

## Prediction of total lactation milk yield based on most frequent daily milk yield and highest daily milk yield of a month in Sahiwal cows

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The present study was undertaken to predict the total lactation milk yield (TLMY) of Sahiwal cows based on most frequent daily milk yield (MFDMY) and highest daily milk yield (HIDMY) of month. To study the relationship, correlation coefficients were estimated as per Steel and Torrie (1981) and multiple regression analysis was used for prediction of total milk yield.

The correlation coefficient between MFDMY and TLMY ranged from 0.566 to 0.806 with highest value in sixth month of first parity. In second parity, the value ranged from 0.670 to 0.823 with highest value in seventh month. The value ranged from 0.657 to 0.905 with highest value in fourth month, 0.6169 to 0.872 with highest value in sixth month, 0.537 to 0.879 with highest value in seventh month, 0.572 to 0.823 with highest value in sixth month for third, fourth, fifth and pooled lactation respectively.

The correlation coefficient between HIDMY and TLMY of a month ranged from 0.410 to 0.784 with highest value in sixth month of first parity. Similarly the value ranged from 0.620 to 0.797 with highest value in fourth month, 0.649 to 0.894 with highest value in first month, 0.540 to 0.879 with highest value in seventh month, 0.561 to 0.929 with highest value in seventh month, 0.546 to 0.812 with highest value in sixth month second, third, fourth, fifth and pooled lactation respectively. Our results that the correlation coefficient between TLMY and MFDMY were higher than the values estimated by Kumar (1997) in crossbred cows, but were slightly lower than the values estimated by Mandal (1995) in Murrah buffaloes.

The estimated intercept value, regression coefficients and coefficient of determination R<sup>2</sup> (%) are given in Table 1, which is self explanatory. All regression coefficients were

Table 1. Estimated intercept values, regression coefficient, coefficient of determination (R<sup>2</sup>) for prediction of TLMY based on MFDMY and HDMY both taken at a time from first to tenth month of 1st, 2nd, 3rd, 4th, 5th and pooled lactations

| Month/Location           | 1                   | 2                   | 3                   | 4                   | 5                   | 6                   | 7                  | 8                  | 9                   | 10                  |
|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|---------------------|---------------------|
| 1 Intercept              | 1043.75<br>(341.26) | 404.49<br>(392.75)  | 61.34<br>(338.64)   | 157.91<br>(351.71)  | -269.63<br>(358.10) | -210.27<br>(339.93) | 254.79<br>(331.40) | 525.22<br>(267.78) | 640.11<br>(291.21)  | 506.24<br>(257.09)  |
| Regression coefficient-1 | 272.58<br>(75.54)   | 257.61<br>(111.89)  | 217.84<br>(99.00)   | 215.95<br>(107.42)  | 158.64<br>(68.86)   | 224.63<br>(89.29)   | 153.25<br>(97.73)  | 220.29<br>(96.69)  | 198.90<br>(83.83)   | 187.92<br>(73.39)   |
| Regression coefficient-2 | -83.27<br>(68.32)   | -32.37<br>(112.10)  | 49.60<br>(85.90)    | 58.52<br>(104.71)   | 166.33<br>(75.01)   | 116.39<br>(95.91)   | 134.02<br>(106.75) | 63.73<br>(90.47)   | 68.40<br>(79.55)    | 110.94<br>(70.38)   |
| R <sup>2</sup> (%)       | 34                  | 40                  | 47                  | 50                  | 57                  | 65                  | 59                 | 58                 | 52                  | 63                  |
| 2 Intercept              | -261.96<br>(494.16) | -362.93<br>(378.83) | -402.96<br>(326.94) | -551.74<br>(309.55) | -133.59<br>(299.67) | 97.27<br>(315.47)   | 502.38<br>(239.76) | 495.83<br>(253.67) | 1043.20<br>(314.79) | 1285.77<br>(328.11) |
| Regression coefficient-1 | 91.13<br>(90.63)    | 121.29<br>(109.50)  | 215.90<br>(78.46)   | 26.55<br>(105.45)   | 364.71<br>(124.32)  | 185.25<br>(100.79)  | 411.86<br>(91.58)  | 25.69<br>(102.85)  | 181.26<br>(109.89)  | 224.38<br>(107.07)  |
| Regression coefficient-2 | 135.01<br>(101.78)  | 118.26<br>(106.22)  | 57.45<br>(75.59)    | 256.40<br>(98.24)   | -33.94<br>(110.18)  | 116.42<br>(100.14)  | -93.07<br>(86.48)  | 244.43<br>(92.71)  | 70.31<br>(110.74)   | 34.15<br>(100.60)   |
| R <sup>2</sup> (%)       | 46                  | 54                  | 61                  | 63                  | 63                  | 58                  | 68                 | 58                 | 48                  | 45                  |

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significant (P<0.05).

The average errors in test data for finding out the TLMY on the basis of MFDMY ranged from -421.95 to 147.43 with

(Table 1 continued)

(Table 1 concluded)

| Month/Location | 1                           | 2                  | 3                   | 4                   | 5                   | 6                   | 7                   | 8                   | 9                  | 10                  |                     |
|----------------|-----------------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
| 3              | Intercept                   | 114.48<br>(410.69) | -52.44<br>(370.43)  | 295.06<br>(281.27)  | -19.40<br>(187.741) | -304.27<br>(215.43) | 137.70<br>(195.74)  | 605.52<br>(256.81)  | 666.95<br>(239.68) | 691.98<br>(257.12)  | 1179.07<br>(271.88) |
|                | Regression                  | 120.53<br>(107.26) | 208.47<br>(101.49)  | 293.49<br>(74.48)   | 306.51<br>(59.24)   | 45.98<br>(84.54)    | 190.20<br>(54.04)   | 103.89<br>(81.35)   | 151.68<br>(99.35)  | 197.94<br>(91.41)   | 254.44<br>(154.27)  |
|                | Regression<br>coefficient-1 | 60.88<br>(103.80)  | -2.83<br>(102.71)   | -78.33<br>(72.31)   | -35.27<br>(54.03)   | 233.35<br>(81.10)   | 95.90<br>(53.81)    | 145.14<br>(83.40)   | 129.09<br>(87.57)  | 112.98<br>(90.06)   | 38.04<br>(145.98)   |
|                | Regression<br>coefficient-2 | 44                 | 58                  | 66                  | 82                  | 80                  | 80                  | 64                  | 65                 | 69                  | 60                  |
|                | R <sup>2</sup> (%)          |                    |                     |                     |                     |                     |                     |                     |                    |                     |                     |
| 4              | Intercept                   | 490.49<br>(568.41) | -137.09<br>(503.05) | -491.43<br>(549.80) | -168.33<br>(335.66) | -38.40<br>(385.71)  | -78.79<br>(321.09)  | 248.65<br>(250.69)  | 449.63<br>(402.40) | 1010.03<br>(492.17) | 2083.05<br>(501.59) |
|                | Regression                  | 160.39<br>(140.22) | 146.17<br>(168.79)  | 25.98<br>(152.74)   | 219.25<br>(114.30)  | 158.57<br>(134.36)  | 164.18<br>(132.24)  | 25.75<br>(123.50)   | 167.20<br>(113.14) | 118.08<br>(186.63)  | 421.35<br>(210.87)  |
|                | Regression<br>coefficient-1 | 0.52<br>(137.06)   | 56.56<br>(165.00)   | 203.23<br>(160.89)  | 43.31<br>(98.05)    | 109.49<br>(136.08)  | 133.50<br>(133.60)  | 240.31<br>(113.03)  | 134.13<br>(113.85) | 133.17<br>(152.91)  | -228.92<br>(212.54) |
|                | Regression<br>coefficient-2 | 38                 | 53                  | 64                  | 69                  | 69                  | 76                  | 77                  | 61                 | 40                  | 43                  |
|                | R <sup>2</sup> (%)          |                    |                     |                     |                     |                     |                     |                     |                    |                     |                     |
| 5              | Intercept                   | 42.27<br>(821.19)  | 314.23<br>(750.61)  | -204.46<br>(603.49) | 469.91<br>(617.40)  | -445.58<br>(537.86) | -403.09<br>(462.50) | -243.83<br>(299.56) | 478.77<br>(324.26) | 907.97<br>(379.90)  | 1515.26<br>(538.70) |
|                | Regression                  | -62.75<br>(265.27) | 248.15<br>(227.95)  | -78.69<br>(179.50)  | 314.64<br>(158.46)  | 149.07<br>(146.99)  | 124.82<br>(156.89)  | -86.03<br>(107.37)  | -50.13<br>(177.47) | -151.41<br>(192.06) | 65.40<br>(340.25)   |
|                | Regression<br>coefficient-1 | 241.72<br>(263.98) | -49.53<br>(226.63)  | 294.88<br>(179.61)  | -80.24<br>(158.05)  | 178.07<br>(151.27)  | 221.71<br>(160.29)  | 401.79<br>(112.39)  | 310.08<br>(168.75) | 369.72<br>(189.75)  | 134.81<br>(293.78)  |
|                | Regression<br>coefficient-2 | 31                 | 41                  | 49                  | 49                  | 69                  | 73                  | 86                  | 78                 | 69                  | 44                  |
|                | R <sup>2</sup> (%)          |                    |                     |                     |                     |                     |                     |                     |                    |                     |                     |
| Pooled         | intercept                   | 807.11<br>(197.53) | 371.85<br>(183.55)  | 227.36<br>(158.95)  | 90.88<br>(140.15)   | -114.48<br>(143.77) | 14.06<br>(134.03)   | 392.95<br>(121.91)  | 534.44<br>(125.83) | 913.07<br>(148.85)  | 1308.50<br>(154.74) |
|                | Regression                  | 145.79<br>(47.71)  | 187.80<br>(58.16)   | 184.50<br>(45.08)   | 210.58<br>(46.09)   | 150.39<br>(44.71)   | 186.14<br>(41.45)   | 161.67<br>(43.59)   | 122.78<br>(48.24)  | 168.66<br>(52.02)   | 253.28<br>(59.81)   |
|                | Regression<br>coefficient-1 | 2.87<br>(48.01)    | -1.47<br>(57.15)    | 29.33<br>(43.57)    | 42.89<br>(42.62)    | 136.79<br>(43.80)   | 117.64<br>(41.96)   | 119.11<br>(43.22)   | 127.47<br>(44.71)  | 90.34<br>(49.69)    | -5.66<br>(56.02)    |
|                | Regression<br>coefficient-2 | 33                 | 45                  | 53                  | 61                  | 66                  | 69                  | 67                  | 62                 | 51                  | 46                  |
|                | R <sup>2</sup> (%)          |                    |                     |                     |                     |                     |                     |                     |                    |                     |                     |

\*Value in parenthesis indicates standard errors.

highest value in second month and lowest value in tenth month and TLMY on the basis of HIDMY ranged from -329.08 to 643.48 with highest value in fifth month and lowest value in tenth month. From the above discussion, it was inferred that the prediction of TLMY can be done with the help of both MFDMY and HIDMY at a time with fair degree of accuracy.

#### SUMMARY

The study was conducted to predict total milk yield based on most frequent daily milk yield and highest daily milk yield of a month in Sahiwal cows. Most frequent daily milk yield (MFDMY) and highest daily milk yield (HIDMY) both

helped in prediction of total milk yield with fair degree of accuracy.

#### REFERENCES

- Kumar S. 1997. 'Simulation of herd milk productivity of crossbred cows.' M.Sc. Thesis, National Dairy Research Institute, Karnal, Haryana.
- Mandal D K. 1995. 'Prediction of lactation milk yield based on daily milk yield records in an organized herd of Murrah buffaloes.' M.Sc. Thesis, National Dairy Research Institute, Karnal, Haryana.
- Steel Robert G D and torrie James H. 1981. *Principle and Procedure of Statistics—A Biometrical Approach*. 2nd edn. McGraw Hill Book Company.