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Effect of Season of Calving and Parity on Some Productive Traits in Pure and Crossbred Cattle in Sudan

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Abstract: This study was conducted to compare some productive traits (overall milk yield; 100 days milk yield; lactation length) and the effect of season of calving and parity number on imported versus locally bred and cross bred (50, 56.5 and 62.5%) in 2 different farms in Khartoum, Sudan. The results indicated a highly significant effect of breed in terms of 100 days milk yield; however, season of calving and parity showed insignificant effect in both farms examined. The lactation length impact on 100 days milk yield is significant at $p<0.01$ between purebred and cross ones.

Key words: Season, calving, parity, cattle, Sudan

INTRODUCTION

The demand for animal products is increasing in the tropics and there is an urgent need for research to discover how to increase production in such areas. In arid countries the low level of productivity of indigenous breeds of cattle along with the increasing demand for milk and its products in urban areas have necessitated the importation of exotic European breeds, particularly the Holstein-Friesian, for use directly in milk production or to upgrade the indigenous breeds. Little attention has been given to the physiological problems that exotic breeds might have in order to withstand the harsh environmental conditions. Various reports indicated low production levels of milk for the Sudanese breed cattle (Osman and Elamin, 1971; Bayoumi and Danasoury, 1963). The mean 305-day milk yield (kg) in Holstein Friesian was 7980±54.2 (Wicks *et al*., 2006). Significant effects of parity were observed on the same parameters. Breed was also found to have a significant effect on some of the parameters. However, there was no significant interaction between breed and parity. The differences between breeds and between parities are typical of the values reported in the literature (Nielsen *et al*., 2003). Breed was found to have significant effects on both the peak yield. The effects of parity on the coefficients of the lactation curve were found to be independent of the breed of cow in question (Hansen *et al*., 2006).

The Holstein-Friesian is the most widely used exotic dairy breed in all farming sectors of many tropical countries including Sudan. The breed is popular for its potentially high milk producing ability and has attractive capabilities for a country where milk supply is not yet able to meet the demands of the growing population. Management systems vary greatly from low input, low milk output to intensive zero grazing based on irrigated pasture production (Peeler and Omore, 1997). Information on the productive herd-life of these animals in the Sudan environment is scarce, the objectives of this study were to evaluate the effect of seasons of calving and parity on selected productive traits in Holstein-Friesian crossbred in Sudan environment under 2 different managemental systems (Butana farm versus University of Khartoum farm).

MATERIALS AND METHODS

Farms and feeding: Butana farm is located in Tieba Elhasanab, 30 km south of Khartoum. This farm was established in 1989 by the importation of 500 Holstein-Friesian at different stage of pregnancy form the Netherlands.

Khartoum University farm is located in Khartoum North, Shambat. This farm was established in 1940 by purchasing of local breeds and adopted in 1972 breeding program with Holstein-Friesian. It maintains the level of foreign blood ranging from 25-62.5%.

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The cows were divided into 6 groups in the 2 farms; imported (breed-1); locally born Friesian (breed-2); 50% Friesian blood (breed-3); 56.5% Friesian blood (breed-4); 65.5% Friesian blood (breed-5).

Cows were fed on forage (home-raised sorghum bicolor), Abu 70 (Medicago sativa), Berseem and concentrates. They were allowed to graze 2 h daily from 7-9 am and the major green fodder is given in the yard. The concentrate is provided during milking and it is composed of cotton seed cake, wheat bran, mollases and salt.

Data collection and analysis: Out of 105 cows at different physiological status, 40 cows were randomly selected and their records were obtained from the University farm. As for Butana farm, 80 cows were also randomly selected out of a herd of 500 cows. Half of this figure was imported and the other half were locally born. The period for which the data was collected from 1989-1998. MINITAB program was employed to analysis the data statistically.

RESULTS AND DISCUSSION

Table 1 and 2 show the effect of season of calving on overall milk yield in Butana and University farms. It appears that there were no significant differences in the 2 farms.

This study is attempted to address the effect of season of calving and parity on some productive traits in the exotic breeds of cattle as compared to different farming systems in Sudan. Holstein-Friesian cattle raised in tropical environments pose a challenge due to genotype by environment interactions which may lead to higher rates of involuntary culling and reduce profit margins obtainable. Due to the low production level of local breeds in terms of milk production in Sudan, the improvement by cross breeding is one of the tools to increase the milk production levels. However, should be done timely with the breeding programs.

Table 3 and 4 show 100 days milk yield in the 2 farms with similar non significant effect due to season or lactation number. Similar findings were also obtained by Ali *et al.* (1988) when he compared Zebu cows with Friesian cows and they confirmed no significant effect of season of calving on milk yield.

Lactation length in relation to the parity number is presented in Fig. 1. The highest figures were obtained for breed-3 (56.5% Friesian blood) and breed-2 (Locally born Friesian cattle).

Figure 2 shows the influence of the number (s) of parity on 100 days milk yield in the 2 farms used in this study.

Table 1: Effect of season of calving on overall milk yield in butana farm

Season	1st lactation	2nd lactation	3rd lactation	Pooled lactation
Summer	4971.82[a]	4109.06[a]	4832.24[a]	4638.61[a]
Autumn	4629.34[a]	5327.30[a]	4912.02[a]	4956.20[a]
Winter	4792.66[a]	5167.35[a]	5077.42[a]	5012.49[a]

[a, a]: Means on the same column having same superscripts are significantly not different at $p<0.05$

Table 2: Effect of season of calving on overall milk yield in university farm

Season	1st lactation	2nd lactation	3rd lactation	Pooled lactation
Summer	2590.40[a]	2141.39[a]	2681.30[a]	2470.80[a]
Autumn	1737.19[a]	2115.39[a]	2319.40[a]	2070.65[a]
Winter	1725.25[a]	2419.45[a]	2967.47[a]	2370.66[a]

[a, a]: Means on the same column having same superscripts are significantly not different at $p<0.05$

Table 3: Effect of season of calving on 100 days milk yield in butana farm

Season	1st lactation	2nd lactation	3rd lactation
Summer	2028.30[a]	1717.03[a]	1466.70[a]
Autumn	1878.09[a]	2061.35[a]	1746.88[a]
Winter	1933.56[a]	1906.31[a]	2011.00[a]

[a, a]: Means on the same column having same superscripts are significantly not different at $p<0.05$

Table 4: Effect of season of calving on 100 days milk yield in university farm

Season	1st lactation	2nd lactation	3rd lactation
Summer	830.96[a]	725.49[a]	1081.41[a]
Autumn	677.56[a]	875.60[a]	854.23[a]
Winter	769.09[a]	818.00[a]	891.17[a]

[a, a]: Means on the same column having same superscripts are significantly not different at $p<0.05$

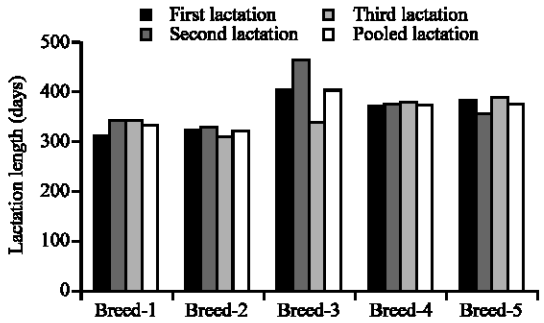

Fig. 1: Effect of parity number on lactation length (days) in Butana and university farms

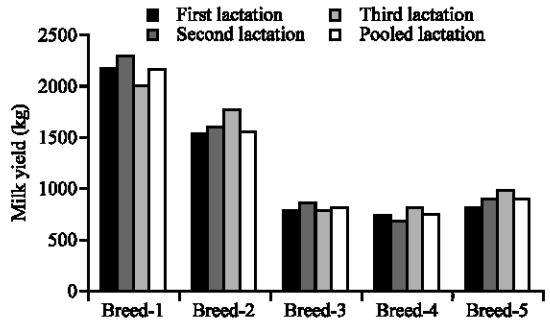

Fig. 2: Effect of parity number on 100 days milk yield in Butana and university farms

Milk yield is the most important trait in dairy cattle production and total yield in 305 days is often used in genetic evaluation of animals. Various factors affect production during a lactation length of 305 days and consequently the shape of the lactation curve, such as sources of variation are the breed (Grossman *et al*., 1986), fixed environmental factors (Ray *et al*., 1992) and management practices (Tekerli *et al*., 2000) and the calving year, calving season, farm operation and parity (Hansen *et al*., 2006).

Various reports indicated that season of calving play an essential role in most of the productive traits in dairy animals. Crossbred kenana x Friesian cows, the wet season calvers produced more milk and had the longest lactation period in Sudan. This is in sharp contrast with data obtained by Fadel Elmoula who indicated that dry summer calvers were more superior in milk production. Environmental effects of herd, year-season, parity, sire area of origin, milk yield class and stage of lactation all significantly affected length of productive life.

A sufficient length of productive life of various European dairy cattle breeds is of great economic importance under tropical environments where there is a large variability in terms of feed quality and quantity and disease challenges. In developing countries, the performance of high-yielding breeds imported from countries with highly advanced production systems is often negatively affected due to genotype-environment interactions (Bondoc *et al*., 1989).

Under the traditional system of management milk yield is about 700 kg per lactation, while under improved management milk yield is about 2254 kg per lactation. Holstein-Friesian milk yield is significantly affected by ambient temperature under tropical conditions. Milk yield in Sudan was reported to be 3358 kg per lactation compared to that found in temperate zones e.g., Sweden 6529 kg (Bratt, 1985) and England 5533 kg (Ditton, 1985).

Lactation length is defined as the period between 2 consecutive calving during which are capable of producing milk or lactating. As far as the lactation length is concerned. Figure 3 and 4 showed a non significant effect of season of calving on lactation length in the 2 farms. With figures in the Butana farm being higher than those of University farm, with the highest record of 423.27 during summer for the 1st lactation in university farm and 308.6 during winter in the Butana farm (the least level). Mahmoud (1987) reported a mean of 241±0.05 days as lactation length for Friesian cattle in Sudan. In line with this, Fadel Elmoula (1994) revealed that lactation length was affected by the percentage of foreign blood in cattle, with 25% having the least figure compared to the rest of percentages (37.5, 50 and 62.5%).

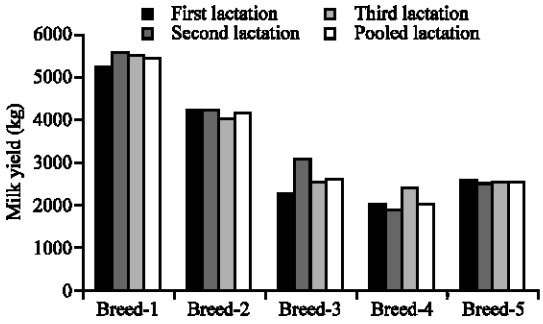

Fig. 3: Effect of parity number on overall milk yield (kg) in Butana and university farms

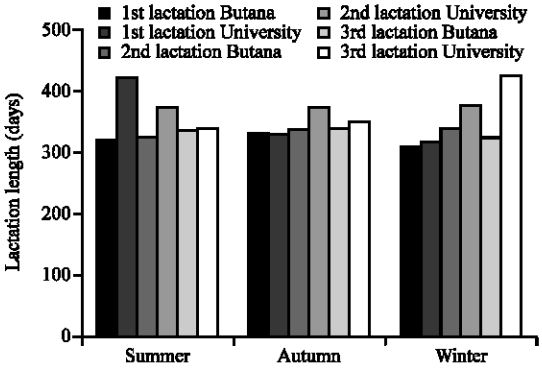

Fig. 4: Effect of season of calving on lactation length in Butana and university farms

It should be noted that exotic breeds of cattle, when brought to a tropical environment, will not be able to express their full genetic potential if not kept under good management conditions. This is expected to play a major role in the variation in the milk yield, whether over all yield or 100 days yield.

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