

Productive and Reproductive Performances of Camel (*Camelus dromedarius*) in Bangladesh

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Abstract

The present study was undertaken to evaluate the productive and reproductive performances of camel in Bangladesh. For this purpose, data were collected randomly from 28 female camels of total 43 camels, Bebe Modina camel farm of Dhaka. It was found that the average milk yield, lactation period, total milk yield, service per conception, post-partum estrus period and calving interval were highly significant ($p < 0.01$) between two age group of camel. It was also found that the average fat% and SNF% between two age group were 3.35 ± 0.07 and 4.37 ± 0.70 , 8.34 ± 0.24 and 9.17 ± 0.49 , respectively and the differences were found highly significant ($p < 0.01$). The lactose% and protein% were differ non-significantly between two age group and significant difference ($p < 0.05$) present in ash percentage. Length of estrus cycle differ significantly ($p < 0.05$) and there was no significant difference in gestation period between two age group. Between two age group mastitis 11.11%, dystocia 5.56% and abortion 16.67% were found in young ages, but abortion was 5.56% in older group. The present study reveals that young group was found to be better performer followed by old group of camel in Bangladesh.

Keywords: Post-partum estrus period; Calving interval; Lactation period

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Introduction

Bangladesh is an agrobased country and more than 80% people in this country depend on agriculture. Livestock is an important sub-sector of agriculture and playing a significant role in the economy of Bangladesh [1]. It plays a vital role in the national economy, contributing about 2.79% of total GDP [2]. The one humped camel (*Camelus dromedarius*) is uniquely adapted domestic animal in arid and semiarid environment. About 85% of the camel population inhabits mainly eastern and northern Africa and rest in Indian subcontinent and Middle East countries. Somalia has the highest camel population of 7.00 million followed by Sudan 4.25 million and Ethiopia 2.4 million camels [3]. In Bangladesh, for the first time camel has been raised commercially by a private entrepreneur. Only 43 camels are being reared in south 'Kamalapur' just behind the Bangladesh Bank in Dhaka. Camels were originally domesticated for their milk. The estimates of camel populations are usually inaccurate due to lack of regular census, their products marketing system, their contribution to subsistence and the national economy tends to be grossly underestimated [4]. A lot of new areas of research and development on this species are emerging [5]. The camels are

interesting as a biological model, as a food animal in remote areas and as a component of the arid ecosystem where they contribute to combating desertification and attaining food security [6]. The reproductive performance of livestock depends on the genetics of the species and breed, the management and the production systems [7]. Camels are slow reproducers; a female camel is sexually mature at the age of 4 ± 0.5 years. Pregnancy is just over 12 months [8] and mean calving parameters which include age at first calving (4.76 years), length of calving (29.8 minutes), postpartum estrus (5.27 months), calving interval (23.8 months), and number of calving in a lifetime (8.49 calves) [9]. In recent years much research on camels has concentrated on anatomy and physiology of reproduction. Therefore, this study is conducted to assess the productive and reproductive performance of camels in Bangladesh.

Materials and Methods

Study area

The study was conducted in 'Babe Modina' Camel Farm at North 'Komolapur' in Dhaka for a period of 15 months from January 2007 to March 2008 under the supervision of the Department of Physiology, Sylhet Agricultural University, Sylhet.

Study population

A total of 28 female camels were randomly selected from 43 camels of the 'Babe Modina' Camel Farm and animals were selected on the basis of age (between 5-16 yrs), good health and free from infectious diseases. In which 8 camels were selected for productive parameters and divided into two age groups of 5 to 10 years and above 10 years old age group. For reproductive parameters 14 camels were allocated for recording service per conception, post-partum estrus period and gestation period while 22, 10 and 18 animals were allocated for gathering data for estrus cycle calving interval and diseases, respectively. Thus, in this experiment, for recording some of the parameters, the same animals were used repeatedly.

Data collection

Data were collected through the survey schedule. The survey schedule contained the major items of information such as owner's information, owner's educational status, camel population, housing, feeding, management, breeding system and productive and reproductive performances.

Feeding management

Feeding management practices in the farm was almost same throughout the year. Stall-feeding was practiced with zero grazing but green grass and different kinds of leaves were supplied to the animal when available. Concentrate feed was given twice a day, in the morning and in the evening. Concentrate feed includes wheat bran, rice polish, til oil cake, mustered oil cake, cooked rice, biscuit powder, kheshari crush and common salt. Besides these, rice gruel was given twice a day to the animals.

Parameter studied

The studied parameters were daily milk yield (litre), milk composition, service per conception (no.), post-partum estrus (days), calving interval (days), estrus cycle (days) and reproductive diseases.

Chemical analysis of milk

Chemical compositions as well as fat%, SNF%, lactose% protein% and ash% of collected milk samples were carried out by using the milk analyzer (Lactoscan, Bulgaria). For this purpose milk sample were collected from milk tank in sample bottles and immediately tested in laboratory.

Statistical analysis

Statistical analyses were carried out by Statistical Package for Social Science (SPSS) using F test. To compare the productive and reproductive parameters, data were analysed by using paired sample t-test [10].

Results

The productive and reproductive performances of the camels measured by observing their milk yield, lactation period, total milk yield per lactation, milk composition (Fat, SNF, Lactose, Protein and Ash) Service per conception, Post-partum estrus period, estrus cycle, Calving interval, Gestation period and Production and Reproductive diseases.

Milk yield

The average milk production of different age groups of camel was presented in **Table 1**. It was found that the average milk yield of 5-10 years age group and above 10 years age group were 5.59 ± 1.114 and 3.28 ± 0.55 litre respectively. Statistical analysis showed that there were significant differences ($p > 0.01$) between milk yield of different age groups.

Lactation period

Table 1 show that the average lactation period of different age groups of camel between 5-10 years age and above 10 years age group of camels were 313.75 ± 57.41 and 261.50 ± 56.15 days, respectively. Statistical analysis showed that there were highly significant differences ($p > 0.01$) within lactation period of different ages.

Total milk yield

Table 1 also shows that the average total milk yield of different age groups of camel were 1839.25 ± 1021.10 and 901.00 ± 415.05 litre per lactation, respectively. The variation in the length of lactation period between the two age groups of camel were highly significant ($p > 0.01$).

Milk composition

The average Fat%, SNF%, Lactose%, Protein% and Ash% of different age group of camel in Bangladesh are presented in **Table 2**. It was found that the Fat percentage between 5-10 years and above 10 years age group were 3.35 ± 0.37 and 4.37 ± 0.70 , respectively. The variation in the percentage of Fat between two age of group of camel were highly significant ($p > 0.01$). It was found that the SNF percentage between 5-10 years and above 10 years age group were 8.34 ± 0.24 and 9.17 ± 0.49 , respectively. The variation in the percentage of SNF between the 5-10 years and above 10 years age of group of camel were highly significant ($p > 0.01$). In the present study, it was found that the lactose percentage between 5-10 years and above 10 years age group were 4.75 ± 0.34 and 4.78 ± 0.76 , respectively. The variations in the percentage of Lactose percentage between two ages of

Table 1 Productive performance of different ages of camels.

Parameters	Age (years)	(Mean \pm SD)
	5-10 (n=4)	above 10 (n=4)
Average milk production (/day/ camel)	5.59 ± 1.114	$3.28 \pm 0.55^{**}$
Lactation period (days)	313.75 ± 57.41	$261.50 \pm 56.15^{**}$
Total milk yield/ lactation	1839.25 ± 1021.10	$901.00 \pm 415.05^{**}$

**=Means ($p < 0.01$), *=Means ($p < 0.05$)

Table 2 Milk composition of different ages of camels.

Parameters	Age (Years)	
	5-10 (n=4)	above 10 (n=4)
Fat (%)	3.35 ± 0.37	4.37 ± 0.70**
SNF (%)	8.34 ± 0.24	9.17 ± 0.49**
Lactose (%)	4.75 ± 0.34	4.78 ± 0.76 ^{NS}
Protein (%)	3.88 ± 0.22	3.80 ± 0.08 ^{NS}
Ash (%)	0.73 ± 0.05	0.76 ± 0.11*

**=Means ($p < 0.01$), *=Means ($p < 0.05$)

group of camel were non-significant. Present study showed that the protein percentage between two age group of camel were 3.88 ± 0.22 and 3.80 ± 0.08 , respectively. The percentages of ash between 5-10 years and above 10 years age group were 0.73 ± 0.05 and 0.76 ± 0.11 , respectively.

Service per conception

Table 4 indicates that the average service per conception of different age group of camels were 2.00 ± 0.76 and 2.71 ± 0.41 , respectively. Statistical analysis showed that the differences were highly significant ($p > 0.01$) between the service per conception of different age groups of camel.

Post-partum estrus period

The average days of post-partum estrus period 5-10 years and above 10 years age groups of camel is presented in **Table 3**. The average days of post-partum estrus period of 5-10 and above 10 years age of camel were 166.86 ± 94.50 and 245.14 ± 114.19 days, respectively. Statistical analysis showed that the differences were highly significant ($p > 0.01$) between the days of post-partum estrus period of different types of age groups of camel. The average days of estrus cycle of 5-10 years and above 10 years age of camel were 22.55 ± 1.37 and 22.73 ± 1.56 days, respectively (**Table 3**). The differences were significant ($p > 0.05$) between the days of estrus cycle of different types of age groups of camel.

Calving interval

Table 3 also indicates the average days of calving interval of 5-10 years and above 10 year age of camel was 672.80 ± 73.41 and 723.00 ± 15.86 days, respectively and there were no significant differences between the days of calving interval of different types of age groups of camel.

Gestation period

The average days of gestation period of 5-10 years and above 10 years age of camel was 369.43 ± 9.54 and 369.57 ± 10.53 days, respectively (**Table 3**). Statistical analysis showed that the days of gestation period were non-significant between the days of calving interval of different types of age groups of camel.

Production and reproductive diseases

The production and reproductive diseases of 5-10 years and above 10 years age group of camels are presented in **Table 4**. Among various diseases, mastitis, dystocya and abortion were found throughout the research period. Among them, the percentage of abortion was higher than the others.

Discussion

Milk yield

The average milk production of different age groups of camel was presented in **Table 1**. It was found that the average milk yield was highest in 5-10 years age group than above 10 years age group of camel. There were significant differences ($p > 0.01$) between milk yield of different age groups. The result of milk obtained in this study is consistent with the findings of Simenew et al. [11] who obtained an average 5 kg milk production per day per animal. The average daily milk yield in this study fairly agrees with the findings of Kedija et al. [12] but lower than that of Mehari [13]; Ishag [14]. In this study the dissimilarities of milk production may be due to variation in nutritional, manage mental age of animal and environmental factors. Milk production also decreases with the increasing of age of animal.

Lactation period

In most of the cases lactation length is 12 month but some factors affecting lactation length include season of the year and demand for milk for more prolonged time. From **Table 1** it was found that the average lactation length was highest in 5-10 years age and lowest in above 10 years age group of camels. Average lactation period between two age group of camel differ significantly ($p > 0.01$). The findings of this study was in close agreement with the findings of other researchers [12,14,15-19]. Although Tefera and Gebreah [20] reported that the lactation period was 365 days. The results showed the dissimilarities with the results of the present findings. These differences could be attributed due to nutritional, managerial and environmental factors.

Total milk yield

The average total milk yield of 5-10 years age and above 10 years age group of camels were 1839.25 ± 1021.10 and 901.00 ± 415.05 litres per lactation, respectively (**Table 1**). The variation in the total milk yield between the two age groups of camel were highly significant ($p > 0.01$). Results of the findings of this study were slightly close with the findings of Bekele et al. [21]. He reported that the average milk yield was 1422 ± 74 kg and 1694 ± 185 kg per lactation, respectively. The variations of milk yield are due to the milk secretion stimulated by the green fodder, health condition and age of animals.

Milk composition

The variation in the Fat% and SNF% between the 5-10 years and above 10 years age group of camel were highly significant ($p > 0.01$). On the other hand, there was no significant difference in lactose% and protein % between the 5-10 years and above 10 years age of group of camel but ash% significantly ($p > 0.05$) differ between two age group of camel. The fat% was highest in 5-10 years age group and low in above 10 years age group, because there is negative correlation between fat% and milk yield. If fat% increases the protein % also decreases. The findings supported the findings of Salman [22] who reported the Fat%, SNF%, Lactose%, Protein% and Ash% in camel milk were 3.36, 8.32, 4.16, 3.41 and 0.81%, respectively. The results of present study also agreed with the results of Eisa [23].

Table 3 Reproduction performance of different ages of camels.

Parameters	No. of animals	Age (Years)	
		05-10	above 10
Service per conception (no.)	N=14	2.00 ± 0.76	2.17 ± 0.41**
Post-partum heat period (days)	N=14	166.86 ± 94.50	245.14 ± 114.19**
Oestrus cycle (days)	N=22	22.55 ± 1.37	22.73 ± 1.56*
Calving interval (days)	N=10	672.80 ± 73.41	723.00 ± 15.86**
Gestation period (days)	N=14	369.43 ± 9.54	369.57 ± 10.53 ^{NS}

**=Means (p<0.01), *=Means (p<0.05)

Table 4 Productive and reproductive diseases.

Parameters	No. of animals	Age (Years)	
		05-10	above 10
Mastitis (%)	N=18	2 (11.11)	-
Dystocia (%)	N=18	1 (5.56)	-
Abortion (%)	N=18	3 (16.67)	1(5.56)

Service per conception

It was observed that the services required per conception were high in 5-10 years and low in above 10 years age group of camels (**Table 3**). Statistical analysis showed that the differences were highly significant (p>0.01) between the service per conception of different age groups of camel. This happened due to the reproductive efficiency also decreases with aging. The findings of this study were in close agreement with the findings of other researchers [24]. Simenew et al. [25] reported the average number of service per conception was 1.84 ± 1.32.

Post-partum estrus period 26

The average days of post-partum estrus period was lowest in 5-10 years and highest in above 10 years age of camel (**Table 3**). The average days of postpartum estrous between two age group of camel differ significantly (p>0.01). The results partially agree with the findings of Ref. [26].

Estrus cycle

It was found that the average days of estrus cycle of 5-10 years and above 10 years age of camel were 22.55 ± 1.37 and 22.73 ± 1.56 days, respectively (**Table 3**). Statistical analysis showed that the differences were significant (p>0.05) between the days of estrus cycle of different age group of camel. The findings are closely similar to the findings of Bodenheimer [27]. They reported that the length of estrus cycle was 14-21, days. Although, Musa [23] reported that the estrus cycle was seen in dromedary camel within 28 days.

Calving interval

The average days of calving interval of 5-10 years was lowest and above 10 year age of camel was highest (**Table 3**) and there was significant (p<0.01) difference in results between two age group of camel. This is happened due to aging process. The findings

of the present study closely agree with findings of Simenew et al. [11] and Mayouf et al. [17] they reported the calving interval of camel were 660 and 720 days respectively. The difference between average days of calving interval could be explained by the method of husbandry management.

Gestation period

The mean gestation periods of 5-10 years and above 10 years age of camels were mostly similar (**Table 3**). Statistical analysis showed that the mean gestation period was non-significant between different types of age groups of camel. The findings of the present study in line with the findings of Keskes et al. [28] who reported that in dromedary camel, the mean gestation period was 12.43 ± 0.5 months.

Production and reproductive diseases

The production and reproductive diseases of 5-10 years and above 10 years age group of camels are presented in **Table 4**. Among various diseases, mastitis, dystocia and abortion were found throughout the research period. Among them, the percentage of abortion was higher than the others. But Bekele et al. [23] and Younan et al. [29] detected mastitis in camel. The differences in diseases reporting might be due to resistance of individual animal and other environmental factors.

Conclusion

Camels play an important role to improve the livelihood in the Bangladesh. The low reproductive performances could be attributed to late age of puberty, long gestation length, and poor management of herders, environmental factor and other physiological and pathological reasons. Proper management and health services can play significant roles in the long term improvement of camel reproduction and productivity. In order to improve the productivity of camels in the study area, development interventions should take into consideration the socio-economic characteristics of camel herders and the prevailing problems in the area.

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