EFFECT OF AGE AT CALVING ON MILK YIELD IN 
F₁ HOLSTEIN FRIESIAN x SAHIWAL

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The data on 305-day milk yield and age at calving in F₁ H. Friesian x Sahiwal crossbred cows for 1977 to 1990 were utilized for this study. The average 305-day milk yield for 1057 normal lactation records was 2622.71 litres and the average age at different calvings was 66.62 months. The maximum milk production (2993.84 litres) was achieved at the calving age of 117 months; the milk production then began to decline at a comparatively slow rate. The quadratic equation developed was:

\[ Y_t = 1568.33 + 24.422 m_t - 0.1046 m_t^2 \]

Based on this equation, age conversion factors were developed.

INTRODUCTION

Dairymen and others frequently compare cow's milk production records for many reasons. Two major reasons are:
1. Evaluating the breeding values of cows to determine potential genetic ability of offspring.
2. Comparing cows to make decision on culling for low production, i.e. predicting future production of cows under consideration.

There are many environmental (non-genetic) influences which affect production and which tend to obscure genetic differences. The major ones include: number of days in lactation, number of times milked per day, age at calving and season of calving (month of the year). These non-genetic influences must be accounted for if cows are to be compared accurately.

Mature equivalent (ME) factors have been developed in various breeds of cattle and buffaloes for adjusting production on a mature age basis. Ahmed (1972) and Khan (1986) have developed age correction factors for Sahiwal cows and Nili-Ravi buffaloes, respectively. Age correction factors for crossbred cows have not so far been developed. This study was therefore undertaken to develop age correction factors for F₁ Holstein Friesian x Sahiwal cows.

MATERIALS AND METHODS

The data on 305-day milk yield and the age at calving of F₁ Holstein Friesian x Sahiwal (HS) crossbreds calving from 1977 to 1990 were utilized for this study. All the incomplete lactation records for any known reason or lactations showing any abnormality were excluded from the study. The lactation records less than 100 days lactation length (only 10 records) were also excluded from the study. The cows were maintained at the Livestock Production Research Institute, Bahadurnagar (Okara) under loose system of housing. The cows were hand-milked twice daily.
The normal lactation records were used to determine the effect of age at calving on milk yield. The quadratic equation given below was fitted to the data

\[ Y_i = \alpha X + B_1 m_i + B_2 m_i^2, \]

where

- \( Y_i \) is the expected lactation record of crossbred cow in \( i \)th age group,
- \( \alpha \) is a constant,
- \( B_1 \) is first degree regression coefficient,
- \( B_2 \) is a second degree regression coefficient,
- \( m_i \) is the age in months of crossbred cow in \( i \)th age group.

The analysis suggested that the age at calving had a definite influence on the lactation milk yield. The age conversion factors were, thus, developed by using the quadratic equation. The quadratic equation was used to estimate the lactation milk yield at various ages and the age of maximum production was taken as mature equivalent (ME). The estimated mature production was taken as standard and it was divided by the estimated lactation yield of other age groups to obtain respective multiplicative correction factors for adjusting differences due to age at calving. All 305-day lactation records were brought on mature equivalent basis.

**RESULTS AND DISCUSSION**

The average milk yield for various age groups is presented in Table 1. The total lactation records used for this study were 1057 and average 305-day milk production was 2622.71 litres, while the average age was 66.62 months. It is evident that lactation yield increased with advancing age till the maximum production (2993.84 litres) was attained at the age of 117 months (say at about 10 years). The production then began to decline at a comparatively slow rate and decreased to its minium at 171 months of age which is the maximum age group for the study. The increase in milk production was sharp; the cows calving at the age of 117 months yielded on an average 2993.84 litres of milk in a lactation as compared to 2094.21 litres of milk in cows calving at the age of 24 months. A curvilinear trend in production with advancing age was observed. The quadratic equation fitted to this data revealed that the milk production increased by 24.4221 litres with each month increase in age at calving until the age of maximum production was attained. The decline in linear regression of milk yield after the mature production was 0.1936 litres for an increase of each one month in age at calving. The quadratic equation was:

\[ Y_i = 1568.33 + 24.4221 m_i - 0.1046 m_i^2 \]

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Average milk yield (litres)</th>
<th>Conversion factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>2035.06</td>
<td>1.471</td>
</tr>
<tr>
<td>24</td>
<td>2094.21</td>
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<td>27</td>
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</tr>
<tr>
<td>50</td>
<td>2527.93</td>
<td>1.184</td>
</tr>
</tbody>
</table>

Table 1. Age conversion factors for adjusting 305-day lactation milk records of F1 Holstein Fresian X Sahiwal crossbreds on a mature equivalent basis
The age conversion factors based on this equation are presented in Table 1.

Webb (1977) has tabulated the factors to standardize lactation records of Holstein, Jersey, Brown Swiss, Ayrshire and Guernsey cows in dairy information sheet. The maximum 305-day milk production has been recorded at the age of 7 years. Similarly, Everett (1977) has also given mature equivalent factors for Holstein cows according to age at freshening and month of freshening. Verde (1969) reported that in Holstein and Holstein crossbreds maintained in Venezuela the maximum milk production was recorded during 8th lactation which was 132% of the first lactation. He found that the effect of lactation length and age at calving on milk production was significant.

Lobo et al. (1979) noted that in Gir cows reared in Brazil the milk yield was maximum at the age of 144 months and the milk yield increased according to the lactation length. Wellington (1968) concluded that in Jamaica Hope breed, cows having 21-24 months age at first calving gave substantially lower milk yield than others. The mean age at first calving was 34.20 months. The correlation between the age at first calving and first lactation milk yield was 0.11 and was highly significant.

Ruvuna et al. (1984) analysed data of 9086 lactation records from six breed groups (three native breeds and three crossbreds with Brown Swiss) kept in one herd at Karnal, India. They found that age differences within a given parity significantly affected milk yield. Patil and Kale (1986) found that parity differences on total and 305-day milk yield were highly significant (P<0.01) in H. Friesien x Gir and Jersey x Gir halfbreds.

REFERENCES

Everett, R.W. 1977. Adjustment records to remove environmental effects. Dairy management, cooperative extension bulletin, Cornell University, New York, USA.


