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Effect of reproductive disorders on production performance of Hf x Gir Halfbred

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Abstract

The data on reproduction and production performance HF x Gir halfbred cows maintained at R.C.D.P. on Cattle, Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra) was collected and analyzed by least-squares technique to estimate the effect of lactation order and reproductive disorders. The lactation order had significant effect on open period and non-significant effect on service period, calving interval, number of service per conception, monthly peak yield, average daily milk yield, monthly peak yield of previous lactation, lactational milk yield, and lactational milk yield of previous lactation. The effect of reproductive disorders was the significant on open period, service period, calving interval, number of service per conception, monthly peak yield, average daily milk yield, monthly peak yield of previous lactation, lactational milk yield, lactational milk yield of previous lactation. Present study shows the per cent increase in open period, service period, calving interval due to reproductive disorders were 15.92 to 91.68, 56.60 to 94.62 and 10.36 to 39.33 per cent, respectively. However there was decline in lactational milk yield in the range of 10.83 to 36.69 per cent due to reproductive disorders.

Keywords: Reproductive, disorders, Hf x Gir Halfbred

Introduction

HF x Gir Halfbred is a halfbreed having blood level of 50 per cent Holstein Friesian and 50 per cent Gir. The important feature of HF x Gir Halfbred is having 3000- 3200 L of milk with fat content in milk of 3.5-4.2 per cent. These cows are having considerable disease resistance and adaptability in various climatic conditions. Generally in crossbred animal's reproductive disorder like dystocia, uterine prolapse, metritis, retained placenta, anestrus, repeat breeder, still birth etc. have been noticed on a large scale. These disorders are affecting the postpartum reproductive performance viz; open period, service period, intercalving period etc. and the milk yield of crossbred cattle, which causes major economic losses to dairy farmer.

Reproductive efficiency is a critical component of a successful dairy operation and acts as an important component of a profitable dairy farm, whereas reproductive inefficiency is one of the most critical problems facing the dairy industry. Reproductive problems occur frequently in lactating dairy cows and can drastically affect reproductive efficiency in a dairy herd.

Low fertility reduces the profit by decreasing the average milk production and the number of calves per cow per year. Poor reproductive performance is a major cause of involuntary culling and therefore reduces the opportunity for voluntary culling and has a negative effect on the future productivity of a dairy herd. Reproductive performance is influenced by the interactive effect of environment, management, health and genetic factors.

Material and Methodology

Present investigation on "Effect of reproductive disorders on subsequent reproduction and production traits of HF x Gir halfbred" was carried out by collecting the data from history and pedigree sheets maintained at Research-Cum-Development Project (RCDP) on Cattle, Mahatma Phule Krishi Vidyapeeth Rahuri, Dist.-Ahmednagar, Maharashtra. In this study the data of reproduction and production traits for HF x Gir halfbred was collected from the pedigree sheets and daily milk yield recording sheets over a period of 16 years (2000 to 2016) maintained at RCDP on Cattle, M.P.K.V., Rahuri.

Statistical analysis

Least squares analysis

In order to overcome results due to unequal subclass model (Harvey, 1990) model was used by

considering effects of lactation order and reproductive disorders on reproduction and production traits in HF x Gir halfbred.

Model-I Effect of lactation order

The least squares technique of fitting constants (Harvey, 1990) were utilized to examine the influence of lactation order on reproduction and production traits by using following model.

$$Y_{ij} = \mu + L_i + e_{ij}$$

Where

Y_{ij} = Observation of reproduction, production traits of j^{th} individual under i^{th} lactation order

μ = Population mean

L_i = Effect of i^{th} lactation order

e_{ij} = Random error NID (σ^2e)

Model-II Effect of reproductive disorders

The data were corrected for the significant effect of lactation order and the adjusted data were used to estimate the influence of reproductive disorders on the traits under study by using following model

$$Y_{ij} = \mu + R_i + e_{ij}$$

Where

Y_{ij} = Observation of postpartum economic traits of j^{th} individual under I^{th} reproductive disorders

μ = Population mean

R_i = Effect of I^{th} reproductive disorders

e_{ij} = Random error NID (σ^2e)

Duncan's Multiple Range Test (DMRT)

Duncan's multiple range test as modified by Kramer (1957) [3] was used to make pair wise comparison among the least squares means with the use of inverse elements and root mean

squares of error.

If the values, $(Y_i - Y_j) \times \sqrt{2/C_{ij} + C_{jj} - 2C_{ij}} > \sigma^2e, Z(P, ne)$

Where,

$Y_i - Y_j$ = Difference between the two least square means

C_{ij} = Corresponding i^{th} diagonal elements of C matrix

C_{jj} = Corresponding j^{th} diagonal elements of C matrix

$Z(P, ne)$ = Standardized range value in Duncan's table at the chosen level of probability for the error degrees of freedom

P = Number of means involved in the comparison

σ^2e = Root mean squares of error

Results and Discussion

Production traits

a. Monthly peak yield

The overall monthly peak yield as affected by lactation order was 411.00 ± 39.52 kg and 364.40 ± 12.78 kg before and after the incidence of reproductive disorders respectively.

Effect of lactation order

The lactation order had non-significant effect on monthly peak yield of previous lactation and monthly peak milk yield of reproductive disordered lactation. The similar result reported by Patond (2009) [4] in Jersey cows and Shelke (2012) [5] in Phule Triveni synthetic cows. Significant effect of lactation order on monthly peak yield was reported by Kulkarni (2001) [6] in Red Sindhi cattle, Patond (2013) [17] in Phule Triveni cows and Nanavti and Singh (2004) [8] in Gir cattle.

The highest monthly peak milk yield of reproductive disordered lactation in cows of LO₇ i.e. 441.33 ± 72.42 kg and monthly peak milk yield of previous lactation was found in cows of LO₄ i.e. 519.59 ± 62.58 kg and lowest monthly peak milk yield of reproductive disordered in cows of LO₈ i.e. 273.44 ± 41.81 kg and monthly peak milk yield of previous lactation was found in cows of LO₁ i.e. 348.40 ± 79.37 kg respectively.

Table 1: Least squares means for monthly Peak yield of previous lactation and monthly peak yield of diseases affected lactation in HF x Gir halfbred as affected by lactation order.

Sr. No.	Lactation order	Monthly peak yield (kg)						Per cent decrease in monthly peak yield over previous lactation
		Previous lactation			Disease affected lactation			
		N	Mean	S.E.	N	Mean	S.E.	
	Population Mean (μ)	226	411.00	39.52	293	364.40	12.78	11.33
1	LO1	23	348.40	79.37	84	334.33	13.68	4.03
2	LO2	75	374.47	43.95	81	366.17	13.93	2.21
3	LO3	48	350.38	54.94	50	347.24	17.74	0.89
4	LO4	37	519.59	62.58	38	396.21	20.35	23.74
5	LO5	20	379.88	85.11	17	355.17	30.42	6.50
6	LO6	11	464.00	114.77	11	401.36	37.82	13.50
7	LO7	3	469.82	48.22	3	441.33	72.42	6.06
8	LO8	9	381.53	126.88	9	273.44	41.81	28.33

The per cent decrease in monthly peak milk yield in the cows of lactation orders LO₁, LO₂, LO₃, LO₄, LO₅, LO₆, LO₇, and LO₈ was 4.03, 2.21, 0.89, 23.74, 6.50, 13.50, 6.06 and 28.33 respectively.

Effect of reproductive disorders

It was seen from Table 3 that the reproductive disorders had significant effect on monthly peak yield during the lactation having reproductive disorders, however it was non-significant on monthly peak yield of previous lactation.

The highest monthly peak milk yield of reproductive disordered lactation in cows was affected by repeat breeder 444.60 ± 53.72 kg and the lowest monthly peak yield in reproductive disorders lactation noticed in cows was affected by still birth 157.33 ± 69.35 kg and in monthly peak milk yield of previous lactation ranges from 300.23 ± 161.21 Kg and 534.02 ± 78.97 kg respectively. In unaffected animal monthly peak yield of reproductive disordered lactation was 396.78 ± 11.35 kg and in monthly peak yield of previous lactation was 387.38 ± 45.29 Kg.

Table 2: Least squares means for monthly peak yield (kg) of previous lactation and monthly peak yield of reproductive disorders as affected by reproductive disorders noticed in HF x Gir halfbred

Sr. No.	Disorders	N	Monthly Peak yield of Previous lactation		N	Monthly Peak yield of reproductive disorders		Percent decrease or increase in peak yield over previous lactation
			Mean	S.E.		Mean	S.E.	
	Population mean (μ)	226	409.10	47.62	293	318.70	12.58	-22.09
1	Unaffected	76	387.38	45.29	112	396.78 ^a	12.58	2.42
2	Anestrus	45	377.96	58.86	59	328.93 ^{abc}	15.64	12.97
3	Metritis	42	429.67	60.93	49	353.02 ^{ab}	17.16	17.83
4	Retention of placenta	25	534.02	78.97	29	361.93 ^{ab}	22.30	32.22
5	Dystocia	10	376.02	124.87	11	275.09 ^{bcd}	36.22	26.84
6	Abortion	16	364.70	98.72	17	292.50 ^{bc}	36.22	19.79
7	Uterine prolapse	6	300.23	161.21	8	258.12 ^{cd}	42.47	14.02
8	Repeat breeder	4	447.75	197.44	5	444.60 ^a	53.72	0.70
9	Still birth	2	464.20	279.22	3	157.33 ^d	69.35	66.10

The means under each class in the same column with different superscript differed significantly

b. Average daily milk yield

The overall average daily milk yield as affected by lactation order was 8.53 ± 0.49 kg while it was 7.43 ± 0.50 in HF x Gir halfbred cow.

Effect of lactation order

Table 4 showed that lactation order had non-significant effect on average daily milk yield. The highest average daily milk yield was found in cows of LO₇ i.e. 10.43 ± 2.80 kg and the lowest average daily milk yield was found in cows of LO₈ i.e. 6.25 ± 1.61 kg respectively.

Table 3: Least squares means for average daily milk yield of HF x Gir halfbred as affected by lactation order

Sr. No.	Lactation order	N	Average Sr. daily milk yield (kg)	
			Mean	S.E.
	Population Mean (μ)	293	8.53	0.49
1	LO ₁	84	7.78	0.53
2	LO ₂	81	8.43	0.54
3	LO ₃	50	8.81	0.68
4	LO ₄	38	8.77	0.78
5	LO ₅	17	7.78	1.18
6	LO ₆	11	10.09	1.46
7	LO ₇	3	10.43	2.80
8	LO ₈	9	6.25	1.62

Effect of reproductive disorders

It is revealed that the reproductive disorders had significant ($P < 0.01$) effect on average daily milk yield. The significantly higher average daily milk yield was affected by anestrus i.e. 8.31 ± 0.62 kg which was at par with metritis, retention of placenta, abortion and repeat breeder and the lowest average daily milk yield was found in cows affected by uterine prolapse i.e. 5.90 ± 1.70 kg and average daily milk yield of unaffected animal was 9.32 ± 0.45 kg, respectively.

c. Lactational milk yield

The overall Lactational milk yield as affected by lactation order was 2698.72 ± 146.914 kg in HF x Gir halfbred.

Effect of lactation order

It was observed from Table 5 that the lactation orders had non-significant effect on lactational milk yield of reproductive disordered lactations and lactational milk yield of previous lactation. The highest lactational milk yield of reproductive disordered lactation was noticed in LO₆ 2779.25 ± 328.02 kg and lowest lactation milk yield in reproductive disordered lactation was noticed in LO₈ 1871.93 ± 362.64 Kg. The lactational milk yield of previous lactation ranges from 2585.77 ± 325.32 kg and 3128.90 ± 294.26 kg in LO₈ and LO₆, respectively.

Table 4: Least squares means for lactational milk yield (kg) of previous lactation and lactational milk yield of reproductive disorders affected by lactation order

Sr. No.	Lactation order	Lactational milk yield						Percent decrease in LMY over previous lactation
		Previous lactation			Reproductive disorders			
		N	Mean	S.E.	N	Mean	S.E.	
	Population Mean (μ)	226	2834.77	101.33	293	2455.30	110.87	5.44
1	LO ₁	23	2707.02	203.50	84	2559.47	118.70	5.45
2	LO ₂	75	2720.49	112.69	81	2570.17	120.88	5.52
3	LO ₃	48	2931.69	140.86	50	2424.36	153.85	17.30
4	LO ₄	37	3051.65	160.44	38	2674.18	176.48	13.36
5	LO ₅	20	2640.68	218.23	17	2591.00	263.86	1.88
6	LO ₆	11	3128.90	294.26	11	2779.25	328.02	11.17
7	LO ₇	3	2911.96	563.47	3	2164.03	628.12	25.68
8	LO ₈	9	2585.77	325.32	6	1871.93	362.64	27.60

Effect of reproductive disorders

The Duncan's Multiple Range Test (DMRT) indicated that significantly higher lactational milk yield of reproductive disordered lactation was noticed in cows affected by repeat breeder 2464.24 ± 454.52 kg and lower lactation milk yield in reproductive disordered lactation was noticed in cows affected by uterine prolapse 1726.65 ± 359.33 Kg. The

lactational milk yield of previous lactation ranges from 1726.65 ± 359.33 kg and 2464.26 ± 454.71 kg in uterine prolapse and repeat breeder, respectively. In unaffected animal lactational milk yield of reproductive disordered lactation 3015.46 ± 96.03 kg and in lactational milk yield of previous lactation was 2932.51 ± 112.88 Kg.

Table 5: Least squares means for Lactational milk yield of previous lactation and lactation milk yield of diseases affected lactation affected by reproductive disorders noticed in HF x Gir Halfbred

Reproductive Disorders	N	Lactational milk yield of Previous lactation		N	Lactational milk yield of reproductive disorder		Percent loss in Lactational milk yield over previous LMY
		Mean	S.E.		Mean	S.E.	
Population mean (μ)	226	2859.84	118.70	293	2209.36	106.466	-22.74
Unaffected	76	2932.51	112.88	112	3015.47 ^a	96.036	2.82
Anestrous	45	2881.99	146.706	59	2258.04 ^b	132.318	21.64
Metritis	42	2697.29	151.855	49	2409.67 ^b	145.193	10.66
Retention of placenta	25	2598.79	196.827	29	2447.61 ^b	188.732	11.06
Dystocia	10	2687.72	311.211	11	1836.96 ^c	306.442	31.32
Abortion	16	2715.63	246.034	17	1888.95 ^c	246.502	23.76
Prolapse	6	2482.33	401.771	8	1726.65 ^d	359.335	30.44
Repeat Breeder	4	3324.05	492.067	5	2464.26 ^b	454.527	25.86
Still Birth	2	3418.3	695.888	3	1836.67 ^c	586.792	46.26

The means under each class in the same column with different superscript differed significantly

Conclusions

All the productive trait *viz.* monthly peak milk yield, lactational milk yield, average daily milk yield, and lactation during reproductive disorders, were significantly affected by reproductive disorders indicated that the reproduction disorders should be avoided by proper health and nutritional management to avoid the losses in milk production.

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