms at Eastern Nile farms

Measurement	**Frequency**	**Percent**
Space per cow consideration:		
Yea	**15**	**25.00[***]**
No	**45**	**75.00[***]**
Roof materials:		
No roof	**5**	**8.33[***]**
Metal roof	**14**	**23.33[***]**
wooded roof	**40**	**66.67[***]**
Plastic roof	**1**	**1.67[***]**
Fences materials:		
Red bricks	**26**	**44.07 [Ns]**
Iron pipes	**21**	**35.59[*]**
Miskeet stem	**3**	**5.08[***]**
Zink	**21**	**35.59[*]**
Pens floor:		
Sandy	**56**	**93.33[***]**
Concretes	**2**	**3.33[***]**
Litter	**2**	**3.33[***]**
Present of dipping area	**2**	**3.33[***]**
Present of calving pens:	**10**	**16.67[***]**
Application of calving pens cleaning:	**10**	**16.67[***]**
Dung removal interval (day):		
1	**5**	**8.33[***]**
2	**13**	**21.67[***]**
3	**13**	**21.67[***]**
4	**2**	**3.33[***]**
5	**2**	**3.33[***]**
7	**16**	**26.67[***]**
10	**2**	**3.33[***]**
15	**5**	**8.33[***]**
20	**1**	**1.67[***]**
60	**1**	**1.67[***]**

correlation of breed type with farmer education (r=0.281; P<0.01) and fund source (r=0.252; P<0.05). This result was in agreement with Ahmed and El Zubeir (2013)

Table 4 shows most of investigated dairy farms owned crossbred dairy cows (95%), while local dairy cows were found in only 5% of total studied farms. Moreover there were

The collected data revealed that most of herders used natural mating (48.33%), while artificial insemination was found to be used in combination with natural mating in 42.67% of total farms. Only 10% of studied farms were found to use A.I as a central technique for insemination (Table 4). This agreed with Bashir and El Zubeir (2013) findings that natural mating was adopted by all herders in extensive and semi extensive systems in Kordofan, Sudan. Most of the farmers in Khartoum North Province (91.1%) use natural mating, while the remaining proportion (5.6%) uses artificial insemination (Elniema *et al.*, 2011). Although A.I centers are found in big cities of Sudan, natural mating using superior Kenana or crossbred bulls is predominantly practiced (Yousif and Fadl El-Moula, 2006).

who reported that Khartoum North was found to contain the high number of cross cows (100%) compared to Omdurman (90%) and Khartoum (85%). The reason for this process of fast upgrading could be due to the fact that farmers aiming to increase milk production in response to high demand in urban areas. These also augmented by the findings of Mustafa *et al.* (2011) who found that most of the households were engaged in dairy farming (96.67%) and tend to keep improved breeds of cattle. It is supported by the observations of

reported that herds may contain many uneconomic and infertile animals. The present survey indicated that 21.67% of the farmers had more than one breeding bull, while the majority of herders (78.73%) had one or no breeding bull. Furthermore, they borrowed a bull from neighbors to mate their herds or used AI services offered by Ministry of Animal Resources.

Table 4: Herd size and structure of dairy animals in Eastern Nile

Measurement	Frequency	Percent
Lactating cows:		
1-10	**20**	**33.33** ^{Ns}
11-20	**21**	**35.00** ^{Ns}
>20	**19**	**31.67** ^{Ns}
Dry cows:		
1-10	**47**	**78.33*****
11-20	**8**	**13.33*****
>20	**5**	**8.33*****
Heifers:		
1-10	**33**	**55.00*****
11-20	**10**	**16.67*****
>20	**8**	**13.33*****
No heifers	**9**	**15*****
Calves:		
1-10	**42**	**70.00*****
11-20	**10**	**16.67*****
>20	**7**	**11.67*****
No calves	**1**	**1.67*****
Breeding bulls:		
0-1	**47**	**78.33*****
>1	**13**	**21.67*****
Total:		
1-20	**9**	**15.00** ^{Ns}
21-40	**26**	**43.33** ^{Ns}
>40	**25**	**41.67** ^{Ns}
Breed type:		
Local breed	**3**	**5.00*****
Exotic breed	**0**	**0.00**
Crossbred	**57**	**95.00*****
Insemination method:		
Natural	**29**	**48.33** ^{Ns}
Artificial	**6**	**10.00*****
Natural+artificial	**25**	**41.67** ^{Ns}
Newly born calf:		
Sold as newly born	**8**	**13.33*****
Raised	**29**	**48.33** ^{Ns}
Sold after fattening	**32**	**53.33** ^{Ns}

milking per day and feeding times (r=0.581) and number of labours (r=0.824). The modern technologies for milking cow (milking machines) were not found to be used in the dairy farms under investigated (Table 5). Similarly, Williamson and Payne (1978) reported that the uses of modern technologies as milking machines in smallholders' dairy farms are completely un-economical and indeed undesirable because of surplus labours. Moreover, most of farmers (86.67%) milk their cows in the presence of calves compared to those milked their cows in their absence (13.33%). This result goes in line with Fröberg *et al.* (2007) who reported that in production systems where milk is used for family consumption and on beef production, the calf is allowed free suckling. However, where farmer aim's to sell milk, the calf is used for stimulation of milk ejection and is allowed to suckle only for a limited time.

Data from Table 5 showed significant (P<0.01) variations in price of milk (Liter) that ranged between 0.5–0.9 Sudanese Pound and 40% producers market their milk directly to the consumer, while 55% of the produced quantities of milk were marketed by mediators. The price of milk showed highly significant positive (P<0.01) with marketing (r=0.516). Furthermore, the milk price indicated highly significant negative correlation (P<0.01) with nature of production (r=-0.329). Mustafa *et al.* (2011) reported that 71.7% of farmers in Khartoum North sold their products at the farm gate homestead. They added that milk supply and marketing are influenced by many factors such as environmental (season), location of the farm with regards to marketing points and the availability of means of transportation. This result is augmented by the findings of Elmagli and El Zubeir (2006) who reported that in Sudan, urban milk supply largely comes from village herds and its marketing is mostly by milk venders who distribute raw milk to households on donkeys. The obtained result might be attributed to the fact that most of farmers need to increase their profits, hence the differences in price of milk were observed among the price of milk. Lack of marketing was a managerial factor that needs correction (El Zubeir and Mahala, 2011). The differences in milk price reported in this study could be attributed to variation in milk quantities that produced in the farms, the market channels and the distance of the farm from

Daily average milk production was recorded to be less than 200 liter in 75% of farms, moreover the data revealed highly significant (P<0.001) differences among dairy farms for milk yield (Table 5). This might

Musa *et al.* (2006) who reported that through experiences, many herdsman have come to understand that the best results are obtained by crossing the best local cattle (usually Kenana and Butana) with exotic breeds (usually Friesian). Herds predominant at the dairy camps in Khartoum State consist of dairy cross cows (60%) and the cows are mainly Friesian × local breed (El Zubeir and Mahala, 2011). The Holstein-Friesian is the most widely used exotic dairy breed in all farming in the tropics (Hansen *et al.*, 2006).

Different results were recorded for herds groups of lactating cows, dry cows, heifers and calves as shown in Table 4. Under traditional management system, the size and composition of the herds are influenced by a number of factors such as seasonal availability of water and feed, high market prices and infectious diseases (Yousif and Fadl El-Moula, 2006). Herd structure in Al-Rudwan dairy campus was not optimum and can be described as deformed (Babiker, 2007). Farms showed that the majority of farmers give much attention only for herd size without any consideration for fertility and reproductive performance. This was the same as what was reported by Sumberge (1992) who attributed to the level of education, housing and feeding of the dairy herd, management practices and veterinary supervision. Milk yield of dairy cow depends on four factors including genetic ability, feeding program, herd management and health (Bebe *et al.*, 2003).

Lactation length of 7.5-8 months (225-240 days) was commonly reported in dairy farms (Table 5). This was shorter when compared to the optimum 305 days by El Fakey and El Zubeir (2004). Ahmed *et al.* (2007) noticed that the groups with 75% and 87.5% of Friesian blood proportion had significantly longer lactation days compared to those with lower level of foreign blood.

Farm visits indicated that all farms under investigation practice two times milking/ day (Table 5). This may be because milking operation is highly linked with feeding, as most of the farmers feed their herds two times/ day. The results indicated highly significant positive correlation (P<0.001) between number of

prices (high concentrate price), low milk price and difficulties in selling of milk in some occasions.

consumption areas. Moreover, 70% of dairy producers stated that price of milk/ Ib do not covered the production cost (Table 5). This might be attributed to instability of the ration

Table 5: Milk production performance in the dairy farm at Eastern Nile farms

Measurement	Frequency	Percent
Daily average production:		
15-100 (liter)	**13**	**21.67** ^{Ns}
101-200 (liter)	**15**	**25.00** ^{Ns}
201-400 (liter)	**17**	**28.33** ^{Ns}
>400 (liter)	**15**	**25.00** ^{Ns}
Lactation length:		
6 months	**7**	**11.67*****
7.5 months	**22**	**36.67*****
7 months	**1**	**1.67*****
8 months	**23**	**38.33*****
9 months	**5**	**8.33*****
10 months	**2**	**3.33*****
No: of milking /day:		
Two times	**60**	**100**
Three times	**0**	**0.00**
Type of milking:		
Hand with calf	**52**	**86.67*****
Hand without calf	**8**	**13.33*****
Machine	**0**	**0.00**
Milk marketing:		
Direct to consumers	**24**	**40.00** ^{Ns}
Mediators	**33**	**55.00** ^{Ns}
Close markets	**2**	**3.33*****
Far markets	**1**	**1.67*****
Milk price:		
0.5 – 0.75 (Sudanese Pound)	**20**	**33.33** ^{Ns}
0.8 – 0.9 (Sudanese Pound)	**24**	**40.00** ^{Ns}
> 0.9 (Sudanese Pound)	**16**	**26.67** ^{Ns}
Visibility of milk production:	**16**	**26.67****

Highly significant (P<0.001) variations were obtained for filtration of milk (8.33%) and immediate milk cooling (3.33%) among dairy farms in Eastern Nile (Table 6). This supported findings of Mohamed and El Zubeir (2007) who reported that no cooling was applied for milk at production areas in the farms in Khartoum State. Similarly, the application of udder examinations were absent in most of the farms under investigation (Table 6). Furthermore, high number of farmers stated that they didn't know about udder test and the only think that they did in case of check milk is to isolate or segregate the cow from the herd and it is milked lastly. This practice may lead to increase incidence of udder infection particularly where unhygienic conditions occurred. Murphy and Boor (2000) state that the health and hygiene of the cow, the environment in which the cow is housed and

Most of farmers were found to give much attention for cleaning of equipment (80%) followed by cleaning of milkers' hands (20%), while cleaning of cow's udders was not found to be practiced in Eastern Nile farms (Table 5). In this survey it was noticed that most of farms have no milking area (Table 6). Moreover, all cows in these farms were milked inside the pens under the shade where accumulation of dung and flies that were found in large quantities. This was in agreement with Abdalla and El Zubeir (2007) who reported that farms milkers practiced bad habits during milking process such as talking, singing, snuffing and introducing of hands into the milk as mean for udder massage. Farmers must be thoroughly trained and educated before control and prevention programs can be designed, implemented and adopted (Kivaria *et al.*, 2004).

only 22 (36.67%) of farms were found to have farms records, which were poorly designed (Table 6). Furthermore, the most common used records were production and financial records.

milked and hygiene during milking and storage equipment, all influence microbial numbers in raw milk

The results indicated highly significant (P<0.001) differences in the recording system,

Table 6: Milking practices and record keeping among dairy farms in Eastern Nile

Measurement	Frequency	Percent
Milking routines:		
Udder cleaning	**0**	**0**
Hand cleaning	**12**	**20*****
Equipment cleaning	**48**	**80*****
Present of milking area:	**11**	**18.33*****
Practiced of milk filtration:	**55**	**91.67*****
Milk cooling practiced:	**2**	**3.33*****
Application of udder test examinations:	**7**	**11.67*****
Udder test interval:		
3 days	**1**	**1.67*****
7 days	**3**	**5.00*****
10 days	**1**	**1.67*****
15 days	**2**	**3.33*****
Present of farms records:	**22**	**36.67 Ns**
Type of records:		
Production	**16**	**26.67****
Health	**7**	**13.33****
Feeding	**5**	**8.33*****
Financial	**11**	**18.33*****
All mentioned	**3**	**5.00*****

and heifers; because of increasing price of concentrates. Moreover, this result was in agreement with Elniema *et al.* (2011) who stated that concentrates were given to dairy herds irrespective of physiological status of the animal. It also goes in line with Musa *et al.* (2006) who reported that Kenana and Butana cattle herders stressed the lack of livestock feed to be the most important limiting factor for productivity of their cattle. It was shown in this study (Table 10) that 76.67% of the respondents mentioned that high price of ration constrains livestock production. This agreed with findings of Leslie *et al.* (1999) who reported that animal feed is a major constraint for zero-grazing dairy cattle. Observations from field visit revealed that low quality of hays were offered during dry season and green fodder also offered in insufficient amounts, moreover part of it is lost when it was distributed on pens floor.

Highly significant (P<0.001) variations were obtained regarding the role of veterinarians in the studied farms, which as follows: 11 (18.33%) resident, 10 (16.67%) visited the farm at regular intervals and 39 (65.00%) on call. Kulneff (2006) stated that the availability of veterinarians in Sudan is very good in urban

This result supported Yousif and Fadl El-Moula (2006) who reported that farmers do not pay much attention to the importance of keeping records, thus the recording system is poor. Also it supported Bebe *et al.* (2003) report that a few small dairy holders kept performance records.

Records are an indispensable component of modern farming; it is a typical aspect of management where keen observation can avoid the need for unproductive animals (McAllister, 2008). Bayemi *et al.* (2005b) reported that one area needing much attention in dairy farms is record keeping and farmers need intensive training and follow up. El Zubeir and Mahala (2011) reported that lack of records and marketing of milk were also among managemental factors that need correction.

As shown in Table 7, 96.67% of farms owner's fed their herds green fodder plus concentrates and 55% of them fed concentrates not according to productivity of cow (P<0.001). This result supported Habeeballa (1996) who found that the farmers of dairy cattle in Eastern Nile Khartoum State fed their animals quantitatively and qualitatively according to availability and price of feed in the market, and they did not offer any concentrate to dry cows

owners of the dairy farms. Establishment of milk collection centers with support services such as cooling, transport, milk pricing structure and marketing facilities. Enforcement of legislations, laws and adoption of standard methods of production to control milk quality are of urgent need.

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no follow up of the application of extension messages from the sources (Table 9).

The recorded data from the questionnaires indicated that high ration price (46; 76.78%), spread of epidemic diseases (15; 25%), parasites problems (14; 23.33%), labours (11; 18.33%) and marketing difficulties (10; 16.67%) were the primary and main constraints that facing farmers. Furthermore, secondary constraints such as low milk price (7; 11.67%), calves mortality (7; 11.67%) and others were shown in Table 10. El Zubeir and Mahala (20011) reported that herd health, trained workers and availability of feed are the major problems facing dairy herd owners.

The critical survey done in this study revealed a lot of malpractices adopted by investigated dairy farms in Eastern Nile, Khartoum State. The majority of farms were poorly constructed and they are with limited management skills on nutritional strategy, general hygiene, herd health programs, herd rising and replacement and milk marketing. With regard to the breed type in dairy herds in Khartoum State crossbred cows representing 95% of the total breeds, but of unknown foreign blood percentages because farmers don't keep records. The extension services were not available for the majority of the farms. Moreover, most of farmers complaining of many problems that constraint their production such as high ration price, spread of epidemic diseases, labours problems and difficulties in marketing of milk.

areas, but in rural areas it is poor. However, administration of using drugs is generally practiced without consultation of the veterinarian (El Zubeir and Mahala, 2011). There were correlation of veterinary supervision with farmer education ($r=0.273$; $P<0.01$), conducting feasibility study ($r=0.501$; $P<0.001$), dairy records keeping ($r=0.364$, $P<0.001$), labours number ($r=0.248$; $P<0.01$), labours training ($r=0.267$; $P<0.01$), udder examinations ($r=0.547$, $P<0.001$), number of lactating cows ($r=0.279$; $P<0.01$) and milk yield ($r=0.547$, $P<0.01$). Livestock vaccination was applied in 46.67% of studied farms. The results indicated highly significant ($P<0.001$) differences (Table 8). Hemorrhagic septicemia (40%), contagious bovine Pleuro-pneumonia (43.33%), foot and mouth disease (25%), brucellosis (1.67%), render pest (5%), black leg (5%), anthrax (11.67%), pox (15%) and hepatitis virus A (1.67%) were the most commune diseases that received vaccination. The results indicated that the most important cause of culling in the dairy farms (Table 8) were the need for cash (43.33%), low productivity (33.33%), ages (8.33%) and diseases (8.33%). This supported El amin and El Zubeir (2002) who reported that culling is practiced in order to reduce the opportunity of low yielder to stay in the herd.

The availability of the extension services were very low (8; 13.33%) and most commonly offered by the ministries, the localities, universities and veterinary hospitals ($P<0.001$). The provision of government incentives to veterinary and extension services is very important, although the promotion of private services may also be good, since public services are hardly regular (Swai *et al.*, 1993; Babiker, 2007). The application of extension messages were found to be in 7(11.67%) of farms and most of farmers (93.33%) indicated that there is

Hence the present study recommended the provision of essential services such as clean potable water, health care and education to the

Table 7: Feeding of dairy herd in Eastern Nile farms

Measurement	Frequency	Percent
Type of feed:		
Green fodder only	**0**	**0.00**
Concentrate	**2**	**3.33** ***
Green fodder+ Concentrate	**58**	**96.67***
Complete ration:	**6**	**10***
No: of feeding/day:		
Two times	**58**	**96.67***
Three times	**2**	**3.33***
Feeding technique:		

Before milking	20	33.33*
After milking	40	66.67*
Introduced concentrate according to productivity:	27	45.00 Ns

Table 8: Veterinary supervision and vaccine application in the dairy farms at Eastern Nile

Measurement	Frequency	Percent
Veterinary supervision:		
Resident	11	18.33***
Regular visit	10	16.67***
On call	39	65.00 Ns
Application of livestock vaccination:	28	46.67
Last vaccination before:		
1 month	4	6.67***
2 months	2	3.33***
3 months	1	1.67***
4 months	10	16.67***
5 months	1	1.67***
6 months	3	5.00***
7 months	2	3.33***
8 months	1	1.67***
9 months	2	3.33***
12 months	2	3.33***
Vaccination against diseases:		
Hemorrhagic Septicemia	24	40 Ns
CBPP	26	43.33 Ns
FMD	15	25.00***
Brucellosis	1	1.67***
Render Pest	3	5.00***
Black Leg	3	5.00***
Anthrax	7	11.67***
Pox	9	15***
Hepatitis Virus A	1	1.67***
Culling strategies:		
Age	5	8.33***
Low productivity	20	33.33***
Disease	5	8.33***
Need for cash	26	43.33 Ns
All mentioned	10	16.67***

Table 10: Constraints facing farms owners in Eastern Nile

Constraints	Frequency	Percent
Major Constraints:		
High ration price	46	76.67***
Spread of epidemic diseases	15	25.00***
Parasite problems	14	23.33***
Labors problems	11	18.33***
Marketing difficulties	10	16.67***
Other Constraints:		
Insects & dogs problems	7	11.67***
Low milk price	7	11.67***
Calves mortality	7	11.67***
No incinerators	5	8.33***
Infertility problems	4	6.67***
High cost of Vet services	3	5.00***
Unavailability of water	3	5.00***

& power		
Vet center far in distance	**1**	**1.67*****
Over crowding	**1**	**1.67*****
No problems	**8**	**13.33*****

Table 9: Availability and sources of extension services for dairy farms' owner at Eastern Nile

Measurement	Frequency	Percent
Extension services:		
Present of extension	**8**	**13.33*****
Absent of extension	**52**	**86.67*****
Sources of extension:		
Ministry	**5**	**8.33*****
Locality	**1**	**1.67*****
University	**3**	**5.00*****
Veterinary hospitals	**2**	**3.33*****
Application of extension information:	**7**	**11.67*****
Follow up of application:	**4**	**6.67*****

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