

Assessment of some production traits of Butana heifers as affected by age and calving season

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Summary

The study investigated the effect of age at first calving and calving season on the first lactation performance of 203 Butana heifers maintained at Atbara Station during (1970/2000). Heifers were grouped into early, medium and late ages at first calving- (<42; 42-48 and >48 months). Seasons were classified into hot (March /August) and moderate (September/February). Data were analysed using the computer program of SPSS.

Age group significantly affected total lactation yield, lactation length, dry period and calving interval ($P<0.001$). Older heifers at first calving were superior compared to the other two age groups producing 259.54kg (23.18%) more milk. However, their lactations were longer by 31.5 days (12.59%) than the youngest age group.

The dry period and calving interval of the youngest age group were 60.35 (29.92%) and 28.11 (6.67%) days longer than those of the late maturing group.

There was a significant season effect on total yield, days in milk and days dry ($P<0.05$). The hot season calves realized 129.92kg greater yield (12.49%) in a 14.02 days longer (5.82%) lactation, but with a correspondingly shorter dry period (17.8 days less, 9.68%) compared with the moderate season.

Age and season of calving affected the productive traits in question with the greatest yield and longest duration achieved by late maturing cows and in the hot season.

Introduction

Age at first calving is a vital economic trait in a dairy enterprise, it signifies the commencement of a heifer's productive life. The younger ages have been proven to reduce the female rearing cost (Mostert, *et al.*, 2001). Non-genetic factors such as calving season and heifer's birth weight were found to affect age at first calving. However, changes in the genetic makeup of the herd over years could also be a source of variation in age at first calving (Saeed, *et al.*, 1987). After weaning tropical heifers tend to be the most neglected group in the farm since there is no immediate income from them. Some producers tended to feed them as cheaply as possible resulting in a poor growth rate and older age at first calving (Gaber, 1987). Research on dairy heifers has focused on rearing dairy replacements to calve at a suitable ages to reach on adequate size and level of body condition that allows them to utilize somebody reserves in early lactation (Wilson *et al.*, 1987). The present study was designed to investigate the effect of age and season of calving on the first lactation performance of Butana heifers.

Materials and Methods

Location:

Atbara Research Station is located north to Atbara city in the/ River Nile State at latitudes 17° 42N and longitudes 33° 58E and 345 meters above sea level.

Management:

Heifers were fed twice daily on sorghum bicolor (Abu 70) and Midcago sativa (Lucerne). Concentrate were offered twice daily during milking time. Heifers were milked with their calves present and annually vaccinated against the major infectious diseases.

Data collection and manipulation:

Records 203 Butana heifers covering the period 1979- 2000 were collected from Atbara Research station. The records were assigned to either of three calving age groups: early, medium or late. The age groups were <42; 42-48 and >48 months old. The data was also classified into two calving seasons: hot (March/August) and moderate (September/February). The study dealt with first lactation yield, lactation length, dry period and calving interval. Meteorological data from the period when the records were made showed that the average highest maximum and lowest minimum temperature were 47°C (June) and 5°C (January), respectively.

Statistical analysis and methods of calculations:

The data was transferred to a microcomputer spread sheet and prepared for statistical analysis in the statistical package SPSS Mecer-Hill (1983). A least squares fixed model was fitted as follows:

$$Y_{ij} = U + A_i + S_j + E_{ij}$$

Where:

Y_{ij} = The trait studied, either milk yield, lactation length, dry period or calving interval.

U = The overall mean underlying the trait studied.

A_i = The effect of age group (1 = Early; 2 = Medium; 3 = Late).

S_j = The effect of season (1 = Hot, 2 = moderate).

E_{ij} = Random error associated with single observations.

Results

Total milk yield, lactation length, dry period and calving interval were significantly ($P < 0.001$) affected by age group (**Table 1**) The respective overall means of the four traits were 975.06 ± 25.13 kg; 233.76 ± 3.03 days; 175.01 ± 4.19 days and 409.21 ± 2.63 days (**Table 2**).

Table 1. The analysis of variance of milk yield, lactation length, dry period and calving interval of Butana heifers by age and calving season.

Source	Trait	d.f	Mean square	F	Sig
Age group	Milk yield (kg)	2	1191414.114	9.278	0.000
	Lactation length (days)	2	17283.489	8.995	0.000
	Dry period (days)	2	64259.150	18.184	0.000
	Calving interval (days)	2	14024.212	10.065	0.000
Season	Milk yield (kg)	1	843937.428	6.572	0.011
	Lactation length (days)	1	9700.674	5.048	0.026
	Dry period (days)	1	15841.667	4.483	0.035
	Calving interval (days)	1	355.472	0.255	0.614
Error	Milk yield (kg)	199	128419.206	-	-
	Lactation length (days)	199	1921.562	-	-
	Dry period (days)	199	3533.795	-	-
	Calving interval (days)	199	1393.310	-	-

Table 2. Effect of age group and season of calving on milk yield (Kg), lactation length, dry period and calving interval (day).

Factor	N	<u>Milk yield</u>		<u>Lactation length</u>		<u>Dry period</u>		<u>Calving interval</u>	
		LSM	SE	LSM	SE	LSM	SE	LSM	SE
Overall	203	975.06	25.13	233.76	3.03	175.01	4.19	409.21	2.63
Age groups:									
Early	71	859.46 ^b	42.54	219.01 ^b	5.20	201.73 ^a	7.05	421.71 ^a	4.43
Medium	65	946.76 ^b	44.73	231.60 ^b	5.47	182.29 ^a	7.42	412.31 ^a	4.66
Late	67	1119.0 ^a	43.82	250.55 ^a	5.38	141.38 ^b	7.26	393.60 ^b	4.56
Seasons:									
Hot	91	1040.0 ^a	37.66	240.73 ^a	4.60	166.11 ^b	6.24	407.87 ^a	3.92
Cold	112	910.1 ^b	33.87	226.71 ^b	4.14	183.91 ^a	5.61	410.54 ^a	3.52

LSM = Least squares mean

SE = Standard error

Means with different superscripts differ significantly

Discussion

Previous research has demonstrated significant differences between breed and age at first calving. Alim (1960) reported that age at first calving has a slight and insignificant effect on first lactation yield. He suggested that this was due to the fact that zebu cattle calve well beyond the threshold that affects first lactation yield. In compliance with the results in table 2 Ageeb and Hillers (1991) found an increased milk yield with age from 1504kg for heifers ≤ 3 years old to 2107kg for those heifers which calved over 4 years. Bath *et al.* (1985) attributed the low production of young heifers to the lactation stress in young growing animals and the ability of the older ones to gain weight quickly after calving. Inconsistent results were however, obtained by Mohamed and Abu Nikhaila (2004) indicating a greater yield by the youngest age-group due to their better management during their early lives.

Late age at first parturition is primarily attributed to the puberty and sexual maturity and may suggest poor management of heifers leading to poor reproduction in zebus. It was suggested that it is possible to reduce age at first calving by better feeding which could make an earlier calving possible (El khidir, 1977).

The early calvers in this study recorded the longest calving interval. Goshu *et al.* (2007) claimed similar findings. Longer calving intervals were also associated with longer post-partum anestrus interval which will impact the overall fertility levels. That is probably responsible for the high reproductive wastage commonly associated with local breeds of cows (Abu Nikhaila and Beshir, 2004). Mahadevan (1958) stated that the first calving interval was some what longer than the subsequent ones on account of the high persistency of the first calvers.

There is a large body of research indicating an essential role of calving season in most of productive traits in dairy animals. This is probably a reflection of the wide diversity of climate, topography and systems of husbandry in the tropics. Eid *et al.* (2012) reported that the greatest yield with the longest duration in winter season. This is in sharp contrast with the present results and with the results obtained by FadelMoula (1994) and Oliveira *et al.* (1989) who supported the superiority of milk production in the hot season. Similar to the findings of Reshma *et al.* (2007) the cows calving in the moderate season in this study exhibited the longest dry period. This is inconsistent with the report of Ali (2011) who found the shortest days dry in the winter season.

Conclusion

The delay of age at first calving brings about a better initial production performance in terms of greater yield over a long milking duration. However, there is need to study its effect on lifetime production

The dry period and calving interval were not in accordance with the desirable length proposed by cow's calendar which indicates the need for improvements in management. Seasonal variations and age at first calving have a significant impact on Butana heifers performance.

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