Characterization of a small herd of Butana cattle Northern Sudan

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SUMMARY

Milk production records of Butana cattle maintained at Atbara Research Station for over thirty (1970 / 2001) were obtained to investigate some production reproductive traits from. Traits chosen were lactation yield lactation length, age at first calving and calving interval. Data revealed a total lactation yield of 1898.94±22.41 kg; first 100-days milk yield of 840.61±8.84 daily milk yield of 6.49±0.08 kg; lactation length of 294.75±2.00 days; age at first calving of 43.63±0.21 months and calving interval of 391.48±2.83 days. Lactation yields were highly affected by both parity order and the linear regression of lactation length ($P<0.01$), and by calving interval ($P<0.05$). However, the yield of the first 100-days of lactation was highly affected by age at first calving ($P<0.01$).

Data on age at first calving and calving interval was divided into three classes; The first class ranged between 23.7 and 38.8 months, the second class ranged between 362 and 395 days.

INTRODUCTION

Venkaya and Anantakrishnan (1956) stated that age at first calving was found to be a potent factor that influences milk yield, length of lactation and calving interval of the first lactation. They indicated that the very early calvers have proven to be poor yielders with a short length but with a corresponding shorter first calving interval. These cows can be expected to have more calvings and a longer productive life. Bath *et al*., (1985) stated that regular calving of dairy cows for a period of 12-13 months was economically desirable for profitable production.

The present study was aimed to investigate some production and reproductive characteristics (milk yield, lactation length, age at first calving and calving interval) of Butana cattle at Atbara Station, North Sudan.

MATERIALS AND METHODS

The station is situated in the River Nile State north at Atbara town at latitudes 17 42 ºN and longitudes 33 58 ºE and at 345 meters above sea level. The foundation herd was brought from Butana region after which the breed was named. Cattle type and herd management as well as ecology and climate of the station had been described by Mohamed (2004). The primary objective of the station was to improve the Butana cattle [through selective production breeding for dairy].

Data collection and manipulation:

Data of this study involved records of 137 milking cows subjected to screening processes based on milking seasons of over 150 days. Data on age at first calving and calving interval were divided into three classes of (<38.8; 38.0-44.9 and >45.0 months) and (<361; 362-365 and >395 days) respectively.

Statistical analysis and methods of calculations:

The data was analyzed according to the Statistical Package of Social Studies (SPSS) that computed least squares means, standard errors, coefficient of variation and Duncan's Multiple Range Test (DMRT) for comparison of mean performances. Analysis of variance was performed in accordance with the following model to investigate the effect of the dependent variables (total lactation yield, yield of the first 100-days of lactation and the daily yield per parity) on the independent variables (lactation length, age at first calving and calving interval).

$$Y_{ij}kl = N + P_i + A_j + C_k + [P \times C]_{ik} + bT + E_{ij}kl$$

Where:

$Y_{ij}kl$ = ijkl observation of the trait in question.
N = Overall mean.
P_i = Effect of the parity number (i=10).
A_j = Effect of age at first calving (j=1,3).
C_k = Effect of calving interval (k=1,3).
$[P \times C]_{ik}$ = Parity x calving interval interaction.
b = Linear regression coefficient.
T = Lactation length.
$E_{ij}kl$ = Random error term.

RESULTS

Figures in table 1 indicated that both daily milk yield and the yield of the first 100-days of lactation increased gradually from parity one and attained it's maximum in parity four (2050.26±65.95 kg), which was significantly higher than the yield in the other lactation ($P<0.05$) with the exception of lactation six which secured a total yield of 2014.91±87.20 kg comparable with lactation four. The mean total yield for the 10^{th} lactations was 1898.94±22.41 kg with a coefficient of variation of 36.41%. The lowest lactation yield was 1691.28±100.43 kg, and was witnessed in the 9^{th} parity ($P<0.05$).

Table 1 also depicted that lactation length followed a descending order for the first five parities. The first parity length was 318.91±6.62 days and it showed the longest duration (P<0.05), whereas the shortest duration was 279.68±9.98 days and was displayed in parity ten (P<0.05). The overall mean lactation length was 294.75±2.00 days with a coefficient of variation of 20.94%.

The results in table 1 also portrayed an overall mean calving interval of 391.48±2.83 days with a coefficient of variation of 20.74%. The first calving interval was of 419.78±15.25 days and was the longest, whereas the second calving interval was of 375.81±6.12 days and was the shortest one (P<0.05).

The results on age at first calving revealed a mean of 43.63±0.21 months with a coefficient of variation of 5.63%.

Table (1). Least-squares means and standard errors of total milk yield, first 100-days yield, daily yield, lactation length and calving interval per parity.

Parity	LMS SE ±				
	Total milk yield (kg)	First 100- days milk yield (kg)	Daily milk yield (kg)	Lactation length (days)	Calving interval (days)
1	1819.39±60.15^{ab}	660.59±19.96^{a}	5.73±0.17^{a}	318.91±6.62^{b}	419.78±15.25^{b}
2	1889.21±51.24^{ab}	854.72±21.38^{bc}	6.41±0.14^{bc}	294.98±4.74^{a}	375.81±6.12^{a}
3	1919.88±54.27^{ab}	887.87±21.63^{bc}	6.63±0.17^{bc}	290.39±4.79^{a}	386.31±5.96^{a}
4	2050.26±65.95^{b}	919.74±25.55^{c}	7.28±0.30^{bc}	288.06±4.99^{a}	376.81±6.04^{a}
5	1816.78±60.61^{ab}	865.77±25.52^{bc}	6.59±0.18^{b}	281.97±5.52^{a}	397.46±8.38^{ab}
6	2014.91±87.20^{b}	877.60±27.41^{bc}	6.64±0.26^{bc}	298.46±6.11^{ab}	387.88±9.66^{a}
7	1823.83±76.27^{ab}	843.84±30.64^{bc}	6.45±0.28^{bc}	286.23±7.33^{a}	406.03±11.05^{ab}
8	1867.47±84.43^{ab}	832.12±31.45^{bc}	6.45±0.26^{bc}	297.02±7.73^{ab}	406.85±8.36^{ab}
9	1691.28±100.43^{a}	802.02±42.22^{b}	5.73±0.30^{a}	297.30±8.63^{ab}	394.32±14.60^{ab}
10	1834.55±143.89^{ab}	890.09±58.89^{bc}	6.48±0.41^{bc}	279.68±9.98^{a}	
Mean	1898.94±22.41	840.61±8.84	6.49±0.08	294.75±2.00	391.48±2.83
C.V%	36.41	32.45	38.03	20.94	20.74

SE = Standard error.
C.V. = Coefficient of variation.
In this table means within each column not followed by the same letter (s) differ significantly at (P<0.05).

Lactation yield were highly affected (P<0.01) by both parity order, linear regression of lactation length, and calving interval (P<0.05).

Table (2) depicted that age at first calving affected (P<0.01) the milk yield of the first 100-days of lactation, but with no effect (P>0.05) on both total and daily yields. However, the interaction of parity and calving interval did not affect the lactation yield (P>0.05).

Table 2. Analysis of variance for total lactation yield, first 100-days yield and daily yield.

Source of variation	D.F	Mean square		
		Total milk yield	First 100-days milk yield	Daily milk yield
Parity	9	1392806.243**	692020.075**	16.152**
Age at first calving	2	292365.695 NS	336947.51**	2.539 NS
Calving interval	2	1364191.897*	224886.657*	17.310*
Parity x calving interval	18	564099.596.NS	90558.765NS	7.990 NS
Linear regression of lactation length	1	78667659.600**	581523.752**	41.994**
Error	922	17920.150	3711.699	0.231

* = *Significant at 0.05.*
** = *Significant at 0.01.*
NS = *Not significant.*

Table (3) portrayed that cows calved at a younger age (<38.8 months) yielded better than both groups calving at an older ages (P<0.05), it was associated with the highest total yield of 1975.82±39.49 kg, first 100-days yield of 885.42±14.39 kg and daily yield of 6.76±0.15 kg. Whereas the second class of age at first calving ranging between 38.9-44.9 months and the third class is ranging between 45.0-73.8 months secured comparable lactation yields.

Table 3. Least-square means and standard errors of total lactation yield, first 100-days yield and daily yield (kg) obtained to the three classes of age at first calving.

Trait	Classes of age at first calving (months)		
	First (23.7-38.8)	Second (38.9-44.9)	Third (45.0-73.8)
Total lactation yield	1975.82±39.49[b]	1839.32±38.32[a]	1867.23±37.62[a]
First 100-days milk yield	885.42±14.39[b]	785.75±13.51[a]	846.47±17.75[a]
Daily yield	6.76±0.15[b]	6.25±0.12[a]	6.42±0.11[a]

In this and the next table, means with different superscript in the same row were significantly different at (P<0.05).

Table 4 revealed that the second class of calving interval ranging between 362-395 days showed the highest total lactation yield of 2074.34±36.01 kg, and the highest daily yield of 6.60±0.13 kg (P<0.05). Although the yield of the first 100-days of lactation was not significantly different among the three classes of calving intervals, but its highest value of 845.05±0.05 kg was recorded by the second class. However, the lowest lactation yield of 1721.15±66.99 kg and daily yield of 5.99±0.21 kg together with the lowest yield of the first 100-days of lactation of 812.94±25.56 kg were witnessed by the longest period of calving interval (third class).

Table 4. Least-square means and standard errors of total milk yield, first 100-days yield and daily yield obtained from the three classes of calving interval.

Trait	Classes of calving interval (days)		
	First (<361)	Second (362-395)	Third (>395)
Total lactation yield	1784.84±29.95[a]	2074.34±36.01[b]	1721.15±66.99[a]
First 100-days milk yield	842.75±12.98[a]	845.05±0.05[a]	812.94±25.56[a]
Daily yield	6.51±0.14[b]	6.60±0.13[b]	5.99±0.21[a]

DISCUSSION

Many reports in literature have demonstrated that Butana cattle have potentialities similar to that of Kenana cattle (Saeed, *et al.*, 1987 and El Habbeb, 1991). With respect to other tropical breeds the herd in the present study demonstrated comparable yields to the Indian cattle as reported by Bhatngar *et al.*, (1983). The yield of the first 100-days of lactation in

this study accounted for 44.27% of the total lactation yield. Similar results were obtained by Badi (1981).

The highly significant effect of parity order on total and daily yield of milk reported here goes in line with that reported by El Habeeb (1991) and Musa (2001) for Kenana and Butana cattle respectively. The effect of parity order on initial and peak yields were on the other hand documented by Ahunu and Kabuga (1994). These progressive increases in yield associated with advanced parities may be explained by the progressive increase in secretary tissues with advancing lactations.

In this study it was verified that lactation length was significantly affected by parity order ($P<0.05$). The lactation length is steadily decreasing with concomitant advanced parities. Many reports in literature were in line with this findings (Lindstorm and Solbu, 1978 and El Habeeb, 1991). The present results postulated that the linear regression of lactation length showed a highly significant effect on lactation yields ($P<0.01$). Musa (2001) claimed a similar advocation. These views confirm previous findings of Ahmed *et al.*, (1996) who worked on Friesian cows in Libya and showed that linear and quadratic regressions of lactation length on daily milk yield were significant in the first lactation.

In the present study the overall mean of age at first calving was similar to that reported by Fengaly (1980) and Musa (2001) for the same breed. Similar results were obtained by Dahlin (1998) for some tropical breeds. The data in this investigation revealed that the first 100-days of milk yield was highly affected by age at first calving ($P<0.01$). Romero *et al.*, (1992) came with the same advocation and claimed that the first 100-days of milk yield were significantly affected by age at first calving both through the initial and peak yields.

The overall mean of calving interval in this study was close to the findings of Alim (1960) for Kenana cattle in the Gezira and El Habeeb (1991) for Butana cattle at Atbara Station. It has been pointed out that the first calving interval was somewhat longer than the subsequent ones on account of the high persistency of the first calvers and to the compensatory growth that have been experienced by the first calvers compared to the older ones (Musa, 2001). On the other hand variations in calving intervals among different parities could be attributed to the variation in the breeding systems concerning the service time, failure of cows to conceive after one service and inadequate feeding (El Amin, 1969). The physiological status of cow and bull might also be an important factor.

The data under this study (table 3) indicated that cows calved at a younger age (first group) yielded better ($P<0.05$) than the other groups this might be justified by the fact that these cows received better management during their early lives and consequently they reached the breeding age earlier. Roy (1980) postulated such a claim in his study. On the other hand the second class of calving interval depicted the highest lactation yields compared to those on the other classes, these results might be attributed to the fact that this class fits well within the optimum recommended length of calving interval in literature.

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تقييم بعض الصفات الإنتاجية والتناسلية في أبقار البطانة

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ملخص البحث:

تم إجراء هذه الدراسة بمحطة تربية الحيوان عطبره . وتم تحليل المعلومات من سجلات الأبقار للفترة مابين 1970–2001م وكان متوسط الإنتاج الكلي للحليب في الموسم 22.41±1898.94 كيلوجرام ، متوسط إنتاج الحليب في فترة المائة يوم الأولي 8.84±840.61 كيلوجرام ، متوسط إنتاج الحليب اليومي 0.08±6.49 كيلوجرام ، متوسط طول فترة الإدرار 2.00±294.75 يم ، متوسط العمر عند أول ولادة 0.21±43.63 شهر ومتوسط طول الفترة بين الولادتين 2.83±391.48 يوم . آفضت الدراسة بأن ترتيب مواسم الحليب والإنحدار الخطي لطول فترة الحليب كان له أثرآ عالياً ($P<0.01$) علي مجمل متوسطات الحليب . أثبتت الدراسة أن العمر عند أول ولادة كان مؤثرآ ($P<0.01$) علي إنتاج المائة يوم الأولي من الحليب وكان تأثير طول الفترة بين الولادتين علي مجمل متوسطات الحليب ($P<0.05$) . وبتقسيم العمر عند أول ولادة وطول الفترة بين الولادتين إلي ثلاث مجموعات وجد أن الأبقار التي أنجبت في عمر مبكر (23.7-38.8) شهر إضافة لأبقار القسم الثاني لطول الفترة بين الولادتين (362-395) يوم أعطت أعلي متوسطات للحليب ($P<0.05$) مقارنة بالأقسام الأخري .