SUMMARY AND CONCLUSION
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The reproductive and productive are two most important traits which influence the economy of a dairy farm. The factors influencing economic traits and association among them can be used to make selection more effective at an early age. Majority of reports available in the literature reflect the study especially in Sahiwal and their crossbreds based on Military Research and Institutional farms. However, few studies have been conducted on these animals at Government farms of Uttar Pradesh and scientific informations on the performance of Gangatiri cows (a popular and well adopted dual purpose breed of Eastern UP and Bihar also known as medium Hariana or Sahabadi) and their crossbreds are hardly available in the literature, therefore, present study was taken up.

The present investigation was undertaken on data of 410 lactations of 71 Sahiwal (S) cows, 228 lactations of 40 Sahiwal x Jersey (S x J) half breeds and 535 lactations of 94 Gangatiri (G) and 55 lactations of 11 Gangatiri x Jersey (G x J) halfbreds maintained at State Live-Cum-Stock Agricultural Farm Chak-Ganjaria (Lucknow) and Arazilines (Varanasi) of Uttar Pradesh covering the period of 28 years (1978 to 1998). The main objectives of this investigation were: (1) to prepare a comparative statement regarding performance of these genetic group, (2) to focus most important reproductive trait responsible for enhancing milk production in a breed, (3) to work out economic feasibility of rearing the cows of Indian breeds and crossbreds and (4) to study the effect of weather and environment on the economic traits.

The performance records envisaged age at puberty (AP), age at first calving (AFC), Age at subsequent calvings (AC), service period (SP), gestation period (GP), lactation length (LL), Dry period (DP), calving interval (CI), lactation milk yield (LMY), 305 day/less day milk yield (305DY), peak milk yield (PY) and milk quality in terms of fat, protein, lactose, ash, SNF and TS contents and specific gravity.
Keeping in view the above objectives of study the data were statistically analysed and least squares analysis of variance were made to estimate the significant effect of period, season and parity on economic traits in each breed separately. In order to find out inter relationship among economic traits correlation coefficients for first six lactations were also estimated in each genetic group separately. The data on AP and AFC were analysed according to period and season of birth, while data on other traits were analysed according to period and season of calving.

The important findings obtained and conclusion arrived after proper observation and statistical analysis of the data are briefly summarised as under:

**5.1 ECONOMIC TRAITS**

1- It was observed that there was not a particular calving season and animals calved all through the year. However maximum frequency of calvings (more than 70%) were recorded during rainy and winter seasons (Jul. - Feb.) of S and S x J genetic groups while G and G x J genetic groups favour winter and summer seasons (Nov.-June) for maximum number (more than 70%) of calvings.

2- The least squares means of AP and AFC and age at 2nd to 4th calvings were highest in S followed by G, G x J and S x J genetic groups. But age at 5th and 6th calvings were found lowest in G x J half breds.

3- LS means of SP and CI were observed longest in S followed by S x J, G and G x J genetic group.

4- Least variation among mean GP of four genetic groups were observed, however it was highest in S followed by G, G x J and S x J genetic group.

5- LS Mean of LL was observed longest in S x J followed by S, G x J and G genetic group.

6- LS mean of DP was longest in S followed by G, S x J and G x J genetic group.

7- LS mean of LMY and 305 DY were recorded highest in S x J followed by S, G x J and G genetic group.

8- LS mean of PY was highest in S x J followed by G x J, S and G genetic group.

9- Average milk quality traits worked out and revealed that all milk quality traits were higher in half breds than inbreds except lactose and ash. Significantly
higher ash and sp.gr. were observed in milk samples of G x J as compared to milk samples of S x J half breds. Differences among other milk quality traits between half breds were found non-significant. Between inbreds, significantly higher fat, ash, SNF, TS and sp.gr. were associated with milk of Sahiwal, while protein content was found significantly higher in milk of Gangatiri cows. Effect of genetic group on all milk quality traits were found significant except lactose.

5.2 EFFECT OF PERIOD, SEASON AND PARITY

Least squares analysis of variance revealed that:

1- Period had significant (P < 0.01) influence on AP and AFC of S, G and S x J, and G x J, SP and CI of G and G x J, LL, LMY, 305 DY and PY of S x J and DP of S x J and G x J genetic groups. Period had non-significant effect on GP of all four genetic groups studied.

2- Season had significant influence on AP, AFC and SP of S, G and S x J, CI of S and S x J, LMY and 305 DY of S and G x J and DP and PY of S genetic group. Non-significant effect of season on LL and GP was also observed in present investigation. Significant effect of season was also observed on all milk quality traits studied except lactose and ash contents.

3- Parity had significant effect on SP of all 4 genetic groups studied, CI of S, G and S x J, LL of S and S x J, DP of S, G and G x J, 305 DY of S and G and PY of S, G and S x J genetic groups. Non significant effect of parity on LMY and GP were observed in present investigation. However, among all productive traits, LL was in a declining trend while LMY, 305 DY and PY was recorded in an increasing trend from 1st to 4th parity and their after it was almost constant among all four genetic groups.

5.3 INTER-RELATIONSHIP AMONG ECONOMIC TRAITS

Phenotypic correlation coefficients among economic traits worked out reveals that at phenotypic level:-

1- AP was significantly (P < 0.01) positively associated with AFC among all 4 genetic groups.
2- Association of AP and AFC with respective AC was also positive, but a progressive decreasement in correlation values were observed from 2nd to 6th calvings among all 4 genetic groups.

3- AP and AFC was positively associated with SP, CI and DP to a limited extent.

4- GP and LL were not much associated with AP and AFC.

5- LMY, 305 DY and PY were not much associated with AP and AFC in S and S x J genetic groups, but in G and G x J genetic groups they were observed positively interrelated.

6- AC was found positively associated with respective SP, DP, LL and CI from 3rd to 6th lactations among all four genetic groups and with respective LMY, 305 DY and PY in S and G genetic groups. In case of crossbreds, association was limited upto 2nd lactation only.

7- LL, DP and CI were found positively and significantly associated with SP from almost 1st to 6th lactations of all four genetic groups studied. But correlation of SP with LMY and 305 DY was observed positive only in S, G, and S x J genetic groups. PY and GP were found not much associated with SP among four genetic groups.

8- No any definite association of GP with LL, DP and CI were observed, however, most of correlation coefficients were found positive with LMY, 305 DY and PY.

9- Correlation coefficients of DP with LL, LMY 305 DY were found negative and significant. However, correlation values between DP and PY were also found negative but non-significant. Correlation between DP and CI were observed positive and highly significant (P < 0.01)

10- A positive correlation of LL with CI, LMY, 305 DY and PY was observed among all 4 genetic groups, however, correlation values in case of G x J were not significant.

11- Correlation of CI with 305 DY and LMY was positive and significant but not with PY.
12- A highly significant and positive association among 305 DY, LMY and PY were observed from 1st to 6th lactations among 4 genetic groups studied.

5.4 CONCLUSION

From the above findings, it maybe concluded that:

1- Sahiwal cows were superior in terms of milk yield and lactation length as compared to Gangatiri, while Gangatiri cows were superior in terms of its reproductive efficiency and regularly of breeding as it exhibited lower AP, AFC, AC and shorter duration of SP, CI and DP as compared to Sahiwal cows.

2- Due to lower AP, AFC, AC, SP, CI and DP with higher LMY, 305 DY PY and higher milk fat, SNF and TS content, Jersey half breds had an edge over indigenous cattle. This also showed better adoptability and economic feasibility of Jersey half breds under prevailing agroclimatic conditions in the region.

3- The mean LMY of 2130 and 1443 kg displayed by S x J and G x J half breds can be certainly considered satisfactory under the adverse environmental conditions. However, Jersey bulls with higher sire indices are used the milk yield amongst the crossbreds can substantially be boosted beyond the present 2130 and 1743 kg.

4- Period, season and lactation order significantly influenced most of economic traits among 4 genetic groups studied and appropriate adjustment for these factors should be used while estimating breeding values and genetic and phenotypic parameters.

5- Significant correlation coefficients lead to conclusion that selection for one trait would bring about desirable changes in other traits too. Hence early expressing traits should be considered for selection of latter expressing traits.

6- The present results suggested that the reproductive traits are mostly influenced by managerial and other environmental factors rather than genetic, therefore, optimum feeding and better management could improve these traits.

5.5 RECOMMENDATIONS

1- Jersey half breds may be recommended for increasing milk production in Lucknow and Varanasi region of Uttar Pradesh.
2- Shortage of green fodder being the main hurdle in dairy development, any programme in this direction must include development of pasture, fodder and crop husbandry.

3- Extension efforts are needed to educate the farmers regarding proper breeding, feeding and management of \( \text{milk} \) animals.

4- Gangatiri cows may be recommended as dual purpose breed to the farmers of eastern UP and western Bihar and efforts should be made to conserve this breed for its reproductive efficiency and adaptability under prevailing conditions.