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Since past three decades mankind is struggling constantly for producing enough food to meet the needs of its ever-expanding population. Animals are a valuable part of the food chain as they are a source of food of high nutritive value. Among all the domesticated species, cattle are more important in India as their usefulness is based upon the production of both milk and work. The bullock, though rapidly being replaced by mechanical power, still forms the main source of draft power for various agricultural operations. The importance of cattle in India is increasing day by day for the reason that the cow is an efficient machine for converting farm crops into useful human food like milk, which is a main source of animal protein in the diet of still large vegetarian population of the country estimated to be 35 to 40 percent. Thus the sustained provision of efficient bullocks for cultivation and cows for more and more milk production assume paramount importance under the prevailing Indian conditions.

India is very rich in live-stock wealth in the form of almost all important species of domestic animals. There is vide genetic diversity exists in the form of breeds and strains which are well adapted to different agroecological conditions.

India possesses a largest cattle population in the world. According to 1992 census there are 198.4 million cattle in India constituting over 15% percent of the world cattle population enumerated to be 1294.605 million (FAO, 1992). But majority of Indian cattle comprised of non-descriptive type endowed with poor productive and reproductive potentials. It has been estimated that in India 94.3 percent of the milch cows yield less than 1 kg and only 0.4 percent yield over 2.0 kg milk per day of 41.3 percent of the total population in milk during 1972 (Sharma, 1987). The reasons for low production in the country have been derived mainly due to low genetic potential of indigenous cattle, no specific breeding policy in a particular area, use of inferior male for breeding purpose, inadequate availability of feed resources etc. There was no significant increase in milk production in early three decades i.e. 17.4 million tonnes (1950-51), 20.4 million tonnes (1960-61) and 22.5 million tonnes in 1972,
but this has increased remarkably to 34.3 million tonnes in the year 1982. Now it has recently surpassed 63 million tonnes in the year 1994-95.

At present our country is producing 74 million tonnes of milk and cow contributes more than 45% of the total milk production. Due to this fact cow may be considered the second backbone of the dairy industry after buffalo who contributes more than 50%. If the crossbred cows replace some of the poor yielding cows, they may play an important role to boost the milk production in the country.

No doubt, in India, dairy front is witnessing a spectacular growth over past three decades, and now milk is emerged as one of the important essential commodities next to wheat. Keeping in view the potential of dairy farming, the Govt. of India has launched a "Technology mission" on dairy development to boost the "operation flood-III" programme which covers the period between 1985 and 1994. The mission primarily aims at increasing milk production from 44 million tonnes 1987 to 61 million tonnes in 1995 and per capita availability of milk from 158 grams per day per head in 1987 to 188 grams per head per day in 1995.

In last two decades of the twentieth century the demand for milk in India is expected to grow at the rate of 6 percent per year. To meet this increased demand of milk from the ever increasing population of the country, India needs to produce 80 million tonnes of milk by the year 2000 A.D. (Mehra et al. 1992).

The demand of milk can be met by no other means except by increasing the production per animal and that can only be achieved by the properly improved breeding and feeding practices. Since cross breeding programme in cattle for increasing milk production has been in operation in India at institutional, organised, reorganized farms and under field conditions, it appears quite relevant to conduct studies pertaining to potential of crossbreds.

Besides this, importance of Indian breeds may not be ignored, because of their qualities of endurance, resistance to tropical diseases and ability to utilize coarse forage.

Unscientific breeding, management and poor nutrition contribute to high calf mortality, low growth rate, late maturity, lower milk production and reproductive disturbances have become commonly evident in the breeds of cows. Many people
now believe that Indian breeds may not be able to survive the challenge of the emerging
crossbred cattle population. It has also been advocated that Indian breeds developed
as triple purpose, like milk production, draught and for both purposes, where as
crossbreeding with foreign breeds improves milk production only. Experimental re-
results have clearly established that draught capacity and meat characteristics have
negative genetic correlation with dairy trait.

Regular reproduction is most important in determining milk production
from an animal. Delayed puberty and postpartum oestrus, long intercalving period,
repeat breeding and problem of heat detection are some of the problems which de-
serve further attention on the basis of work already carried out on these problems.

Reproduction is an important component in increasing the economic value
of an animal. Early maturity and higher reproductive efficiency results in reduced
cost of maintaining the animal during the unproductive phase of its life. The repro-
ductive efficiency is, therefore, a complex phenomenon controlled by both genetic
and non genetic factors. The reproductive efficiency varies not only between species
and breeds but also among animals within a particular breed. Most of the reproduc-
tive and productive traits are polygenic in nature and have very low heritability. Low
heritability indicates little possibility of improving the productive efficiency by
selection. As against this, good degree of improvement can be brought about by
providing better environment and by proper feeding of young stock.

Indian cattle are considered to be more efficient utilizer of coarse
roughages than the exotic breed and accordingly the nutritionists have recommended
quality roughages for high milk producing animals. The present economic condition
demands not only an individual animal be high producer but should be profitable
also. The income from a dairy cattle depends not only on milk production perform-
ance but also on the vital economic traits of growth, production and reproductive
efficiency and herd life, for profitable milk production and best reproductive effi-
ciency a dairy cow must calve regularly. It has been observed that extremely high
milk production in the first lactation may have some detrimental effect on long herd
life.
The diversity of the breeding stock and variation available in economic traits of cattle in the country offer greater challenge and scope for their improvement to the animal breeder. It may also be noted that there are certain inherent difficulties particularly to our country which stood in the way of rapid progress in cattle development; these are (1) Enormous cattle population, most of them with lowest average daily milk yield (2) Acute shortage of feeds and fodder (3) Poor genetic potential for milk production, (4) The small size of land holdings and consequently small dairy units make them economically unviable, it also acts against introduction of advanced techniques, (5) Adverse climatic condition of the tropics (6) Poor grazing and environmental factors, (7) Lack of organised marketing facilities of the products, and (8) Religious sentiments of the people.

A dairy cow will be profitable only when it combines high reproductive rate with high level of production. The efficiency of production and profit of a cow during her life time, would largely depend upon age at first calving, days open, days dry, and other life. The relationship between profit and reproductive efficiency trait and herd life are not linear, there ought to be optimum levels of reproduction and herd life which would maximize the life time profit. The knowledge about optimum level of breeding and management parameters will enable a breeder to outline his programming suitable for maximizing profit over the entire life time of an animal.

A determining factor in the productive and reproductive performance of the farm animal is environment. There is a close relationship between the dairy cattle and the ambient environment. Adverse climate causes stress on the animal in both direct and indirect ways. Therefore, to have the maximum yield from a dairy cow during her lifetime, it becomes essential for a dairyman to know the favourable breeding months. It is important to have the pregnancy imposed in cows at the right time, otherwise dairy farming will not prove to be a profitable concern. Months and seasons of the year are considered to be the important environmental factors affecting productive and reproductive traits in a breed.

Sahiwal (Montgomery) is a medium sized, somewhat fleshy breed famous for its milk production. This breed of cow is now reared throughout Punjab and
other states of the country. The milk yield ranges from 1400 to 2500 Kg. per lactation. The heritability of this trait is 0.2 to 0.3. The age at 1st calving ranges from 37 to 48 months and the calving interval is from 430 to 580 days. This is one of the most popular breeds of sub-continent and it has been exported to Sri Lanka, Kenya, Latin America and West Indies.

Gangatiri cow, on the other hand also renowned as “Eastern Haryana” or “Sahabadi” is originated with tract falling between Ganga and Ghaghara rivers known as “Duaba belt”. This tract comprised of 8 districts of Eastern Uttar Pradesh and 4 districts of West Bihar. This breed has fixed an identity amongst Indian breed so far as milk production is concerned. It is medium sized, good looking and produces on an average about 4.5 litres of milk per day even under poor feeding and management conditions. The cows of this breed have great resistance to survive under adverse weather conditions. Unfortunately, no efforts have been made to improve this breed. As a result there is only one organised dairy farm of this breed i.e. State live stock-cum-Agricultural farm, Arazilines, Varanasi, maintaining a herd of approximately 200 cows and a sizeable herd is also maintained at Dairy farm, U.P. College, Varanasi.

In order to improve the milk yielding capacity of indigenous cows exotic cattle breeds have been extensively used in India. At present mainly 4 exotic breeds viz. Holstein friesian, Red Dane, Brown swiss and Jersey are being used for this purpose. The Jersey approaches the true dairy type. It is smallest of the dairy breeds and is considered comparatively an economical producer of milk under Indian conditions. They can be pets under good management or mean under poor management. No exotic dairy animal exceeds the Jersey in grazing ability. They are small and active so their maintenance requirements are lower than those of the larger breeds. In India Jersey breed has very well acclimatised. The milk yield of first generation progeny obtained by use of jersey bulls on indigenous cows has increased in individual cases by about two and a half times more than that of their dams. The age of maturity and intercalving period in the progeny have also been considerably reduced. Jersey is economical producer of milk with 5.3 percent fat and 15 percent total solid. The highest record of milk yield was 11381 kg and fat 544 kg in a lactation of 365
days. A large number of reports on the performance of exotic bulls and indigenous breeds of cows are available in the literature (Singh and Desai, 1967, Koul et al, 1973, Arora and Desai, 1979). However very little information is available on the performance of Jursey x Gangatiri and Jursey x Sahiwal at Govt. farms of Uttar Pradesh.

It appears quite relevant to conduct studies pertaining to potential of indigenous breeds and crossbreds. The production and reproduction are two most important traits that influence the economy of a breed. For efficient management of dairy cows and to chalk out an efficient breeding programme for their improvement one should have not only the knowledge of production and reproduction traits but also to know the environmental effect and inter relationship at phenotypic level between these two economic traits.

Thus keeping the above views in mind the present investigation entitled “Performance of Sahiwal and Gangatiri cows and their Crossbreds” was planned and executed with the following aims and objectives:-

1- To prepare a comparative statement about the reproductive traits of Sahiwal and Gangatiri cows and their crossbreds with Jersey bulls.

2- To prepare a comparative statement regarding productive traits of Sahiwal and Gangatiri cows and their crossbreds with Jersey bulls.

3- To focus on the most important reproductive trait which is responsible for enhancing milk production in a breed.

4- To work out economic feasibility of rearing the cows of Indian breeds and their crossbreds.

5- To study the effect of existing weather and environment on the milk yield in Indian cows and their crossbreds.