

ABSTRACT

Tarek Abd El-Aziz Soleman Fooda. Possibilities of improving 12-month weight of Egyptian buffaloes by selection index. Unpublished Doctor Philosophy of Agricultural Science Thesis in Animal Breeding, University of Ain Shams, Faculty of Agriculture, Department of Animal Production, 2005.

Data on birth weight, body weights at 3, 6, 9 and 12 months of age and daily gains from birth to weaning and from weaning to 12 months for 96 male and 148 female buffalo calves progeny of 27 sires and 192 dams were used to construct selection indexes to improve body weight at 12 months of age and to evaluate the sires based on their progeny performance.

Estimates of genetic and phenotypic parameters for these data were calculated from paternal half-sib components of variance and covariance. The heritability estimates were 0.49, 0.10, 0.44, 0.69, 0.95, 0.02 and 0.89 for body weight at birth, 3, 6, 9, 12, pre- and post-weaning average daily gain, respectively.

The genetic inter-age correlations for weights were bigger than the phenotypic. Genetic correlations of weaning weight with subsequent weights at 6, 9 and 12 months were 0.98, 0.89 and 0.96, respectively. Those of yearling weight with weights at 3, 6 and 9 months were 0.96, 0.97 and 0.91, respectively. The correlation of yearling weight with post-weaning average daily gain was close to one.

Fourteen selection indexes were constructed to improve the 12-month body weight. The full index incorporating body weight at birth, 3, 6, 9 and 12 months of age had the highest correlation with aggregate breeding value ($r_{TI} = 0.63$). The correlation fell to 0.62 when body weight at birth and 3 months were omitted from the

index. Selection for body weight at 12 months of age alone is expected to be 76.2 % as efficient as selection for the full index.

The maximum expected genetic gain in 12-month body weight was 8.85 kg/generation when all five body weights were included in the index; this decreased to 8.09 kg/generation when body weights at birth, 3 and 6 months were excluded and further decreased to 6.94 kg/generation when selection based on yearling weight only. From the practical standpoint, selection on I_5 involving W9 can be considered as the best for improving W12 since its application is earlier, less expensive, higher accuracy than any index excluding W12 and giving reasonable amount (+5.39 kg) improvement in W12 as compared to direct selection (+6.94 kg).

Breeding values for body weight at different ages and for pre- and post-weaning average daily gains were estimated by three methods of sire evaluation viz. Selection Index (SI), Best Linear Unbiased Prediction (BLUP) and Generalized Least-Squares (GLS). There were very small changes in the rank of the first 10 top sires evaluated by these methods. One sire, no. 9900, had the highest merit for body weights from weaning to yearling weights and for daily gains by the three methods of sire evaluation.

Key words : Egyptian buffaloes, body weight, daily gain, phenotypic and genetic parameters, selection indexes and genetic gain, sire evaluation, breeding values, BLUP, SI, GLS.

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LIST OF ABBREVIATIONS

W0	Birth weight
W3	3-month weight
W6	6-month weight
W9	9-month weight
W12	12-month weight
W18	18-month weight
WFC	weight at first calving
ADG	Average daily gain
ADG 0-3	Pre-weaning average daily gain
ADG 0-6	0-6 months average daily gain
ADG 0-12	0-12 months average daily gain
ADG 3-6	3-6 months average daily gain
ADG 3-12	Post-weaning average daily gain
ADG 6-9	6-9 months average daily gain
ADG 6-12	6-12 months average daily gain
ADG 9-12	9-12 months average daily gain