Prediction of 305-Day Lactation Milk Yield from Part Lactation Yields in Jersey Crossbred Cows

S. Vinothraj1, A. Subramanian, R. Venkataramanan, Cecilia Joseph, N. Sivaselvam and H. Gopi

Department of Animal Genetics and Breeding, Madras Veterinary College, TANUVAS, Chennai – 600 007, Tamil Nadu.

(Received : 18-05-2016 215/16 Accepted : 16-08-2016)

Abstract

Monthly milk production records of 164 lactations from 2005 to 2014 were analysed for prediction of lactation milk yield from part lactation yields. Cumulative 30, 60, 90, 120, 150, 180, 210, 240, 270 and 300-day milk yields were calculated by adding monthly yields. From the results, $R^2$ values were the high and error sum of square low for 300 days, 270 days and 240 days part cumulative yield. However, these lactation yields are not much useful in early selection because of late availability. Hence, it may be concluded that 120 days or 150 days cumulative milk yield can be used with reasonable efficiency and better economy for predicting 305-day milk yield.

Key words: Coefficient of determination ($R^2$), Crossbred cows.

Lactation milk yield is the single most important economic trait for selection of dairy cows to bring genetic improvement in milk production. Since availability of data on complete lactation milk yield takes longer time, thus delaying the selection, it is imperative to look for some alternative criteria to advance the selection. Early cumulative part lactation milk yields have immense potential in early selection and prediction of 305-day milk yield. This study indicates that the genetic merit of Jersey x Red Sindhi crossbred cows can be assessed effectively at early and mid-stages of the lactation for improving milk production.

Materials and Methods

A total of 164 lactation data (milk yield particulars) of 108 Jersey x Red Sindhi cross bred cows maintained from 2005 to 2014 (10 years) at the

Post-Graduate Research Institute in Animal Sciences (PGRIAS), Kattupakkam, Tamil Nadu were utilized in the study. The 10 individual monthly milk yields were calculated by adding the daily milk yield at an interval of 30 days from 6th day (excluding 5 days of colostrum) to 305-day of calving. Cumulative 30, 60, 90, 120, 150, 180, 210, 240, 270 and 300-day milk yields were calculated by adding the monthly milk yields. Abnormal lactations due to abortion, stillbirth, premature birth, mastitis and incomplete records due to disposal or death of animals were excluded from this study.

Cumulative monthly milk yields were used for prediction of 305-day milk yield by simple regression method.

Simple regression

$$\hat{Y} = a + bjX_i$$

Where,

$b_j = $ Regression coefficient associated with $X_i$

$\hat{Y} = $ Expected value of $Y$

$a = $ Value of $Y$ when $X$ is equal to zero.

$X_i = i^{th}$ cumulative monthly milk yield

The intercept values, regression coefficients, prediction equations, coefficient of determination ($R^2$) and error sum of squares were used for judging the efficacy of part yields in predicting 305-day milk yield.

Results and Discussion

Among various cumulative part yields used for prediction of 305-day milk yield, highest $R^2$ value (99.70 per cent) was estimated for 300 days.
followed by 270 days milk yield ($R^2=98.6$ per cent) (Table I). An increasing trend was observed for $R^2$ values with advancing cumulative yields from 30 to 300 days. From the results (Table I), the $R^2$ values were highest and error sum of square was low for 300 days, 270 days and 240 days part cumulative yield (Table I). However, these lactation yields may not be much useful because of delay in getting data. Hence, 120 days cumulative milk yield ($R^2=80.60$ per cent) or 150 days cumulative milk yield ($R^2=86.10$ per cent) can be used with reasonable efficiency and better economy for easy prediction of 305-day milk yield. These findings were comparable to the reports of Yadav et al. (1984), Khoda and Trivedi (1987), Ranjan et al. (2005), Raja et al. (2012) and Verma et al. (2014).

### Table I. Prediction equation for 305-day milk yield based on various cumulative part milk yields in Jersey x Red Sind crossbred cows.

<table>
<thead>
<tr>
<th>Cumulative milk yield at</th>
<th>Intercept</th>
<th>Regression coefficient (b)</th>
<th>Prediction equation</th>
<th>$% R^2$</th>
<th>Error sum of squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 days</td>
<td>383.63</td>
<td>6.385</td>
<td>$383.63 + 6.385x$</td>
<td>57.00</td>
<td>126053.55</td>
</tr>
<tr>
<td>60 days</td>
<td>231.46</td>
<td>3.471</td>
<td>$231.46 + 3.471x$</td>
<td>67.80</td>
<td>94412.52</td>
</tr>
<tr>
<td>90 days</td>
<td>183.81</td>
<td>2.446</td>
<td>$183.81 + 2.446x$</td>
<td>75.40</td>
<td>72066.82</td>
</tr>
<tr>
<td>120 days</td>
<td>117.59</td>
<td>1.952</td>
<td>$117.59 + 1.952x$</td>
<td>80.60</td>
<td>56761.19</td>
</tr>
<tr>
<td>150 days</td>
<td>92.97</td>
<td>1.628</td>
<td>$92.97 + 1.628x$</td>
<td>86.10</td>
<td>40834.18</td>
</tr>
<tr>
<td>180 days</td>
<td>33.94</td>
<td>1.442</td>
<td>$33.94 + 1.442x$</td>
<td>90.90</td>
<td>26786.92</td>
</tr>
<tr>
<td>210 days</td>
<td>16.44</td>
<td>1.283</td>
<td>$16.44 + 1.283x$</td>
<td>94.50</td>
<td>16129.86</td>
</tr>
<tr>
<td>240 days</td>
<td>1.831</td>
<td>1.666</td>
<td>$1.83 + 1.666x$</td>
<td>96.90</td>
<td>9139.36</td>
</tr>
<tr>
<td>270 days</td>
<td>0.245</td>
<td>1.074</td>
<td>$0.245 + 1.074x$</td>
<td>98.60</td>
<td>4196.01</td>
</tr>
<tr>
<td>300 days</td>
<td>13.56</td>
<td>1.000</td>
<td>$13.56 + 1.000x$</td>
<td>99.70</td>
<td>936.43</td>
</tr>
</tbody>
</table>

$R^2$ = Coefficient of determination

### References


