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International Journal of Current Research
Vol. 7, Issue, 09, pp.20106-20108, September, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

CALF PARITY NUMBER, SEASON AND PERIOD OF CALVING INFLUENCE ON SUBSEQUENT 305-DAY FIRST LACTATION YIELD OF FRIESIAN × BUNAJI COWS

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ARTICLE INFO

Article History:
Received 10th June, 2015
Received in revised form
28th July, 2015
Accepted 20th August, 2015
Published online 16th September, 2015

Key words:

305-Day,
First Lactation Yield,
Calf Parity Number,
Season of Calving,
Period of Calving.

ABSTRACT

Data from 558 Friesian-Bunaji crossbreds were used for this study. Season and period of calving significantly ($p<0.05$) influenced 305-day first lactation milk yield while calf parity number significantly ($p<0.05$) influenced first milk yield at 2, 4, 6, 8 and 10 months. First lactation yield of crossbreds did not follow a particular trend but was better in animals calved in the late wet season (982.41kg) followed by early dry season (950.45kg) and least in the early wet season (868.19kg). Subsequent 305-day milk yield was highest (951.91kg) in Period 2006 – 2010 and least (425.17kg) in period 1986 – 1990. It is concluded that crossbreds from the 2nd calf parity, calved in the late wet season have an optimum 305-day first lactation yield subsequently.

Citation: Yakubu, H., Barje, P. P. and Iyeghe-Erakpotobor, G. T. and Shoyombo, A. 2015. "Calf parity number, season and period of calving influence on subsequent 305-day first lactation yield of friesian × bunaji cows", *International Journal of Current Research*, 7, (9), 20106-20108.

INTRODUCTION

Dairy cows are maintained primarily for the production of milk and offspring. In most Zebu cattle (*Bos indicus)* which are predominant in the tropics, milk yield is low, often not much more than needed to feed the calf properly. Short lactations and complete cessation of milk secretion are common with Zebu cows whether they are milked by hand or machine in the absence of their calves (Malau-Aduli *et al.* 1996). 305-days period is set as the standard lactation period based on the expectancy that a cow should calve at least once in a year and the recommendation that cows should be dried 60 days before calving. Thus the cow should be in milk 305 days out of the 365 days in a year. Although lactation length is often used to compare the lactation performance of dairy cattle within breed, across breed and among individuals, it is well known that some cows do lactate over the 305 days, while others do not. Crossing tropical breeds with European breeds has resulted in increase in lactation length. For instance, various grades of crossbreeding between Friesian and Bunaji increased lactation length from 254 to 285 days.

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Friesian crosses were superior to other temperate breeds in terms of growth and production, while Jersey crosses have better reproductive efficiency (Bhat, 1983). Majid *et al*. (1996) studied the lifetime productivity of purebred Sahiwal, Friesian and indigenous animals, and F1, F2 and F3 crosses involving 2 or more of Sahiwal, Friesian and indigenous, Jersey and Sindhi (Red Sindhu). They reported that mean 100-day, 305-day, lactation and total lifetime milk yields averaged 928.0kg, 2188.0kg, 2666.0kg and 11,134kg respectively; the values for all traits were highest in pure bred Friesians.

MATERIALS AND METHODS

Data of crossbreds from the Dairy Research Programme over a period of 30 years (1981-2010) from National Animal Production Research institute (NAPRI), Shika were used for this study. The calves which were ½ Friesian crosses born to either Friesian × Bunaji or pure Bunaji dams were raised either by bucket feeding or suckling method. In the bucket feeding system, the calves remain with their dams for 4 to 5 days postpartum to obtain colostrum. Thereafter, they were separated from their dams and fed fresh whole milk from an open bucket at the rate of 2.0kg/head/day.

In addition, the calves received concentrate diets and legume hay *ad libitum.* The concentrate consisted of 57% maize, 40% cotton seed cake, 1.5% bone meal, 1% salt and 0.5 vitamin premix. The milk allowance was given twice daily at 9am and 4pm until the calves reached 3 months of age. Between 1981 and 2000, weaned calves were moved to an outdoor herd, where concentrate and hay rations were supplied free choice until they attained 6 months of age however, and from 2001 – 2010 weaned calves were kept indoors until 6 months of age. In the suckling system, calves were allowed to run with their dams and were suckled until they were weaned at 6 months of age. Heifers and milking animals were kept in fenced paddocks during the day except time of grazing between 9 am and 4 pm when they were out. The cows and weaned calves were kept mainly on unimproved rangeland in the wet season while they were fed grass hay or maize silage *ad libitum* supplemented with un-delinted cottonseed cake at the rate of 0.5 – 1.0kg/head/day for calves and 1.5 – 2.0kg/head/day for cows depending on the quality of available roughage in the dry season. Water was offered to animals in the pens after grazing with salt licks to supplement their mineral requirements. Routine deworming of calves with flukazole was carried out at the beginning and end of the wet season. Spraying of all animals against ectoparasites was done weekly during the wet season and every 2 weeks in the dry season. All the animals were inoculated against rinderpest, brucellosis, and contagious bovine pleura pneumonia and weighed monthly with the Avery weighing scale to monitor their body weights. Sick animals were isolated from healthy animals and closely monitored in the animal health unit.

Calf Parity Number this was considered as the calf from either the 1st, 2nd, 3rd or 4th calving of the dam. Season of Calving was considered as the time of the year the calf was delivered. Based on the prevailing climatic conditions, the calving season adopted was as follows: Early Dry (October, November and December), late dry (January, February and March), early wet (April, May and June) and late wet (July, August and September) as reported by Osinowo *et al.* (1992). Period of Calving was taken as the period the young is delivered, grouped into six namely: 1981 – 1985, 1986 -1990, 1991-1995, 1996-2000, 2001-2005 and 2006-2010. Statistical analysis of calf factors and lactation performance was carried out using the GLM (General Linear Model) procedure of the Statistical Analysis System (SAS, 2001).

The linear model used was

$Y_{ijkl}=\mu + P_i + S_j + C_k + e_{ijkl}$

Y_{ijkl}= the l^{th} observation in the k^{th} calving period (year), j^{th} calving season, i^{th} parity

μ=overall mean

P_i=effect of the i^{th} calf parity number

Sj= effect of the j^{th} season

C_k=effect of the k^{th} calving period (year)

RESULTS

First lactation performance of the crossbreds was significantly ($p<0.05$) influenced by calf parity number, season and period of calving (Table 1). Friesian-Bunaji cows calved from the 2nd calf parity had a higher first milk yield at 4, 6, 8 and 10 months into lactation, but at 305-day milk yield, crossbred cows calved at 3rd calf parity had a higher milk yield. Season of calving significantly ($p<0.05$) affected 6th month milk yield with the highest (176.38kg) observed in early dry season and lowest (127.28kg) in the late wet season. Milk yield at 2 months was 167.58kg for crossbreds calved in the late dry season followed by those calved in the early dry season (165.4kg), early wet season (148.13kg) and late wet season (145.69kg).

A similar pattern as at 2 months was observed for cows at 4 months into lactation, the highest milk yield observed in those calved in the late dry season (190.72kg) and lowest milk yield of 149.37kg for cows calved in early wet season. In the 8th and 10th month of lactation, crossbreds calved in the early dry had the highest milk yield while the lowest was observed in cows calved in late wet season. However, at 305-day, milk yield of Friesian-Bunaji cows was higher in those calved late wet season (982.41kg) and 868.19kg for those calved in the early wet season. Period of calving also significantly ($p<0.01$) influenced milk yield of crossbreds, with period 2006 – 2010 having the highest yield across and the least observed in period 1986 – 1990. Milk yield of Friesian × Bunaji cows over 1981 – 2010 as influenced by calf parity number at 305-day first milk yield are presented in Figure 1. Crossbreds from calf parity number 2 had higher milk yield followed by those from calf parity numbers 3 and 1 (lowest milk yield). Milk yield increased with advancement in the years considered under this study. 305- Day first milk yield of Friesian-Bunaji cows from 1981 – 2010 increased in animals that were calved in late wet season (Figure 2).

Table 1. Effect of calf parity number, season of calving and period of calving on Lactation of Friesian × Bunaji cows

Lactation (months)							
	N	2	4	6	8	10	305-day FLMY
Overall mean	558	169.23±6.09	189.07±7.33	192.78±8.28	204.62±8.39	210.92±9.51	966.62±29.43
Calf parity number							
1	184	147.26±9.75^{b}	167.08±11.73^{b}	147.01±13.25^{b}	146.04±14.29^{b}	176.46±14.98^{b}	844.11±60.68
2	177	187.51±19.22^{a}	191.27±23.11^{a}	200.06±26.11^{a}	184.59±26.38^{a}	218.78±32.53^{a}	859.15±72.18
3	197	135.33±25.15^{b}	146.97±30.25^{c}	122.47±34.17^{c}	106.13±34.31^{c}	116.39±36.88^{c}	862.56±75.08
Season of calving							
Early dry	137	165.40±15.42^{a}	170.68±18.54^{b}	166.38±20.94^{a}	168.37±20.97^{a}	185.27±23.84^{a}	950.45±168.61^{ab}
Late dry	148	167.58±16.12^{a}	190.72±19.39^{a}	162.18±21.90^{a}	146.63±22.64^{b}	165.73±26.93^{bc}	914.03±176.31^{ab}
Early wet	134	148.13±16.30^{b}	149.37±19.60^{bc}	150.20±22.15^{ab}	150.96±22.51^{ab}	174.33±24.32^{ab}	868.19±178.29^{b}
Late wet	139	145.69±16.91^{b}	162.99±20.34^{b}	147.28±22.97^{b}	116.38±23.15^{c}	156.84±25.60^{c}	982.41±184.95^{a}
Period of calving							
1981 – 1985	73	105.38±25.36^{d}	132.84±30.50^{d}	58.87±34.45^{d}	55.60±40.93^{d}	101.37±45.43^{d}	733.95±77.38^{d}
1986 – 1990	89	102.78±34.94^{d}	106.51±42.02^{d}	54.21±47.47^{c}	31.64±4.73^{e}	103.69±36.63^{d}	425.17±82.13^{e}
1991 – 1995	91	127.13±21.23^{d}	111.02±25.53^{d}	126.42±28.84^{b}	120.48±29.17^{c}	108.28±32.83^{d}	915.40±32.16^{c}
1996 – 2000	90	169.13±12.91^{c}	186.94±15.53^{c}	138.87±21.86^{ab}	205.52±17.53^{b}	210.50±19.65^{c}	922.51±41.23^{b}
2001 – 2005	102	199.83±14.86^{b}	224.89±17.87^{b}	146.28±22.18^{a}	253.49±20.23^{a}	243.51±23.05^{b}	942.69±32.55^{a}
2006 – 2010	113	235.96±21.04^{a}	284.48±25.30^{a}	148.13±21.62^{a}	270.06±30.23^{a}	280.05±35.94^{a}	951.91±30.07^{a}

N=number of observations, S.E=standard error; 305-day FLMY=305-day first lactation milk yield, ($^{a, b, c, d, e}$=values with superscripts are significantly ($P<0.05$) different along the column.)

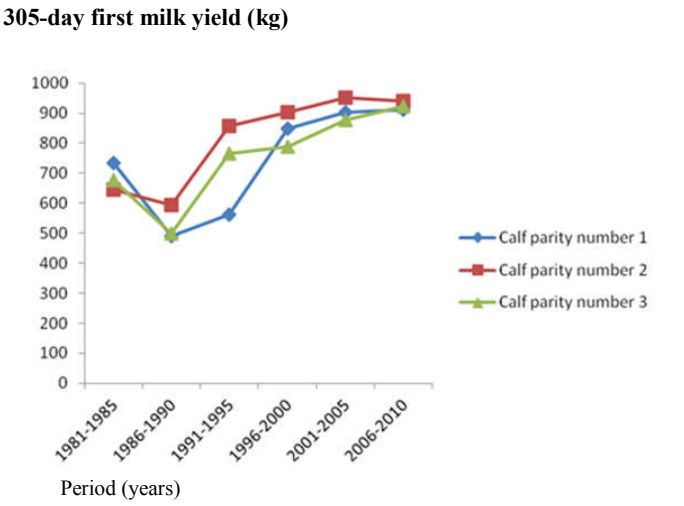

Figure 1: Effect of calf parity number on 305-day First Milk Yield of Friesian-Bunaji Cows over 30 years (Standard error for calf parity number 1=83.23, calf parity number 2=91.4, calf parity number 3=93.31)

For the cows calved at other seasons, a similar trend was observed with a sharp depression in yield from 1986 to 1990 with the cows calved in early wet having the lowest 305-day milk yield over the period.

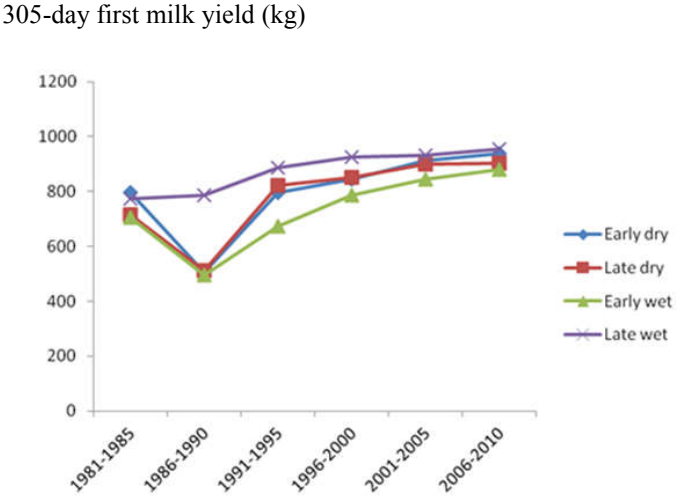

Figure 2: Influence of season of calving on 305-day first milk yield of Friesian-Bunaji crossbred over 30 years (Standard error for early dry season=53.7, late dry season=61.9, early wet season=72.9, late wet season=59.5)

DISCUSSION

305-day first milk yield of crossbreds showed a decline and picked up in 1986 – 1990 largely due to incomplete daily milk records encountered. Generally, subsequent 305-day milk yield increased over the period, the highest observed in cows calved in the 2nd parity (310kg) and the least in those calved in the 3rd parity (220kg).

The increase in subsequent milk yield after calving across parity numbers could be due to the fact that physiological and anatomical feature for milk secretion and production fully developing in the crossbreds.

Oni *et al*. (2001) observed that as an animal advances in age, there is a concomitant increase in milk production and yield until a limit is reached and beyond which an inverse relationship takes effect. An improvement in 305-day milk yield was observed in crossbreds calved in the seasons. Cows calved in the late dry season had the highest improvement by 120kg at 305-day milk yield followed by those calved in the early wet (50kg) and the least was observed in cows calved in early dry season (30kg). Literatures in this area are scanty.

Conclusion

It is concluded that crossbreds from the 2nd calf parity, calved in the late wet season have an optimum 305-day first lactation yield subsequently.

Acknowledgement

The authors appreciate the permission given them by the management of the National Animal Production Research Institute (NAPRI), Shika-Zaria to use data and publish the findings.

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