

## Why chicken research for development?

*Tadelle Dessie*

### Critical roles for poultry

Chicken production promises considerable potential to improve the livelihoods of rapidly increasing populations of developing countries. For many poor people in developing countries, chickens are the only type of livestock they can afford to keep, which are relatively risk-free.

Chickens can look after themselves, are an important source of high-quality protein, and provide additional income to resource poor farmers, especially women. Above all, they are using Scavenging Feed Resource Base (SFRB) to produce the first 40 or more eggs.

The small investment (feed cost, space requirement, low cost of the animals) and short generation interval make chicken rearing a suitable farming activity for the poor.

Chickens can easily be sold off at times of economic difficulty and in some parts of the tropics selling chickens prevents the sale of breeding flock of sheep and goats when there is a need to cover immediate, but relatively small expenses in the household.



Chickens are sustainable because they continue to produce eggs – one does not have to kill the source to get the protein. Research from Uganda suggests that poor farmers raise fish and pigs to sell and rarely eat their own production while chickens are raised both for income and intake.

Chickens are often the only items rural women sell in the market and the earnings from the sale of eggs and chickens are their only sources of cash income.

The consistent decrease in grazing areas due to the increasing demand for cultivable land in most regions of the tropics makes chicken production more suitable than other types of livestock production. Moreover, chicken production is a cheaper means of creating rural employment.

Improving chicken productivity will result in an improved diet, especially for children, and in improved social-economic status. Chickens thus can serve as a first step out of poverty, without which upgrading to, for example, small ruminants or other agricultural activity most likely would never be possible.

## Indigenous chicken breeds

Chickens are a means of investment that is important to the welfare of women and children in traditional, low-input-output farming systems in the tropics. Most indigenous birds, except those bred for cockfighting, are non-specialized, and are known for their ability to survive on irregular supplies of feed and water, and with minimal health care. They form vital and integral parts of a balanced farming system. Retrospective research on some indigenous birds from the tropics shows that their potential for egg and meat production is low (Mathur et al., 1989).

However, results from several productivity evaluation of indigenous chicken show that there are some highly productive indigenous bird populations with some exhibiting a remarkably higher performance levels than the other improved ecotypes, especially under low to medium production systems (Mathur et al., 1989; Tadelle et al., 2000).

Although indigenous chickens have a number of adaptive traits and genes such as necked necks, minimum and frizzle feathers, black bones and meats, which have special utility in the hot and humid tropics, the real value of indigenous breeds remain under-estimated. This is mainly due to their lack of uniformity, appearance (darkness) and less tender meat, hence low levels of commercial interest on them. Although some of these negative attributes are non-genetic, the negative prejudices remain, leading to continued neglect and little attention being given at international and national level to research on them and their development.



Although local chicks are slow-growing and poor layers of small sized eggs, they are ideal mothers, good sitters, excellent foragers, hardy, and believed to possess better natural immunity against common poultry diseases (Mathur et al., 1989; Tadelle et al., 2000).

The most effective and sustainable way to conserve animal genetic resources is to make them economically competitive under existing production systems, i.e. conservation through improvement and utilization. It is therefore necessary to design sustainable utilization and improvement schemes, especially in hotspots of known high genetic diversity, with the active participation of local communities who currently own such chickens.

The concept of community-based management of animal genetic resources is consistent with new thinking on the conservation and utilization of animal genetic resources. Community-based management of animal genetic resources facilitates further genetic studies in traditional populations while also serving the longer-term objectives of sustainable use of the genetic resources.

## Chicken genetic improvement at Debre Zeit Research Center

The breeding program **utilizing indigenous chickens in Ethiopia** started five years ago (2007-2011) involving ILRI and Wageningen University (WU). The aim is to improve the production and productivity levels of village chickens through selective breeding using participatory approaches.

The Horro breed and the breeding objectives for this program were identified using a participatory approach. Farmers identified the production traits: egg number (but not egg weight) and live weight (growth) as the most important economic traits and the breed they seek is dual purpose where they can get both better number of eggs and meat. Traits that have no direct economic values were also found to have high significance to farmers. The preferred physical characteristics are red/brown or white plumage colours and comb types other than single (Nigussie, 2011). Thus, the breeding program mainly targets dual purpose breeds based on the indigenous chickens through selective breeding.

The Horro flock is at its 8th generation and currently there are about 800 chickens with pedigree information and individual performance records. Selection based on breeding values is not yet in effect because estimation of the population parameters is not finalized; it is expected to be completed in a few months. Currently, mass selection based on own performance is being used and chickens are being selected for the following traits: Egg number (females), growth based on live weight (males). Birds with extended sexual maturity and having long broody period compared to the rest are being culled. Selection in this way progressed for the past two generations.

Even so, infectious diseases have major impacts on productivity. The chicken improvement program in Ethiopia didn't include genetic resistance which represents an under-exploited low cost opportunity for disease control in the ongoing breed improvement program.

While the ILRI and WU collaborative project is going on, aimed to address this gap and to identify genetic regions and genes that can be used to inform breed improvement in Ethiopia, a project entitled **"Reducing the Impact of Infectious Disease on Village Poultry Production in**

**Ethiopia"** is being implemented. The aim is to develop a poultry breeding program to improve resistance to priority infectious diseases whilst enhancing productivity. Realization of this objective requires three further overlapping objectives:

- We will use genome-wide association studies using large numbers of SNPs and polymorphism studies at candidate resistance genes to identify the genetic components of indigenous poultry resistance/susceptibility to disease challenge. Investigation of resistance in local Ethiopian poultry will not only identify genetic regions and genes that can be used to inform cross-breeding programs in Ethiopia, but will also greatly extend our knowledge of the genetics of resistance in poultry, which to date has largely been studied in inbred and commercial poultry lines.
- We will identify and prioritize infectious diseases that impact on village poultry. We will use ELISA for diagnosis of key viral and bacterial pathogens and use coprological examination to diagnose gut parasites. This knowledge will enable more precise disease control planning by Ethiopian policy makers and animal health professionals, as well as inform targeting of the breeding program.
- Using participatory methods we will work with farmers to identify diseases impacting poultry production, factors affecting uptake of control strategies and the desirable characteristics of birds. We will utilize all these results to inform selection in an ongoing breeding program which is improving the productivity of local poultry ecotypes for distribution to villages. Thus we should ensure that the improved birds also have enhanced resistance to key infectious diseases.



## Project milestones in 2011

- Project Launch Event at ILRI in January brought together scientists, policy makers and poultry research and development practitioners.
- Poultry diagnostic and research laboratory established at the Ethiopian Institute for Agriculture Research (EIAR) in Debre Zeit.
- Field sampling training session in March where 14 Ethiopian staff, students and researchers learned about phenotypic characterisation of indigenous chickens, clinical examination, data collection and use of standardised sheets, bio-containment and health and safety.
- Surveys and data collection. Survey questionnaires developed for the phenotypic characterization of Ethiopian village chicken; to evaluate the economic importance of chicken breeding including possible socio-economic impact of poultry diseases; and a training manual and checklist to support Participatory Rural Appraisal of village poultry production

## References

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*On 9 and 10 November 2011, the ILRI Board of Trustees hosted a 2-day 'liveSTOCK Exchange' to discuss and reflect on livestock research for development.*

[www.ilri.org](http://www.ilri.org)

P O Box 30709, Nairobi 00100, Kenya  
Phone: + 254 20 422 3000  
Fax: +254 20 422 3001  
Email: [ILRI-Kenya@cgiar.org](mailto:ILRI-Kenya@cgiar.org)

P O Box 5689, Addis Ababa, Ethiopia  
Phone: +251 11 617 2000  
Fax: +251 11 617 2001  
Email: [ILRI-Ethiopia@cgiar.org](mailto:ILRI-Ethiopia@cgiar.org)

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