

The Types And Quantities Of Feeds On Offer And Profitability Of Peri-Urban Dairy Camels Of Mogadishu

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Abstract:

A study was done to identify the types and quantities of feeds on offer and the profitability of peri-urban dairy camels. A total of 120 lactating camels from 10 peri-urban dairy farms were recorded. A purposive sampling of 12 camels within each farm with four camels in each lactation stage (early, middle, and late) was done. Whenever possible, the selected camels were of almost similar parities and weights. The types of feeds on offer to lactating dairy camels varied across the farm categories where the large and small-scale farms were using maize corn, sesame oil meal, alfalfa hay, yellow pea seeds, and sorghum straw while the medium scale was using the same feedstuffs except for yellow pea seeds. The quantity of feed offered also varied across the farm categories ($P < 0.05$). On average, the large, medium, and small scale farms were offering an average of 13.6kg/d, 10kg/d, and 8.4 kg/d respectively, which translated to 12.3 kg/DM/day, 9.3 kg/DM/day, and 7.7 kg/DM/day for the large, medium and small scale farms, respectively. The average estimated quantity of Metabolizable Energy, crude protein, and digestible protein offered among the large, medium and small scale farms were 121.3 MJ ME, 1983.6 g CP and 1400.6 g DP; 83.8 MJ ME, 1227.7g CP, 821.4 g DP and 73.5MJ ME, 1092.5 g CP, and 749.7 g DP, respectively. The quantity of milk produced also varied across the three categories ($P < 0.05$). On average, the milk production was 4.7 liter in the small-scale farms while the large-scale farms were 5.7liter. Therefore, the medium-scale production was quite better than other scales in terms of feeding practice, income, and proficiency. It can be used to improve and sustain the milk production of the entire peri-urban dairy camel system.

Keywords: feeds, Profitability, Crude protein, Digestibility

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I. Introduction

It is estimated that the annual world production of camel milk is 2.9 million liters. Somalia is the leading producer of 1.1million liters followed by Kenya, Mali, Saudi Arabia, Niger, Sudan, the UAE, Mauritania, and Chad. The total worldwide production of camel milk increased 4.6 times between 1996 and 2013, from 629 to 2928 thousand liters, mainly due to increasing demand in Africa. (FAOSTAT, 2015). Camels' basal diet consists of a wide variety of vegetation and different parts of browse which differ in quality (Wilson, 1989; Hashi et al., 1995). Ingestion levels can be rapid where preferred or selected browse is abundant but much slower on thorny species with small leaves (Kassilly, 2010). The quantity of feed eaten by a camel depends on the water content of the forage. If a camel eats 30-40 kg of fresh fodder which has a water content of 80% then the intake is only 6-8 kg dry matter (Yagil, 1994). Detailed nutritional studies in the arid lands of northern Kenya have shown that the small-bodied Rendile / Gabra camels eat 1.67% of their live weight daily. The daily dry matter intake DDMI determined by multiplying this amount by actual live weight resulted in 5.02 kg per day (Field, 2005). Energy and protein are the most limiting nutritional factors. Both are required for maintenance and production. In terms of energy, the demands for milk production are high. The required amount of one liter of milk is approximately 10 percent of the maintenance requirement. In terms of protein, milk is much more demanding in nutrients and one liter requires about 20 percent of a 400 kg female camel's maintenance requirement (Wilson, 1989). Under peri-urban (sedentary) camel production systems, the once desirable mixed exposure and intake of feed are lost with consequences of reduced camel performance (Dereje & Uden, 2005). Camels were brought to Mogadishu to produce milk to meet growing demand in the city of Mogadishu. However, no systematic documentation of their feeding systems or assessment of their efficacy for feeding was not been done. In this paper, we report documentation of the feeds offered to peri-urban dairy camels and an assessment of their ability to meet nutritional requirements for milking camels.

II. Material And Methods

This study was conducted in a selected peri-urban dairy camel farm at Mogadishu, it is a semi-arid area that has a bimodal rainfall pattern, with an unpredictable and irregular distribution. The average rainfall in the area according to the Rainfall Estimate was 25-150 mm. Long rains come in late March through May and short rains in November to December, with most parts of the Country having mean annual temperatures between 24°C and 30°C. (Reliefweb 2019)

Study Design: The design of the study was descriptive non-probability purposive design.

Study Location: The study was carried out in a selected peri-urban dairy camels farms in Mogadishu.

Study Duration: September 2019 to March 2020.

Sample size: 120 Lactating Dairy camels.

Sample size calculation: A total of 120 lactating camels from 10 peri-urban dairy farms were recorded. Purposively selection of 12 camels within each farm with four camels in each lactation stage (early, middle, and late) was done

Procedure methodology

Well-designed forms were used to collect the secondary data from different categories of peri-urban dairy camels which were small (less than 30 camels), medium (31-50 camels), and large (over 50 camels) herd farms. There were 3 forms, the first one was a Census form recording all camels' data (120 camels) such as the name of the camel or number, date of birth (age), parity, date of the last calving, calve sex, size(weight) and other remarks.

The second form was recorded feeds offered to camel groups like types of feed offered, the price of different feeds, the amount, and feeding regime. The third one has recorded the daily milk yield. It was recorded the sessions they milk for example Am sessions and Pm sessions.

The types and amounts of feeds offered were recorded twice a week for twelve weeks while the milk yield was recorded daily on each farm. It was used 10 enumerators to collect and record the data from the 10 farms. Each enumerator used these printed forms. The milking card was colorized with different colors to record the different stages of lactation (early, mid, and late lactation).

In addition to that, it was obtained data from Feedipedia to compare what peri-urban dairy keepers fed their herds and what is suitable to feed their dairy camels in standards to know about if they are overfeeding or underfeeding

Statistical analysis

The recorded data were cleaned, sorted, and entered into a Microsoft Excel spreadsheet. This was exported to Statistical Package for Social Sciences (SPSS), version 21.0. For analysis, descriptive statistics were obtained using t-tests and cross-tabulation.

III. Result and Discussion

3.1 Types and amounts of feeds on offer to lactating dairy camels and estimated composition from feed tables

The different types and amounts of feeds offered to lactating dairy camels and their estimated composition from feed tables are shown in Table 1. The large and small scale farmers used to feed their camel herds with the same feedstuffs, such as maize, sesame oil meal, yellow peas seed, Alfalfa hay, and sorghum straw while the medium-scale farmers used only maize, sesame oil meal, sorghum straw, and alfalfa hay. On average, the large, medium, and small scale farms were offering an average of 13.6 kg/d, 10 kg/d, and 8.4 kg/d, respectively, which translated to 12.3 kg/DM/day, 9.3 kg/DM/day, and 7.7 kg/DM/day for the large, medium and small scale farms, respectively. The average estimated quantity of metabolizable energy, crude protein, and digestible protein offered among the large, medium and small scale farms were calculated at 121.3 MJME, 1983.6 g CP and 1400.6 g DP; 83.8 MJME, 1227.7 g CP, 821.4 g DP and 73.5 MJME, 1092.5 g CP, and 749.7 g DP, respectively. Similar findings were reported by Mercha et al. (2020) who used diets containing Lucerne, barley grain, wheat bran, and grown straw which is quite similar to what was recorded in the current study. It has been recorded by Wardeh (2004) that the lactating camels consumed greater quantities of dry matter (9.3 kg/head/day) than dry ones (6.7 kg/head/day). Feeds on offer are calculated at 2.5 percent of the body weight at 10.88 MJ ME / kg DM, with 8.39 MJ / kg DM for lactating and dry camels respectively, according to Basmail (1989).

Table 1 the Types of Feeds on Offer to Lactating Dairy Camels and Estimated Nutrient Composition from Feed Tables

Scale production	Types of Feedstuff	Ave. Amount of feedstuff in (kg)/d	DMI (kg)	ME/MJ	CP (g)	DP (g)
Large	Maize	3.3	2.8	38.7	267.7	177.5
	Sesame oil meal	2.0	1.9	23.2	833.3	653.3
	Alfalfa hay	2.0	1.8	15.0	325.4	228.4
	Sorghum straw	5.3	4.9	32.0	182.4	41.6
	Yellow Peas seed	1.0	0.9	12.3	374.7	299.8
Total		13.6	12.3	121.3	1983.6	1400.6
Medium	Maize	2.0	1.7	23.5	162.2	107.6
	Sesame oil meal	1.6	1.5	18.6	666.7	522.7
	Sorghum straw	5.3	4.9	32.0	187.3	42.7
	Alfalfa hay	1.3	1.2	9.8	211.5	148.5
Total		10.2	9.3	83.83	1227.74	821.43
Small	Maize	2.2	1.9	25.8	178.5	118.3
	Sesame oil meal	1.7	1.6	19.7	708.3	555.3
	Alfalfa hay	0.1	0.1	0.8	16.3	11.4
	Sorghum straw	4.3	4.0	26.0	152.0	34.6
	Yellow Peas seed	0.1	0.1	1.2	37.5	30
Total		8.4	7.7	73.5	1092.52	749.7

CP= Crude protein, DCP= Digestible crude protein

ME=Metabolizable Energy,

MJ= Megajoules, Kg= kilogram

Percentage of dry matter bases of all feedstuff such as maize, sesame oil meal, alfalfa hay, sorghum straw, yellow peas seed (86.3, 92.8, 89.4, 93, 88.8) respectively

Standard values of ME MJ per kg of DMI in all feedstuffs (13.6, 12.5, 6.5, 8.5, 13.9)

The standard value of CP% per kg in all feedstuffs (9.4, 44.9, 3.8, 18.2, 42.2)

Standard values of DCP% per kg in all feedstuffs (66.3, 78.4, 70.2, 22.8, 80.0)

Source of these values by Heuzé V., Tran G., Lebas F., 2017. Feedipedia,

3.2 Comparison of the nutrient requirement of lactating camel to current feed offered in Peri-urban dairy camel production

The comparison of the nutrient requirements for lactating camels reported in the literature to those of peri-urban dairy camel production in Mogadishu is shown in Table 2. The energy and protein requirements were based on the average body weights for different scales of production. In the large-scale production which was under average body weight of 493 kg, the requirement of dry matter intake and metabolizable energy was (13.3 kg/d and 122.7 MJ/day) and the diet offered provided (12.3kg DM/d and 121.3 MJ/day) which means it met 99% of the requirements. This same diet provided 1400.6 g of digestible protein per day. The requirements for digestible protein for the large scale were 845. g per day which means that the diet supplied 66% more than the requirement or about 555.6 g more of digestible protein. The medium and small-scale camel herds had average body weights between 445 kg and 463kg respectively or approximately 450kg. The dry matter intake and metabolizable energy requirement were 12.5 kg/d and 115.2 MJ/day. They provided 9.3kg DM/d and 83.8.7 MJ/day for medium and 7.7 kg DM/d and 73.5 MJ/day for small-scale production, respectively. The same diet provided 821.4g and 749.7g of digestible protein for medium and small-scale production, respectively. The requirement for digestible energy for both scales was 803g per day. Therefore, for the medium scale, the camels met 73% of the metabolizable energy requirements and 102% for digestible protein requirements. The small-scale production provided 64% of metabolizable energy requirement and 93% of digestible protein falling short of requirements. Similar findings were reported by Wardeh (1989), noting that the nutrient requirement for lactating camels depends on different camel body weights. The energy and protein requirement for maintenance and production of 500kg live weight camels are for example 122.7ME MJ, 845 g DP/day while the requirements for 450 kg live body weight camel is 115.2 ME MJ, 803 g DP.

Table 2 Comparison of the nutrient requirement of lactating camel to current feed offered in Peri-urban dairy camel production

Scale production	Ave. Bodyweight	As per requirement			Current feed offered		
		DMI (kg)	Energy MJ ME	DP (g)	DMI (kg)	Energy MJ ME	DP (g)
Large	493	13.3	122.7	845	12.3	121.3	1400.6
Medium	445	12.5	115.2	803	9.3	83.8	821.4
Small	463	12.5	115.2	803	7.7	73.5	749.7

3.3 The quantity of milk produced and their parity in peri-urban dairy farms

The quantity of milk produced varied with parity across the three farm categories with ($P < 0.05$). On average, the milk production was lowest in the small-scale farms while the large-scale farms had the highest production. Within each of the farm categories, significant differences were observed between the stages of lactation as shown in table 4.3.3 below. In each of the categories, it was observed that milk production was lowest during the late stage of lactation. A similar finding was reported by Farah (2004) that the average daily milk of Somali breed camels is from 5 to 8 liters meaning only the small-scale farmers were below the average in the current study. It was also reported by Field (1979) that daily yields peak between 10-20 weeks after parturition, tailing off to give low yields at the end of lactation in agreement with the current study. It was also observed that within the large scale farms, camels in the 2nd parity gave the highest milk yield, followed by those in the 4th parity for the medium-scale while the 5th parity camels within the small scale farms trailed. Babiker & El-Zubeir (2014) reported that she-camels had the highest milk yield in the second parity (4.06 ± 1.85 L/day) in agreement with camels in the large scale farms in the current study. However, in contrast, (Musaad et al. 2013) showed that the highest recorded average was the eighth parity.

Table 3: The quantity of milk produced by the confined peri-urban dairy camel farms

Scale production	Stage of lactation	Mean yield (liters)	Std. error of difference	Parity	p-value
Large	Early	5.8	0.2	3	<0.05
	Late	4.4	0.1		
	Mid	5.9	0.1		
Total		5.4	0.1		
Medium	Early	4.7	0.1	4	<0.05
	Late	4.5	0.1		
	Mid	6.0	0.1		
Total		5.0	0.1		
Small	Early	4.7	0.1	5	<0.05
	Late	4.5	0.0		
	Mid	4.8	0.0		
Total		4.7	0.0		

3.4 The cost of feed, profitability, and milk efficiency of peri-urban dairy camels

The cost of feed, profitability and milk efficiencies of peri-urban dairy camels are shown in Table 4.3.4. The cost of feeds used in peri-urban dairy varied across the three farm categories ($P < 0.05$). On average, the feed cost was lowest in small-scale farms and highest in large-scale farms. The profit also varied among the scale production ($P < 0.04$). On average, the profit was lowest in small-scale farms while the medium-scale farm had the highest. The milk efficiency among the scale production differed ($P < 0.05$). On average, the milk efficiency was lowest on a large scale while the medium-scale farms had the highest.

A similar report was published by Dairexnet (2019) that lower feed intake and feed cost resulted in higher feed efficiency due to lower nutrient excretion as manure. As earlier indicated in table 4.3.2 on feed intake, camels in the large scale farms had the highest feed intake and feed cost compared to medium and small scale farms. This therefore the low profitability and milk efficiency of the large scale farms compared to lower scales as shown in Table 4.3.4. The most profitable scale of production was the medium.

Table 4: The cost of feed, profitability, and milk efficiency of peri-urban dairy camels

Scale production	Parameters	Means (per day/head)	Std. error of means	p-value
Large scale	Feed cost	4.4\$	0.1	< 0.05
	Profit	6.3\$	0.2	<0.04
	Milk efficiency	44.7%	0.6	<0.09
Medium-scale	Feed cost	3.1\$	0.02	<0.05
	Profit	6.9\$	0.1	<0.04

	Milk efficiency	53.8%	0.8	<0.09
Small scale	Feed cost	3.0\$	0.03	<0.05
	Profit	6.2\$	0.1	<0.04
	Milk efficiency	61.4%	0.5	<0.09

IV. Conclusion

The study concluded that the types of feed offered in the peri-urban dairy camel production in Mogadishu were maize corn, sesame oil meal, alfalfa hay, yellow pea seeds, and sorghum straw. The highest average amount of feed offered to camels was 13.6kg as fed and equivalent to 12.3kgDM/day in large-scale farms while the lowest average amount of feed offered was 8.4kg as fed equivalent to 7.7kgDM in small scale farms. Besides, lactating camels in the medium-scale production were fed adequately and met their daily nutrient requirements. Camels in large-scale production were properly covered in terms of dry matter intake and metabolizable energy requirements but exceeded by 66% the required amount of digestible protein for their level of milk production. Camels in the small-scale farms were fed less and had lower yields than those in the other categories. Although the large-scale camels had the highest milk yields, it was lower than those targeted for the feed offered. The profitability and milk efficiency for the large-scale farms were low compared to the medium-scale farms which produced approximately at the same level as the large-scale farms but a lower cost. The medium and small-scale farms had higher incomes from good milk production efficiency.

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