

Gain in Dairy Economy hangs around Age at First Calving (AFC) and Calving Interval (CI)

¹Sahana V N, ²Heena kauser, ³Salur Srihitha

¹ PhD scholar, Division of Animal Genetics and Breeding, ICAR-NDRI, Karnal

² PhD scholar, Dairy Chemistry Division, ICAR-NDRI, Karnal

³ Assistant Professor, Department of Animal nutrition, CUTM, Odissa

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Dairy farming which is practiced in India from time immemorial plays a significant part in Indian ruraleconomy. The input of dairy farming is revolving around the economic traits of cattle and buffalo, whichmajorly includes age at first calving and calving interval. Due to negative correlation between milk yieldand fertility, selection for high milk yield in dairy animals eventually lead to low reproductive performance (decline in fertility). The profitability will remain as a far approach in the absence of regularbreeding and calving at the appropriate time.

The quality of the stock management is determined majorly by the AFC and CI, so they are called the key indicators of quality of stock management. Reproduction is an important consideration in the economics of dairy farming. Reproductive efficiency which means the greater number of calves during lifetime, so that life time production is increased, is measured using AFC and CI. Healthy calf each year, which is the goal of dairy farming, can only be achieved by incorporation of managemental practices thatcontrol AFC and CI.

Age at first calving

It is the age of the female animal when it calves for the first time or a period that female calf needs to reach puberty and to reproduce for first time. The desirable age at first calving for Indian cattle breeds is 3 years, cross breed cattle is 2 years and for buffaloes it is 3½ years. It varies from breed to breed- AFC of Holstein Friesian and Jersey is 22 months while that of Brown Swiss and Ayrshire is 23 months. Optimum AFC is 22 -25 months in cattle.

Factors affecting AFC

Role of nutrition in controlling AFC is vital. Cows with good body condition attain puberty earlier lowering first calving age. Provision for good feed with proper proportion of mineral mixture, concentrateand forage and adequate water help to attain desired body weight and maturity at early age. Genetic potential of the animal is the other factor which determines AFC, so there in variation

between breeds pertaining to AFC. Age at first mating and number of services per conception have positive association with AFC. Effect of season is noticed where calves born in south west monsoon were youngest at first calving while the calves born in summer were oldest. AFC is extended by the incidence of diseases.

Effects of varying AFC

Milk yield

Prolonged AFC will have high production at first lactation but there will be decrease life time production due to a smaller number of calvings. There is also reduction in milk persistency due to prolonged AFC. Early first calving is associated with decreased first lactation yield and milk fat percentage. Age at first calving has positive genetic correlation with days to attain peak yield but AFC has negative correlation with milk yield per day of lactation. Reduction in AFC can be achieved by selection based on milk yield per day of lactation which also led to increase of milk yield per day of lactation. Fertility: More fertility is reported in heifers that conceive early and give birth at younger age and they may also have shorter calving interval. The positive and intermediate genetic correlation between AFC and CI indicate that CI is increased by increase in AFC with consequent increase in service period. Higher risk of dystocia is associated with both smaller heifers and old heifers. Dystocia with early AFC is attributed to decreased pelvic size. Increased risk of dystocia with delayed AFC is due to increase in calf birth weight.

Longevity

Extended AFC are commonly related to reproductive problems, which is the reason for greater culling risk for animals with more AFC. Longer the lifetime of cows means the return over feed cost is greater and smaller the percentage of cows needed for replacement every year.

Economic returns

Reducing AFC reduces feed cost and lead to early return on investment which in turn reduces the replacement expenses. Higher economic returns can be obtained when AFC is in optimum interval.

In evaluation of sire experiments, the progeny tests of sampling bulls are carried out earlier by lowering AFC. As decreasing AFC, reduces generation interval which has positive effect on genetic progress and a greater number of calves per cow can be obtained. If the age at first calving is below optimum, calves are born weak and are also prone to infections. In similarity with other economic traits, AFC also has low heritability and is influenced by environment factors.

Calving Interval

It is the period between two successive calving's. It is the best index to measure reproductive efficiency of cattle herd. One calf a year is more profitable in cattle, while it is one calf for every 15 months in buffaloes. Calving interval can be divided into 3 periods:



- i) Gestation period - the period between successful conception to calving
- ii) Postpartum anestrus- period date of calving to estrus
- iii) Service period- date calving to next successful conception. Heritability OF calving interval is low indicating that they do not have good response to selection.

Causes of variation in CI

Nutrition

Estrus and ovarian activity depend on the availability of nutrients. Proper nutrition after calving reduces the service period and thus shortens CI. The good nutrition availability leads to earlier establishment of estrus activity.

Season

The total requirement for maintenance, growth, lactation of cows calving in dry season is met by improved nutritional conditions in the subsequent rainy season, so they have less CI than calves born at wet season.

Time of mating

The ovum released from the graafian follicle in cow is capable of fertilization only for a period 5- 10 hours. So, for effective fertilization, the time of mating in relation to ovulation is important. If not inseminated at proper time, there is no fertilization which leads to lengthening of CI by 21 days for each late insemination.

Percent of fertilization

CI is increased if fertilization of ova fails due to too early or late service or insemination so that sperms and eggs do not meet at proper time, no fertilization occurs. The other causes of failure of fertilization are low viability of semen, ovulation failure, uterine infections.

Genetics

Even best feed and management cannot meet performance beyond the genetic limit of animal. CI of Gir is 18 months and Brown Swiss 20.3 months. Longer calving interval of Brown Swiss indicates lack of adaptation to humid environment. Sex of the calf born also influences the interval of calving where the cows with female calf have shorter calving interval than cow with male calf. Days open: To achieve optimum calving interval of 12 months in cattle, the days open should not exceed 80-85 days and ovarian activity should be re-established soon after calving. It also requires high conception rates.

In the absence of diseases that affect reproduction the calving interval will be reduced. Faster uterine involution shortens CI as it helps to bring back the ovulation activity and makes animal ready for next conception. Suckling delays uterine involution which in turn extends CI.

Factors influenced by CI

Total number of calving's is reduced if the calving interval is more, which in turn leads to



reduction in total milk production of life time. Loss of production due to prolonged calving intervals leads to economic losses. Breeding efficiency will be greatly improved by lowering the calving interval. Breeding of females at lower age and rebreeding at earliest chance after each pregnancy results in increased lifetime efficiency. A major role is also played by calving interval in profitability of farm by reducing the additional cost on the system if a cow calves for every 365 days. Longer calving interval leads to decrease in life time profit. The cause for economic losses due to prolonged calving interval lies in the fact that it includes increased insemination cost, reduced return from calves born and high replacement costs.

Managerial practices to improve Calving Interval

Accurate breeding records of dates of heat, service and parturition should be maintained. Female animal must be carefully observed for heat symptoms. If the cattle do not exhibit heat symptoms even after 30 months get examined by a vet. Cows need to be bred or inseminated near the end of heat period. Estrus synchronization with different hormonal protocols and fixed time artificial insemination can practice reduces calving interval. When the animal is not conceived even after 3 services, getting the animal examined by a veterinarian. After 60 days of insemination, get animal checked for pregnancy. Effective measures should be implemented for controlling parasites and prevention of diseases. Timely vaccination of animals against diseases has to be done. Animals should be selected against infertility. Buying replacement stock from healthy herds only and testing them before introducing into herd. Balanced nutrition and adequate water need to be supplied. General programs of sanitation should be followed. There should be provision of comfortable environment to exploit the full genetic potential of the animals. Stress conditions should be minimized to the maximum extent. Veterinarian assistance should be taken in management of infertility problems.

Conclusion

AFC and CI are the key parameters to measure in dairy cattle. Ideal AFC and CI help to optimize long term milk yield, fertility and longevity within herd. Optimum AFC and CI reduces the period in which heifer is only a capital drain on farm resources which in turn reduces rearing costs. Highest economic returns can be achieved by implementing proper managerial strategies to improve AFC and CI, as they influence the major source of income to farm i.e., the milk production per year and life time milk production. High and multidimensional benefits of AFC can be obtained by reducing AFC to the extent that it is not harmful to reproduction efficiency with proper modification of rearing programs. Potentiality to lower risk of dystocia, to get higher lactation performance, shorten length of calving interval lies in controlling AFC. A major role is played by AFC and CI in lowering the cost of rearing replacements in a dairy herd.

