UTILIZING LOCAL POULTRY GENE RESOURCES IN NIGERIA

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SUMMARY

Although the large indigenous chicken population in Nigeria is characterised by general poor performance, it has a number of single genes which may have both direct and indirect effects on important economic characters. Quantitative genetics principles are being employed to explore their use and that of polygenes in bringing about improvement in production characters in synthetic populations of indigenous and exotic strains.

INTRODUCTION

The Nigerian indigenous poultry constitute more than 90% of the total poultry population and contribute about 90% of the supply of poultry products in the country. They are traditionally raised under extensive management, with little or no supplemental feeding. The birds are therefore characterised by such survival traits as small body size, slow growth, late maturity, poor production, tolerance of and/or resistance to certain locally prevalent diseases and parasites, and hardiness.

There is increasing need to increase animal protein production in Nigeria in order to improve the per caput animal protein intake of the population which is presently grossly below the recommended level. One way to achieve this is to improve the production capacity of locally adapted animals by utilizing known genes with direct or indirect relevance to production, which they may possess.

PRODUCTION PERFORMANCE

Table 1 shows egg production and egg weight of indigenous fowls under different management systems. The performances of indigenous, exotic and their F_1 are given in Table 2. These tables indicate improved performance of indigenous chickens by improved management and by genetic manipulation, in this case crossbreeding and utilization of hybrid vigour.

Table 1 Egg production and egg weight of indigenous chickens.

Character	Management	Value	Reference
Annual Egg Prod.(no.)	Extensive	60-80	Hill and Modebe, 1961
	Semi-intensive	100	"
	Battery cage	124	"
	Deep Litter	128	Nwosu, 1979
Egg weight (g)	Extensive	29-36	Omeje and Nwosu, 1988
	Intensive	40	"

Table 2 Performance of indigenous, exotic and F_1 hybrid chickens

Character	Indigenous	F_1	Exotic
100-day hen-day egg no.	39.2	53.5	55.6
Mean egg wt. (g)	32.6	40.6	47.3
Day-old body wt. (g)	20.6	25.9	31.0
20-week body wt. (g)	853.3	1,176.0	1,196.0

Source: Omeje and Nwosu, 1988.

RELEVANT MAJOR GENES

Tropically-relevant major genes (Horst, 1988) that are commonly found in the Nigerian indigenous stock are naked neck (Na), frizzle (F) and Silky (h). These genes cause a reduction in tropical heat stress by improving the individual's ability for convection, resulting in improved feed conversion and better performance. Horst (1988) has shown that the first two confer superiority in some production characters in the tropics. For example, individuals of genotype Nana ff Dw- showed a superiority of 5.8, 3.6 and 4.4% for egg number, egg weight and 40-week body weight, respectively over normal individuals (nana ff Dw-). Similarly, individuals of genotype Nana Ff Dw- were 9.6, 3.0 and 4.8% superior to normal individuals in egg number, egg weight and 40-week body weight, respectively. In addition, the following genes with direct effects on quantitative trait loci should be exploited: early feathering (rapid growth, increased egg production), pea comb (meatiness), B^{21} (resistance to Marek's disease) and B^5 (immunity to coccidiosis caused by *E. tenella*), among others.

STRATEGIES FOR IMPROVEMENT

In addition to improved management and feeding, improvement of the genetic endowment of the indigenous stock is desirable. There are two possible strategies to achieve this. One might use genetic engineering techniques to manipulate the various relevant major genes identified. Although attractive and promising, factors such as lack of adequately trained biotechnologists and lack of appropriate equipment and materials militate against its use in Nigeria. Genetic improvement of indigenous poultry must meanwhile rely on quantitative genetics principles. These principles are incorporated into such schemes as grading up, systematic crossbreeding and development of synthetic populations, which are being explored.

Perhaps development of synthetic composites of a number of different strains of indigenous and improved exotic chickens might be most promising in the long term. Two general methods of approach have been suggested: immediate crossing of the different strains to create a heterogeneous population which is then subjected to intense selection (Osman and Robertson, 1968; Pirchner, 1969), and intense selection within strains before crossing (Osman and Robertson, 1968). While the former enables a breakthrough to be achieved quickly, the latter results in increased response in the long term.

A scheme that is being explored consists of crossing (including

reciprocals) of different indigenous (some possessing tropically-relevant single major genes) and improved strains, followed by a single backcross to both original parents to form a large genetically heterogeneous base population. Individuals are then selected for a combination of short-term egg number, egg weight and body weight based on BLUP, using an animal model with all available information.

This is expected to lead to more accurate evaluation of breeding values of individuals for selection and hence to greater genetic gain and faster improvement of the synthetic population.

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