

GENETIC VARIABILITY OF KARYOTYPIC CHARACTERISTICS IN RELATION TO THE GENETIC IMPROVEMENT OF SOME ECONOMICALLY-IMPORTANT TRAITS OF WATER BUFFALOES

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Abstract

One hundred and thirty (130) water buffaloes grouped into: purebreeds [i.e. Philippine carabao (PC), Indian Murrah (IM), and Bulgarian Murrah (BM)], two-way crosses (i.e. 50%IM-50%PC, 50%BM-50%PC, 50%Nili-Ravi-50%C), backcross (i.e. 75%IM-25%PC), and three-way crosses among PC, IM, and Nili-Ravi, were considered for karyotype analysis using the modified Leukocyte Culture Technique and evaluation of their production and reproductive performance using the ordinary least squares method.

Karyotypic characteristics (i.e. modal chromosome number based on chromosome frequency, chromosome type, and percent relative length, centromeric index, and arm ratio for some chromosomes) were significantly different between breed groups. Significant differences between breed groups were also found for production traits (i.e. 1-year and 3-year old body weights, withers height, heart girth, and body length) and reproductive parameters (i.e. total milk yield, lactation length, age at first calving, and semen volume). Significant linear correlation between karyotypic characteristics and some economically important traits in water buffaloes are also highlighted in the study. The significant correlation values imply that some karyotypic characteristics can be used as important markers or criteria to select potentially productive young water buffaloes.

The high coefficient of variation (C.V.) values in karyotypic characteristics, production and reproductive traits imply potential and practical basis to accurately distinguish genetic differences between breed groups, especially in the absence of breeding history and factual pedigree and identification records on-farm.

Results of the karyotype analyses and their relationships with production and reproductive traits in water buffaloes can be applied in the design and development of local selection, crossbreeding, and/or conservation programs. Differences between purebreeds and their crosses in terms of percent heterosis and advantage over the Philippine carabao will be useful in the design and development of systematic crossbreeding programs useful in the dominant local production and marketing systems. Indirect selection for overall productivity based on the karyotypic characteristics of breeding animals can be practiced at a much earlier age, thereby reducing generation interval considerably.

Because of the requirements for laboratory facilities and expertise, the use of karyotype analysis is however recommended for the gene pool and institutional herds such as those maintained by the Philippine Carabao Center (PCC) in aid of the establishment of a national buffalo registry and implementation of a national breeding program for water buffaloes.

Keywords: karyotype analysis, chromosome number, chromosome type, relative length, centromeric index, arm ratio, production and reproductive traits, water buffaloes

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