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## Estimation of repeatability for certain productive traits lactation length and gestation period in various grade of Jersey × Red Sindhi crosses at SHUATS dairy farm, Prayagraj, Uttar Pradesh

**Amit Kumar, Ram Pal Singh, Sarvjeet Herbert and Rajan Singh**

**Abstract**

Department of Animal Husbandry and Dairying, Sam Higginbottom University of Agriculture, Technology and Sciences was used to examine 65 entries from 1935 to 1975 65 entries were evaluated from a pedigree cum history sheet from department of animal husbandry and dairying under Sam Higginbottom University of Agriculture, Technology and Sciences. Skilled people raised and cared for the animals in identical feeding and management conditions. Lactation lengths, gestation period, were the reproductive features investigated. The data revealed that the repeatability ( $r$ ) with Standard Error (SE) for the lactation length, gestation period ( $r=0.81$ ,  $SE=0.04$ ), ( $r=0.60$ ,  $SE=0.170$ ) respectively.

**Keywords:** Repeatability, lactation length, gestation period, correlation, standard error, seasons, pedigree

**Introduction**

The repeatability is the correlation between tow records and future performance of individuals in a population. Thus, repeatability indicates the strength of relationship between repeated records of the same trait on the individuals of a population. The repeatability of a trait measures the average degree to which an animals will perform in her next lactation as much above or below the average of herd as she did in the previous lactation. It is usually calculated as an intra- class correlation within the herd or as correlation between records made by the same animal cow in different lactations. Repeatability error is the maximum difference in output when approaching the same point twice forms the same direction. The difference between output readings for four or more consecutive pressure cycles to rated range under duplicate conditions, approached from the same (increasing or decreasing) direction. There are only a few studies on repeatability in Jersey crossbred cattle. Repeatability is the fraction of the variance that is attributed to permanent differences between individuals. Higher the repeatability, more accurate will be the culling of cows on the basis of the first lactation. In the present study, repeatability values of the milk yield, fat yield. Gestation period, were lower than those of the earlier report of Khan *et al.* in Jersey × Red Sindhi. However, the estimated values are higher than those reports in Jersey × Sahiwal crossbreds. The estimates were low to moderate in magnitude. The low repeatability estimates of reproduction traits ranged from 0.001 (milk yield) to 0.42 (fat yield) indicate that they were influenced more by temporary environmental effects. Lactation length is one of the major factors determining milk yield. Dairy animals are not selected for these economic traits because can cause increase in calving interval which is not an economically viable option. Milk production records are usually adjusted for lactation length. Many factors such as feed and fodder availability, management conditions along with seasonal variations affect it. As animals do not get equal opportunities for this trait, breeding value of animals are adjusted up or down towards a standard such as 305 days. The first lactation length (FLL) in cross breed cattle ranged from 277.26- 1.01 days to 377.10-450 days. (Beyero and Kapoor 2014) <sup>[26]</sup> Reported lactation length as 287.02-2.2 days in cross breed cattle. Lactation length in cross breed cattle jersey × Red Sindhi cow was 270-280 days. Gestation period is one of the most important factors of cattle. Cow conceives the ovum when this day to birth the calf when called is gestation period. (Davis and Andersen 2003) <sup>[17]</sup> Reported that gestation period and birth weight varies greatly among breed. In cattle, Aberdeen Angus seems to have the shortest gestation period (273) days and Brown Swiss the longest (292 day), Younger cow generally have calves of lighter weight.

The creation of synthetic population following selection resulted into a new breed of cattle “Karan Fries” The color of Karan Fries breeds predominantly of black patches and sometimes is completely dark with white patches on forehead and tail. The average 1st lactation milk yield was 3619 kg in 305 days. The average fat% ranged between 4.10 and 4.17 and SNF ranged between 8.58 and 8.75%. The Project Directorate on Cattle (PDC), Meerut has developed National crossbred cattle “Frieswal” a Holstein Friesian-Sahiwal cattle cross, yielding 4000 kg of milk with 4% butter fat in a lactation of 300 days (Directory of Frieswal Bulls, 2011). The chief body color of Frieswal cattle was black and white. Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri of district Ahmednagar, Maharashtra has developed a triple crossbred cow breed named “Phule Triveni” giving milk yield of 3000 to 3500 Liter/lactation with 4% of fat. The new breed has been developed by crossing Holstein Friesian (50%), Jersey (25%) and Gir (25%) breeds (Ignetiuous *et al.* 2020) [23]. The genetic constitution of “Vrindavani” cattle carries 50-75% inheritance from exotic cattle breeds concerning Holstein-Friesian, Jersey and Brown Swiss and 25-50% from indigenous Haryana breed. The Vrindavani cattle exhibit almost all possible coat colors in addition to roan, light-dark brown, black and white and brown and white. The Vrindavani cattle yield around 3,000 kg milk in 305 days of lactation with 4-4.5% fat (DARE/ICAR, Annual Report, 2007-08).

**Material and Methods**

A total of 65 records were used in this study to explore

repeatability for specific productive features such as lactation length and gestation period in various grades of Jersey× Red Sindhi hybrids. Data for the current study project was gathered from the SHUATS Department of Animal Husbandry and Dairying's history sheet. The repeatability values were estimation by using restricted maximum likelihood procedure as outline by Thompson, R. (2008) [36] fitting an individual's animal model. The data regarding productive traits were recorded and analyzed by intra class correlation method (R.A. Fisher 1921). The standard error of repeatability will calculate as per Swiger *et al.*, (1964) [35].

$$Y_{km} = \mu + bK + e_{km}$$

Where,

$Y_{km}$  is the  $M^{th}$  measurement on  $K^{th}$  individuals

$\mu$  is the common mean

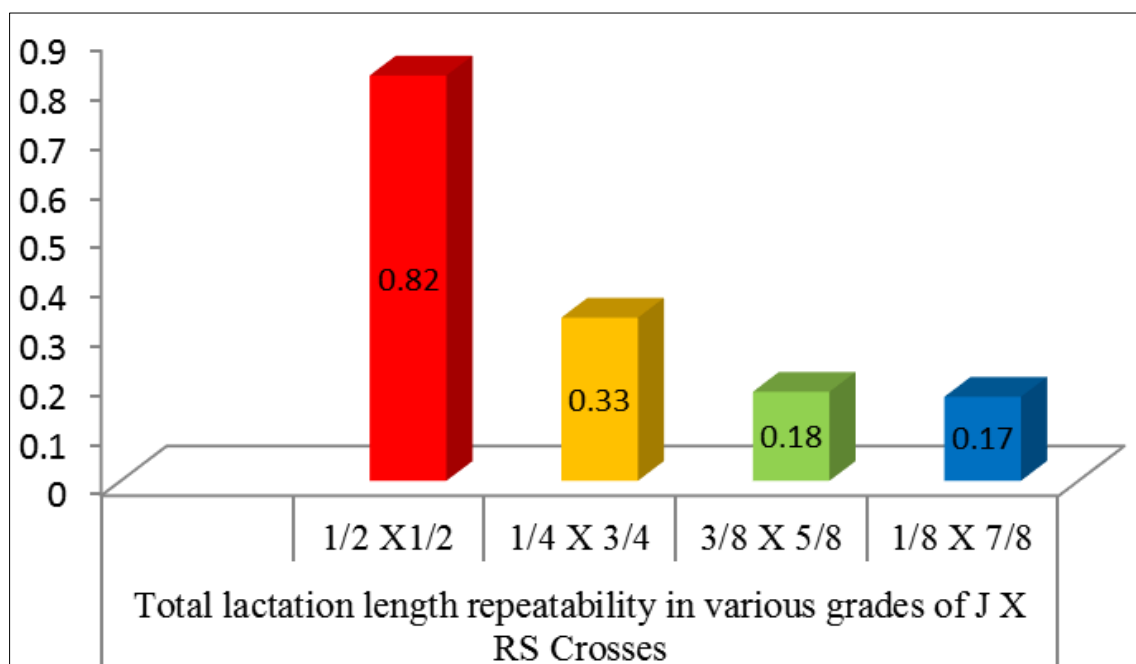
$b_k$  is the effect of  $K^{th}$  individuals

$e_{km}$  is environmental deviation of the  $M^{th}$  measurement of  $K^{th}$  individual.

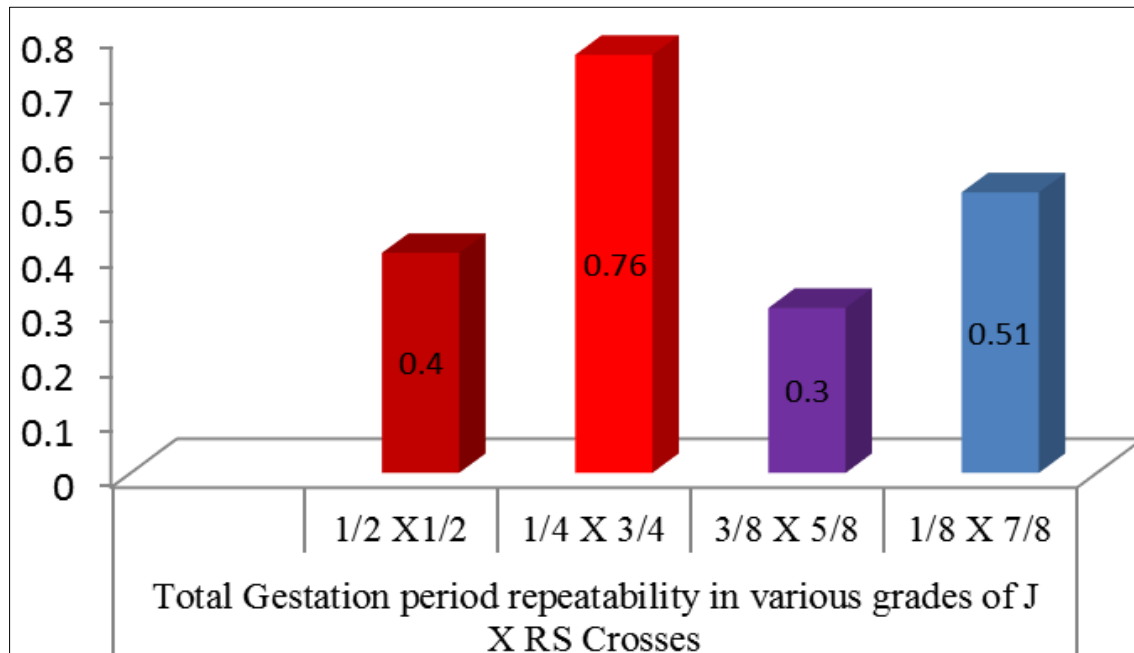
The various fixed effects observed to be significant source of variation for different performance trades were fitted in the above mixed model for the estimation of repeatability. These included years of calving, lactation number lactation length for 305 days and lactation number of lactation length, Year of calving for lactation length and gestation period.

**Table 1:** Repeatability estimates for various performance of productive triads of Jersey × Red Sindhi Crosses.

Traits	Number of records	Number of animals	Repeatability (r)	Stander (SE)
Lactation length 1/2J×1/2RS crosses	48	16	0.82	0.15
Lactation length 1/4J×3/4RS crosses	69	23	0.33	0.10
Lactation length 3/8J×5/8RS crosses	27	09	0.18	0.04
Lactation length 1/8J×7/8RS crosses	51	17	0.17	0.16
Gestation period 1/2J×1/2RS crosses	48	16	0.40	0.17
Gestation period 1/4J×3/4RS crosses	69	23	0.76	0.11
Gestation period 3/8J×5/8RS crosses	27	09	0.30	0.30
Gestation period 1/8J×7/8RS crosses	51	17	0.51	0.12



**Fig 1:** Repeatability of lactation length in 1st, 2nd and 3rd lactations of 1/2J × 1/2RS, 1/4J × 3/4RS, 3/8J × 5/8RS, 1/8J × 7/8RS crosses.



**Fig 2:** Repeatability of gestation period in 1st, 2nd and 3rd lactations of 1/2J × 1/2RS, 1/4J × 3/4RS, 3/8J × 5/8RS, 1/8J × 7/8RS crosses.

### Lactation length

The repeatability estimation with standard error for lactation length based on 1/2 J × 1/2 RS 48 lactation records of 16 cattle were  $0.82 \pm 0.15$ , 1/4 J × 3/4 RS 69 lactation length of 23 cattle were  $0.33 \pm 0.10$ , 3/8 R × 5/8 RS 27 lactation length of 9 cattle were  $0.18 \pm 0.04$  and 1/8 R × 7/8 RS 51 lactation length of 17 cattle were  $0.17 \pm 0.16$  (Table 1) respectively. The heritability of age at first lactation length obtained for Jersey × Red Sindhi were  $0.82 \pm 0.15$ , and this was higher than the values reported by Okara *et al.* (1990) [37] and Hadge and M.R, Kuralkar but lower than that of Okara and Singh. The overall lifetime production performance of the Jersey x Red Sindhi crossbred cows of the herd studied were abysmally lower than the available reports for Jersey crossbreds in the tropics, Okara *et al.* (1990) [37] Hadge and M.R, Kuralkar (2012) [19], Hadge M.R, Kuralkar (2012) [19].

### Gestation period

The repeatability estimation with standard error for gestation period were found to be 1/2 J × 1/2 RS 48 Days record of 17 cattle were  $0.40 \pm 0.17$ , 1/4 J × 3/4 RS 69 gestation period record of 23 cattle were  $0.76 \pm 0.11$ , 3/8 J × 5/8 RS 27 gestation period record of 9 cattle were  $0.30 \pm 0.2$  and 1/8 J × 7/8 RS 51 gestation period record of 17 cattle were  $0.51 \pm 0.12$  respectively Chaudhri and Purohit (2012) [11].

### Conclusion

Livestock plays an important role in Indian economy and 20.5 million people depend upon livestock sector for their livelihood. Livestock also provide serve the farmers as income, employment, food, social security, draft and dung. The crossbred animal Jersey × Red Sindhi have proud to be outstanding breeds for the environmental condition and show good overall performance. The repeatability coefficient for all the traits were analyzed and concluded that the traits having slight to moderate repeatability performed better in production perspective. The moderate repeatability for all lactation length in 3/8 J × 5/8 RS crosses and for gestation period in 1/2 J × 1/2 RS crosses. For production performance point 3/8 J × 5/8 RS crosses were found best compared to all crosses.

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