



An Analysis of Management and Milk Production from Camel (*Camelus dromedarius*) under Pastoral Production System in North–West, Nigeria

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Abstract

*Milk is one of the major products obtained from camel on daily basis. In order to document a findings on the management, breeding and milking in one humped camel (*Camelus dromedarius*), this study was designed to come up with a useful report. Two hundred and forty one (241) structured questionnaires were administered across four States (Jigawa, Katsina, Zamfara and Sokoto) of North-West, Nigeria. Majority of the respondents (97.90%) practiced extensive system of management. Camel herders experiences difficulties of grazing areas during wet season (88.40%) and watering points during hot dry season (80.10%) while the growth performance was excellent during wet season (99.60%), normal growth during cold dry season (96.70%) and a little drop in weight during hot dry season (72.60%). The time for breeding was during cold dry season (November–February) and age at first calving was four (4) years as indicated by majority (81.70%) of the respondents, respectively. Milk production is highest in wet season with an average of 10 lactating camel cows producing over thirty liters (30 liters) of milk daily. In conclusion, with little effort to improve the production system, there should be an increase in milk production, more calving and sustainability will be guaranteed.*

Key words: Camel, Milk, Breeding, North–West, Pastoral

Introduction

One humped Camel is an important animal that adapt to the harsh environmental conditions of the arid and semi-arid lands (ASALs). Majority of one humped camels are owned by pastoralists who primarily depended on the animal for transportation and supply of food in terms of milk and meat (Wilson, 1998). In some areas, camels are considered multipurpose animal with versatility of function as draught animal, socio-cultural activities, racing, trading and supply of food (Hammadi *et al.*, 2010). Camel production systems practiced by majority of pastoralists in the ASALs of the world is still traditional. The skills and ability of the pastoralists to keep proper production records is still not available. Many aspects of the production practices by the pastoralists do not in many ways contribute to the development of herds in areas of camel

advancement (Getahun and Kassa, 2002). Camel milk production started soon after calving, with calf sharing the milk with pastoralists to meet-up family demands. The actual milk yield by camels under free ranging condition of arid zones of West Africa especially Nigeria are not enough. Efforts have been deployed and researches have been conducted and reported by several authors to address the problem. Besides the milk yield, composition of the milk constituents is another area of importance looking at the nutritional, medicinal and therapeutic contribution of the milk (Agrawal *et al.* 2005 and Hwellet *et al.* 2011). However, the present study was initiated to highlight and collect information on camel management system with respect to breeding, reproduction and milk production

Material and Methods

Design of the study

The study was designed and conducted in three seasons of the year. The seasons were Wet (June–October), Cold Dry (November–February) and Hot Dry (March – May) respectively.

Sampling technique/questionnaire administration

Purposive sampling technique was used to select Local Government Areas (LGAs) for questionnaire administration as shown in Table 1. The selection was based on the previous information on the availability of camel herders. A total of two hundred and forty one (241) structured questionnaires were administered to the respondents across the four States as shown in Figure 1. Information collected includes management, milk production, breeding and performance of one humped camel.

Herd management and Milking of the camels

In all the herds selected for the field study, the calf was allowed to suckle first to elicit the milk let-down reflex. After a few seconds, the calf was moved aside and the camel cow were milked by two men standing on opposite sides of the animal. The milk volume was measured immediately using a graduated container. However, to get the quantity of milk expected, calves were tied with protective guard on their muzzle to prevent them from suckling milk overnight.

The management practice of the camels was pastoral production system whereby the camels are allowed to graze throughout the day with only supplementation of potash periodically purposely to aid appetite for grazing and building body immunity. The milking practice is once daily milking (ODM).

Table 1: Summary of the Sampling

States	LGAs	No. of Villages	No. of Respondents	Total
Sokoto	Gada	5	42	93
	Illela	3	25	
	Tangaza	2	15	
	Gudu	2	11	
Zamfara	Zurmi	4	43	68
	Bungudu	3	20	
	Kaura Namoda	1	5	
Katsina	Mashi	2	21	39
	Daura	1	11	
	Mani	1	7	
Jigawa	Maigatari	4	21	41
	Kazaure	3	9	
	Gwiwa	2	6	
	Yankwashi	2	5	
Total		35		241

Statistical analysis

Statistical package for social sciences (SPSS) version 16.0 using simple descriptive statistics of frequency and percentages were used.

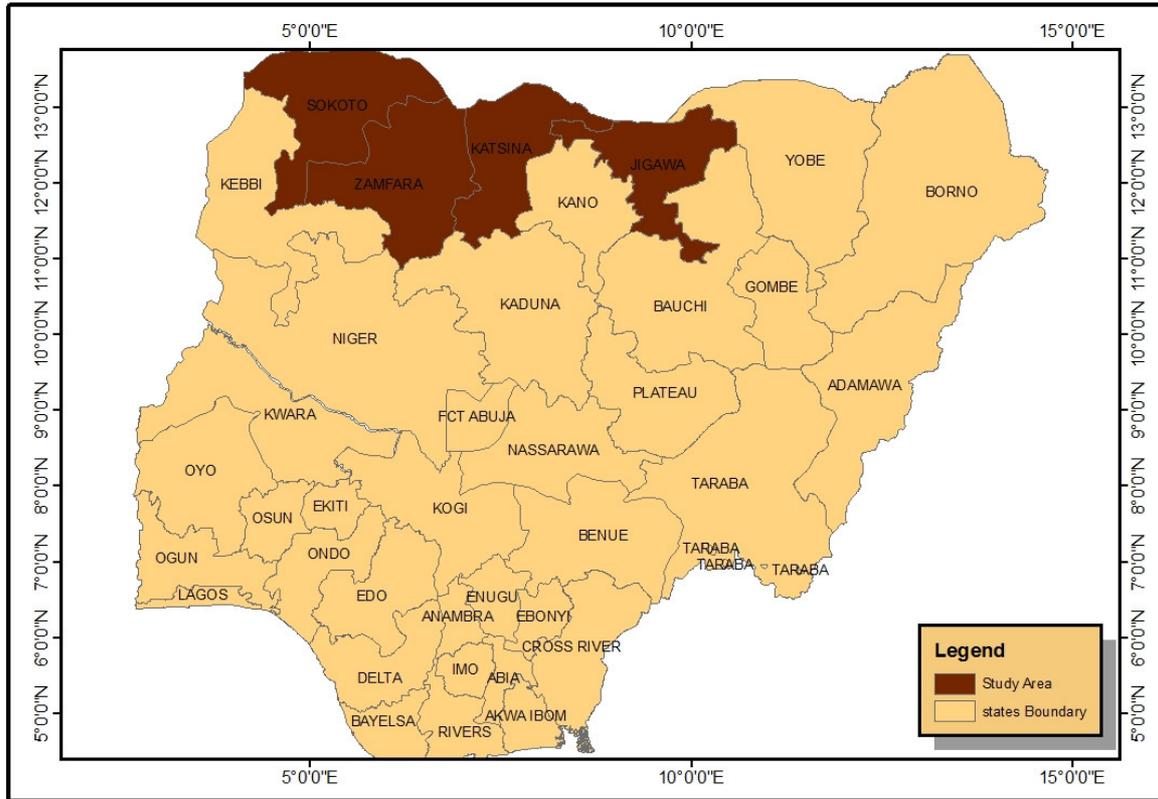


Figure 1: Map of Nigeria indicating the experimental locations (States)

Results

Management and performance of camels
 Table 2 present the results of camel management and performance. Majority (97.90%) of the respondents engaged the practice of extensive/free range system of management while only 2.10% practice semi-intensive with none of them practicing intensive system. During wet season, majority (88.40%) had problem of grazing area while in cold dry season it was (62.66%) of the respondents. However, watering point was indicated by 26.97% while disease problem was 10.37%, respectively. Majority (80.10%) indicated watering point as the major problem in hot dry season. Camels grow faster in wet season as indicated by the majority (99.60%). However, majority (96.70%) revealed normal growth in cold dry season while in hot dry

season normal growth were indicated (72.60%).

Breeding

Camel breeding is reported in Table 3. Majority (90.46%) indicated cold dry season (November–February) as the appropriate time of breeding camels while only 9.54% whom indicated camel breeding can exceed to hot dry season (March–May). Age of breeding camel heifers as indicated by the majority (82.10%) were three years followed by 10.4% who indicated four years and only 7.50% indicated two years, respectively. All of them are in the practice of keeping both males and females together in the herd throughout the year. Age at first calving as revealed by the majority (81.70%) was four years followed by 11.20%

who indicated five years and only 7.10% indicated three years, respectively.

Table 2: Management and growth performance of camels N=241

Parameter	Frequency	Percentage
System of management		
Extensive	236	97.90
Semi-intensive	5	2.10
Intensive	-	-
Total	241	100.00
Major problems in managing camels during wet season		
Grazing area	213	88.40
Diseases	28	11.60
Watering point	-	-
Total	241	100.00
Major problems in managing camels during cold dry season		
Grazing area	151	62.66
Diseases	25	10.37
Watering point	65	26.97
Total	241	100.00
Major problems in managing camels during hot dry season		
Grazing area	48	19.90
Diseases	-	-
Watering point	193	80.10
Total	241	100.00
Growth performance of camels during wet season		
Fast growth	240	99.60
Normal growth	1	0.40
Slow growth	-	-
Total	241	100.00
Growth performance of camels during cold dry season		
Fast growth	8	3.30
Normal growth	233	96.70
Slow growth	-	-
Total	241	100.00
Growth performance of camels during hot dry season		
Fast growth	8	3.30
Normal growth	175	72.60
Slow growth	54	22.40
Missing	4	1.70
Total	241	100.00

Table 3: Some camel Breeding indices (N=241)

Parameter	Frequency	Percentage
Approximate time of breeding camels		
Wet season (June – October)	-	-
Cold dry season (November – February)	218	90.46
Hot dry season (March – May)	23	9.54
Total	241	100.00
Age of breeding camel heifers		
2 years	18	7.50
3 years	198	82.10
4 years	25	10.40
5 years	-	-
Total	241	100.00
Keeping male and female camels together throughout the year		
Keeping them together	241	100.00
Not Keeping them together	-	-
Total	241	100.00
Age at first calving		
3 years	17	7.10
4 years	197	81.70
5 years	27	11.20
Total	241	100.00

Some milk production indices of camel

Quantity of milk produced is presented in Table 4. Number of lactating camel-cows in wet season as indicated by the majority (65.60%) were between 5-10 followed by 22.00% had between 11-20 while 5.40% and 7.00% of the respondents had more than 20 and less than 5 lactating camel cows respectively. Majority (50.20%) of the respondents harvested more than 30 liters of milk daily in wet season followed by 31.10% that harvested between 21-30 liters of milk daily and only 15.40% harvested between 10-20 liters and a meager 3.30% harvesting less than 10 liters respectively. In cold dry season, majority (66.80%) had between 5-10 lactating camel-cows followed by 16.20% that had 11-20 with only 10.80% having less than 5 and the remaining 6.20% had more than 20 lactating

camel-cows. In cold dry season, majority (39.00%) of the respondents harvested between 21-30 liters daily followed by 30.70% harvesting more than 30 liters and only 27.00% harvested between 10-20 liters of milk and a meager 3.30% harvesting less than 5 liters respectively. Majority (68.00%) had between 5-10 lactating camel-cows in hot dry season followed by 14.50% of the respondents who had between 11-20 while 9.60% and 7.90% accounted for less than 5 and more than 20 camel cows. Reports in hot dry season indicated that majority (46.90%) harvested 10-20 liters of milk followed by 28.20% who harvested between 21-30 liters with only 16.60% harvesting more than 30 liters and the remaining 8.30% harvested less than 5 liters of milk, respectively.

Table 4: Some milk production indices of camels in the study area

Parameter	Frequency	Percentage
Number of lactating camel cows do you have in wet season		
< 5	17	7.00
5 – 10	158	65.60
11 – 20	53	22.00
> 20	13	5.40
Total	241	100.00
Average quantity of milk harvested daily in wet season		
< 10 liters	8	3.30
10 – 20 liters	37	15.40
21 – 30 liters	75	31.10
> 30 liters	121	50.20
Total	241	100.00
Number of lactating camel cows do you have in cold dry season		
< 5	26	10.80
5 – 10	161	66.80
11 – 20	39	16.20
> 20	15	6.20
Total	241	100.00
Average quantity of milk harvested daily in cold dry season		
< 5 liters	8	3.30
10 – 20 liters	65	27.00
21 – 30 liters	94	39.00
> 30 liters	74	30.70
Total	241	100.00
Number lactating camel cows do you have in hot dry season		
< 5	23	9.60
5 – 10	164	68.00
11 – 20	35	14.50
> 20	19	7.90
Total	241	100.00
Average quantity of milk harvested daily in hot dry season		
< 5 liters	20	8.30
10 – 20 liters	113	46.90
21 – 30 liters	68	28.20
> 30 liters	40	16.60
Total	241	100.00

Discussion**Management and performance of camels**

Management of camels in the study area was solely extensive/free range system. Camels are traditionally reared under pastoral system,

usually in communally owned rangelands, mainly by subsistence pastoralists. This system is dominated by low production, low capital, seasonal trans-migratory, inadequate/shortage of feed and water. This is

in line with the report of Farah *et al.* (2004) and Guliye (2007). Socio-economic importance of camel is closely associated with existed production systems. These systems are largely determined by seasonal variations, types of soil and vegetation, water sources among others. Camel production systems may be nomadic, transhumant and sedentary depending on the region, geographical and natural setting (Aujla *et al.* 1998 and Mahmood, 2005). During wet season, majority of the respondents are facing problem of grazing area because of crop cultivation on most of the available grazing lands. This necessitated the camel owners to migrate to an area where there is grazing land suitable for camels and not cultivable. Also, in cold dry season, grazing area is the major problem because of the irrigation farming practiced by some of the inhabitants where there are irrigation facilities. The green plants grown during the season attract the camels to graze on and this encompasses the destruction of the fence hence damaging the crops (Ghude, 2017). As such, the normal tradition of allowing camels to go for grazing on their own is not possible. A herder must follow the camels throughout the day to control them from damaging the irrigated crops. Watering point is another problem in hot dry season. This is because of the arid nature of the study area. During hot dry season, streams, tube-wells and other sources of water are dried-up. This is in agreement with the reports of Hashi *et al.* (1995) who reported that livestock farmers are facing water difficulties in hot dry seasons in arid and semi-arid zones of the tropics as a result of the dried-up of the available sources of water. Camel performance across the seasons does not have many problem. The shortage of feed and water does not drastically affect its production and performance. In wet season as indicated by the majority, camel grow faster followed by cold dry season while in hot dry season, normal growth were observed, respectively. Similar

reports were reported by Farah *et al.* (2004) from Somali region of Ethiopia.

Breeding

Cold dry season (November–February) is the approximate season of breeding camels which is also the observations of Arthur *et al.* (1989); Bestern *et al.* (1993); Rahim and El-Nazier (1994) while Yagil (2006) and Zeleke *et al.* (2007) reported months of December–March in Somali region of Ethiopia and parts of Oman. An average age of breeding camel heifers as indicated by the majority was three years. Female camels can reach puberty as early as three years and in some cases can be delayed for up to five years. Since there is no organized breeding policy, as reported from this study, all of the respondents are in the practice of keeping both males and females together in the herd due to lack of selective breeding (Ghude, 2007). Age at first calving as revealed by the majority was four years. The age at which young females are exposed to breeding males for the first time is 3 to 5 years and the gestation period is about twelve and half months. In some cases, age at first calving was found to start when the camel was four to five years but sometimes is extended to six years depending on management systems. This is in agreement with the reports of Aujla *et al.* (1998) and Simenew *et al.* (2013). The pattern of reproductive cycle appears to relate to the harsh environment in which camels live. The camel reaches puberty at 3 to 5 years of age. However, majority of the respondents practiced random mating. Pastoralists in the arid and semi-arid lands of the tropics do not determine when to mate their camels but only adopted the practice of random mating. The respondents also revealed that in a herd of 40–50 camels with at least 15–20 camel heifers and cows, one bull can serve them in one breeding season without showing any sign of distress. Similarly, the same bull can be used in another herd with approximately equal number of females to be served similar to the

bull's herd depending on the age, management and health status. This is in harmony with the reports of Wool *et al.* (1998); Abu-Lehia *et al.* (1989); Abbas *et al.* (1991); Farhan *et al.* (2001) and Szuan *et al.* (2006).

Milk production

Seasons of the year affected the rate of milk produced as indicated by majority of the respondents in which they observed higher quantity of milk produced in wet season under once daily milking (ODM), respectively. In a study conducted by Ahmad (2012), it was reported that the quantity of milk produced by lactating camel cows under pastoral production system is higher in wet season when the animals have excess feed. However, the quantity of milk produced from camels under free ranging condition may be as a result of milking regimes, feed availability, weather conditions, physiological status and stage of lactation (Ghude, 2017).

Conclusion

The study concluded that an appreciable quantity of milk is produced under pastoral production system and also with increase in weight gain even without feed supplementation. However, with little improvement in management system, there shall be an increase in milk production and hence it will ensure sustainability.

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