ESTIMATION OF OPTIMUM FIRST DRY PERIOD IN KARAN FRIES CATTLE

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ABSTRACT : Study for estimation of optimum first dry period was conducted on 571 Karan Fries Cattle (Crossing Tharparkar and Sahiwal cows with American Holstein Friesian Sires) at National Dairy Research Institute, Karnal, Haryana. The data were corrected for non-genetic factors by using least squares analysis. The genetic and phenotypic parameters were estimated using standard statistical methods. The overall least squares mean for first dry period estimated as 64.47 ± 1.46 days. The relationship between first dry period and second lactation production traits were studied by using polynomial regression analysis and class interval method. Six classes of first dry period was used. Optimum first dry period was identified on the basis of higher second lactation milk production and numbers of animals in various classes as 51-70 days. However, to determine optimum level maximum profit to be taken into account.

Key Words : Cattle, Karan Fries, Optimization and Dry Period.

INTRODUCTION :

Indian dairying is an emerging industry, so to make it profitable and sustainable we should have not only produce high producer animals but also develop an economic and profitable production system. Overall economic return from individual animal depends upon various performance and reproductive traits beside milk production. First dry period is one of the important factor contributing to economic return and mostly controlled by management practices. A reasonable dry period is necessary to regain the energy lost during last lactation and to regenerate the secretary cells of animal for the next lactation. The present study was planned to optimize the first dry period for maximum milk production in second lactation in Karan Fires cattle.

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MATERIALS AND METHODS :

The data comprising of reproduction and production records of 571 Karan Fries cattle for the period from 1978-1995, maintained of National Dairy Research institute, Karnal, Haryana was collected. The cows maintained at this farm were exposed to extreme climatic stress due to wide range of various meteorological factors. The cows which had at least 150 days milk production period and more than 500 Kg milk production in second lactation were considered for this study. The data spread over 18 years (1978-1995) was classified into four periods and each year again classified into four seasons. The adjustment of periodical and seasonal influences on the characters are imperative and it would standardize the apparent variation in traits.

The mean, standard deviations, standard errors and coefficient of variation of all traits calculated by using standard statistical procedures described

by Steel and Torrie (1980). In order to study the effect of various non genetic factors and to overcome the problem of non-arthogonality of data due to unequal and dis-proportionate sub-class frequencies, least squares analysis (Harvey, 1975) of data was used. In order to estimate various genetic and phenotypic parameters the sires which had at least five daughters were considered and for estimation paternal half sibs method (Becker, 1986) was used. The variation in second lactation production traits i.e. second lactation 305 days or less milk yield (SL305Y), second lactation total milk yield (SLTMY), milk yield per day of second lactation length (MY/SLL) and milk yield per day of second calving interval (MY/SCI) due to first dry period (FDP) were studied by using polynomial regression models (Draper and Smith, 1981). Regression analysis was not adequate to explain the variation in production traits, therefore class interval method was used to find and the relationship between FDP and second lactation production traits. FDP was divided into 6 (six) classes i.e. <51 days, 51-60 days, 61-70 days, 71-80 days, 81-100 days cow > 100 days. The production against each class was compared to find out the optimum first dry period.

RESULTS AND DISCUSSION :

The overall least squares mean of first dry period (FDP) was estimated to be 64.47 ± 1.46 days. Similar estimates in Karan Fries cattle were reported by Singh and Tomar (1990, 1991). However higher estimates was reported by Pandey et al (1988) in varies HF Crosses. The effect of sire, season and period on FDP was found to be statistically non-significant. Similar findings were also reported by Singh (1995), Jadhav et al (1991) and Nayak and Raheja (1996) in HF crosses.

The heritability estimate of FDP was low i.e. 0.112 ± 0.154. This low heritability estimate suggested that this trait was largely influenced by non-genetic factors and further improvement can be brought by improving management practices. The heritability estimate of second calving interval (0.19 ± 0.12), Second lactation 305 days milk yield (0.22 ± 0.13), second lactation total milk yield (0.16 ± 0.11) and second lactation length (0.22 ± 0.12) was also found to be low to moderate. So further improvement of these traits are possible by improving management practices.

The relationship between first dry period and second lactation production traits were studied by using regression analysis and class interval method. The results of three regression equation (linear, Quadratic and cubic) showed that only 1-7 percent variation in production traits was due to variation in dry period (Table-1). So only class interval method was used to find out the relationship.

Table No.1 : Regression analysis of various second lactation production traits on first dry period in Karan Fries cattle

Traits	Type of equation	Intercept constant b_0±S.E.	Regression coefficients			Multiple correlation coefficient (R)	Coefficient of determination (R^2%)
			b_1 ± S.E.	b_2 ± S.E	b_3 ± S.E		
SL305Y	L	3721.9468 ± 40.6773	-4.0520720 ± 2.1062577	-	-	0.1106	1.22
	Q	2430.2192 ± 41.6090	29.7794170 ± 11.2319727**	-0.1937776 ± 0.0632239**	-	0.2059	4.24

	C	-1218,9387± 61.2437	176.6727295 ± 46.8451309**	- 2.0277128 ± 0.5717207 **	0.0069609 ± 0.0021571 * *	0.2736	7.48
FLTM Y	L	4015.6133± 50.6128	-5.4809403± 2.6207147*	-	-	0.1201	1.44
	Q	2786.9001± 52.1101	26.7001495± 14.0666409	- 0.1843246 ± 0.0791800 *	-	0.1789	3.20
	C	-1297.7426± 76.9700	191.1238098 ± 58.8741684**	- 2.2371252 ± 0.7185288 **	0.0077917± 0.0027111 *	0.2413	5.82
MY/S LL	L	12.3005± 0.1231	-0.0108431± 0.0063751	-	-	0.0979	0.96
	Q	8.3308± 0.1259	0.0931256± 0.0339796*	- 0.0005955 ± 0.0001913 **	-	0.2020	4.08
	C	1.3648± 0.1872	0.3735374± 0.1432060*	- 0.0040964 ± 0.0017478 *	0.0000133± 0.0000066 *	0.2318	5.37
MY/S CI	L	10.3046± 0.1146	-0.0137986± 0.0059321	-	-	0.1333	1.78
	Q	7.1279± 0.1176	0.0694022± 0.0317520*	- 0.0004766 ± 0.0001787 **	-	0.2016	4.07
	C	-1.4162 0.1741	0.4133370± 0.1331550**	- 0.0047705 ± 0.0016251 **	0.0000163± 0.0000061 * *	0.2509	6.30

* Indicate significant at (P < 0.05) L=Linear
** Indicate significant at (P < 0.01) Q=Quadratic C=Cubic

The highest SL305Y was estimated to be 3524.94 ± 72.75 kgs in the cows whose FDP was within the range of 61-70 days (Table-2). It was observed that there was increase in SL305Y, SLTMY, MY/SLL and MY/SCI with the increase in FDP up to 70 days. This may be due to the fact that the animals could regain the depleted energy in previous lactation and repair mammary glands which lead to increase in performance. The decrease in performance thereafter with FDP beyond 70 days may be due to longer first service period which may be due to some reproductive disorder. Therefore these physiologically unfit animal could not show there optimum production performance.

Table – 2 : Average performance of second lactation production traits for different class of first dry period

FDP Classes (days)	SL305Y Mean ± SE (kg)	% Difference from lowest class	SLTMY Mean ± SE (kg)	% Difference from lowest class	MY/SLL Mean ± SE(kg)	% Difference from lowest class	MY/SCI Mean ± SE(kg)	% Difference from lowest class
<51	3133.30± 91.26a (75)	-	3267.81± 115.39a (71)	-	11.00± 0.32a (55)	-	8.75± 0.33ab (42)	-
51-60	3376.78± 55.20bc (205)	+7.76	3603± 68.41bc (202)	+10.26	11.66± 0.18a (168)	+6.00	9.60± 0.18c (141)	+9.71
61-70	3524.94± 72.75c (118)	+12.49	3767.37± 89.89 (117)	+15.28	12.28± 0.23a (100)	+11.63	10.20± 0.24c (80)	+16.57
71-80	3168.56± 13971ab (32)	+1.18	3329.78± 171.88a (32)	+1.89	11.12± 0.45ab (28)	+1.09	9.33± 0.48bc (21)	+6.62
81-100	3187.40± 152.10abc (27)	+1.72	3334.32± 183.74abc (28)	+2.03	12.01± 0.50ab (22)	+9.18	9.29± 0.54abc (16)	+6.17
>100	2941.58± 135.54a (34)	-6.12	3051.73± 166.74a (34)	-6.61	10.64± 0.46 (26)	-3.27	7.73± 0.53a (17)	-11.65

*Mean Subscripted by different letters differed significantly (P<0.05)
**Figuers in the parenthesis are the number of observations.

Critical appraisal of the table-2 showed that highest FL305Y group had non-significant difference with average of FDP class 51-60 days. Around 65% animals had FDP between 51-70 days. Almost similar observation was found for the trait SLTMY also. The highest average MY/SLL (12.28 ± 0.23kg) in 61-70 days FDP class differed non-significantly with other classes except for 6th class (>100days FDP) which had lowest MY/SLL (10.64 ± 0.46 kg). The maximum average MY/SCI (10.20 ± 0.24 kg) had also non-significant differences with average of all other classes except 1st (below 51 days) and 6th (> 100 days) FDP class. The animals with 61-70 days FDP had 16.57% more MY/FCI in comparison to the animals having below 51 days FDP. The frequency distribution showed that most of the animals (above 80%) had dry period below 71 days.

From the above discussion, it was observed that all the 2nd lactation production performance which were studied were maximum for the animals having FDP 61-70 days. To have sufficient numbers of animals and at the same time maximum production performance 51-70 days FDP may be considered as optimum for Karan Fries cattle.

Singh and Desai (1967) reported that 60-90 days dry period was optimum in Hariana cattle for maximum milk production. Gurnani and Bhatnagar (1974) found (40-80) days dry period as optimum for Brown Swiss X Sahiwal / Red Sindhi cross breeds. Pandey et al. (1978) reported that 61-90 days dry period in Friesian crosses was suitable for

maximum milk production. Reddy and Basu (1985) reported in HFXSW crosses that in higher crosses the optimum dry period per lactation for life milk, life profit, life milk per day, life profit per day and herd life was 116, 107, 87, 103 and 147 days respectively.

CONCLUSION : The optimum dry period for maximum milk production was 51-70 days for Karan Fries cattle. However, to determine the optimum range of this trait more emphasis should be given as maximizing profit rather than maximizing milk production.

Reference :

1. Becker WA. (1986) Mannual of quantitative genetics. Wasington State Univ., Pullman, USA.

2.Draper NR and Smith H .(1981) Applied regression Analysis. John Weliy and sons Inc. USA.

3.Gurnani M and Bhatnagar DS. (1974) Association of preceeding dry period and lactation yield crossbred cows. Indian J. Dairy Sci., 27(2): 130-133.

4.Harvery WR. (1975) Least squares analysis of data with unequal subclass numbers. ARS, 2.28, USD.A. Wastington D.C.

5.Jadhav KL ,Tripathi VN and Kale MM. (1991) Performance of crossbred cows for productive and reproduction traits in different production level groups. Indian J.Dairy Sci., 45(ii) 620-622.

6.Nayak SK and Raheja KL. (1996). Performance of half bred and three breed crosses for Hariana with exotic dairy breeds. Indian J. Anim. Sci., 66(2): 154-158.

7.Pandey RS , Bhatnagar DS and Gurnani M. (1978) Inheritance of dry period and its effect on subsequent lactation yield in Tharpakar cattle. India Vet. J., 55 : 935-939.

8.Pandey HS ,Pandey NN, Jana DN and Nautiyal LP. (1988) First lactation Production performance of three breed inter-se crosses. Indian Vet. J., 65: 801-807.

9.Reddy CO and Basu SB (1985) Factors affecting profit function and production traits in crossbred cattle. Indian Jl. Anim. Sci. 55:35-41.

10.Singh MK. (1995). Factors affecting trends in performance of Karan Swiss and Karan Fries cattle. Ph.D. Thesis, NDRI, Karnal.

11.Sing R and Tomar SS. (1990) Inheritance of first lactation production traits and their relationship in crossbred cattle. Indian J.Dairy Sci. 43(2): 147-151.

12.Singh RA and Desai RN. (1967) Effect of body weight and age at first calving on milk production in crossbred (Hostein X Sahiwal) as compared Sahiwal cattle. II Effect of age and its comparison with that of body weight. Indian J. Vet. Sci., 3(1): 8-11.

13.Steel RGD and Torrie JH. (1980) Principles and procedures of statistics, a bio metrical approach, 2nd Edition, Mc. Graw Hill international Edn.

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