Improved and accessible dual-purpose chicken for African farmers

Poultry constitutes an important economic activity for the rural poor in many African countries. Additionally in many poor, rural families, poultry provides the family with a low cost, highly efficient and nutritious protein.

by Louis Perrault, Sasso, Sabres, France, Randall Ennis, World Poultry Foundation, Huntsville, USA & Naomi Duijvesteijn, Hendrix Genetics, Boxmeer, The Netherlands.
www.hendrix-genetics.com

The local indigenous breeds can be inefficient and unproductive compared to other alternative and improved breed options. Unfortunately, the smallholder farmers in rural areas often do not have access to these improved genetics. The access to an improved low-input and dual-purpose chicken to supplement the local indigenous breeds could transform the rural poultry enterprise.

In some countries such as Uganda, Ethiopia, Tanzania, Nigeria and Burkina Faso, investments are made to support the African Poultry Multiplication Initiative (APMI) or other comparable structures. The model generally operates through capable local private companies to establish a parent stock and hatchery operation for the production of day-old-chicks of improved dual-purpose chicken breeds for smallholder farmers.

The day-old-chicks from the parent stock farm are transported to so called 'Brooder Units' (equivalent to 'Mother Units' or 'Ambassadors') who will specialise in the brooding, feeding, and proper vaccination process for the first 30-40 days of the chicks' life. Through this system, local smallholder farmers have access to improved genetics and the chickens have a high chance of survival due to their good start.

SAPPSA project

Recently Hendrix Genetics received a grant from the Bill & Melinda Gates Foundation to further enhance the use of improved poultry genetics to provide a better living to women smallholder farmers in Africa.

The programme, named Sustainable Access to Poultry Parent Stock for Africa (SAPPSA), aims to:

- Secure access of poultry parent stock.
- Grow the APMI-like initiatives within and across countries.
- Improve the dual-purpose better breeds for African smallholder farmers.

Secure access of poultry parent stock

Reliable access to improved parent stock genetics is crucial for the success of APMI-like initiatives. Today, the main improved breeds are Kuroiler, which is developed and marketed by Keggfarms, and Sasso, which is developed and marketed by Hendrix Genetics. The Kuroiler is currently being used in Uganda, Tanzania, and Zambia and Sasso is being used in Ethiopia, Tanzania, Zambia, Mozambique, Burkina Faso and Zimbabwe.

At present, Kuroiler parent stock are only available from India and the Sasso lines used in Africa are available from France and Brazil. The supply of parent stock can be disrupted by outbreaks of diseases such as avian influenza. An outbreak of avian influenza in the source country can lead to a ban on the export of parent stock.

A long-term sustainable solution to mitigate this risk is duplication of the germplasm in another geographic location that allows direct export to countries, in order to create redundant supply points.

Grow the APMI-like initiative within and across countries

The World Poultry Foundation (WPF) has been working with the Gates Foundation to scale access to dual-purpose chicken in Africa. The APMI is a system that has to be set up in each African country and adjustments per country to the model can be necessary, but the basics of the model will be similar.

A private company will acquire parent stock from a dual-purpose breed. They will supply the day-old-chicks to Brooder Units (BU) together with feed and proper vaccination. The BUs often have a capacity to hold between 500-2,000 birds. The owners will be trained and will need to show commitment to be able to proceed as a BU owner. In addition to the supply of birds and material, the BU owners will receive technical support and gender empowerment provided by the PS farm (supported by funding from the Gates Foundation).

The BU holder will often need a loan and a financial institution needs to provide that loan. After keeping the chickens for four weeks, they will be sold to smallholder farmers. The number of chickens they buy varies but is usually between 2-20 (they tend

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to buy what they can afford). The male chickens will be used for meat consumption and are either consumed by the family or sold to a local market.

The hens are used for egg production. The key to success of this system is money. Every party in APMI needs to make money for the system to work, and results from the WPF show that this is possible. For example, the profitability of a standard BU in Nigeria was 30% net profit per batch. The WPF using the APMI is currently active in two African countries (Tanzania and Nigeria).

The five basic goals of APMI are to increase productivity, increase household income, improve nutrition, empower women in rural areas, and employment opportunities.

Productivity improvement at the village level has improved a lot with the use of Sasso, Noiler or Kuroiler chickens (referred to as APMI chickens from now on) where mortality at Mother Unit is <5% and <10% at the smallholder level (where mortality rates of 40-80% are normal).

The number of eggs produced by the APMI hens varies between 143 and 178 depending of the APMI breed compared to an average production of village chickens of 40 eggs/year. The number of days to reach 2.0kg also reduced a lot from ~220 days for village chickens to ~80 days for APMI breeds.

The APMI (combining Tanzania and Nigeria) has reached many smallholder farmers through this system, where in total 10.7 million day-old-chicks have been placed, 1,590 Brooder Units have been started, 525,000 smallholder farmers have been reached, and 292 positions have been hired (by the end of 2018).

The goal is to duplicate this model to another 10 African countries. The goal is to impact two million households in 2020 with 54 million day-old-chicks being placed at smallholder farmers. To be able to grow the APMI, plans per country will be made and different institutions are involved to be able to manage country-specific challenges and to be able to roll out APMI as effectively as possible.

Breeding

Breeds such as Kuroiler and Sasso perform better than most local indigenous breeds, where productivity and feed utilisation efficiency is far lower than current commercial breeds. Results from ILRI's African Chicken Genetic Gain project (ACGG; funded by Gates Foundation) shows that there is a wide variability in the performance of Kuroiler and Sasso in different agro-ecologies.

The Kuroiler and Sasso breed may not be as adaptable or resilient to the local environment as the indigenous breeds. In addition, genetic improvement is a powerful technology to further generate increases in the productivity, adaptability, feed efficiency, and resilience of the lines that are used to produce Kuroiler and Sasso parent stock. As many different agro-ecologies are present in sub-Saharan Africa, field tests within the SAPPSA project will be conducted to investigate the field performance in different agro-ecologies. Combinations between local (sire)lines and improved breeds will also be tested to be able to provide the right breed combinations for different agro-ecologies.

Within the SAPPSA project, performance under African conditions will be part of the breeding programme through recurrent testing. Recurrent testing is directed towards increasing performance at the crossbred level under local circumstances, whereas selection is performed at purebred level.

To improve the dual-purpose breeds, both growth performance and egg performance on crossbred chickens will be tested. For egg production, hens are housed in sire-family groups and dam pedigree is unknown (the breed is known), and group performance is recorded (~40 offspring per sire tested).

For growth performance chickens will be individually measured and the sire performance is evaluated through a sire model. The predicted performance per sire is included in the selection index and can be ranked on growth and egg production performed under African conditions. The genetic gain of the lines may be further accelerated by the application of genomics and other molecular tools.

Conclusions

By securing access to high quality parent stock and improving the breeding programme of dual-purpose breeds under African conditions, the APMI can be better implemented in African countries with reduced risks (good access to PS) and improved performance (better performing breeds).

To make each APMI successful, collaboration needs to be established to improve the infrastructure (access to finance, logistics, network and training) to reach the smallholder farmers. Each country will need small modifications (breed, APMI set up), but ultimately for smallholder farmers it will result in:

- Increased poultry production and productivity.
- Increased rural household income.
- Improved household nutrition.
- The empowerment of women. ■

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