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Original Article

Prediction of First Lactation Milk Yield from Part Lactation Yields for Buffaloes

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ABSTRACT

The simple linear regression of the first lactation yield on each part production was used to predict the first lactation milk yield. The value of R^2 indicates the magnitude of explainable variation. The higher value of R^2 for the 3rd month indicates that the efficiency of prediction will be maximum if it is based on the 3rd-month milk yield. Among cumulative part lactation yields, 90 days' yield showed the highest predictability (R^2= 63.03) while the 180 days showed the lowest predictability (R= 57.93). The high magnitude of R^2 values for the 3rd month indicates the efficiency of prediction which was observed maximum if the prediction was based on 3rd-month milk production. In the case of cumulative milk production, 90 days yield showed the highest magnitude of R^2 value for prediction of first lactation production. When the earlier part of lactation was considered the single fourth monthly yield gave comparatively better efficiency of selection. Among cumulative yields, the first 120 days' yield was efficient for indirect selection of complete first lactation yield.

Keywords: Selection, buffaloes, part yields, cumulative monthly, lactation yield, progeny testing

INTRODUCTION

The selection of milch buffaloes at an early age on the basis of part yields is beneficial to the dairy farmer as it cuts down the cost of rearing the animals and also helps in

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progeny testing. Part yields (monthly milk yield) or cumulative monthly records have been shown to have a very high genetic and phenotypic relationship with full records. The ability to predict the complete lactation period of a cow from its part yields would determine the successes of dairy herd culling programmes (Ranjan *et al*., 2005). In dairy cattle, high rate of genetic improvement is only possible through early culling of low producing cows (Ranjan *et al*., 2005). This can be achieved by selecting cows and bulls on the basis of their part records provided that full lactation yield can be accurately predicted from part yields. Predicting total lactation yield on the basis of part lactation records has practical utility (Ranjan *et al*., 2005). The present study was undertaken to find out the earliest part lactation yield of the first lactation which can efficiently predict the complete lactation yield.

MATERIALS AND METHODS:

First lactation records of 1033 Murrah and 690 Nili Ravi buffaloes maintained at military dairy farm Ambala, Ferozpur, Lucknow and Madhurikund and Mathura farm of C.S.A. Agriculture University, Kanpur was utilized. The lactation records were collected over a period of 24 years. The number of sires used was 60 and 34 for Murrah and Nili Ravi breeds respectively. The prediction equations were calculated by using linear regression techniques using the method described by Snedecor and Cochran (1967). The heritability estimates were calculated by the paternal half-sib correlation method and its standard errors were obtained from the formula given by Swiger *et al.,* (1964). The genetic and phenotypic correlations were calculated by using the variance and covariance techniques (Robertson, 1959).

The relative efficiency of selection was calculated as per the method described by Lerner and Cruden (1948) as,

$$RE = r_g \, hp_1 / h_w$$

Where. r_g is the genetic correlation between the two traits and h p_1 and h_w are square roots of heritability of part lactation yields and complete lactation yield respectively.

RESULTS AND DISCUSSION

The equations for first lactation milk yield from monthly and cumulative monthly yield were developed (Table 1). The simple linear regression of the first lactation yield on each part production was used to predict the first lactation milk yield. The value of R^2 indicates the magnitude of explainable variation. The higher value of R^2 for the 3rd month indicates that the efficiency of prediction will be maximum if it is based on the 3rd-month milk yield.

Table 1: Prediction of complete first lactation yield from first lactation part and cumulative yields in Murrah and Nili Ravi buffaloes

Month of lactation	Prediction equation	R^2 (%)
Monthly Milk Yield		
1st month	Y = 554.26±6.16 X	51.62
2nd month	Y = 351.22±6.56 X	61.40
3rd month	Y = 534.88±5.99 X	66.66
4th month	Y = 699.04±5.60 X	59.35
5th month	Y = 468.89±7.42 X	59.00
6th month	Y = 476.72±8.00 X	58.69
7th month	Y = 251.84±10.35 X	54.16
8th month	Y = 887.25±7.05 X	37.94
9th month	Y = 717.06±9.58 X	44.94
10th month	Y = 1204.19±6.47 X	23.90
Cumulative part yields		
60 days	Y = 334.60±3.46 X	51.39
90 days	Y = 386.39±2.23 X	63.03
120 days	Y = 286.39±1.71 X	60.75
150 days	Y = 392.20±1.39 X	60.61
180 days	Y = 460.65±1.10 X	57.93
210 days	Y = 340.99±1.10 X	56.64
240 days	Y = 339.60±1.00 X	62.85
270 days	Y = 448.71±0.86 X	57.98
300 days	Y = 288.00±0.91X	62.53

Y = Complete lactation yield.

X = Part yield of first lactation.

Among cumulative part lactation yields, 90 days yield showed the highest predictability (R^2= 63.03 while the 180 days showed the lowest predictability (R= 57.93). The high magnitude of R^2 values for the 3rd month indicates the efficiency of prediction which was observed maximum if the prediction was based on 3rd-month milk production. In the case of cumulative milk production, 90 days yield showed the highest magnitude of R^2 value for prediction of first lactation production. All the estimates of R^2 values under the present study were considerably high which compared favorably with those reported by Singh and Yadav (1986), Dass and Sadana (2003), Gandhi *et al.,* (2009), Gandhi *et al.,* (2010), Chakraborty *et al.,* (2010), Ruhil *et al.,* (2011), Sharma *et al.,* (2013), Kokate *et al.,* (2014), Sahoo *et al.,* (2015), Rahayu *et al.,* (2018), and Ekta Rana *et al.,* (2021).

The relative efficiency of selection on the basis of part lactation over total first lactation yield has been presented in Table 2.

Table 2: Relative efficiency of the selection on the basis of partial records of first lactation over complete first lactation milk yield in Murrah and Nili Ravi buffaloes

Part	1	2	3	4	5	6	7	8	9	10
Single monthly yields	0.57	0.73	0.60	0.75	0.58	0.32	0.55	0.51	0.45	0.45
Cumulative part lactation yields	-	0.91	0.91	0.96	0.92	0.58	0.87	0.55	0.19	0.92

The amount of genetic progress based on partial records of the first lactation with complete first lactation yield assumes that the intensity of selection is the same as presented in Table 1. Although the estimate of heritability of fourth-month milk yield was higher than those of other monthly yields (0.18±0.06), the higher genetic correlation of fourth-month yield with first lactation production increased its ability in getting genetic gain. In general, the relative efficiency of selection based on a single monthly first lactation yield for complete first lactation was low. When the earlier part of lactation was considered the single fourth monthly yield gave comparatively better efficiency of selection. Among cumulative yields, the first 120 days yield was efficient for indirect selection of complete first lactation yield. These findings are in close agreement with the results reported by Kokate *et a*., (2014), Sahoo *et al.,* (2015), Rahayu *et al.,* (2018), and Ekta Rana *et al.,* (2021).

CONCLUSION

From this investigation it may be substantially in the estimation of first lactation yield concluded that the high magnitude of R^2 values for the 3rd month indicates the efficiency of prediction which was observed maximum if the prediction was based on 3rd-month milk production. In the case of cumulative milk production, 90 days yield showed the highest magnitude of R^2 value for prediction of first lactation production.

CONFLICT OF INTERESTS

The author declares that there is no conflict of interest involved in this study

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REFERENCES

Chakraborty, D Dhaka, S S, Pander B L, Yadav A S, Singh S and Malik P K (2010) Prediction of lactation milk yield from test day records in Murrah buffaloes. Indian Journal of Animal Sciences. 80(3): 244-245.

Dass G and Sadana D K (2003) Predictability of lactation milk yield based on test day values in Murrah buffaloes. Indian Journal of Animal Research. 37(2): 136-138.

Gandhi R S, Raja T V, Ruhil A P and Kumar A (2009) Prediction of lifetime milk production using artificial neural network in Sahiwal cattle. Indian Journal of Animal Sciences. 79 (10): 1038-1040.

Gandhi R S, Raja T V, Ruhil A P and Kumar A (2010). Artificial neural network versus multiple regression analysis for prediction of lifetime milk production in Sahiwal cattle. Journal of Applied Animal Research. 38(2): 233-237.

Kokate L S, Singh A, Banu R, Gandhi R S, Chakravarty A K, Gupta A K and Sachdeva G K (2014) Prediction of 305-day lactation milk yield based on bimonthly test day values in Karan Fries cattle. Indian Journal of Animal Research. 48(2): 103-105.

Lerner I M and Cruden D M (1948) The heritability of cumulative monthly and annual egg production. Poultry Science. 27: 67-68.

Rahayu AP, Hartatik T, Purnomoadi A and Kurnianto E (2018) Estimation of 305 day milk yield from cumulative monthly and bimonthly test day records in Indonesian Holstein cattle. In: IOP Conference Series: Earth and Environmental Science.119(1): 012028.

Rana Ekta, Gupta A K, Singh Avtar, Ruhil A P, Malhotra R, Gedam S and Yousuf Ete. (2021) Prediction of first lactation 305-day milk yield based on bimonthly test day milk yield records in Murrah buffaloes. Indian Journal of Animal Research. (55):486-490.

Ranjan S K, Lakhera M L and Singh M (2005) Development of prediction equations for 300 days milk yield from part yields, cumulative part and sequential monthly records in Sahiwal cows. International Journal of Agriculture & Biology. 07(4):574–578

Roberson A (1959). The sampling variance of genetic correlation coefficients. Biometrics, 15, 469-85.

Ruhil AP, Gandhi R S, Monalisa D, Behra K and Raja T V (2011) Prediction of lactation yield based on partial lactation records using artificial neural networks. In: Proc. 5th National Conference on Computing for Nation Development, INDIACom-2011.

Sahoo S K, Singh A, Gupta A K, Chakravarty A K, Ambhore G S and Dash S K (2015) Comparative evaluation of different lactation curve functions for prediction of bi-monthly test day milk yields in murrah buffaloes. Animal Science Reporter. 9(3): 89-94.

Sharma A K, Jain D K, Chakravarty A K, Malhotra R and Ruhil A P (2013) Predicting economic traits in Murrah buffaloes with connectionist models. Journal of the Indian Society of Agricultural Statistics. 67(1): 1-11.

Singh C V and Yadav M C (1986) Prediction of lactation production from part lactation yield in Nili Ravi buffaloes. Presented in scientific session of Indian Dairy Association (NZ) held at NDRI, Karnal from February 7-8, 1986.

Snedecor G W and Cochran W G (1967) Statistical methods. IOWA State University Press, America IOWA.

Swiger L A, Harvey W R, Everson D O and Gregory K E (1964) The variance of Interclass correlation involving groups with on observation. Biometrics. 20: 818-26.