

Flock Improvement of Meat and Layer Breeds

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Summary

Inferior breeds with poor genetics and poorly controlled diseases are major limiting factors for poultry production in Africa. Naturally selected local chickens exhibit adaptation to adverse conditions but offer lower meat and egg production than improved breeds raised under better management. Heritable traits of interest in chickens include growth rate, egg yield, average daily gain, and feed conversion efficiency. Improved breeds are distributed through large hatcheries that produce and market chicks at affordable prices. Flock improvement refers to the process of successive improvement of chickens through improved genetics and management. The different breeds of poultry are grouped according to their production purpose (meat, eggs and dual-purpose). Chickens bred for meat are known as “broilers” while those for maximum egg production are “layers”. Genetically improved chicken breeds, however, are not suitable for extensive production systems without supplementary nutrition, shelter, and veterinary services. Some chickens serve dual purpose, providing both meat and eggs often under less intensive management regimes suited to small-scale farming systems.

Technical Description

Improvement of chicken breeds involves accurate identification of individual chickens, accurate recordkeeping, and measurement of desired production traits. With reasonable knowledge of genetic selection, it is possible to develop new breeds that better suit producers' conditions. Chick producers select birds with desirable traits in meat production (for broilers), and egg production (for layers). The best performing males (cocks) are mated with the best performing females (hens), and the fertilized eggs recovered. These eggs are incubated and hatched over about 21 days in commercial facilities with capacity to produce thousands of chicks in a continuous manner. The common product is day old chicks (DOCs) that are marketed to farmers who rear them either for meat or egg production. The DOCs are best delivered alongside other technologies described in this catalogue including vaccination and feeding practices.

Uses

Breeding for flock improvement by industrial chicken farms mainly takes place through semen collection whereas in extensive small-scale system the genetic resources are preserved in living populations. Breeders and farmers can collaborate in developing new breeds of chickens better adapt to specific management and environmental conditions.

Composition

The requirement for maintaining an improved chicken flock include suitable protection from predators and inclement weather, good nutrition through balanced feeds and routine vaccination. It also requires good infrastructure and capital investment.

Means of application

Different methods are used for flock improvement, such as individual selection, family selection, progeny testing, sibling testing, and pedigree selection. Techniques such as artificial insemination and semen collection and preservation can be applied. The DOCs are generally reared in a brooder house under controlled climate conditions and optimal nutrition. The brooder house, which simulates the traditional brooding of a mother hen, is aimed at conserving heat and light, nurturing, and protecting the DOC from predators. A brooder house can be constructed from simple materials such as cardboard, wood, insulated metal sheets or concrete. Poultry houses must be constructed on well-drained lands, and need to control heat, light and wind. The ideal temperatures for chicks 34° to 38°C and birds become more adaptable as they get older. The feed, water and medication are delivered to chicken via feeders and drinkers. The feed of improved chickens is formulated rations with specific energy protein and mineral contents. Feeds formulations change over time as chickens develop.

Agroecologies	All Agroecologies.
Regions	Africa South of Sahara.
Developed in Countries	Kenya, Zimbabwe, Zambia, Uganda, Tanzania, South Sudan, Somalia, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Malawi, Madagascar, Ivory Coast, Guinea, Ghana, Gabon, Ethiopia, Democratic Republic of the Congo, Central African Republic, Burundi, Botswana, Benin.
Available in	Kenya, Zimbabwe, Zambia, Uganda, Tanzania, South Sudan, Somalia, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Malawi, Madagascar, Ivory Coast, Guinea, Ghana, Gabon, Ethiopia, Democratic Republic of the Congo, Central African Republic, Burundi, Botswana, Benin.
Solution Forms	Genetics.
Solution Applications	Livestock Production.

Agricultural Commodities	Poultry.
Target Beneficiaries	Women, Youth, Small-scale farmers, Commercial farmers.

Commercialization

Commercialization Category

Commercially available

Startup Requirements

Several industrial brooding companies in Africa rear improved breeds, such as Zartech in Nigeria, Kenchic in Kenya, Ethiochicken in Ethiopia, and Irvine's Poultry in South-Africa. Under enabling national policies that promote private sector participation, international companies can partner with a local private sector and the public sector. The start-up requirement for developing a flock improvement program include acquiring a license to breed stock and market chicks.

Production Costs

The production facilities such as the breeding pens, incubators and hatcheries must be designed and installed according to sound management principles and a rigorous financial plan. The cost of establishing a poultry breeding company can run into millions of dollars.

Customer Segmentation

Production of improved poultry breeds is a lucrative commercial activity and suitable for specialty breeding centers and intensive farms.

Potential Profitability

For layers, the main objective of a breeding program is to bring improvement in traits such as age of first laying, egg number, egg weight, fertility, egg quality and feed efficiency. For broilers, the indicators for maximizing economic value include body weight at maturity, growth rate and feed conversion rate. Tolerance to high temperature is a key factor that can be improved by incorporating single genes that modify or reduce feathering such as naked-neck, scaleless and frizzle genes. Improved breeds can attain 1.5 to 2.5 kg live weight gain in only 6 to 8 weeks in contrast to local breeds that may require to six months to attain the same weight. The annual egg laying potential of local breeds reared under extensive management is 30-60 per hen with an average egg weight of 38g while for improved breeds of chicken under intensive management this around 250 per hen with average egg weight of 50-56g.

Licensing Requirements

Poultry flock improvement programs operate in both the public and private sectors and access to improved parent material may be negotiated through them. Livestock research institutes such as ILRI also develop chicken breeding program.

Innovation as Public Good

The solution is a public good created by Taddelle Dessie of the African Chicken Genetics Gains program.

Solution Images



*Improved breeds of broilers
(top) and layers (bottom)*



Selective mating for flock improvement

Institutions



Accompanying Solutions

[Artificial Hatching in Semi-Automatic Incubators](#)