

Poultry Breeding and Genetics

The dramatic gains in poultry meat and egg production from individual birds in commercial flocks over the past 50 years are largely due to genetic selection in the nucleus breeding flocks of large global poultry breeding companies and the rapid transfer of these gains to the commercial cross-bred progeny. This has been facilitated by high reproductive rates, short generation intervals, reduced environmental variation, large population sizes to minimize the detrimental effects of inbreeding, and the use of several differentially selected sire and dam lines. Until now, much of the improvement in performance has been derived from the application of quantitative genetic selection, with limited use of molecular technologies. The large majority of commercial broilers and layers in developing countries have been produced from imported grandparent or parent stock originating from large global breeding companies. There are also a few smaller breeding operations that supply stock to regional markets. Chickens, as well as other animals, have the ability to change their behavior and physiology based on the costs and benefits to fit their environment. Through natural selection, the population preserves and accumulates traits that are beneficial and rejects those that are detrimental in their prevailing environments. The surviving populations are able to contribute more genes associated with beneficial traits for increased fitness to subsequent generations. With advances in understanding of genetic mediation of animal physiology and behavior and the discovery of the genome sequences of many species, animal production breeding programs can be improved in both speed and efficiency. Modern chicken breeding programs have the potential to be operated successfully in the breeding of tomorrow's chickens with high production efficiency and optimal welfare, resulting from resistance to stress, disease, or both. Recently, there has been a major shift from the differentiation of poultry breeds according to morphological and feather coloring characteristics, to differentiation based on measurements at the molecular level. The use of molecular markers can provide quantified criteria for assessing genetic diversity, either within or between populations. However, although they can be used to study relatedness between populations, provide information on past history of populations, detect introgressions and contribute to the genetic definition of a breed's entity, molecular markers do not provide information on phenotypes and special adaptive traits.

Poultry Breeding and Genetics deals with the transmission of individual characteristics of both parents to the offspring through the mechanism of heredity. Poultry breeding utilizes genetic principles to accomplish the goals of poultry producers for meat or egg production. Use of transgenic technology in poultry is also examined. Transgenic technologies offer the promise of being able to address issues by creating new genetic variability, rather than being restricted to existing variation as with quantitative and genomics methods. In addition, transgenic technology can develop new uses for egg products, particularly as a bioreactor for other applications. One of the greatest issues in the poultry industry is that of disease resistance and transmission. This book will be beneficial for the students, teachers, researchers, farmers, and other professionals, who are interested to strengthen and expand their knowledge about chicken products in fields of poultry science, biotechnology, plant science, and agriculture.

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Editor:

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