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MANAGEMENT PRACTICES OF DAIRY FARMS; CASE STUDY: KHARTOUM NORTH AND EASTERN NILE LOCALITIES, KHARTOUM, SUDAN

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ABSTRACT*:* This case study was conducted to assess the management practices in the dairy farms of Eastern Nile and Khartoum North localities, Khartoum State, Sudan. A questionnaire targeting local dairy producers was used to cover 70 milk producers in the areas of Tibna, Silate, Eidbabiker and Elafoon. The single-visit, multiple-subject approach was used for data collection. The results showed that 53% of the farm owners adopted traditional type of animal keeping. The housing of calves was in groups. Calves, in general looked thin. The number of calves kept together was large and all calves, pre weaning, were kept in the same pen. Eighty-five percent of the farm's cows had high body condition score (BCS) than recommended (obese cows). Ninety-four percent of the owners were not interested in measuring the weight of their animals or calves at birth. The percentage of the infectious diseases such as Mastitis, Foot and Mouth disease, Contagious Bovine Box and Pleuro–phneumonia were found to be 99%, 51%, 13% and 11%, respectively. Diarrhea and Jaundice were the major causes of mortality in suckling calves in the study area. The respondents mentioned three major problems afflicting the dairy sector which were the high cost of nutrition, prices of drugs and lack of new technologies. Lack of extension services, poor veterinary services and scarcity of water comprised as major setbacks.

Keywords: Dairy Management, Housing, Calves Management, Body Condition Score, Infectious Diseases.

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INTRODUCTION

Dairy cattle are kept all over the world. Keeping a dairy cow can be very lucrative, especially close to urban areas. The dairy cow is, however, a very valuable animal and owning one entails a number of risks. The biggest risk is losing the animal. Low productivity due to poor management will also lead to losses (Bonnier et al., 2004). Cow better management can increase overall health, milk yield, and productive life because of enhanced animal welfare (Wagner-Storch et al., 2003). Housing systems for dairy cows vary from housing cows throughout the year to housing cows in the winter months only. Outdoors grazing is allowed throughout the year in regions with the appropriate climate. Systems in which cows are housed throughout the year [referred to as zero-grazing, (ZG) systems] are used in areas where grazing the cattle is not the most efficient or cost-effective use of the land. Cows can be fed high levels of concentrate feed more easily when they are housed, so extended or continuous housing systems are more common in farms having cows with a high genetic potential for milk yield. It is hypothesized that the increased length of the housing period may have adverse effects on cow lameness and leg injury (Haskell et al., 2006). Provision of adequate shading is the easiest and most effective way in controlling cows' heat stress. Direct sunlight adds a tremendous heat load to the cow, but heat energy that is reflected from areas exposed to the sun such as concrete floors, barn walls and other exposed surfaces also add to the cow's heat stress. Shading reduces the black globe environmental temperature (a measure of temperature and radiant energy) and lowers the rectal temperature and respiration rate of cows, increasing feed intake and milk yield. Gains in milk production of 10 to 20 percent occurred where shaded and unshaded cows were compared (West, 2009). Loose housing barns provide shade for cows without the cost of free stalls or the concrete floors. These barns have a sand base mounded in the center of the barn to minimize accumulation of moisture. The bedding must be cleaned and maintained regularly to prevent pitting and fresh sand must be added as needed (West, 2009).

Kulneff (2006) studied the dairy management system in relatively modern systems in Khartoum State, Sudan, and reported that the animals were housed in pens on the ground, surrounded by either mud walls or iron fences and with access to roofs for shadow. The weaned female calves are kept as replacement heifers, as for the males, there were disposed by sale, and only one or two were retained for the purpose of breeding. A study carried out in Khartoum State, Sudan, revealed that 50% of the farm owners purchased their drugs directly from drug stores, 30% were neither dealt with clinics nor purchased drugs to treat their sick animals, 10% purchased their

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drugs from drug stores and treat their animals by themselves and 10% preferred to deal with veterinary clinics to treat their animals (Mustafa, 2008). The study area is known to be the main source of milk supplied to Khartoum State. However, limited studies have been carried out to evaluate the management practices in the study area. Thus the main objective of this study is to assess the management practices in the dairy farms of Eastern Nile and Khartoum North localities, Khartoum State, Sudan. The study also aims to determine the problems and constraints of the milk production sector in the study area.

MATERIAL AND METHODS

Study area:

The study was conducted in Khartoum State, Sudan, specifically at four administrative units of Khartoum North and Eastern Nile provinces. The included administrative units (regions) were Tibna, Edbabiker, South Silate and Elafon regions. The average minimum and maximum temperatures of the study area during the study period ranged from 16-31°C in January to 27-42°C in May (Climate Zone, 2012). Both agro-ecological zones have high dairy cattle concentration and are major producers of milk in Eastern Nile.

Data Collection:

The study started with a survey targeting the local dairy producers. The Single-visit, multiple-subject approach of data gathering described by (Gilbert et al., 1980) was used in this study. A questionnaire covered seventy randomly selected milk producers who accounted for 18% of the total number of milk producers in the area was used in the study. The owners and workers of the visited farms were individually interviewed and the collected data were recorded. Moreover, observations regarding the housing system, conditions of the animals in barns and other issues that may not be reported by the respondents were also recorded.

Descriptive statistics analysis was carried out for the collected data in terms of percentage.

RESULTS AND DISCUSSION

Management in study area:

Almost all farm owners in the study area were following the same management system. The study revealed that 47% of the owners adopted modern type of animals keeping and 53% adopted a traditional type (Table 1). Seventy six percent of the traditional type farms' breeders depend on straw in building their barns roofs because they believed that straw roof has a role in avoiding worms, while 19% and 5% depend on reeds and iron scrap, respectively. Most of the barns in study area were shaded. Regarding fencing, 61% of the owners constructed their fences using iron while 26%, 10% and 3% used mud bricks, bricks and wire + zinc, respectively (Table 1). On the other hand, the entire surveyed farms floors were not concreted because the breeders believe that the concrete floor is harmful for their animals' feet. The above results were supported by Kulneff (2006) who studied the dairy management system in relatively modern systems in Khartoum State and reported that the animals were housed in pens on the ground, surrounded by either mud walls or iron fences and with access to roofs for shadow.

The weaned female calves were kept as replacement heifers, as for the males, there were disposed by sale, and only one or two were retained for the purpose of breeding. The returns from the sale of calves often used to cover the costs of feeding. Similar results were reported by Mustafa (2008) who stated that the small and large commercial farmers used the same calves' management system regardless of the studied regions. He also reported that weaned female calves were kept as replacement heifers, while almost all male calves were culled, exchanged or sold to neighboring smallholder dairy farmers. The result is also in line with the findings of Hanyani-Mlambo et al. (1998) who studied the socio-economic aspects of smallholder dairying in Zimbabwe.

The housing of calves was in groups (Figure 1A). Calves generally looked thin. The number of calves kept together was large and all calves, pre weaning, were kept in the same pen. The pens were on soil and, in some herds, with walls of mud, allowing infectious agents to persist in the environment. Poor growth and health problems in these animals are probably caused by restricted suckling in combination with scanty feeding, poor access to water in some cases and high disease pressure. Some of the farms only kept cattle and others kept several other species beside cattle, in this case all animals were kept together. These results were similar to that reported by Kulneff (2006). The majority of farm owners relied on the naming system to identify their animals by giving them different names (Figure 1A). As for keeping their records, 74% of the farms have records, but these records are not recorded properly and did not contain sufficient information, while the rest lack records. Seventy-nine percent of farmers were culling their animals on the basis of aging and decline of production. Most of the owners did not practice weaning and abandoned their calves with their mothers (Figure 1B). Restricted suckling was the system found to be practiced by almost all owners. Milking is usually done twice a day; early in the morning and in the

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evening (Figure 2). Milking is commonly done outside, beside a restraining wooden post erected near the main kraal or under a tree. The calf is allowed to suckle to stimulate milk let down and the cow was then milked. The calf is allowed to suckle again before being tethered away from the cows. In most cases no attempt is made to wash the udder before milking. This may be due to the practice of allowing the calf to suckle before milking. A bad milking practice which is commonly observed is that of the milker dipping his fingers into the milk as a means of lubricating the teats during milking. Similar observations were reported by FAO (1990) and Lyimo et al. (2004) in Southern and Eastern Africa.

The main obstacles facing calves rearing reported by the owners were calves diseases and poor growth of calves. Others were inadequate knowledge on calf rearing and mortality. As for overall evaluation of the management system in study area, the management system in more than 50% of the farms was judged as very bad (Figure 3).

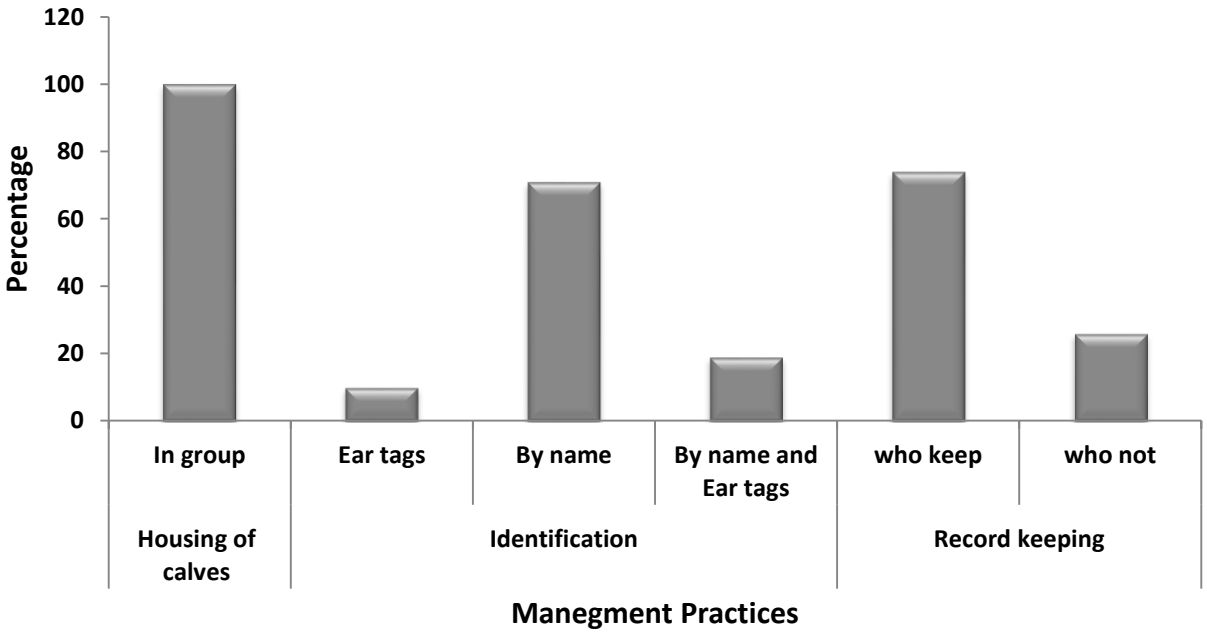

Figure 1A. Farm Management in the study area (N=70)

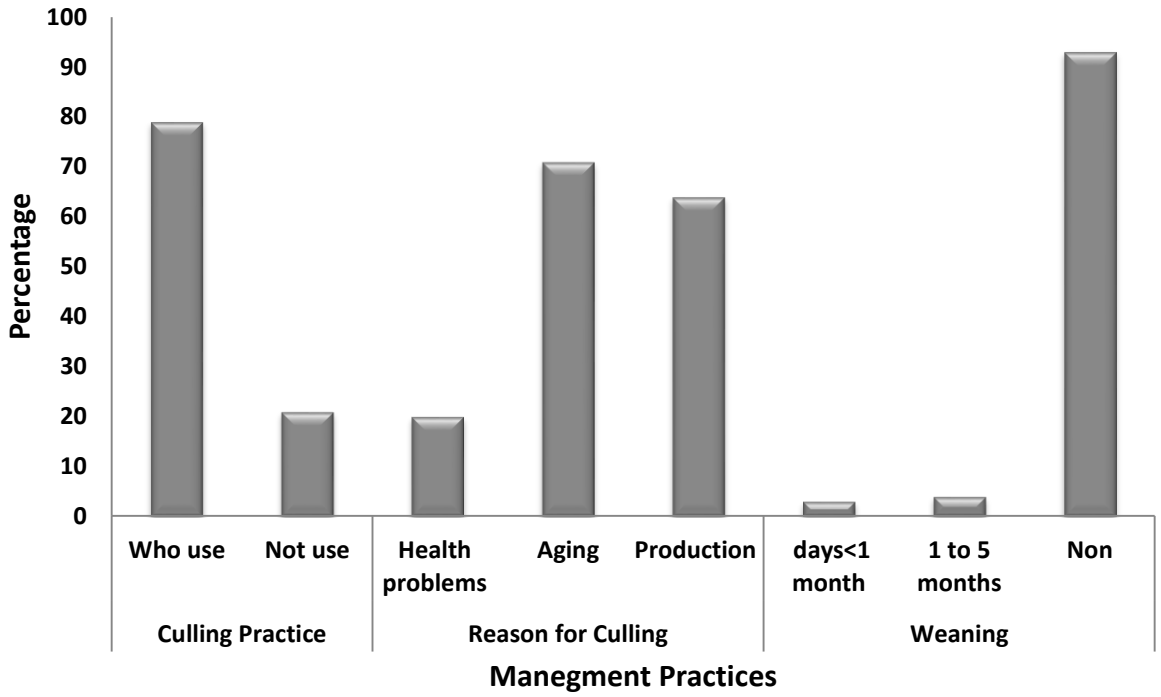

Figure 1B. Farm Management in the study area (N=70)

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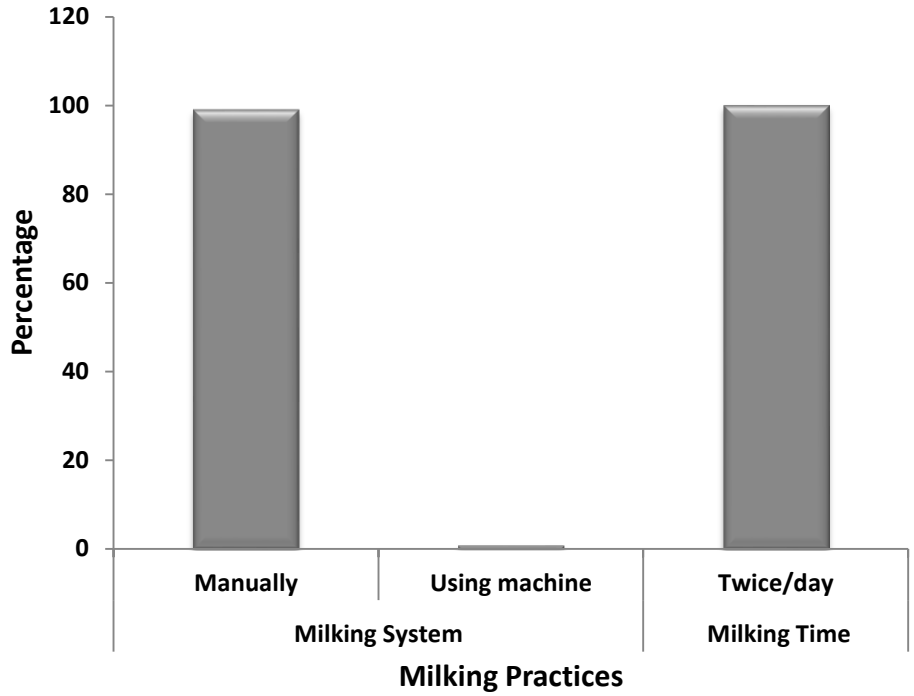

Figure 2. Milking system and milking frequency in study area (N=70)

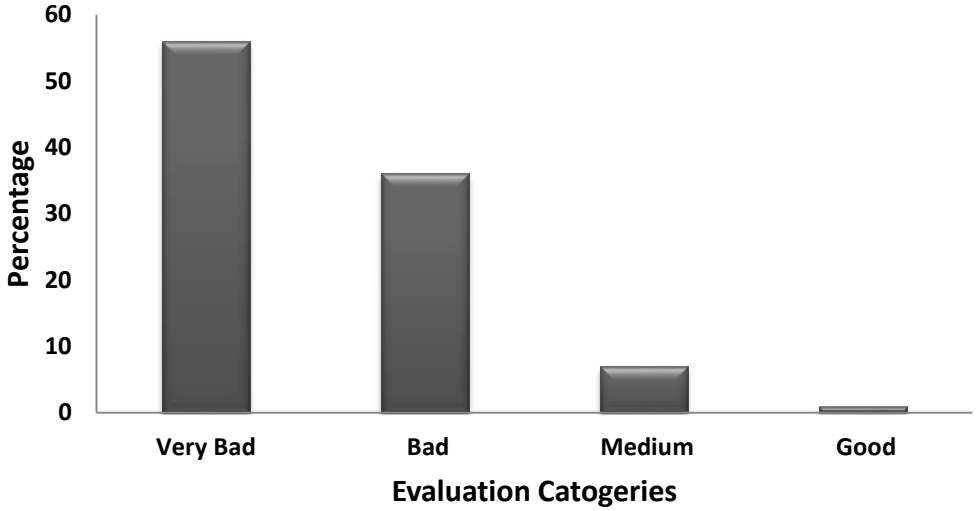

Figure 3. Evaluation of the Current Management System in Study Area (N=70)

Body Condition Score

Body condition score (BCS) is a method of evaluating fatness or thinness in cows, according to a five-point scale and used the score to fine-tune dairy herd nutrition and health. Evaluation of BCS is recommended because it reflects the nutritional status and energy balance in dairy cows (Kim and Suh, 2003). Eighty five percent of the farms cows had higher BCS than recommended (obese cows), while 4% had BCS lower than physiologically accepted (Figure 4). These finding are consistent with these reported by Mustafa (2008). This result could be due to the lack of specific feeding plans. Concentrate was given to dairy herds irrespective of physiological status of the animal. The Feed quantities were not weighed and sometimes cows given more than their actual requirements. On the other hand, the fertility problems in the study area could be attributed to the higher BCS. Mongeon (2011) reported that the successful pregnancy can be achieved earlier when the BCS low point and reserve replenishment happens early in lactation. It also seems that the optimal BCS at the onset of the breeding period should range between 3.0 and 3.5. For cows above or below this range, successful heat detection decreases rapidly. Cows with high BCS at calving have a much greater risk of coming down with metabolic problems later on. He also reported a 30% increase in the risk of milk fever if a cow's BCS was greater than 3.5 at calving. Similarly, a doubling of ketosis risk was recorded in dairy cows calving at a BCS greater than 3.5 compared to cows calving at 3.5. Generally, over-

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conditioning-BCS greater than 3.5 increased risk of metabolic disorders around calving time. BCS has also been linked to lameness. Recent findings suggest previous BCS recommendations need to be lowered slightly. Optimal BCS at calving should range between 3.0 and 3.25, and the loss of BCS after calving should be no more than 1 point to a lowest score of 2.25 quoting by Mongeon (2011). High BCS before calving, as well as marked losses in body condition after calving are associated with metabolism related diseases like fatty liver, decreased fertility and increased culling rates (Hayirli et al., 2002; Šamanc et al., 2010).

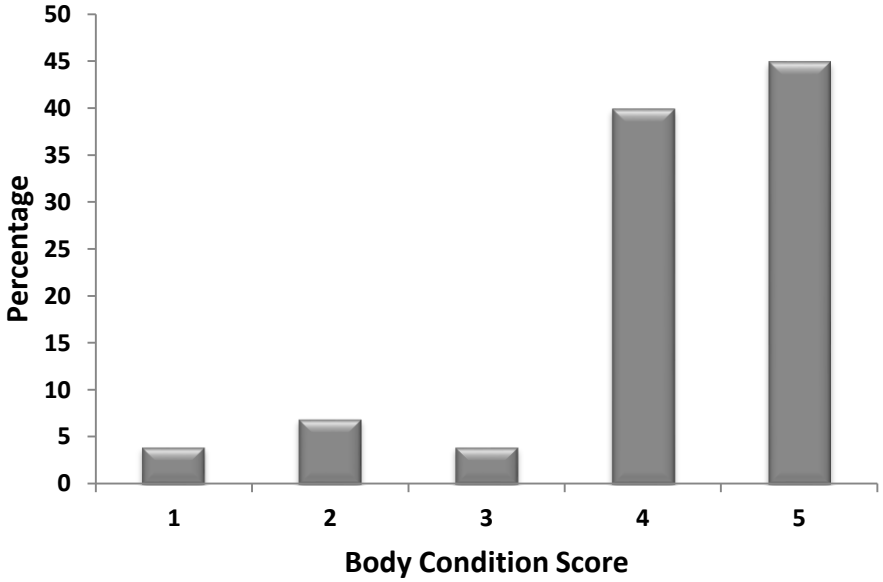

Fig 4. Body Condition Score (BCS) of milking cows in study area (N=70)

Animal health and common diseases in study area

Livestock keepers in the study area, irrespective of the location in the four regions had listed a wide range of diseases. The percentage of the infectious diseases such as Mastitis, Foot and Mouth disease, Contagious Bovine Box and Pleuro–phneumonia that frequently occurred in the milk herd in both small and large scale livestock keepers were 99%, 51%, 13% and 11%, respectively (Figure 5). Other diseases of importance were Bloats 4%, hoof problems 3% due to bad management and milk fever 1%. These finding are partly complying with these reported by Mustafa (2008) who found that infectious diseases such as Foot and Mouth diseases, Contagious Bovine and Pleuro–phneumonia had frequently occurred in the herd with a percentage of 60%, he also found Mastitis with a percentage of 35.6% and Diarrheas and Bloats with a percentage of 24.4%.

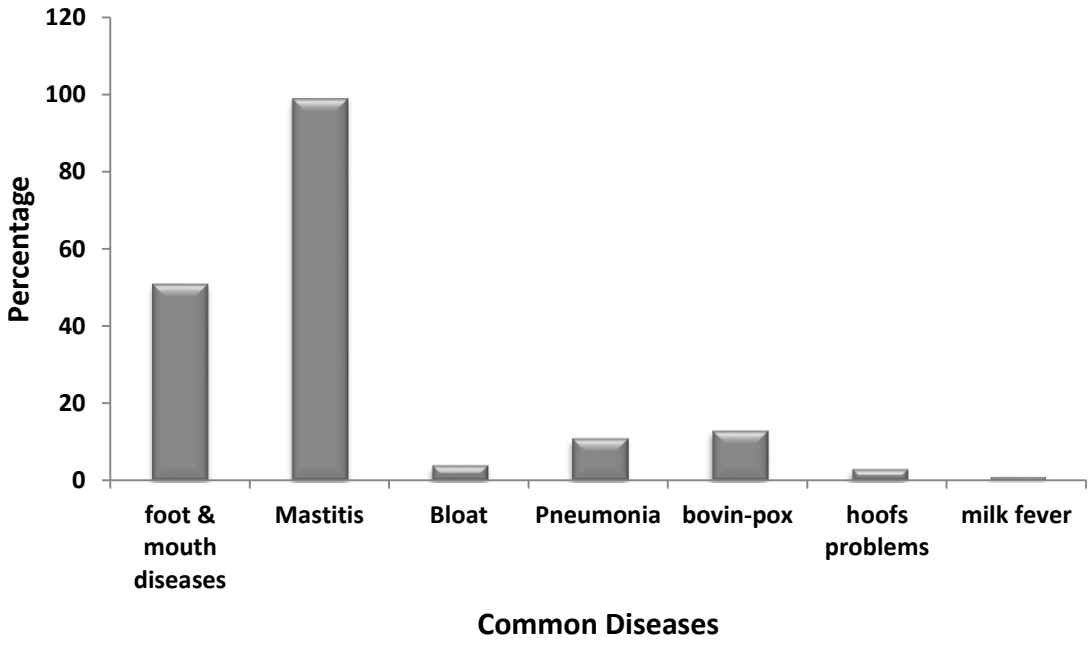

Figure 5. Percentage of common diseases in study area

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Musa et al. (2006) also found the incidences of infectious diseases in cows in Butana cattle area at a rate of 24% for Foot and Mouth diseases and 40% for Contagious Bovine and Pleuro–phneumonia. The same study also reported a similar finding for Diarrheas. Mustafa (2008) observed that Foot and Mouth disease, Rinderpest and Hemorrhagic septicemia in ruminants are among the most infectious diseases found in the traditional production system in Khartoum urban and peri-urban regions.

Diarrhea and Jaundice were the major causes of mortality in suckling calves in study area (Table 2). Diarrhea and Jaundice together are responsible for 36% of the suckling calves mortality, while Diarrhea, Jaundice and other problems were responsible for 33%, 13% and 15%, respectively. As the ground was soil in the study area, infectious agents may remain in the permanent pen and thus put a high disease pressure on new calves introduced into the herd. This result is in accordance with the result of Kulneff (2006). Because the majority of farmers in the study area did not wean the calves which remain with their mothers until it gives birth for the second time, the colostrums may not be enough to the newborn calves and this might weaken their immunity against diseases. This might be another reason for the high mortality rate of the suckling calves in the study area as colostrum is an important factor in developing immunity. Lidfors (1996) found lower mortality rates for calves that received their colostrum by suckling their mothers compared to calves that received colostrum from an open bucket.

Disease prevention has to be adjusted to the management system and the disease pattern in the herd (Payne and Wilson, 1999). The ways available to protect livestock from infectious diseases are by increasing the host's defense and by preventing the animals from meeting the contagion. Through breeding regimes, animals have become more tolerant or even resistant to some diseases. Generally, by providing good hygienic conditions, the disease pressure can be diminished (Payne and Wilson, 1999). In a housed environment, other ways of spreading diseases has to be taken into consideration. Many animals then have close contact in a limited area. The walls and floors may harbour infectious agents. Other ways of controlling diseases are by vaccination, vector control (e.g. dipping) and for young animals by securing colostral immunity (Algers et al., 2009).

No separation between groups, permanent pens directly on the soil, and poor watering and feeding regimes, cause many problems for the health of animals and thus productivity and income for the farmers. Many of these problems could be diminished by extension activities.

Major constraints facing small-scale dairy farms

The respondents mentioned three major problems afflicting the dairy sector which were the high cost of nutrition, prices of drugs and lack of new technologies (Table 3). Also they stated some other obstacles facing the dairy sector including location, taxes, marketing and financing. This is in accordance with the finding of Mustafa (2008) who found that the major constraints for livestock production were high prices of concentrates, high taxes, poor extension coverage, small land area and pressures from governmental health authorities. Other constraints included lack of utilizable technologies, lack of capital, poor local genes, and poor management practices. Also Masangi (1998) and Leslie et al. (1999) reported that animal feed is a major constraint for zero-grazed dairy cattle. The results also goes in line with the finding of Musa et al. (2006) who reported that Kenana and Butana cattle herders stressed that lack of livestock feed was the most important limiting factor for productivity of their cattle. However, Habeeballa (1996) attributed high concentrates prices to export of industrial by-products and high prices of green fodder to seasonal factors. In some cases especially during fall and festivals low milk prices and high concentrates prices acted as a disincentive, forcing producers to restrict their feeding.

Problems of dairy farms observed in the study area

Many problems were observed in the study area including lack of extension services (70%), poor veterinary services (63%), availability of water (44%), spread of ticks (30%) and fertility problems (30%). In addition to some other minor problems like obesity, extreme emaciation, over feeding and expensive feed components. Some of the studied farms provided different types of concentrates per day in order to reduce the feeding cost (Table 4). Moreover some farms have large numbers of milking cows which were milking manually.

Mustafa (2008) reported that only 5.6% of the respondents indicated the availability of extension services from governmental extension authorities. The reason behind poor government extension coverage could be due to the negligence of government authorities to this important sub-sector. In this context and regarding the veterinary services, El-Sammani et al. (1996) reported that the high incidence of infectious diseases and the high cost of veterinary drugs could be attributed to the liberalization of the economy and the sudden shift from completely government subsidized to privatized veterinary services provided at market price.

For the tick problems, Jongejan et al. (1987) reported that the greater number of ticks in Khartoum than in other locations is probably due to the dense livestock population in the area, which would have led to a high pick-up

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rate of ticks by cattle that are always kept in pens. Cattle in the other locations are not confined in pens because of the nomadic life of cattle owners.

Table 1 - Type of Barns, fences and floor in the study area

Items	Types	%
Type of Barns	Modern	47%
	Traditional	53%
Traditional	Straw	76%
	Reeds	19%
	Iron scrap	5%
Shading	Yes	96%
	No	4%
Fencing	Barbed wire + Zinc	3%
	Iron fence	61%
	Mud brick wall	26%
	Bricks	10%
Floor type	Soil	100%

Table 2 - Percentage the causes of mortality in Suckling calves in study area

Mortality	%
Diarrhea	33%
Jaundice	16%
Diarrhea & Jaundice	36%
Others	15%
Total	100%

Table 3 - Major constraints encountered in small-scale dairy farming

Major constraints	% of the studied farms
Funding	4%
Cost of Nutrition	100%
Technical	100%
Prices of drugs	100%
Marketing	6%
Tax	13%
Location	14%

Table 4 - Problems of Dairy Farms Observed in the study Area

Problems	% of studied farms
Lack of Extension services	70%
Veterinary services	63%
Availability of water	44%
Fertility problems	30%
Ticks	30%
Over Feeding	21%
Obesity	20%
Providing different types of concentrates per day	19%
Vaccination	14%
Lacking of milking parlour	11%
Extreme emaciation	8%
Availability of workers	6%
Expensive components	4%

Among the constraints facing productive and reproductive performance of dairy cows, Duguma et al. (2012) reported that the age at first calving was affected by shortage of feed, feeding and disease and the combined effect of feeding, disease and breeding management. The respondents in this study reported that feed shortage and interactions of nutrition, health, housing and management level were major problems affecting milk production in the neighboring country Ethiopia. Age at first calving was reported to be influenced by the onset of puberty, which itself is affected by environment, breed type, season and herd effects (Mukasa-Mugerwa, 1989). Duguma et al. (2012) reported that dry season feed shortage was the main reason for seasonal fluctuation of milk production.

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Poor nutrition increases the susceptibility of dairy cows to health problem and physiological stress which results in lower production, much longer calving intervals, as well as problems in fertility (Reda, 1999; De Boer, 1999).

It can be concluded that farms suffer from poor management and the impact of the spread of disease, especially Mastitis and Foot and mouth disease, in addition to the high mortality rate of calves due to Diarrhea and Jaundice diseases. The dairy sector completely lacks the extension services, as well as veterinary services as the majority of the farm owners buy the medicines and treat their animals by themselves.

REFERENCES

Algers B, Blokhuis H J, Bøtner A, Broom DM, Costa P, Domingo M, Greiner M, Hartung J, Koenen F, Müller-Graf C, Morton DB, Osterhaus A, Pfeiffer DU, Mohan R, Roberts R, Sanaa M, Salman M, Sharp JM, Vannier P and Wierup M (2009). Scientific opinion of the panel on animal health and welfare on a request from European commission on the overall effects of farming systems on dairy cow welfare and disease. European Food Safety Authority, The EFSA Journal, 1143: 1–38.

Bonnier P, Maas A and Rijks J (2004). Dairy cattle husbandry. Agromisa Foundation. Second edition. Digigrafi, Wageningen. the Netherlands, ISBN: 90-77073-66-3.

Climate Zone (2012). Climate information for Sudan. Climatezone.com. 12 Jul. 2012. http://www.climatezone.com/climate/sudan/fahrenheit/khartoum.htm.

De Boer AJ (1999). Socio-Economic aspects of smallholder dairy farmers. In smalholder dairying in the tropics. Addis Ababa. International Livestock Research Institute ILRI. 25.

Duguma B, Kechero Y and Janssens GPJ (2012). Productive and reproductive performance of Zebu X Holstein-Friesian crossbred dairy cows in Jimma Town. Oromia, Ethiopia. Global Veterinaria, 8 (1): 67–72.

El-Sammani MO, Zaroug MG and Awad F (1996). Review of OXFAM livestock programme. OXFAM U.K., Khartoum, Sudan.

FAO (1990). Milking conditions and hygiene. In: The technology of traditional milk products in developing countries. FAO Animal Production and Health Papers 85.

Gilbert EH, Norman DW and Winch FE (1980). Farming system research: A critical appraisal. MSU Rural Development Papers 6. Department of Agricultural Economics, Michigan University, East Lansing, Michigan, USA. pp: 135 + xiii.

Habeeballa AM (1996). Assessment of dairy farming practices in Eastern Nile, Khartoum State. M.Sc. Thesis, Faculty of Animal Production, University of Khartoum, Sudan.

Hanyani-Mlambo BT, Sibanda S and Østergaard V (1998). Socio-economic aspects of smallholder dairying in Zimbabwe. Livestock Research for Rural Development 10(2): 1–14.

Haskell MJ, Rennie LJ, Bowell VA, Bell MJ and Lawrence AB (2006). Housing system, milk production and zero-grazing effects on lameness and leg injury in dairy cows. Journal of Dairy Science 89(11):4259–4266

Hayirli A, Grummer RR, Nordheim EV and Crump PM (2002). Animal anddietary factors affecting feed intake during the prefresh transition period in Holsteins. Journal of Dairy Science, 85(12): 3430–3443.

Jongejan F, Zivkovic D, Pegram RG, Tatchell RJ, Fison T, Latif AA and Paine G (1987). Ticks (Acari: Ixodidae) of the Blue and White Nile ecosystems in the Sudan with particular reference to the Rhipicephalus sanguineus group. Experimental and Applied Acarology. 3(4): 331–346.

Kim IH and Suh GH (2003). Effect of amount of body condition loss from the dry to near calving periods on the subsequent body condition change, occurrence of postpartum diseases, metabolic parameters and reproductive performance in Holstein dairy cows. Theriogenology, 60: 1445–1456.

Kulneff C (2006). A comparative study of urban and rural dairy management systems in Sudan. Swedish University of Agricultural Sciences degree project 2006: 56. Faculty of Veterinary Medicine. Animal Sciences Uppsala. 22 Jul. 2012 http://ex-epsilon.slu.se:8080/archive/00000875/01/CKulneff.pdf

Leslie J, Swai ES, Karimuribo E and Bell C (1999). Tanga and Southern Highland, dairy development programmes: Socio- Economic aspects and farmer perception of dairy cattle keeping and animal diseases, DFID/NRRD -Animal Health Research Programme23–45.

Lidfors LM (1996). Behavioural effects of separating the dairy calf immediately or 4 days postpartum. Applied Animal Behaviour Science 49(3): 269–283.

Lyimo HLN, Mtenga LA, Kimambo AE, Hvelplund T, Laswai GH and Weisbjerg MR (2004). A survey on calf feeding systems, problems and improvement options available for the smallholder dairy farmers of Turiani in Tanzania. Livestock Research for Rural Development, 16 (4). 22 Jul. 2012 http://www.lrrd.org/lrrd16/4/lyim16023.htm

Masangi BS (1998). The effect of feeding on the performance of crossbred dairy cattle in the smallholder dairy system along the coast of Tanzania. Ph.D Upgrada Report, Department of Agriculture, University of

Reading, UK.

Mongeon M (2011). Body condition scoring. Ministry of Agriculture, Food and Rural Affairs, Ontario RUL: http://www.omafra.gov.on.ca/english/livestock/dairy/facts/bodycondscoring.htm.

Mukasa-Mugerwa E (1989). A review of reproductive performance of female Bos indicus (Zebu) cattle. ILCA Monograph No. 6. International Livestock Center for Africa, Addis Ababa, Ethiopia. http://www.fao.org/wairdocs/ilri/x5442e/x5442e00.htm

Musa LMA, Ahmed MKA and Peters KJ (2006). On farm characterization of Butana and Kenana cattle breed production systems in Sudan. Livestock Research for Rural Development 18, Article 177.

Mustafa EA (2008). Surveys on some livestock keeping practices in urban and peri-urban parts of Khartoum North Province, Sudan. Ph.D. Thesis, University of Khartoum, Sudan.

Payne WJA and Wilson RT (1999). An introduction to animal husbandry in the tropics. 5th ed. Cambridge: Blackwell Science Ltd.

Reda T (1999). Feeding of a crossbred dairy cow. Addis Ababa, Ministry of Agriculture (MOA), 26.

Šamanc H, Kirovski D, Jovanović M, Vujanac I, Bojković-Kovačević S, Jakić-Dimić D, Prodanović R and Stajković S (2010). New insights into body condition score and its association with fatty liver in Holstein dairy cows. Acta Veterinaria. Belgrade, 60(5): 525–540.

Wagner-Storch AM, Palmer RW and Kammel DW (2003). Factors affecting stall use for different free stall bases. Journal of Dairy Science, 86(6): 2253–2266.

West JW (2009). Managing and feeding lactating dairy cows in hot weather. Extension Dairy Scientist. Cooperative Extension, College of Agricultural and Environmental Sciences, the University of Georgia, U.S. http://extension.uga.edu/publications/files/pdf/B%20956_2.PDF.

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