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Genetic studies on gestation period and it's influence on first lactation milk yield in Jersey (J) × Red Sindhi (RS) crosses

HD Kuchekar and RP Singh

Abstract
The present study was undertaken to find out the effect of gestation period on first lactation milk yield in Jersey (J) × Red Sindhi (RS) crosses at SHIATS dairy farm, Allahabad. A total of 135 records of Jersey × Red Sindhi crosses were grouped into four genetic groups viz. ¼ J × ¾ RS (G_1), ½ J × ½ RS (G_2), 3/8 J × 5/8 RS (G_3), and 1/8 J × 7/8 RS (G_4). The records of cows having lactation length below 270 days were considered abnormal and hence not included in the study. It was concluded that the gestation period has significant effect on first lactation milk yield in Jersey (J) × Red Sindhi (RS) crosses. Similarly the cows of gestation period 270 to 280 days and 281 to 285 days had significant effect on first lactation milk yield hence due to consideration should be given at the time of selection or purchase of animals.

Keywords: Gestation period, genetic group, first lactation milk yield

Introduction
Gestation period (GP) is a physiological trait which begins with conception and ends with termination of pregnancy. It means is the period from conception to parturition or the birth of calf. It ranges from 273 to 286 days with average of 281 days in cattle. Gestation period varies a few days among the animals within the breed and it also depends and on sex of fetus and species of livestock. Milk production is considered to be one of the most important traits in selection of dairy cow causes of variation in milk yield may be divided in to genetic, environmental and managemental factors. Season of calving also has great effect on milk production especially in cross breed cattle as they contain certain percentage of exotic blood belonging to temperate region (Khedker, 1982). Dairying contributes close to a third of gross income of rural households and in the case of those without land nearly half of their gross income (Bhasin, 2012) [2]. An estimated 70 Million rural household are engaged in milk production, which has shown rapid growth between 4 to 5 per annum during last two decades. It is encouraging to note that annual milk production in India has grown to anticipated level of 146.3 million tons in 2014-2015, and per capita milk availability has reached to a level of 322 gram per day (Makwana *et al*., 2011) [4].

Materials and methods
The present investigation was made to determine the influence of gestation length on first lactation milk yield of Jersey (J) × Red Sindhi (RS) crosses maintained at Allahabad Agricultural Institute, Dairy Farm. Agricultural Institute, Dairy Farm was established in 1910 but the herd of Red Sindhi cows was introduced on this farm in 1923. The history sheets of the animals maintained during the period 1924 to 1985 at the agriculture institute, Naini, Dairy farm formed the basis of this study. A total of 135 records of Jersey (J) × Red Sindhi (RS) were grouped into four genetic groups viz. ¼ J × ¾ RS (G_1), ½ J × ½ RS (G_2), 3/8 J × 5/8 RS (G_3), and 1/8 J × 7/8 RS (G_4). The records of cows having lactation length below 270 days were considered abnormal and hence not included in the study. The records of animals selected were first calvers and completed at least their first lactation period. The following were the parameter of this study.

A) Genetic Groups
1) ¼ J × ¾ RS (G_1)
2) ½ J × ½ RS (G_2)
3) 3/8 J × 5/8 RS (G_3)
4) 1/8 J × 7/8 RS (G_4)

B) Reproductive trait

Gestation period viz. groups

1) GP_1 (270 - 280 days),
2) GP_2 (281 - 285 days),
3) GP_3 (286 - 290 days) and
4) GP_4 (Above 290 days).

C) Productive trait

1) First lactation milk yield (FLMY) (kg)

Results and discussion

Effect of genetic group of Jersey (J) × Red Sindhi (RS) crosses on gestation period

The data regarding gestation period in the cow of different genetic group Jersey (J) × Red Sindhi (RS) crosses are presented in the Table 1. The gestation period in Jersey (J) × Red Sindhi (RS) crosses irrespective of genetic group ranged from 270 to 300 days. The gestation period in ¼ J × ¾ RS (G_1), 3/8 J × 5/8 RS (G_2), ½ J × ½ RS (G_3) and 1/8 J × 7/8 RS (G_4) ranged from 270 to 300 days, 270 to 288 days, 279 to 294 days and 276 to 299 days, respectively. The mean gestation period in Jersey (J) × Red Sindhi (RS) crosses pertaining to genetic group namely G_1, G_2, G_3 and G_4 was 286.41, 280.54, 286 and 287.23 days, respectively. The differences in the gestation period of cows due to different genetic groups were significant.

The data on gestation period of Jersey (J) × Red Sindhi (RS) crosses of different genetic groups are furnished in the Table 1 and Fig.1. However, the shortest mean gestation period 280.54 days was observed in cows of G_2 followed by 286.0 days gestation period in cows of G_3, 286.41 days in cows of G_1 and 287.23 days in cows of G_4. Since the differences in these were found significant. It indicated significant effect of genetic group of cows on their gestation period. G_3 group of cows registered significantly shortest gestation period but the differences G_1 & G_4, G_2 & G_3, G_3 & G_4 and G_2 & G_4 were found non-significant, being at par.

Effect of gestation period on first lactation milk yield (kg) (FLMY)

The data regarding first lactation milk yield (kg) of Jersey (J) × Red Sindhi (RS) crosses as influences by different gestation periods are presented in Table 2. In general the first lactation milk yield (kg) of Jersey (J) × Red Sindhi (RS) crosses ranged from 421.5 to 3090.8 kg. The first lactation milk yield (kg) of Jersey (J) × Red Sindhi (RS) crosses pertaining to their gestation period of 270 to 280 (GP_1), 281 to 285 (GP_2), 286 to 290 (GP_3) and above 290 days (GP_4) days ranged from 427.72 to 3090.8, 421.95 to 2840.95, 725.11 to 2338.68 and 655.23 to 2379.4 kg, respectively. The mean first lactation milk yield (kg) Jersey (J) × Red Sindhi (RS) crosses pertaining to 270 to 280 days (GP_1), 281 to 285 days (GP_2), 286 to 290 days (GP_3) and above 290 days (GP_4) was 1839.26 kg, 1648.64 kg, 1495.36 kg and 1545.72 kg, respectively. The differences in the first lactation milk yield of cows due to gestation period group were significant.

The perusal of data from first lactation milk yield of Jersey (J) × Red Sindhi (RS) crosses furnished in the Table 2 and fig. 2 indicated that highest mean first lactation milk yield 1839.26 kg was observed in cows having gestation period 270 to 280 days followed by 1648.26 kg in cows with gestation period of 281 to 285 days, 1545.72 kg in cows having gestation period more than 290 days and 1495.36 kg in cows of gestation period ranging from 286-290 days. The differences in first lactation milk yield due to gestation period were found significant indicating thereby a significant effect of gestation period on milk yield of first lactation. However, the milk yield of cows of GP_1 was significantly higher than cows of GP_2 and GP_4 because the differences in the values were found significant. Similarly cows in gestation period GP_3 were found at par with the cows of GP_4 because the differences in the lactation yield in these were non-significant. It is interesting to note that cows having shorter gestation period (GP_1 & GP_2) compared to cows having longer gestation period (GP_3 & GP_4) produced significantly more milk in their first lactation. Banerjee and Banerjee (2003) [1] reported that the phenotypic correlation between gestation period and lactation milk yield was estimated to be 0.12 + 0.03 while the correlation between gestation period and lactation milk yield and gestation period was estimated to be 0.136 ± 0.029. The estimated values indicate that the milk production of an animal is fully realized only when the animal completes its full gestation length. Any disruption in gestation period will eventually lead to a fall in milk production yield.

Table 1: Gestation period of different genetic groups Jersey (J) × Red Sindhi (RS) crosses.

Genetic group wise gestation period (days)				
Sr. No.	**G_1 ¼ J × ¾ RS**	**G_2 ½ J × ½ RS**	**G_3 3/8 J × 5/8 RS**	**G_4 1/8 J ×7/8 RS**
Minimum	270	270	279	276
Maximum	300	288	294	299
Mean	286.41	280.54	286.00	287.23

Genetic groups	**G_4**	**G_1**	**G_3**	**G_2**
Mean gestation period (days)	287.235	286.416	286	280.545

Sr. No	**Genetic groups**	**Difference**	**C.D**	**Results**
1	G_1 and G_2	5.871	0.66	S
2	G_2 and G_3	5.455	0.90	S
3	G_3 and G_4	1.235	0.70	NS
4	G_1 and G_3	0.416	0.44	NS
5	G_1 and G_4	1.019	0.46	NS
6	G_2 and G_4	6.69	0.92	NS

*S = Significant *NS = Non-significant

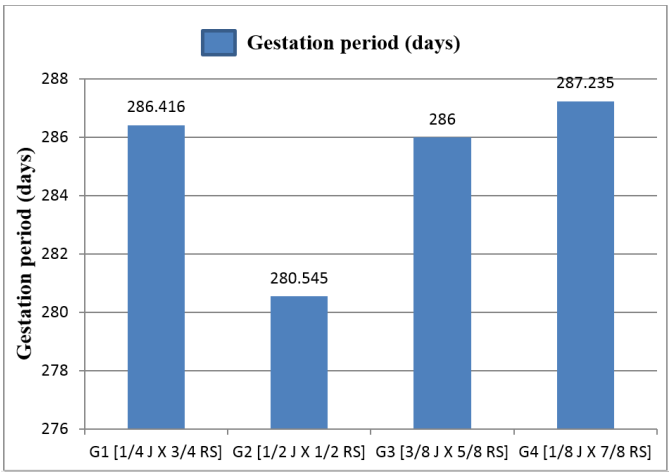

Fig 1: Gestation period of Jersey (J) × Red Sindhi (RS) crosses of different genetic groups.

Table 2: First lactation milk yield (kg) (FLMY) of Jersey (J) × Red Sindhi (RS) crosses as influenced by their different gestation period.

Genetic group wise First lactation milk yield (kg) (FLMY)				
Sr. No.	**G_1 ¼ J × ¾ RS**	**G_2 ½ J × ½ RS**	**G_3 3/8 J × 5/8 RS**	**G_4 1/8 J ×7/8 RS**
Minimum	427.72	421.95	725.11	655.23
Maximum	3090.80	2840.95	2338.68	2379.40
Mean	1839.26	1648.64	1495.36	1545.72

Genetic groups	**GP_1 (270-280 d)**	**GP_2 (281-285 d)**	**GP_4 (above 290 d)**	**GP_3 (286-290 d)**
Mean first lactation milk yield (kg)	1839.26	1648.64	1545.72	1495.36

Sr. No	Gestation period-groups	Difference	C.D	Result
1	GP_1 and GP_2	190.628	31.53	S
2	GP_2 and GP_3	153.28	44.52	S
3	GP_3 and GP_4	50.36	44.52	NS
4	GP_1 and GP_3	343.908	31.53	S
5	GP_1 and GP_4	293.548	31.53	S
6	GP_2 and GP_4	102.92	44.52	S

*S = Significant *NS = Non-significant

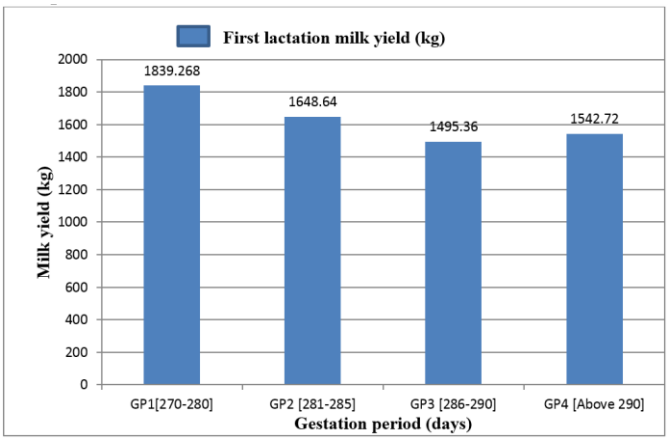

Fig 2: First lactation milk yield (kg) Jersey (J) × Red Sindhi (RS) crosses as influenced by their gestation periods

Conclusion

It was concluded that the gestation period has significant influence on fist lactation milk yield of Jersey (J) × Red Sindhi (RS) crosses. Similarly the cows of gestation period 270 to 280 days and 281 to 285 days had significant effect on first lactation milk yield, due to consideration should be given at the time of selection or purchase of animals.

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