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EFFECTS OF LOCATION, PARITY, CALVING INTERVAL AND CALF BIRTH WEIGHT ON 305-DAY MILK YIELD OF FRIESIAN AND CROSSBRED COWS IN NORTHERN NIGERIA

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ABSTRACT

Three hundred and nineteen (319) lactation records of 49 purportive sampled pure and crossbred Friesian cows were used to evaluate the effects of Calving Interval (CI), Calf Birth Weight (CBW), Parity and location of rearing on 305-Day Milk Yield. The results showed that Crossbred cows had higher Total- and 305-Day Milk Yield (305-DMY) than purebred Friesian cow. There was no significant effect of parity on Total- and 305-Day Milk Yield of Friesian cows, although the 305 milk yield nominally increased with parity. There was a significant increase ($P<0.01$) in the 305-day milk yield of crossbred cows with increased parity. The 305 DMY was better with longer Calving interval (11-14 months) than for lower calving interval in both Friesians and crossbred cows. The 305- Milk yield of Friesian and Friesian x Local cattle increased with calf birth weight. The effect of calf weight on 305- Milk yield was significant ($P<0.01$) for Friesian x Local crossbred cows. There was variation in the 305 DMY among the Friesians kept in the three locations, with the highest mean value recorded in Kano where fogger is used to mitigate the effect of climatic conditions. In the present study, although production environment depressed the 305-day milk yield of Friesian cow in Nigeria, the use of environmental modification such as the application of foggers and crossbreeding may help to improve the 305- day milk yield of cows.

Keywords: Parity, 305 Day Milk Yield, Friesian, Calving interval (CI) and Calf Birth Weight

INTRODUCTION

The main purpose of raising dairy animals is for direct production of milk and for the production of replacement cows for future milk production. Dairy cattle represent the highest producer of milk worldwide. The Zebu breeds (*Bos indicus*) are the most important source of domestic milk in Nigeria with 96 % of cattle population in the hands of pastoral Fulani (Cunningham and Syrstrad, 1987, RIM, 1990). The per capital milk consumption in Nigeria is low (9.17Kg/ year), partly due to the low milk production (211.6 Kg/305 Day Milk Yield), long calving interval (22 – 24 months) and age at first calving (48 – 50 months) of the traditional Zebu (Bunaji) cattle (ILCA, 1976). There is therefore a wide gap between supply and demand for dairy milk in Nigeria (1,120,005 tonnes). A recent Livestock Subsector Review report (2005) put the demand for dairy milk at 1,120,005 tonnes as against the current supply of 606,827 tonnes. In response to the huge deficits, there have been efforts at direct importation of the high milk producing European cattle (*Bos Taurus*) such as the Holstein cattle and crossbreeding with the local Zebu breeds by government owned institutions and some privately owned commercial dairy farms. Breed substitution or crossing of exotic breeds with their locally adapted counterparts can only result in rapid improvements in dairy productivity if they are appropriate for the environment and the production systems they are brought into. For instance, the importation of *Bos Taurus* breeds into tropical environments may put the environmental temperature near or above the animal's body temperature, thereby exposing them to the risk of heat shock and reduced milk production by as much as 50 % (St. Pierre *et al.*, 2003, Ben Salem and Bouraoui, 2009). According to King *et al.* (2006) reported that both heat stress and energy deficits make the use of Friesians in smallholdings on the Kenyan coast unsustainable. There is therefore the need to ensure that the imported dairy breeds of cattle are appropriate and sustainable in

the tropical production environment. The aim of the present study is to evaluate the reproductive performance and milk yield of Holstein-Friesian cattle in two ecological zones of Northern Nigeria.

MATERIALS AND METHODS

The data used for this study were collected from dairy farms located in three Nigerian states (Kano, Kwara, and Plateau). The three locations were chosen because of their markedly different climatic conditions. In Kwara state the wet season, dry season, total annual rainfall, minimum temperature, maximum temperature and relative humidity extends from April to October, November to March, 800mm to 1,500mm, 21.1ºC to 25 º C, 30° to 35°C and 60%, respectively (KWADP, 1996). In Kano state the total annual rainfall, mean temperature range and raining months of 800mm to 1,000mm, 26° to 33°C and 3 to 5 months, respectively. Plateau State has a near temperate climate with an average temperature of between 18°C and 22°C and mean annual rainfall of 1,318mm to 1,460cm (Plateau state official website, 2010). The Holstein cattle raised in Kano and plateau states were strictly bucket feeding with formulated feeds with fogger's application when ambient temperature exceeds 25°C in the former. The Holstein cattle raised in Kwara state were managed with bucket feeding with morning and evening grazing and no fogger application.

319 records of 49 purportive sampled pure and crossbred Friesian cows were used to evaluate the effects of Calving Interval (CI), Calf Birth Weight (CBW), Parity and location of rearing on 305 Day Milk Yield. The crossbred cows were produced by crossing the Friesian with the local Zebu. The 305 day Milk Yield was calculated by multiplying 305 by the Total Milk Yield (TMY) of the animal divided by Total No of Days (TND) for producing the milk (i.e. 305 × TMY ÷TND). Data were subjected to Analysed of Variance (ANOVA) appropriate for a Completely Randomized Design (CRD) and significant means were separated using Duncan Multiple Range test.

RESULTS AND DISCUSSION

The results of Total Milk Yield (TMY) and 305- Milk yield of Friesian and Friesian x Local cattle in 5 parities were presented in Table 1. There was no significant difference in the Total Milk Yield of Friesian cows with respect to different parity, although the Total milk yield of cow was highest in parity 2. The 305 milk yield nominally increased with parity with parity 5 having the highest 305-day milk yield. Crossbred cows had higher total- and 305-day Milk yield than purebred Friesian cow. There was a significant increase ($P<0.01$) in the 305-day milk yield of crossbred cows with increased parity. The 305 DMY was better with longer Calving interval (11-14 months) than for lower calving interval in both Friesians and crossbred cows (Table 2). The effect of calf weight on 305- Milk yield of Friesian and Friesian x Local cattle is presented in Table 3. The 305- Milk yield of cow belong to the two genotypes increased with calf weight. The effect of calf weight on 305- Milk yield was significant ($P<0.01$) for Friesian x Local crossbred cows. There was variation in the 305 DMY among the Friesians in the three locations considered in this study (Table 4).

The Milk yield of Friesian cows and the crossbred cows were lower compared to the milk yield record of 7000 litres reported by Borsberry and Dobson (1989) in the United States of America. This is probably due to the depressing effects of heat stress on milk production (St. Pierre *et al.*, 2003, Ben Salem and Bouraoui, 2009). The 305 DMY for cows with calving interval of 13-14 months in this study were close to the 2268 kg milk yield reported by (Cunningham and Syrstrad ,1987) in Friesians crosses with calving interval of 14.4months. The use of environmental modification such as foggers may have contributed to the observed better performance of cows in Kano and plateau states.

CONCLUSION

It is concluded from the present study that, although production environment depresses the 305-day milk yield of Friesian cow in Nigeria, The use of environmental modification such as the application of foggers and crossbreeding may help to improve the 305-day milk yield of crossbred cows.

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Table 1: Total Milk Yield (TMY) and 305- Milk yield of Friesian and Friesian x Local cattle

Parameters	**Parity**						
	Genotypes	1st	2nd	3rd	4th	5th	± SEM
Total MilkYield (Kg)	Friesian	1816	2063	1720	1347	75	718.7
	Crosses	2118	1794	1965	2318	2331	802.3
305- yield (kg)	Friesian	1835	2320	2312	2512	2841	526.8
	Crosses	2021[a]	2349[a]	2250[a]	2742[a]	2970[b]	620.3

Means along the row with different superscripts differ significantly (P < 0.01)

Table 2: Effect of calving interval on 305- Milk yield of Friesian and Friesian x Local cattle.

	Calving Interval (CI) months			
Breeds	9 – 10	11 – 12	13 – 14	SEM
Friesian 305 Milk Yield(kg)	2235	2416	2268	219.7
Crosses 305 Milk Yield(kg)	1387	1667	2146	396.6

Table 3: Effect of Calf Birth weight (kg) on 305- Milk yield of Friesian and Friesian x Local cattle

	Calf birth weight (CBW) Kg			
Breeds	20 – 30	31 – 40	41 -50	SEM
Friesian 305 Milk Yield(kg)	1991	2060	2985	405.3
Crosses 305 Milk Yield(kg)	2139[a]	2682[b]	3077[b]	144.3

Means along the row with different superscripts differ significantly (P < 0.01)

Table 4: Effect of location on location on the performance of Friesians breeds

State	305 Day Milk Yield	± SEM
Kano	2505	502.0
Plateau	2390	502.0
Kwara	2273	502.0