Challenges and opportunities for improved tropical poultry productivity and resilience

Tadelle Dessie

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Chicken production systems in SSA

• Village production system
• Small-scale production system
• Commercial production system

⇒ Based on:

• Objectives of the producer
• Type and number of animals
• Management system followed
Opportunity - Village production system

- High potential for women’s empowerment
- Chicken leads the global meat trade with 40% of exports to Africa and the Middle East
- Low-productivity but high potential for growth across a range of systems
- Egg and chicken meat are often the highest value agricultural product globally
- High potential for contributing to dietary diversity globally

Income + Nutrition = Pathway out of Poverty
Yield gaps in chicken production in Africa: the opportunity

Sources: The data for the hybrid used here are from Kuroiler from an Indian environment (Ahuja et al., 2008); while for indigenous birds the data are from Hill and Modebe 1961; Oluyemi and Oyenuga,1971; Akinokun and Dettmers, 1976; Nwosu et al, 1979; Nwosu and Omeje, 1985; and Sonaiya, 1990. Dessie, 1995 etc
Challenges: Village production system

- High mortality - Farmers lost interest to invest

- Birds are slow growers and lay small size/number of eggs
  - Absence of tropically adapted and more productive breeds
    - No continuous supply of improved genetic material to small producers
      - Major cause of failure of improvement projects

- Similar issue for feed and health service provision

-> catalyze public-private partnerships for increasing smallholder chicken production and productivity growth

-> Need to organize a supply chain of inputs tailored specifically to the needs of small-scale poultry producers
African Chicken Genetic Gains

A platform for testing, delivering, and continuously improving tropically-adapted chickens for productivity growth in sub-Saharan Africa
The vision of this program is to **catalyze public-private partnerships for increasing smallholder chicken production and productivity growth as a pathway out of poverty** in sub-Saharan Africa.
The ACGG project

- ILRI led BMGF funded project

The project has been testing in parallel multiple tropically adapted and more productive chicken strains under both on-station and on-farm management conditions, in different agro-ecologies
What are we doing differently?

ACGG Five Pillars of Change

1. High-producing genetics that is well-adapted to low-input production systems;
2. Farmer preferred breeds of chickens;
3. Public-private partnership for improvement, multiplication, and delivery;
4. Women at the center to ensure success; and
5. Innovation platforms for developing solutions across the value chain.
What must be different?

1. From “silver bullets” to researched options (informed by farmer experimentation)
2. From “we are here to offer you solutions” to “we are here to work with you to find solutions”
3. From pure focus on pushing ‘promising strains’ to recognition of importance of O x C
4. Innovation Platforms at national and community level as on-going processes for industry integration which outlive the current Project!
What is the science?

<table>
<thead>
<tr>
<th>Geography / Conditions</th>
<th>Breed</th>
<th>Average eggs/ year</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Africa scavenging (sub)-humid</td>
<td>Indigenous</td>
<td>33</td>
</tr>
<tr>
<td>East Africa scavenging (sub)-humid</td>
<td>Indigenous</td>
<td>58</td>
</tr>
<tr>
<td>Egypt</td>
<td>Fayoumi</td>
<td>146</td>
</tr>
<tr>
<td>South Africa</td>
<td>Koekoeke</td>
<td>204</td>
</tr>
<tr>
<td>Ghana (intensive feeding)</td>
<td>Naked Neck</td>
<td>288</td>
</tr>
<tr>
<td>Ghana (intensive feeding)</td>
<td>Frizzle Feather</td>
<td>287</td>
</tr>
<tr>
<td>Uganda</td>
<td>Kuroiler</td>
<td>180</td>
</tr>
<tr>
<td>India</td>
<td>Rainbow Star</td>
<td>160-180</td>
</tr>
<tr>
<td>India</td>
<td>CARI lines</td>
<td>198-220</td>
</tr>
<tr>
<td>Developed world</td>
<td>“Exotic”</td>
<td>300+</td>
</tr>
</tbody>
</table>

Source: Mwacharo et al 2008; Dessie et al 2011
Give up other farming for full-time poultry; intensive grain feeding competes with cheap imports.

Identify most productive local ecotypes and multiply.

Supplemental feeding, vaccination, and brooding.

Smallholder adoption productive of tropically adapted birds.

Artificial hatching of indigenous chickens

Selected indigenous chickens

~80

~80

120-150 (semi-intensive)

Intensive production

Egg Yield /Year:

Indigenous chickens: 40-50

Selected indigenous chickens: ~80

Artificial hatching of indigenous chickens: ~80

Artificial hatching of tropically adapted / crossbreds: 120-150

Intensive production: 250-300

Mortality:

Indigenous chickens: 70-80%

Selected indigenous chickens: 50-70%

Artificial hatching of indigenous chickens: 10-20%

Artificial hatching of tropically adapted / crossbreds: 5-10%

Intensive production: <5%

Too risky for many smallholders?
Chicken strains being tested

- Kuroiler
- Koekoek
- Sasso (RIR X Sasso)
- Sasso
- Horro + XX ecotypes in the sites

- Kuroiler
- Sasso
- Shika Brwn
- FUNAB Alpha
- Fulani +
- XX ecotypes in the sites

- Kuroiler
- Sasso
- Black Australorp
- XX ecotypes in the sites
ACGG data:

Data driven understanding of the breeds and specific traits that poor smallholder farmers, especially women, prefer across the various countries and agro-ecologies – Main outcome of ACGG

• Major points of data collection for ACGG are:
  • Baseline and cross sectional survey
  • Longitudinal survey
Major outcomes- Baseline and cross sectional survey

• Baseline Data cleaned and analyzed Specific production characteristics identified

• Outputs of the baseline information used as an input to design on-farm testing
What are the desires of SHC Farmers?

To have birds that

- Grow bigger & faster
- Lay more eggs
- Have high survival rate
ACGG Longitudinal data – interim analysis results
Fitted growth curve (growth data from day old to 18 weeks of age) using the non-linear models (Gompertz equation) for estimating growth curves to describe the relationship between live body weight and age of Kuroiler breed at DZARC, Ethiopia.
Fitted growth curve (growth data from day old to 18 weeks of age) using the non-linear models (Gompertz equation) for estimating growth curves to describe the relationship between live body weight and age of Sasso breed at DZARC, Ethiopia
Fitted growth curve (growth data from day old to 18 weeks of age) using the non-linear models (Gompertz equation) for estimating growth curves to describe the relationship between live body weight and age of FUNAB Alpha breed at FUNAAB, Nigeria.
Live body weight (g) (0 to 18 wks), at six weeks and age when two kg live body weight of Kuroiler breed at FUNAAB, Nigeria
Live body weight (g) (0 to 18 wks), at six weeks and age when two kg live body weight of Sasso breed at FUNAAB, Nigeria.

<table>
<thead>
<tr>
<th>Age in weeks</th>
<th>Body weight in grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 0</td>
<td>39.1 (9.38)</td>
</tr>
<tr>
<td>Week 2</td>
<td>148.87 (9.84)</td>
</tr>
<tr>
<td>Week 4</td>
<td>148.87 (10.31)</td>
</tr>
<tr>
<td>Week 6</td>
<td>476.51 (11.33)</td>
</tr>
<tr>
<td>Week 8</td>
<td>748.06 (10.93)</td>
</tr>
<tr>
<td>Week 10</td>
<td>1226.98 (29.04)</td>
</tr>
<tr>
<td>Week 12</td>
<td>1716.24 (30.55)</td>
</tr>
<tr>
<td>Week 15</td>
<td>2397.37 (29.40)</td>
</tr>
<tr>
<td>Week 16</td>
<td>2644.06 (30.35)</td>
</tr>
<tr>
<td>Week 18</td>
<td>2397.37 (29.40)</td>
</tr>
</tbody>
</table>
Live body weight (g) (0 to 18 wks), at six weeks and age when two kg live body weight of Kuroiler breed at DZARC, Ethiopia

Week 17

Body weight in grams

Age in weeks

Week 0
Week 2
Week 4
Week 6
Week 8
Week 9
Week 12
Week 16
Week 18

Body weight in grams

Age in weeks

Week 0
Week 2
Week 4
Week 6
Week 8
Week 9
Week 12
Week 16
Week 18

700g + LBW
Live body weight (g) (0 to 18 wks), at six weeks and age when two kg live body weight of Sasso breed at DZARC, Ethiopia
Mean body weight (g) of different chicken strains tested at Debre Zeit, Ethiopia (9 to 18 weeks of age) -200 to 300 % increase from the indigenous chicken-ACGG on-station testing interim result
ACGG On-farm Testing - Research driving delivery at scale

Longterm Genetic Gain Program

Testing Information
- Production/Productivity
- Mortality
- Input Access
- Preferences
- Profitability
- Farmers’ Perceptions

Innovation Platform

Brooders/Multipliers

Scale!

7,500 Farmers
The Long Term Chicken Genetic Gains (LTGG) Program

A platform for developing a Long Term Genetic Gains program for tropically-adapted and farmer preferred chickens for sustainable productivity growth in sub-Saharan Africa
What is our vision for this “network”?

Key elements

- Set-up a long term genetic Gains program (Pure breeds or GPS) of farmer preferred strains - ACGG’s longitudinal study, by private sector chicken breeding companies
  - potentially within-breed selection and crossbreeding
  - Base population 180 eggs/hen/Y – 2% GG annually
- Establish a supply of improved Parent stock with improved growth, egg production, feed conversion and adaptability traits
- Multiplier flocks established and scaled-up via a network of hatcheries/multipliers
- When target scale is reached, hatcheries begin sale of day-old improved chicks to mother units/farmers
- Chicks vaccinated by hatcheries/multipliers and/or mother units
Who are the partners of the Long Term Genetic Gains program network?

- National Agricultural Research System (NARS)
- Private sector breeding companies
- ILRI/PSBCs—Overall coordination of the program
- The platform members (ILRI, PSBCs, WUR, NARS etc)

- Day-to-day management of the genetic gains work;
- Multiply and sell parent stock and GPS to hatcheries;
- Maintain parent stock; and
- Multiply and distribute commercial germplasms to mother units and/or farmers at scale.

- Negotiate the IP and access to the preferred strains;
- Design and coordination of the LTGG program;
- Capacity assessment/gap analysis in the private/public sector partners; and
- Develop and lead the implementation of context specific capacity building.

- Germplasm testing, data collection, storage and genetic evaluation of lines, feedback and quality assurance.

- Provide technical backstopping in the design and setting up of the LTGG program-data capture, genetic evaluation, and capacity building.
Chicken’s high rate of reproduction enables rapid scale distribution could begin after 12 months.

Phase 2 Months:
- **6 months**: No chick distribution
- **12 months**: Limited distribution (5-10%)
- **18 months**: Full dissemination
- **24 months**: Full dissemination

**Size Multiplier flock**:
- 100
- 100*
- 1,970
- 38,800
- 765,000

**Number of smallholders benefiting**:
- 7,300
- 145,000
- millions
- More millions

This model can be implemented simultaneously in multiple geographies and countries.
The four cardinal aims of ACGG - outcomes

• Employment creation
• Wealth creation
• Poverty reduction
• Building the capacity of partners
Field Officers/enumerators - Nigeria

Female: 44%

Male: 56%

Photo credit: ACGG-NG FOs Database
Project partner farmers/Beneficiaries...2100 in Nigeria

Kwara  Rivers  Imo  Nasarawa  Kebbi

420 Farmers per
Thank you for your attention.