J. Soils and Crops 27 (2) 96-100, Dec. 2017

ISSN 0971-2836
NAAS Rating - 4.46
Scientific Journal Impact Factor - 4.338

STUDIES ON CALVING PATTERN AND PRODUCTIVE PERFORMANCE OF CROSSBRED COWS UNDER F_1 AND F_2 GENERATION

A.S.Ingole[1], V. G. Atkare[2], S.M. Khupse[3]

ABSTRACT

The investigation on calving pattern and productive performance of crossbred cows under F_1 and F_2 generations on total 126 crossbred cows (Jersey x Sahiwal) was carried out at College Dairy Farm, Animal Husbandry and Dairy Science section, College of Agriculture, Nagpur during the year 2012-2013. The twelve years data from 2001 to 2012 (both inclusive) on milk yield upto 5th lactation and occurrence of calving of crossbred cows were collected and analysed statistically to see the pattern of calving and productive performance of crossbred cows.

It is inferred from total observations on 126 lactations pertaining $F_1$and F_2 Jersey crossbred cows that the maximum calving in crossbreds took place in winter months (Oct. to Jan.). However, the study reveals that summer (Feb. to April.) calving should be encouraged in order to have more production from F_1 and F_2 crossbreds.

Average maximum lactation milk yield was recorded during the 3rd lactation and minimum in the 1st lactation. Average maximum weekly milk yield did not show any distinct trend during 1st to 8th week of lactations. Whereas, in all lactations, performance remains constant with respect to weekly milk yield for a period of four weeks from 9th to 12thweek after attaining peak yield. In 17th to 24th week of lactations, maximum milk yield was recorded in 20th week of lactation, thereafter declining trend was noticed upto 24th week of lactation during F_1 and F_2 generations.

(Key words: Productive performance, calving pattern, crossbred cows)

INTRODUCTION

Milk has a high nutritive value. Hence, it is considered almost an ideal food. It supplies body building proteins, bone forming minerals and health giving vitamins and furnishes energy providing lactose and milk fat. All these properties make milk an important food for every age of human being. Milk is an important product that contains almost all the nutrients required for human life by virtue of its composition, high nutritive value and digestibility. It advocates it self as a very important component of diet from the Vedic period. India is the largest milk producing country in the world with the production of 143.8 million tons during the year 2014-2015 (Anonymous, 2015).

The demand for milk and its products increased sharply now a days with increase in population worldwide. The selective breeding and crossbreeding are the main tools to enhance the milk production potentiality of tropical indigenous cattle. Marked improvement in cattle has been reported, through crossbreeding (Eleman and Abu Nekhella, 2012).

The highest calving frequency was found during autumn followed by winter, summer and spring season. The period, season and month of calving considered as source of variation in calving pattern (Deokar *et al*.,2008). Maximum calving (42.28%) was recorded during in winter months particularly October to January in Jersey crossbred. Such type trends give an indication that better nutritional facilities which are available during winter to crossbred animal might be resulted into better body condition after calving. Providing desired pregnancy conditions obviously this situation results in occurrence of oestrus cycle in early summer month (Bhagat, 2012).

The introduction of superior exotic dairy germplasm has brought about considerable improvement in productive and reproductive efficiency of Indian cows by adopting crossbreeding programme. Among the F_1,F_2 and F_3 crossbred Frisian should the highest performance in milk yield.The half bred Frisian in successive generation, yielded low milk yield. Similar trend was obtained in case of crossbred with other breed such as jersey, sahiwal and sindhi. The performance in respect to milk yield of pure bred Frisian and their F_1 half bred with indigenous were superior over F_2 and F_3 crossbred between Frisian and any other breed in respective of proportion of blood (Masjid *et al*.,1996).

Production performance of crossbred cows (Jersey x Sahiwal) maintained at College Dairy Farm, Section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur is not yet been reported. Such type of study would produce valuable information for making an appropriate future breeding policy.

Keeping these in mind, the present paper focused on evaluation of calving pattern and productive performance of crossbred cows under F_1 and F_2 generations.

1 and 2 .Assoc.Professors, Animal Husbandry and Dairy Science Section, College of Agriculture, Nagpur
3. P.G. Student, Animal Husbandry and Dairy Science Section, College of Agriculture, Nagpur

MATERIALS AND METHODS

The data on total 126 calvings comprising of 89 and 37 calvings occurred during F_1 and F_2 generations were traced out pertaining jersey crossbred having 50 % exotic blood inheritance irrespective of their parental breeds. The productive performance evaluated on the basis of lactation number I, II, III, IV and V for F_1 and F_2 generation for the study. The milking cowsupto5th lactation were searched out from the record maintained at College Dairy Farm, Animal Husbandry and Dairy Science section, College of Agriculture, Nagpur during 2001 to 2012. The information collected on occurrence of calving and weekly milk yield upto 24 weeks in each lactation.Out of the total calving that occurred, month wise calving was worked out. The year was divided into three seasons viz., rainy (June to September), winter (October to January) and summer (February to May).

The data collected in respect to calving pattern and productive performance were tabulated and subjected to statistical analysis by adopting the standard technique prescribed by Panse and Sukhatme (1985), to find out mean, Standard deviation and coefficient of variation so as to estimate the central value and the extent at variability in the data. The standard deviation and coefficient of variation were calculated by adopting the following formulae.

$$\sigma = \frac{\sqrt{\sum \left(X_i - \overline{X}\right)^2}}{n}$$

Where,

σ = Standard deviation

X_1 =Values of the variables

$\overline{X}$ = Mean

n =No.of observations of the series

Coefficient of variation was used to compare the magnitude of relative dispersion among the data of different variations.

$$C.V. = \frac{S.D.}{\overline{X}} \times 100$$

Where,

C.V. = coefficient of variation

S.D. = Standard Deviation

$\overline{X}$ = Mean

RESULTS AND DISCUSSION

Calving pattern

From the table 1, it is inferred that total 126 calving took place in different months comprising of 89 and 37 calving in F_1 and F_2 generations over a period of 12 years (2001-2012). The trend of calving indicated that maximum calving under F_1 and F_2generations(42.86 %) was occurred in winter season (Oct.-Jan.) followed by rainy (36.52%) and summer season (20.62 %).The results showed that the maximum calving was observed in September (19.26%) while minimum calving percentage was observed in June (3.97%) .

It was noticed that the calving pattern of Jersey crossbred cows under F_2 generation over a experimental period did not reveal a definite trend in different calving months of rainy and summer seasons and were more or less similar i.e., 21.63 % and 21.60 %,respectively. It was further noticed that more or less similar trends on calving pattern was recorded during summer months i.e., 20.37 and 21.60 per cent in F_1 and F_2 generations.

It appears from the results that the difference in frequency of calving might be due to the non genetic factor, particularly the nutritional and environmental factors. In the present study maximum calving was occurred in winter month particularly in October to January. This might be due to more nutritional facilities available during winter season to animal. Which provide better condition for conception of the end of previous winter season. So, animal can maintained better body condition after calving. This situation resulted in occurrence of oestrus cycle in early summer month, (Atkare *et al*.,2003).

Maximum calving (45.06%) was noticed during in winter month particularly in October to January. Due to better nutritional facilities which are available during winter to crossbred animal resulted into better body condition after calving (Narote, 2015). Bhagat (2012) also noticed maximum calving (42.28%) during in winter month particularly in October to January. She further noticed that better nutritional facilities which are available during winter to crossbred animal resulted into better body condition after calving. Obviously this situation results in occurrence of oestrus cycle in early summer months.

Productive performance of crossbred cows during F_1 generation

It is evident from the table 2 that the overall average weekly milk yield based on 89 calving in F_1 generation over a period of experimental period i.e. upto 24th week of lactation was 37.32 ± 1.06 l. Maximum milk yield was recorded in 3rd lactation (38.98±0.89 l) followed by 5th lactation (38.14±1.58 l), 4th lactation (38.08±1.28l) 2nd lactation (37.24±1.28 l), and 1st lactation (34.52±1.09 l), respectively with coefficient of variation 11.33, 22.39, 16.18, 16.91 and 15.52, respectively.

It was observed that average weekly milk yield pertaining F_1 generation showed inclined performance upto 8th week of lactation in all lactations except 1st lactation. Maximum weekly milk yield was recorded (46.80l) during 8th week of lactations, while minimum milk yield was recorded (26.901) during 24th week of lactations. After attaining the peak yield, the productive performance examined was more or less constant for a period of four weeks i.e.9th to 12th week with respect of average weekly milk yield during 1st to 5th lactations. On the other hand, during 2nd and 3rd lactation, peak yield did not show any distinct trends. After 16th week

Table 1. Monthly and seasonal distribution of calving in crossbred cow

Month & Season	F1-Generation		F2-Generation		Overall	
	No. of Calving	% Distr--bution	No. of Calving	% Distr-ibution	No. of Calving	% Distr-ibution
			Rainy			
June	03	3.37	02	5.43	05	3.97
July	07	7.87	03	8.10	10	7.94
August	08	8.98	00	0.00	08	8.35
September	20	22.48	03	8.10	23	19.26
Total	**38**	**42.60**	**08**	**21.63**	**46**	**36.52**
			Winter			
October	12	13.48	06	16.21	18	14.28
November	09	10.11	04	10.82	13	10.32
December	06	06.74	05	13.52	11	08.73
January	06	06.74	06	16.21	12	09.53
Total	**33**	**37.04**	**21**	**56.77**	**54**	**42.86**
			Summer			
February	04	04.94	03	8.10	07	05.55
March	06	06.74	01	2.70	07	05.55
April	05	05.61	01	2.70	06	04.76
May	03	03.67	03	8.10	06	04.76
Total	**18**	**20.36**	**08**	**21.60**	**26**	**20.62**
Grand Total	**89**	**100**	**37**	**100**	**126**	**100**

Table 2.Lactation wise mean weekly milk yield (lit) under F_1 and F_2 generations of crossbred cows (Jersey x Sahiwal) over experimental period (2001- 2012) 126

Weeks	F_1L_1	F_1L_2	F_1L_3	F_1L_4	F_1L_5	Average
1st	28.8 (40.1)*	33.3 (34.05)	28.7 (49.16)	31.1 (35.7)	24.3(16.0)	29.2 (34.9)
2nd	37.8 (49.4)	41.5 (42.4)	40.1 (53.5)	39.05 (46.7)	33.4 (34.4)	38.3 (45.2)
3rd	37.3 (49.1)	40.9 (40.5)	39.2 (50.8)	42.6 (47.5)	33.8 (36.5)	38.7 (44.7)
4th	45.6 (58.1)	48.2 (46.6)	48.1 (62.8)	43.2 (55.2)	39.7 (38.6)	44.9 (52.2)
5th	39.3 (46.9)	43.2 (52.0)	36.7 (55.7)	44.2 (42.9)	41.3 (39.0)	40.9 (47.3)
6th	37.2 (46.4)	43.2 (50.06)	39.02 (58.0)	43.2 (24.2)	42.7 (38.1)	41.06 (43.3)
7th	36.5 (49.4)	42.1 (44.3)	41.0 (57.1)	46.9 (39.0)	42.5 (39.0)	41.8 (45.7)
8th	40.7 (55.8)	51.3 (58.6)	46.4 (57.8)	41.5 (39.6)	54.1 (39.5)	46.8 (50.2)
9th	36.1(47.7)	39.9 (44.7)	41.7(50.3)	39.0 (34.4)	42.6 (36.7)	39.8(42.7)
10th	36.2 (44.02)	38.6 (42.7)	40.5 (51.5)	38.1 (32.4)	46.3 (33.9)	39.9 (40.9)
11th	35.9 (46.9)	35.9 (41.01)	37.4 (47.9)	39.4 (31.8)	41.5 (35.3)	38.02 (40.5)
12th	36.1 (50.7)	33.9 (48.6)	42.9 (5.4)	36.5 (38.1)	40.0 (33.6)	37.8 (44.2)
13th	41.6 (27.1)	40.7 (34.8)	46.3 (41.2)	37.8 (33.1)	53.2 (36.3)	43.9 (34.7)
14th	30.0 (22.3)	32.1 (32.1)	39.6 (41.8)	36.3 (30.4)	38.0 (35.0)	35.2 (32.4)
15th	32.9 (20.5)	33.0 (33.7)	40.6 (34.8)	35.5 (26.9)	38.0 (34.0)	36.01 (29.9)
16th	39.2 (21.2)	42.4 (38.7)	42.2 (50.0)	36.9 (34.4)	49.0 (32.4)	41.9 (35.30)
17th	32.6 (23.7)	32.8(34.40)	36.6 (27.1)	37.3 (28.1)	31.3 (18.1)	34.1(26.28)
18th	30.8 (26.7)	31.3 (32.3)	35.7 (22.1)	42.2 (25.7)	32.7 (19.5)	34.5 (25.28)
19th	32.2 (24.7)	31.4 (29.7)	36.0 (20.5)	45.4 (29.6)	29.9 (11.5)	34.9 (23.20)
20th	36.7 (28.1)	38.1 (35.8)	36.6 (21.2)	45.7 (35.6)	38.2 (17.2)	39.0 (27.6)
21st	28.6 (19.3)	34.3 (27.9)	35.2 (18.1)	33.0 (29.1)	35.7 (14.5)	33.3 (21.78)
22nd	26.6 (17.0)	31.4 (26.9)	36.8 (19.4)	25.7 (28.6)	31.3 (18.3)	30.3 (22.04)
23rd	25.6 (18.9)	28.5 (26.5)	34.7 (17.2)	26.0 (27.5)	28.8 (18.6)	28.7 (21.7)
24th	24.3 (20.8)	25.2 (25.5)	33.6 (14.2)	24.7 (26.1)	27.1 (15.5)	26.9 (20.5)
Av.	34.52 (35.61)	37.24 (38.49)	38.98 (40.52)	38.08 (38.33)	38.14 (28.81)	37.32 (35.64)
SE (±)	1.09 (2.85)	1.28 (1.80)	0.89 (3.27)	1.28(1.78)	1.58 (2.03)	1.06 (2.06)
CV%	15.52 (39.29)	16.91(22.98)	11.30 (39.61)	16.58 (22.81)	22.39 (34.54)	13.93 (28.31)

*** Figures in parenttheses denotes data on F_2 generation**

of all lactations, declined trend was observed upto the 24th week of lactation in average weekly milk yield.

Productive performance of crossbred cows during F_2 generations

It is evident from the table 2 that the overall average weekly milk yield based on 37 calving in F_2 generation over a period of experimental period i.e. upto 24th week of lactation was 35.64 ± 2.06 l. Maximum milk yield was recorded in 3rd lactation (40.52±3.27l.) followed by 2th lactation (38.49±1.80 l.), 4th lactation (38.33±1.78 l), 1st lactation (35.61±2.85l) and 5th lactation (28.81±2.03l), respectively with coefficient of variation 39.61,22.98,22.81,39.29 and 34.54, respectively.

It was observed that average weekly milk yield pertaining F_1 generation showed inclined performance upto 8th week of lactation in all lactations except 1st lactation. Maximum weekly milk yield was recorded (50.20l) during 8th week of lactations, while minimum milk yield was recorded (20.50 l) during 24th week of lactations. After attaining the peak yield, the productive performance examined was more or less constant for a period of four weeks i.e.9th to 12th week with respect of average weekly milk yield during 1st to 5th lactations. On the other hand, during 2nd, 3rd and 4rd lactation peak yield did not show any distinct trends. After 16th week of all lactations, declined trend was observed upto the 24th week of lactation in average weekly milk yield.

The results of present investigation are in conformity with the results obtained by Haider *et al.* (1984) who recorded the highest lactation milk yield in J x S and F x ND crossbred cows during 3rd lactation. Ahmad *et al.* (2011) reported that the milk yield increased gradually from the 1st to 3rd lactations. The highest milk yield was recorded in 3rd lactation and the lowest in 1st lactation.

The milk yield tended to increase with lactation number in crossbred cows but maximum milk yield was recorded in third lactation (Bhaskar *et al.,* 2007).Likewise, Lateef *et al.* (2008) and Narote (2015) recoded the maximum lactation milk yield in the 3rd lactation in IHF, IJ, FBHF cows and Jersey crossbreds.Thus, present findings are more or less in line with these findings.

REFERANCES

Ahmad, S., FMA Hossain and N. Islam, 2011.Effects of lactation number and different stage of lactation on milk yield of Indigenous and Crossbred cows in Bangladesh,International J. Natural Sci. **1**(1):222-225.

Anonymous, 2015.India to produce 146 MT milk in 2015.Food and Agriculture Organization at http://www.financial xpress.com/news.

Atkare, V.G., A. B. Deshmukh, A.M.Deshmukh and W.M. More, 2003. Calving pattern in crossbred cattle raised under hot-dry climate,J. Maharashtra agric.Univ.**28** (1) : 100 -102.

Bhagat Yogini, 2012. Calving pattern and persistency of lactation of crssbred cows in relation to climate.Unpublished M.Sc. (Agric.) Thesis,Dr. PDKV, Akola (M.S).

Bhaskar, M.L., M.P. Gupta and K.P. Singh, 2007.Effect of lactation number on production and quality of milk of crossed cows and Murrah buffalo. Indian J. Dairy Sci. **60**(6): 426-431.

Deokar, D.K., B.R. Ulmek, R.G. Nimase and R.R. Adhale, 2008. Studies on calving pattern in crossbreed cattle. J. Bombay Vet. College. **16**(1) : 39-41.

Eleman, M. B. and A. M. Abu Nekhella, 2012. Some productive traits of crossbred dairy cows in the farm of university of Khartoum,Sudan.Emir.J.FoodAgric.**24**(2):155-158.

Haider, I., M. Zaman, M. A. Farooq and S. Shah, 1984.Productive and reproductive performance of crossbred cows under the subtropical environmental condition of Punjab. Pakistan J. agric. Res**. 5** (3):190-197.

Lateef, M., K. Z. Gondal, M. Younas and M. Sarwar, 2008. Milk production potential of pure breed Holstein Friesian and Jersey cow in sub tropical environment of Pakistan. Pakistan vet.J.**28**(1):9-12.

Masjid,M.A., A.Z.Talukder and M. Zahirudin, 1996.Productive performance of crossbred in central cattle breeding farm and dairy farm of Bangladesh. AJAS,**9** (4) : 461-462.

Panse, V. G. and P. V. Sukhatme, 1985.Statistical methods for agricultural workers, I. C. A. R., New Delhi.

Rohini Narote, 2015. Studies on productive performance and quality of milk of crossbred cows. J. Soils and Crops. **25** (1): 173-177.

Rec. on 10.11.2016 & Acc. on 05.12.2016