Phenotypic characterization and mating plan for biodiversity conservation in Modenese chicken breeders

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Preserving local chicken breeds is essential as global poultry demand rises. While commercial hybrids dominate, native breeds are declining, reducing genetic diversity. Though less productive, local breeds offer cultural, socioeconomic, and environmental value, adapting well to local climates. Recognizing their importance beyond economics, conserving endangered breeds supports biodiversity, sustainable farming, and future food security. The aim of the present research is to describe the Modenese chicken breed, renowned for its distinctive physical characteristics and adaptability, from a genetic and phenotypic point of view. In the conservation center of the University of Milan, Lodi, a total of 9 roosters (R) and 14 hens (H) of the Modenese breed were housed. The birds were reared in floor pens, provided with a 14L:10D photoperiod, and fed *ad libitum*, with water supplied via nipple drinkers. Breeding families (F1: 1R+4H; F2: 1R+3H; F3: 1R+6H) were established based on the results of molecular DNA analysis (24 microsatellite markers; AVIANDIV-FAO) aimed at reducing inbreeding levels and maximizing the flock's genetic variability. Breeding performance was recorded from March to June. A phenotypic characterization of morphological and reproductive traits was carried out. Birds were measured and weighed according to FAO body measurements protocol. Reproductive data focused on oviposition, fertility and hatchability. The average live weight was 2.53 kg in roosters and 2.25 kg in hens, the average egg weight was 54.2 g. The highest egg production was recorded in March and April. Fertility was 88.71%, while hatchability on total eggs set and on fertile eggs were 71.51% and 80.61%, respectively. For genetic characterization, DNA extracted from feathers was genotyped using 26 microsatellite markers. Total number (Na), and effective number (Ne) of alleles, observed (Ho) and expected (He) heterozygosity, and F (Wright's inbreeding coefficient) indexes were calculated. A total of 76 alleles were identified and 3 loci were not polymorphic. The average Na was 2.7, and Ne was 2.0. Observed and expected heterozygosity were 0.41 and 0.43 respectively, with F=0.03. The results support the importance of objective characterization in traditional Italian breeds from both genetic and phenotypic perspectives to gather effective data for defining conservation strategies and breeding plans aimed at improving genetic variability and productivity in unique populations.

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