

Village chicken production in the central and western highlands of Ethiopia: Characteristics and strategies for improvement



RESEARCH
PROGRAM ON
Livestock and Fish

ILRI PROJECT REPORT



Ethiopian Institute of Agricultural Research



WAGENINGEN UNIVERSITY
WAGENINGEN UR

Koepon Stichting

Village chicken production in the central and western highlands of Ethiopia: Characteristics and strategies for improvement




Tadelle Dessie, Wondemeneh Esatu, Liesbeth Vander Waaij, Fisseha Zegeye, Solomon Gizaw, Okeyo Mwai and J. van Arendonk

ILRI works with partners worldwide to help poor people keep their farm animals alive and productive, increase and sustain their livestock and farm productivity, and find profitable markets for their animal products. ILRI's headquarters are in Nairobi, Kenya; we have a principal campus in Addis Ababa, Ethiopia, and 14 offices in other regions of Africa and Asia. ILRI is part of the Consultative Group on International Agricultural Research (www.cgiar.org), which works to reduce hunger, poverty and environmental degradation in developing countries by generating and sharing relevant agricultural knowledge, technologies and policies.

© 2013 International Livestock Research Institute (ILRI)



This publication is copyrighted by the International Livestock Research Institute (ILRI). It is licensed for use under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported License. To view this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>. Unless otherwise noted, you are free to copy, duplicate, or reproduce, and distribute, display, or transmit any part of this publication or portions thereof without permission, and to make translations, adaptations, or other derivative works under the following conditions:

-  **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by ILRI or the author(s).
-  **NON-COMMERCIAL.** This work may not be used for commercial purposes.
-  **SHARE ALIKE.** If this work is altered, transformed, or built upon, the resulting work must be distributed only under the same or similar license to this one.

NOTICE:

For any reuse or distribution, the license terms of this work must be made clear to others.

Any of the above conditions can be waived if permission is obtained from the copyright holder.

Nothing in this license impairs or restricts the author's moral rights.

Fair dealing and other rights are in no way affected by the above.

The parts used must not misrepresent the meaning of the publication. ILRI would appreciate being sent a copy of any materials in which text, photos etc. have been used.

ISBN: 92-9146-341-8

Cover photo by: ILRI/Dereje Legesse

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Citation: Dessie, T., Esatu, W., Waaij, L.V., Zegeye, F., Gizaw, S., Mwai, O. and van Arendonk, J. 2013. *Village chicken production in the central and western highlands of Ethiopia: Characteristics and strategies for improvement*. Nairobi, Kenya: International Livestock Research Institute.

ilri.org
Better lives through livestock
ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: + 254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

Contents

Tables	v
Figures	vi
Executive summary	vii
Introduction	1
Chicken production and challenges in Ethiopia	1
EIAR–ILRI–WUR chicken project	2
Objectives	2
Methodology	2
Chicken production and livelihoods	4
Chicken production in Horro and Ada'a <i>woredas</i>	4
Contributions to livelihoods	5
Chicken production, wealth status and livelihood activities	6
Breeding, management and marketing practices	10
Village chicken breeding	10
Management practices	13
Gender and chicken production	18
Chicken and egg marketing	22
Opportunities, constraints and solutions	25
Opportunities	25
Constraints	25
Farmers' solutions	27
Strategies to improve village chicken production	30
Improved breeding	30

Improving the production environment	31
Improving farmers' access to inputs and markets	31
Concluding remarks	32
References	33
Annex I: List of PRA discussion facilitators	34
Annex II: List of farmers included in PRA exercise in Horro <i>woreda</i>	35
Annex III: List of farmers included in PRA exercise in Ada'a <i>woreda</i>	36
Annex IV: PRA checklist	37

Tables

Table 1. Egg production characteristics of chickens in Horro (Homi and Dembel Gobeya villages) and Ada'a <i>woreda</i> (Qurqura Dembi and Odee villages)	5
Table 2. Livelihood options and success factors in Horro (Homi and Dembel Gobeya villages) and Ada'a (Qurqura Dembi and Odee villages) <i>woredas</i>	6
Table 3. Values of wealth indicators in Horro <i>woreda</i>	7
Table 4. Values of wealth indicators in Horro <i>woreda</i> in Ada'a <i>woreda</i>	8
Table 5. Proportion of households belonging to different wealth categories.	8
Table 6. Farmers' direct matrix ranking of local, exotic and crossbred chicken in Homi village, Horro <i>woreda</i> , from 1 (strong) to 3 (weak).	11
Table 7. Farmers' ranked preferences (1 is highest) for breeding chicken traits in Horro and Ada'a <i>woredas</i>	13
Table 8. Farmers' preference ranking of plumage colours (1 is highest) in Horro and Ada'a <i>woredas</i> , by village	13
Table 9. Farmers rankings of diseases/parasites according to their economic importance (1 is highest) in Horro <i>woreda</i> (Dembel Gobeya village) and Ada'a <i>woreda</i> (Qurqura Dembi and Odee villages)	15
Table 10. Gender daily calendar in Horro <i>woreda</i> , dry season (24 hour clock)	19
Table 11. Gender daily calendar in Horro <i>woreda</i> , wet season (24 hour clock)	20
Table 12. Gender daily calendar in Ada'a <i>woreda</i> , dry season (24 hour clock)	21
Table 13. Gender daily calendar in Ada'a <i>woreda</i> , wet season (24 hour clock)	22
Table 14. Livelihood options, problems and solutions in Horro and Ada'a <i>woredas</i>	28

Figures

Figure 1.	Proportion of farmers in each wealth category engaging in different livelihood activities	9
Figure 2.	Seasonal calendar for activities and events in Horro (Homi village) and Ada'a (Qurqura Dembi village) <i>woredas</i>	10
Figure 3.	The proportion of farmers willing and able to buy improved breed at different price levels in Horro and Ada'a <i>woredas</i>	12
Figure 4.	Seasonal availability of feeds for chickens in Horro (Homi and Dembel Gobeya villages) and Ada'a (Qurqura Dembi and Odee villages) <i>woreda</i> , according to farmers' low-to-high scoring on a scale of 0 to 12	14
Figure 5.	Farmers' scoring of seasonal severity of New Castle Disease (0 is low, 5 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a <i>woredas</i> (Qurqura and Odee villages)	16
Figure 6.	Farmers' scoring of seasonal severity of Infectious coryza and Infectious bronchitis (0 is low, 3 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a <i>woredas</i> (Qurqura and Odee villages)	16
Figure 7.	Farmers' scoring of seasonal severity of external parasite occurrences bronchitis (0 is low, 3 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a <i>woredas</i> (Qurqura and Odee villages)	16
Figure 8.	Farmers' scoring of seasonal severity of Avian cholera bronchitis (0 is low, 4 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a <i>woredas</i> (Qurqura and Odee villages)	17
Figure 9.	Household division of labour in chicken husbandry and marketing activities in Horro <i>woreda</i>	18
Figure 10.	Marketing channels for chickens and eggs for Homi village	23
Figure 11.	Marketing channels for chickens and eggs for Qurqura Dembi village	24

Executive summary

This paper describes the characteristics of village chicken production and marketing, analyses its contributions to farmers' livelihoods, and presents options for improving the traditional village breeding practices in Horro and Ada'a *woredas* in the central and western highlands of Ethiopia. The paper is based on a survey in four villages in Horro *woreda* (Homi and Dembel Gobeya villages) and Ada'a *woreda* (Qurqura Dembi and Odee villages). A participatory rural appraisal (PRA) technique was used for the survey. The PRA tools used include focus group discussion, wealth-status analysis, willingness-to-pay analysis, trend analysis, gender analysis, key-informant interviews and field observations. Options for improved breeding practices were derived from a desk study.

Local chicken production in both *woredas* is predominantly based on scavenging, a low input–output production system. There is virtually no investment for housing, feeding and other husbandry practices in both *woredas*. In Horro *woreda*, the local chicken breed is the dominant breed type, with only 2.8 to 7.2% of the chickens reared being crossbreds. On the contrary, in Ada'a *woreda*, exotic chicken breeds account for 30.2 to 59.8% of the chickens reared. A higher level of management is practiced by farmers rearing exotic chickens. Analysis of gender roles in both *woredas* showed that both the husband and wife as well as the children play important, but different, roles and assume different responsibilities in poultry production and marketing. Women (wives and girls) play the major role, have more responsibilities than do men, and are involved in house cleaning, feeding, watering, and selling of chickens and eggs.

Husbands and boys are mainly responsible for shelter construction and procurement of breeding chickens. There are minor variations in gender roles between *woredas*. For instance, in Ada'a *woreda* the husband decides on sale and purchase of chickens, while wives are responsible for sale of eggs and may participate in chicken marketing under the supervision of the husband. Analysis of daily routines indicate that women work longer hours and both men and women spend more time at work during the wet season.

The market channels for both *woredas* are similar, although farmers in Ada'a *woreda* have a better access to markets. The major actors involved in chicken marketing chain are rural and urban chicken producers, primary collectors, secondary collectors or traders, retailers, shops, hotels and restaurants, and consumers. Farmers may sell their chickens and eggs directly to rural and urban consumers, rural chicken collectors and retailers, hotels and restaurants, and rural and urban chicken producers.

Analysis of farmers' livelihoods showed that crop production, livestock production, petty trade, and casual labour are the primary livelihood options, in that order. Among the livestock enterprises, cattle production, sheep and goat production, poultry production, fattening and dairy production were the major sources of cash income in order of importance. Village chicken production was found to be the source of additional income for covering household expenses, school fees and other agricultural expenses. The result of the wealth-ranking exercise in the two villages of Horro *woreda* shows that the majority of the households are poor and destitute. In Ada'a *woreda*, the majority of the households (55%) in Qurqura Dembi village are poor, whereas in Odee village 40% of the households are classified as having medium wealth status. Involvement of the households in different livelihood options greatly depends on their wealth status. The wealthier and the middle-income group are involved primarily in crop and livestock production, due to their advantage over productive resources such

as land, capital and labour. On the other hand, the lower-income group tends to be involved in petty trade and casual labour. In addition, the lower-income group are involved in local chicken production since the system needs less investment; whereas the wealthier and the middle-income group are involved in exotic chicken production due to their advantage over resources, especially finances needed for investment.

The village breeding practices are traditional with very little attempt to improve the genetic value of indigenous genetic resources. Some farmers give consideration to genetics when establishing breeding flocks; for instance, some buy foundation stocks only from the same village to control spread of disease, acquire breeding stock from known pedigree, and generate replacement chickens from hatching eggs produced on the farm. Besides health and age, farmers' preferred traits for breeding cocks are, in rank order, comb type, colour and body size in Horro *woreda*, and comb type, body size and colour in Ada'a *woreda*. The primary criterion for hen selection is ability to hatch eggs in Horro and egg production in Ada'a. The breeding flocks in the study area are commonly small with the total flock size per household in the range from five to 15 chickens.

Small flock size is a hindrance to efficient breeding. The majority of farmers in both *woredas* prefer rearing crossbred chickens because of their superior adaptation to the local environment and productivity. The pure local breed, which is considered less productive but well adapted, is ranked the second-most preferred breed. The exotic breeds are least preferred although some villages prefer them to the pure local breed. Farmers' willingness-to-pay analyses were undertaken in both *woredas* in order to determine farmers' real demands for improved chicken breeds. The analysis showed that farmers have a high demand for exotic breeds. In Horro and Ada'a *woredas*, 25 to 60% and 45 to 55% of the villagers, respectively, showed a high level of interest for the improved exotic breeds, although the maximum prices they are willing to pay for an exotic chicken seem to be low, varying from Birr 5 to 15 in both *woredas*.

The major constraints for profitable chicken production identified by farmers include: poor services to village chicken production including technical advices; trainings; input supplies and in particular breeding stocks; and health services. Farmers express particular dissatisfaction in the health services, as their chickens are not vaccinated before or after disease outbreaks. Diseases and external parasites are the major problems identified by farmers in both *woredas*. The major diseases include New Castle disease (locally known as fengil), avian cholera, infectious bronchitis, red fowl mite (*qinqin/susii*), fowl pox (*fentata*), sticktight fleas (*yeaynquncha*). Farmers reported that New Castle disease is the most prevalent and economically important disease.

Characterization of the chicken production system leads to the following recommendations for improvement of chicken production in low-input systems:

- introduction of market-oriented production practices to enhance the contribution of chicken production to farmers' livelihoods;
- introduction of an efficient system for the provision of inputs;
- access to more profitable markets;
- training of farmers to enhance their market orientation.

Interventions need to target women who are the main actors in village chicken production. Major technical interventions would be control of diseases, particularly NCD, improved feeding, housing and breeding stock.

Improvement of chicken breeding needs to focus on the village system as this is the major source of chicken supply in Ethiopia. Large-scale commercial chicken production is currently insignificant, accounting for only 1% of the national production. Moreover, the village system encourages many people to improve their livelihoods. The strategies for the use of exotic breeds need to focus on the rational utilization of resources, since exotic chickens need to be limited to commercial farms and villages with access to inputs such as compound feeds and markets. By default, such situations are located near urban areas (e.g. the villages in Ada'a *woreda* in this study). Furthermore, the exotic chicken breeding system has been unsustainable, requiring continual importation of

germplasm, until recently when grand-parental stocks were imported. Nevertheless, a more sustainable option for utilization of the exotic resources is formation of a self-replacing straight-breeding synthetic population based on the imported exotic genetic resources.

For regions with poorer access to inputs and product markets, improvement of the genetic value of the indigenous chicken ecotypes through recurrent selection is more relevant. Breeding in indigenous populations could facilitate conservation of the adapted indigenous genetic resources, which are at risk from the indiscriminate dissemination of exotic breeds into villages. Improvement of indigenous chicken ecotypes through recurrent selection has been absent until recently when a nucleus-breeding program for the Horro breed was set up at Debre Zeit Research Center. Breeding schemes that are well suited to smallholder village conditions are usually difficult to design.

One approach could be to disseminate improved cocks from the nucleus flock at Debre Zeit to villagers organized in a cooperative breeding program. Improved chickens in the nucleus flock could also be used alternatively in crossbreeding, where they are crossed with exotic sires to produce crossbred hens and cocks, which are then distributed to villages.

Another option is village-based cooperative breeding program, which does not involve nucleus flocks. Implementation of breeding at the village level requires cooperation among villagers because of small individual flock sizes.

Low-input breeding schemes suited to village conditions vary from simple exchange of breeding roosters among cooperating villagers to more complex schemes recording pedigree and performance. These schemes need to be evaluated for their feasibility and efficiency to bring about genetic improvement in local breeds.

Introduction

Chicken production and challenges in Ethiopia

The total chicken population in Ethiopia is estimated at 49.3 million (CSA 2011), with 99% of the population consisting of indigenous breeds reared under village production systems, and the remaining 1% being exotic breeds reared under intensive management (Tadelle and Ogle 2001). Over several decades, the performance of the poultry sector has been poor. The backyard small-scale chicken production is characterized by low input–output scavenging, with minimal investment in housing, feeding and health care, and hence weak biosecurity, high offtake rates and high mortality rates. The system is only partially market-oriented, production being targeted for both household consumption and the open market (Gezahegn and Karl 2010). The system generally does not involve investments beyond the cost of the foundation stock (USAID 2010).

There has been an extensive development effort in the poultry sector, mainly in the importation, multiplication and dissemination of improved exotic chicken breeds. Nonetheless, maintenance and multiplication of the exotic resources have proved challenging and continual importation of the exotic resources was required. While there have been emerging commercial poultry farms producing exotic chickens, the impact of the exotic birds on village chicken productivity and farmers' livelihoods is not commensurate with efforts. The exotic or crossbred chickens distributed to villages are rarely maintained as breeding flocks, but are sold to meet immediate cash needs. There is little follow-up and no clear breeding scheme to establish a sustainable breeding flock in villages. The dissemination strategy could also endanger the survival of the indigenous breeds. Recurrent selection of indigenous stocks have started only recently and, as yet, no such breeding programs exist within the village chicken populations. As a result, while elsewhere chicken meat is one of the cheapest and available animal protein source, it remains largely a festival food in Ethiopia.

EIAR–ILRI–WUR chicken project

In response to the aforementioned challenges, a project entitled 'Improving village chicken production to elevate livelihoods of poor people in Ethiopia' was initiated in 2010. The project is a joint undertaking of the Ethiopian Institute of Agricultural Research, the International Livestock Research Institute and Wageningen University. The purpose of the project is to enhance the production and productivity of the family poultry production system through improving their genetic potential and economic competitiveness. The project objectives include: (1) characterization and documentation of village chicken production practices with the aim of identifying intervention options; (2) establishing a selection program in a nucleus flock of the Horro chicken ecotype, crossbreeding of selected Horro chicken with exotic breeds; and (3) dissemination of improved genotypes to villages. This paper addresses the first objective of the project.

Objectives

The objective of this study was to generate baseline information on village chicken production in the central and western highlands of Ethiopia and identify intervention options. The study aimed specifically to characterize village chicken production, including management practices and marketing channels, livelihood options and contributions of chicken production to livelihoods, and opportunities and constraints. The study focuses on characterization of village chicken breeding practices and identifying options for further breeding.

Methodology

Study area

A survey of village chicken production was conducted in Homi and Dembel Gobeya villages in Horro *woreda*, East Wollega zone and Qurqura Dembi and Ode villages in Ada'a *woreda*, East Shoa zone of Oromia regional state. The villages were selected based on variation in opportunities and problems of chicken production. Homi and Dembel Gobeya villages consist, respectively, of 298 and 163 households and are located at 17 and 24 km from the *woreda* capital Shambu. Qurqura Dembi and Ode villages consist, respectively, of 621 and 763 households and are located at 3 and 10 km from the *woreda* capital Bishoftu.

Study approach and tools

A participatory rural appraisal (PRA) approach was used to gather information on characteristics of village chicken production and farmers' livelihood options. Focus group discussions (FGDs) were the primary tools used in the survey. Ten to 15 local people per village were selected for the FGDs. The participants were selected in consultation with local leaders and other important stakeholders, and were comprised of men, women and youngsters. The FGDs were conducted with men, women and mixed gender groups, and were

facilitated by a multidisciplinary team consisting of animal breeder, agro-economist, animal scientist, veterinarian, rural development specialist, village extension agent and animal health technician. Each FGD took 2–3 hours to complete. Information gathered through FGDs was crosschecked and verified through a triangulation approach that involved conducting individual interviews with key informants including development agents, elders and religious leaders. The purpose was to overcome any biases arising from the participants in the FGDs.

A number of PRA tools were used during the FGDs. Wealth and wellbeing ranking using proportional piling method was used to categorize community members into different wealth groups. Farmers' preferences for important traits were elicited through pairwise ranking, matrix ranking and scoring. Important poultry diseases and parasites were identified and prioritized through pairwise ranking. Willingness-to-pay analyses was conducted to elicit farmers' relative preference for different chicken breeds. Trend analyses were conducted and seasonal calendars constructed to capture seasonality of feed availability, disease incidence, and management activities. Daily-routine activities, workloads and the roles and responsibilities of the different gender groups were described using gender analysis and daily calendars. Problems and possible solutions were identified and prioritized using preference ranking and scoring.

In addition to the FGDs, field visits, secondary data analyses, and desk research were conducted. During the field visits, the team critically observed and photographed the types of breeds, poultry houses and the surroundings. Desk research helped identify options for improved village-chicken breeding.

Chicken production and livelihoods

Chicken production in Horro and Ada'a *woredas*

Production system

The chicken production system in Horro and Ada'a *woredas* is predominantly small-scale backyard village-chicken production. Based on the breeds of chickens kept and the management inputs provided, two subsystems can be recognized, namely local chicken and exotic chicken production, although most households keep mixed breeds. The local chicken production system is a low input–output system, whereas the exotic chicken production system involves larger inputs in feeding and housing. Chicken production is predominantly based on the local breed in Horro *woreda*, with only 2.8% and 7.2% of the chickens reared in Homi and Dembel Gobeya villages, respectively, being crossbreds. In contrast, in Ada'a *woreda* 59.8% and 30.2% of the chickens in Qurqura Dembi and Odee villages, respectively, are exotic chickens. The total chicken populations in Horro and Ada'a *woredas* are estimated to be 1750 (1055 in Homi and 695 in Dembel Gobeya village) and 4140 (1673 in Qurqura Dembi and 2467 in Odee village), respectively (source: *Woreda* Agricultural Development Offices). Hens constitute the majority of birds. For example in Odee village, 472 of the local and 1012 of the exotic chickens are hens.

Productivity

Productivity of the local chicken breed was reported to be low. The number of eggs produced per hen depends on the chicken breed, feeding and other husbandry practices. Farmers' estimates of egg production of the local chickens in Horro and Ada'a *woredas* are presented in Table 1. Productivity of a chicken population and flock buildup is determined by the proportion of the eggs produced that are allotted for hatching. Farmers in both *woredas* reported that most of the eggs produced are sold to meet cash requirements, rather than maintained for hatching and flock buildup. For instance, half (Homi village) or most (Dembel Gobeya village) of the eggs produced are sold, and the remaining are used for household consumption and hatching chicks. Hatchability is one of the major factors that determine flock productivity in a backyard chicken production system. Eggs are set for hatching during the dry season when feed is available and disease incidence is low, although some farmers relate the hatching period with markets. For instance, farmers in Odee village (Ada'a *woreda*) prefer to set eggs for hatching in September to produce chickens for the Easter market in April. The number of eggs set per hen vary from 10 to 20.

Table 1. Egg production characteristics of chickens in Horro (Homi and Dembel Gobeya villages) and Ada'a *woreda* (Qurqura Dembi and Odee villages)

	Horro		Ada'a	
	Homi	Dembel Gobeya	Qurqura Dembi	Odee
Peak laying season	Dec.–March	Nov.–January	Nov.–December	Oct.–January
Eggs/hen/clutch	12–25	12–18	15–30	15
Clutch length (days)	15–30	24–36	21–35	
No. of clutches per year	3–5	4–5	3–5	3–4
Total eggs per year	45–75	48–90	45–150	45–60

Hatchability, according to farmers' estimates, varies from 78.1% in Horro *woreda* to 90.0% in Ada'a *woreda*. Farmers estimate that 50 to 88.8% of the chicks hatched will survive to sexual maturity. They recognize that using improved technologies, such as a hay box, helps to reduce chick mortality. The other factor that affects productivity of the local chickens is the length of the broody period, which varies from one to three months. Traditional techniques to break broodiness include hanging the broody bird upside down from trees, separating and confining, and sending away the broody hens to nearby neighbours for about one week.

Contributions to livelihoods

Major sources of livelihoods

Major sources of livelihoods for farmers in Horro and Ada'a *woredas* are presented in Table 2. Farmers in both Horro and Ada'a *woredas* reflected a number of livelihood options, which were found to be similar in both *woredas*. The options in descending order of importance include crop production, livestock production, non-farm activities and off-farm activities. The non-farm activities according to the farmers definition includes handcrafting, remittance, petty trade, and horse and cart; whereas, the off-farm activities are daily labour, land renting, and sale of fire wood. Despite the competition among the options over resources, farmers have attempted to integrate options and diversify their sources of income from at least two or more options.

Crops grown are maize, wheat, teff, field pea, faba bean and noug in Horro *woreda*, and teff, wheat, barley, field pea, faba bean, lentil, haricot bean, and chickpea in Ada'a *woreda*. The livestock species kept in Horro *woreda* in order of their importance include cattle, shoa and poultry. Fish and honeybee are used as additional sources of income for some households. In Ada'a *woreda*, the relative importance of livestock species in ranking order of importance are cattle production, fattening, sheep and poultry production in Qurqura Dembi village, and cattle, dairy cow, fattening, shoa, and poultry production in Odee village.

Chickens, particularly for egg production, as well as cows' milk are important sources of protein. Livestock ownership is also an important indicator of household wealth status. The farmers perceive chicken production as a vital source of income to cover household expenses such as purchase of food, agricultural inputs, child schooling and clothing. Chicken rearing is also a preferred livelihood option because it is less labour-, land- and capital-intensive under the traditional production practice, although it is more vulnerable to risks than other activities.

Table 2. Livelihood options and success factors in Horro (Homi and Dembel Gobeya villages) and Ada'a (Qurqura Dembi and Odee villages) *woredas*

Livelihood activities	Success factors	Livelihood activities	Success factors
Horro (Homi village)		Horro (Dembel Gobeya village)	
1. Crop production Cereals (wheat, maize, teff, Barley) Pulses (field pea, Faba bean) Oil crop (Noug)	Diverse and suitable agro-ecology	Crop production Cereals (Wheat, Maize, Teff, Barley) Pulses (Field pea, Faba bean) Oil crop (Noug)	Diverse and suitable agro-ecology
2. Livestock production Cattle Shoat Poultry Fishing	Suitable area for poultry production Good health service Lake and river (Finchweha and Amertiy)	Livestock production Cattle Shoat Poultry Fishing	Suitable area for poultry production Good health service Lake and river (Finchweha and Amertiy)
3. Non-farm income—Petty trade		Off-farm income—casual labour	Fincha sugar factory
4. Off-farm income—Casual labour	Fincha sugar factory		
Ada'a (Qurqura Dembi)		Ada'a (Odee village)	
1. Crop production Cereals (Teff, Wheat, Barley) Pulses (Field pea, Lentil, Faba bean, Haricot bean)	Diverse and suitable agro-ecology Access to main road	Crop production Cereals (teff, wheat, barley) Pulses (chickpea, field pea, faba bean, lentil)	Diverse and suitable agro-ecology Soil fertility Water availability Access to market and transport Availability of GOs (research centres) and NGOs (JICA)
2. Livestock production Cattle Fattening Shoat, Poultry	More private enterprises working on poultry More demand for livestock products Suitable area for poultry production	Livestock production Cattle, Dairy cow, Fattening Shoat, Poultry	Suitable agro-ecology Suitable for forage development Good health service
3. Non-farm income Handcrafting, Remittance, Petty trade, Horse and cart	Proximity to urban market	Trade—Transportation service (horse and cart)	Near to urban centre
4. Off-farm income—Sales of fire wood, Renting land, casual labour (Agricultural and non-agricultural wage)	More option to work in industries	Off-farm income—casual labour	Factories

Chicken production, wealth status and livelihood activities

Farmers' perceptions on wealth and well-being

Wealth ranking of community members was conducted by participating farmers to relate chicken production and other livelihood activities to wealth status. Wealth ranking is a method whereby the participants identify and define the criteria of wealth and wellbeing and the socioeconomic classes in a particular community. Prior to the wealth-ranking exercise, a brainstorming exercise was conducted to elicit the farmers' perceptions on wealth and wellbeing. The exercise revealed that there is variation in the farmers' perceptions across villages and *woredas*. In Horro *woreda*, Homi village, a wealthy person was defined as one who owns resources, including large sums of cash exceeding the family needs, and who can support others, while 'wellbeing' was defined as the state of being well and free from any kind of risk and hazard. Farmers in Dembel Gobeya village were more specific and defined wealth as possessing a house in urban area, flour-grinding mills, a large area of land, and a large number of cattle, while wellbeing was defined as having healthy and normal life.

In Ada'a *woreda*, Qurqura Dembi village, wealth was defined as having productive assets for living, basic necessities for healthy life and ability to support others in the community, while wellbeing was defined as the state of being healthy, happy, leading good life and free from anxiety. In Odee village, wealthier people were defined as those who can earn surplus from their work, be considered as an example for others, cover their household expenses, fees for schools, and health expenses, and who own house and do not depend on nature (rain) for agricultural activities. Wellbeing was defined by the farmers as the state of being independent in every aspect of life.

Criteria and indicators of wealth status

The wealth status indicator criteria produced by farmers in Horro *woreda* were land holding, livestock holding, agricultural produce (quintal of grain produced per year), and the type of house and number of rooms (the type of house is determined by the building material such as iron sheet, cement, stone, mud and grass). The criteria in Ada'a *woreda* were land holding, livestock holding, agricultural produce, type of house (type of roof, walls and number of rooms), and ability to cover school fees. There was some variation among villages/*woredas* in the wealth indicator variables derived from the wealth criteria. Chicken holding is considered an indicator variable in Ada'a *woreda* and Homi village, but not in Dembel Gobeya village in Horro *woreda*.

Four main socioeconomic classes were defined based on the wealth criteria and indicators defined earlier. The four classes were defined by farmers as: (1) rich people having surplus, more money than most others, more than one house either in urban or rural areas, able to rent farm land for others; (2) middle income having enough for living, enough for them and their family, able to send their children to school, and cover other expenses; (3) poor people who produce less food than their requirement, unable to send their children to school; and finally (4) the destitute who are extremely poor and have nothing for their life. The criteria and values of the wealth indicator variables for the four classes are presented in Tables 3 and 4.

Table 3. Values of wealth indicators in Horro *woreda*

Criteria	Rich (Eressaa)	Middle income (Giduugallessa)	Poor (Eyeessaa)	Destitute (Eyeessaaeyeessaa)
Homi village				
Land holding (ha.)	10	5	2–3	0.5
Livestock holding (No.)				
Cattle	50	30	20	2
Poultry	3	10	15	30
Annual agricultural produce (Qt.)	80	60	40	10
House type	Corrugated sheet iron roof, Brick block wall, five rooms	Corrugated sheet iron roof, mud and wood wall, three rooms	Corrugated sheet iron roof, mud and wooden wall, two rooms	Grass thatched roof and mud and wooden wall, one room
Dembel Gobeya village				
Land holding (ha.)	7	4	0.5	0
Livestock holding (No.)				
Cattle	50	20	2	0
Goat	60	5–6	2	0
Annual agricultural produce (Qt.)	105	40	20	0
House type	Corrugated sheet iron roof and brick wall	Corrugated sheet iron roof, mud and wooden wall	Corrugated sheet iron roof, mud and wooden wall	Grass thatched roof and mud and wooden wall

Table 4. Values of wealth indicators in Ada'a woreda

Criteria	Rich (Ditta)	Middle income (Giduugallessa)	Poor (Eyeessaa)	Destitute (Hommaa Hinqabnee)
Qurqura Dembi village				
Land holding (ha.)	2.5	1–2.25	0.25–0.75	No land possess
Livestock holding (No.)				
Cattle	15	9–14	1–8	No
Sheep	10	7–9	1–6	No
Poultry	4	4–5	6–15	10
Agricultural produce per year (Qt.)	30	11–29	8–10	No
House type	Corrugated iron sheet roof and mud and wood wall and six rooms	Corrugated iron sheet roof and mud and wood wall and three rooms	Corrugated iron sheet roof and mud and wood wall and two rooms	Grass roof and mud and wood wall and two rooms
Education (ability to cover school fees)	Able	Able	Unable	Unable
Odee village				
Land holding (ha.)	3 and above	2.5–1.75	Below 1.75	0
Livestock holding (No.)				
Ox	4	2	1	0
Goat	12	5–11	4	0
Poultry	3	5	9	10 and above
Agricultural produce per year (Qt.)	100	30	20	0

Wealth status and livelihood activities

In Horro woreda, 35% of the households are categorized as destitute or the poorest of the poor. Among the villagers in the study area, 15, 20, 30 and 35% of the households in Homi village and 20, 30, 35 and 15% of the households in Dembel Gobeya village were classified as rich/better off, middle income, poor, and destitute, respectively. In Ada'a woreda, Qurqura Dembi village, the majority of the households (55%) are estimated to be poor, whereas 10, 15, and 20% of the households are rich, middle income and the destitute, respectively. In Odee village, 15, 40, 25 and 20% of the households are evaluated to be rich, middle income, poor, and destitute, respectively (Table 5).

Table 5. Proportion of households belonging to different wealth categories.

	Horro woreda		Ada'a woreda	
	Homi	Dembel Gobeya	Qurqura Dembi	Odee
Rich/better off	15	20	10	15
Middle income	20	30	15	40
Poor	30	35	55	25
Destitute	35	15	20	20

The livelihood activities of farmers greatly depend on their wealth status. The primary and secondary sources of income for the wealthy and middle income are crop production and livestock production, respectively, because of their advantages in terms of resources. Due to shortage of farmland, the poor and the destitute have to engage in non-farm and off-farm activities such as petty trade, casual labour, and fishing. The poor and the destitute are also engaged in poultry production since it does not require a large investment.

In Ada'a *woreda*, there is similarity between the two villages in the involvements of each socio-economic group in household livelihood activities. According to the PRA group in Qurqura Dembi village, the poor and destitute households are more likely to be involved in off-farm and non-farm activities, whereas the wealthier and wealthiest households are more likely engaged in crop production and livestock production, with the exception of chicken production. Local chickens are more likely to be kept by the poor and the destitute, but exotic chickens are maintained by the wealthier group because of the large initial investment for founding stock and high cost of husbandry (housing, feeding, and disease and parasite control). The patterns of participation in livelihood activities are similar across the study area (Figure 1).

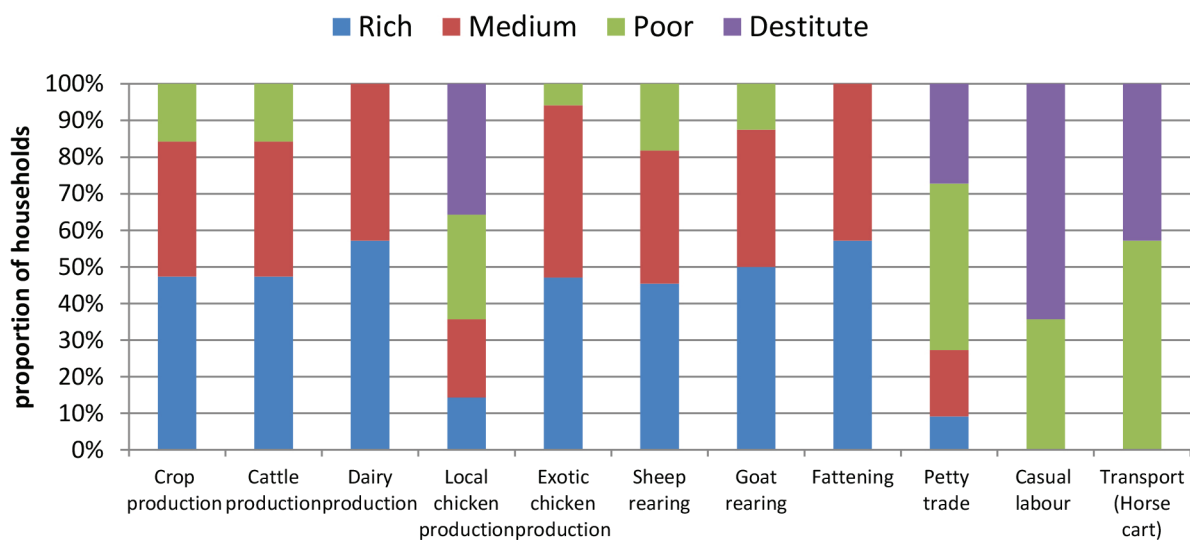


Figure 1. Proportion of farmers in each wealth category engaging in different livelihood activities

Breeding, management and marketing practices

Village chicken breeding

Flock establishment

In Horro *woreda*, foundation stocks are bought from markets or directly from contacts within the neighbourhood. The foundation flock would typically consist of one cock and five to six pullets (Homi village) or one to two pullets and one cock (Dembel Gobeya village). Farmers may also rely on cocks in the neighbourhood. In Ada'a *woreda*, the sources of foundation stock are contacts in the same village (Qurqura Dembi) or in the same or different villages, to control diseases and give preference to breeding stock from sources with known performance. The flock is established with a single pullet and cock as in Qurqura Dembi village or with five pullets as in Odee village. The average size of the breeding flock ranges from four to 15 in Qurqura Dembi village and from five to 15 in Odee village.

Seasonal calendars: Farmers have well-defined seasonal calendars for important events and activities (Figure 2). Flocks are established during the dry season, due to the risk of disease outbreaks during the wet season. Flocks are built up and sold/lost chickens are replaced through hatching eggs produced on the farm. Reproduction is high during the dry season due to low incidence of disease and good feed availability.

Horro - Activity/event	Bira			Bona			Afrasa			Gana		
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug
Flock establishment	■			■	■			■	■	■		
High bird population	■	■	■	■	■	■	■	■	■			
Peak egg laying				■	■	■	■	■	■			
Setting eggs for hatching	■	■	■	■	■	■	■	■	■			
Supplementary feeding	■		■	■	■	■	■	■	■	■	■	■
Ada'a - Activity/event	Bira			Bona						Gana		
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug
Flock establishment	■			■	■			■				
High bird population			■	■	■	■	■	■	■			
Peak egg laying				■	■							
Setting eggs for hatching	■	■	■	■	■	■	■	■	■			
Supplementary feeding	■	■	■	■	■	■	■	■	■	■	■	■

Figure 2. Seasonal calendar for activities and events in Horro (Homi village) and Ada'a (Qurqura Dembi village) *woredas*

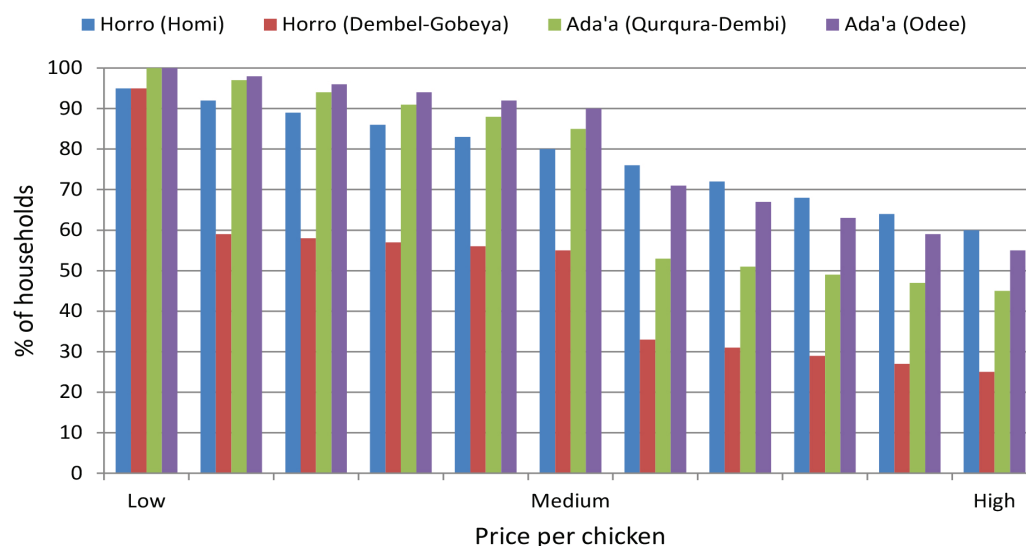
Breed preferences

Exotic breeds have been introduced to the Horro *woreda* villages through the government extension services, although most households currently keep only local ecotypes and crossbreds, the exotic stocks being lost due to diseases and adaptation problems. Currently, there is no institution providing exotic stocks and technical support. In Ada'a *woreda*, exotic breeds at Birr 70–85 and compound feeds are supplied by Alema Poultry Farm and Genesis Farm Ethiopia. The chicken suppliers are not providing either technical or any other support to exotic poultry production. Farmers' preferences for the local, exotic and crossbred chickens are similar across *woredas* and villages, except that farmers in Odee village in Ada'a *woreda* showed equal preferences for exotic and local breeds, after crossbreds. Details of farmers' rankings are depicted in Table 6 taking Homi village as an example.

Table 6. Farmers' direct matrix ranking of local, exotic and crossbred chicken in Homi village, Horro *woreda*, from 1 (strong) to 3 (weak)

Criteria	Local breed	Exotic breed	Crossbreed
Egg size	3	1	2
Egg numbers	3	1	2
Egg and meat test	1	3	2
High price in the market	3	1	2
Growth rate	2	1	1
Less broody nature	2	1	1
Less costly	1	2	1
Body size	3	1	2
Resistance to disease	1	3	2
Scavenging	1	3	2
Escaping from predators	1	3	2
Adaptability	1	3	2
Total scores	22	23	21
Overall rank	2nd	3rd	1st

Willingness-to-pay analysis: Farmers' willingness-to-pay analyses were undertaken in both *woredas* and villages, in order to determine their real purchase preferences for improved chicken breeds. The analysis showed that farmers have a strong preference for exotic breeds. In Horro *woreda*, 60, 20, 15 and 5% of the villagers in Homi village and 25, 55, 15, and 5% in Dembel Gobeya village, respectively, showed strong, medium, low and no interest for the improved exotic breeds. The willingness-to-pay analysis was based on low, medium and high purchase prices for improved chickens, which were set at 5, 10 and 15 Birr, respectively. Figure 3 shows the proportion of farmers willing and able to buy improved chickens at prices ranging between Birr 5 and 15.



Note: Low, medium and high prices are 5, 10, and 15 Birr, respectively, for all villages, except for Qurqura Dembi village where low, medium and high prices were respectively 10, 15 and 20 Birr.

Figure 3. The proportion of farmers willing and able to buy improved breed at different price levels in Horro and Ada'a woredas.

In Ada'a woreda, farmers in both villages are willing and able to pay for the improved breeds, if these breeds are recognized as superior to local breeds in terms of productivity and other important traits (rose comb, red, white colour). The results of proportional piling in Qurqura Dembi village shows that 45% of the villagers have a strong purchase preference for the improved breed, and the rest, 40% and 15% have medium and low demand, respectively. In Odee village, 55% of the villagers show a strong demand for the improved breed, and the remaining 35% and 10% have medium and low levels of demand, respectively. Figure 3 shows the proportion of farmers willing and able to buy improved chicken breeds between Birr 10 and 20 in Qurqura Dembi village and between Birr 5 and 15 in Odee village.

Trait preferences

The farmers in both Horro and Ada'a woredas practice selection of breeding stocks when establishing flocks. When purchasing chickens for breeding or consumption, they consider the health status and age of the birds, as well as other appearance traits influencing the market value and body weight. The villagers in both sampled villages consider similar traits/characteristics for breeding. Farmers' preference rankings of traits for breeding parents are presented in Table 7. Characteristics considered for consumption include healthiness, age, sex, comb type (rose comb), colour and body size, with minor variation across villages. Health status is the top-ranked trait for all farmers. For Homi villagers, health, age and comb type are the top criteria in ranked order, whereas for Dembel Gobeya villagers, sex and for Ada'a farmers sex and age are equally important as comb type. According to farmers' opinion, rose-combed cocks taste better than single-combed ones and lightweight hens are preferred for breeding.

A variety of plumage colours was observed. In Horro, red (key), white (nech), gebisima, black (tikur), jigra, kokima, and libetikur are the main plumage colours of chickens seen. Red (key) white (nech), black (tikur), gebisima, zagolima (mix of red, white and black) and qoqima are the predominant plumage colours of local chickens in Ada'a woreda. Farmers' preferences for plumage colour are shown in Table 8. The reasons behind farmers' preference for plumage colour are market value, cultural purpose and the farmers' belief that some colours are not easily recognized by predators.

Table 7. Farmers' ranked preferences (1 is highest) for breeding chicken traits in Horro and Ada'a woredas

Traits	Horro woreda		Ada'a woreda	
	Score	Rank	Score	Rank
Breeding cocks				
Body size	0	5	1	4
Colour	1	4	0	5
Comb type	2	3	2	3
Illness	4	1	4	1
Age	3	2	3	2
Breeding hens				
Body size	0	6	1	5
Colour	1	5	0	6
Ability to hatch	3	3	2	4
Egg production	2	4	3	3
Illness	5	1	5	1
Age	4	2	4	2

Table 8. Farmers' preference ranking of plumage colours (1 is highest) in Horro and Ada'a woredas, by village

Plumage color	Horro woreda		Ada'a woreda	
	Homi	Dembel Gobeya	Qurqura Dembi	Odee
Nech	5	6	2	2
Tikur	6	5	5	6
Key	1	1	1	1
Gebshima	2	2	3	3
Libetikur	3			
Kokima	4	4		5
Jigra		3		
Zagolima			4	4

Management practices

Housing

The purpose of housing chickens is to protect them from predators, theft and bad weather. Typically, there is little or no cash investment in housing, and the level of housing provided varies among farmers. In Horro woreda, Homi village, housing included separate overnight chicken houses constructed from bamboo, wood, mud and iron sheet, and a hay-box brooder to protect chicks up to two months of age from predators. Perches and sometimes shades were built inside the chickens' house. The house may be cleaned daily and sprayed with DDT. The waste is either used as fertilizer or burned. In Dembel Gobeya village, while some farmers keep their chickens on simple perches constructed from wood and wire adjacent to their house, others construct separate shades for the chickens and a hay box for the chicks. The house may be cleaned daily and the litter is used as fertilizer.

In Ada'a woreda, no separate house is provided for local chickens, but perches are constructed under the roof (Qurqura Dembi village) or attached to the main house (Odee village). For the exotic birds, separate houses constructed from mud, straw, wood and corrugated iron sheet are provided in both villages. The house may be cleaned daily or regularly and the litter used for livestock feed in Qurqura Dembi, or as compost fertilizer in Odee village.

Feeding and watering

The primary objective in feeding poultry is to secure the most economical gains in weight during growth and fattening, and the most economical production of eggs throughout the laying period (Jull 2008). The feed resource for rural chicken production in Ethiopia is scavenged, and consists of household waste, anything edible found in the immediate environment, and small amounts of grain supplements provided by the women (Tadelle and Ogle 1996). In Horro *woreda*, scavenging is the predominant feeding system. Since the major feed is grains produced on-farm, feed availability is high during the dry season and harvesting period from December to March in Homi village, and from November to January in Dembel Gobeya village (Figure 4). The chickens travel to scavenge for about 50 m and 25 m away from their own surroundings in Homi and Dembel Gobeya villages, respectively, during the dry season. During the wet season, scavenging is limited to around the homestead. During the rainy season, supplementary feed is given two to three times per day, depending on the availability of feed. The major supplementary feeds are wheat and maize grains, but also include kitchen wastes and bone meal. Injera fitfit (leftover household food) is provided for the chicks until they are fully able to scavenge.

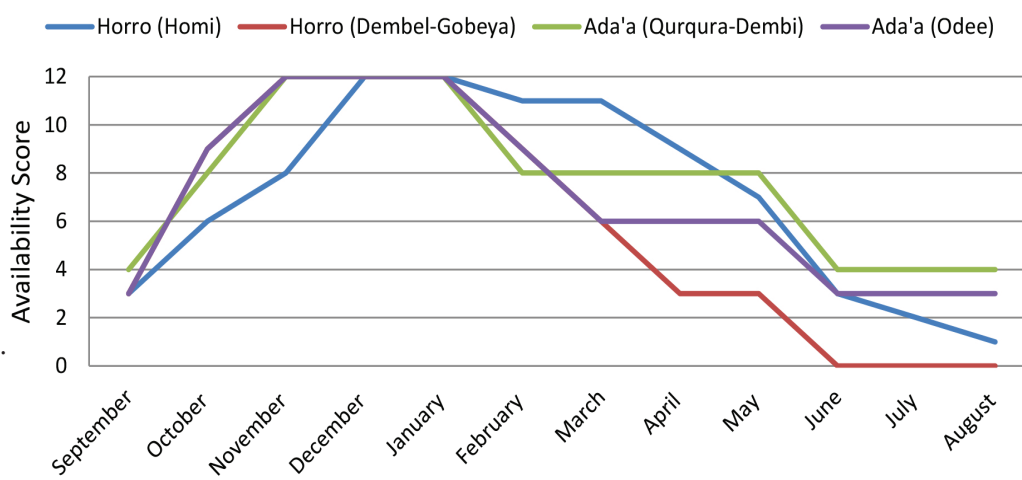


Figure 4. Seasonal availability of feeds for chickens in Horro (Homi and Dembel Gobeya villages) and Ada'a (Qurqura Dembi and Odee villages) *woreda*, according to farmers' low-to-high scoring on a scale of 0 to 12

Water is freely available during the wet season from rainwater collected on the ground. During the dry season, tap water is provided to chickens every day in Homi village. In Dembel Gobeya village, water is in short supply during the dry season and the only source is spring water. In Homi village, feed and water are provided on feeders that are cleaned every two to three days. In Dembel Gobeya village, only water is provided on feeders that are cleaned occasionally, while feed is provided on the ground.

In Ada'a *woreda*, scavenging is the primary source of feed with meager amounts of supplements. Seasonal availability of feeds is shown in Figure 4. While scavenging during the dry season, chickens may travel from 100 to 300 m from the homesteads in Qurqura Dembi village and 40 m in Odee village. The cocks may travel for more than 300 m in search of females. During the wet season, when feed is less available and when there are outbreaks of disease, chickens are maintained around the homesteads and provided with supplementary feed. Supplementary feed is provided twice per day in Qurqura Dembi village and thrice in Odee village. The amount of supplementary feed varies among farmers and some households may not feed their chickens at all. The supplementary feeds include wheat, barley and maize grain. Exotic breeds are managed in confinement and provided with commercial compound feed supplied by Alema Poultry Farm and Genesis Farm Ethiopia, which are located at Debre Zeit town. Communal tap water is the main source of water in Qurqura Dembi village. Chickens are watered twice per day, but sometimes may not be watered at all or the water may be shared by other animals like dogs and cats. Water and feed is provided on feeders that are rarely cleaned. In Odee village, a hand-dug well is the only source of water for the community. Water is provided on feeders that are cleaned once every three days. Water is freely available during the rainy season from rainwater collected on the ground. Exotic breeds are provided water daily with proper and regular cleaning.

Diseases, parasites and health management

The PRA field exercise identified virtually similar diseases and parasites in both villages in Horro *woreda*. New Castle disease (NCD), known locally as Fengil, and the external parasite Red Fowl mite known locally as Qinqin or susii were mentioned as the most economically important disease and parasite in the villages (Table 9). Chicks are reported to be more susceptible to NCD. Outbreaks of NCD are reported to occur every year (more than once in some years) in May or sometimes between September and November resulting in extensive mortality. Other causes of death include accidents and predators such as domestic cats (*adure*), rats (*hantuta*), and wild birds (*allatii*). Hay-box brooders made from locally available materials are used to protect the chickens from predators.

Table 9. Farmers rankings of diseases/parasites according to their economic importance (1 is highest) in Horro *woreda* (Dembel Gobeya village) and Ada'a *woreda* (Qurqura Dembi and Odee villages)

Diseases/parasites	Horro <i>woreda</i>		Ada'a <i>woreda</i>
	Dembel Gobeya	Qurqura Dembi	Odee
New Castle disease	1	1	1
Avian cholera	2	2	2
Infectious coryza	3		
External parasite	4		4
Fowl pox		3	
Fowl mite		4	
Infectious bronchitis			3

There are health clinics and drug vendors located at 5 to 10 km and 3 km away from Homi and Dembel Gobeya villages, respectively. While villagers get technical support on chicken production from agricultural extension workers, the health service is not yet operational to provide advisory service, training, or supplies. Villagers complained that as there is no timely veterinary service before or during disease outbreaks, due to the limited number of committed health professionals, lack of appropriate medicine, inadequate facilities and lack of vaccine, and have thus resorted to traditional health management practices. Traditional treatments against NCD and other diseases and parasites include a local alcoholic drink (*arekie*), garlic, supper dip (Flavoured Instant Powder Drink), antibiotics such as tetracycline and DDT, but treatments are not always effective.

In Ada'a *woreda*, farmers identified two diseases and two external parasites in Qurqura Dembi village (Table 9), and three diseases and two external parasites (chicken body lice/*qiniqin* and sticktight fleas/*yeaynquncha*) in Odee village (Table 6). Economically, NCD was found to be the most important disease and threat to village chicken production. Other causes of mortality include polluted river water, accidents and predators such as domestic cats (*adure*), shelemimat, and wild birds (*allatii*). Farmers in both villages indicated that they use traditional treatments against diseases and parasites. The treatments include oxytetracycline, leaves of Chinaberry (*Melia azadirach*) mixed with feed and water, and Vaseline® or butter on stick tight flea for local breeds, but farmers do get their exotic chickens vaccinated. Farmers indicated that traditional treatments against stick tight flea are effective.

According to farmers in the PRA discussion group, there are outbreaks of NCD every year and the outbreak typically occurs during rainy season between May and August. Seasonal occurrences of diseases and parasites are shown in Figures 5–7. Incidence of disease outbreaks is related to introduction of new chickens into the villages during holidays and other occasions.

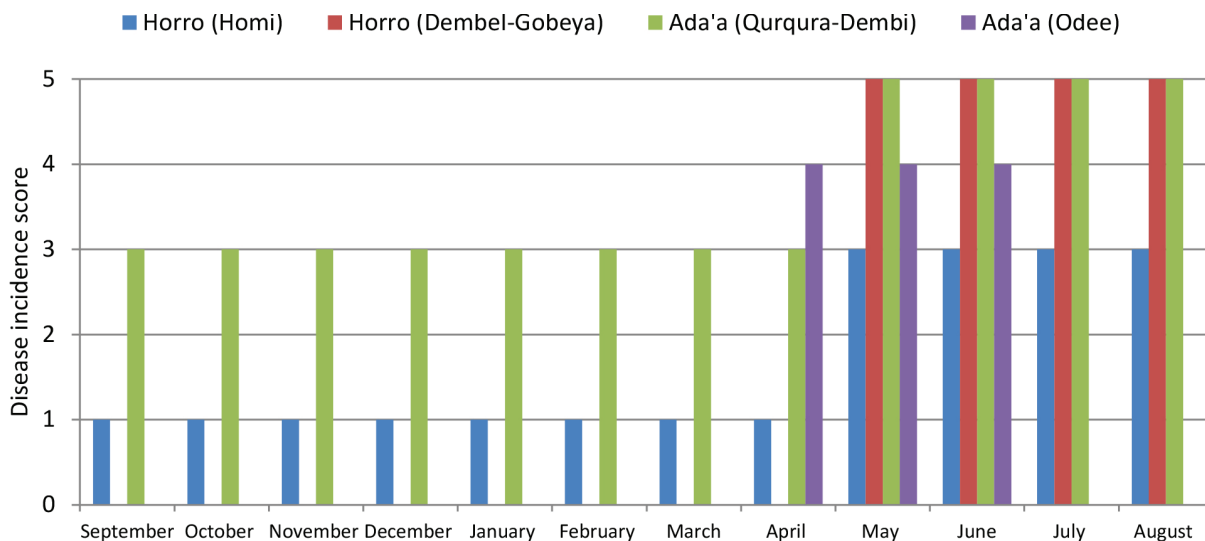


Figure 5. Farmers' scoring of seasonal severity of New Castle disease (0 is low, 5 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a *woredas* (Qurqura and Odee villages)

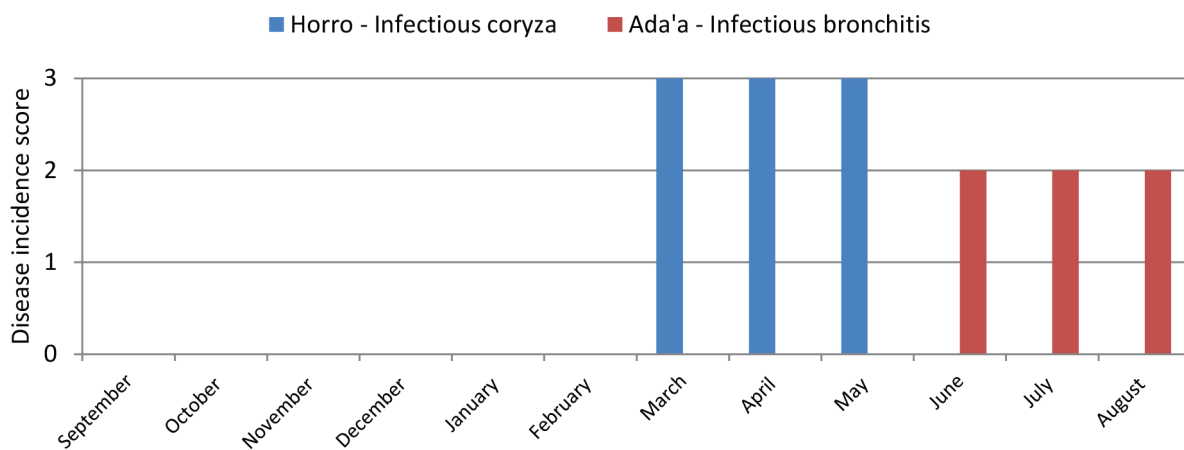


Figure 6. Farmers' scoring of seasonal severity of Infectious coryza and Infectious bronchitis (0 is low, 3 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a *woredas* (Qurqura and Odee villages)

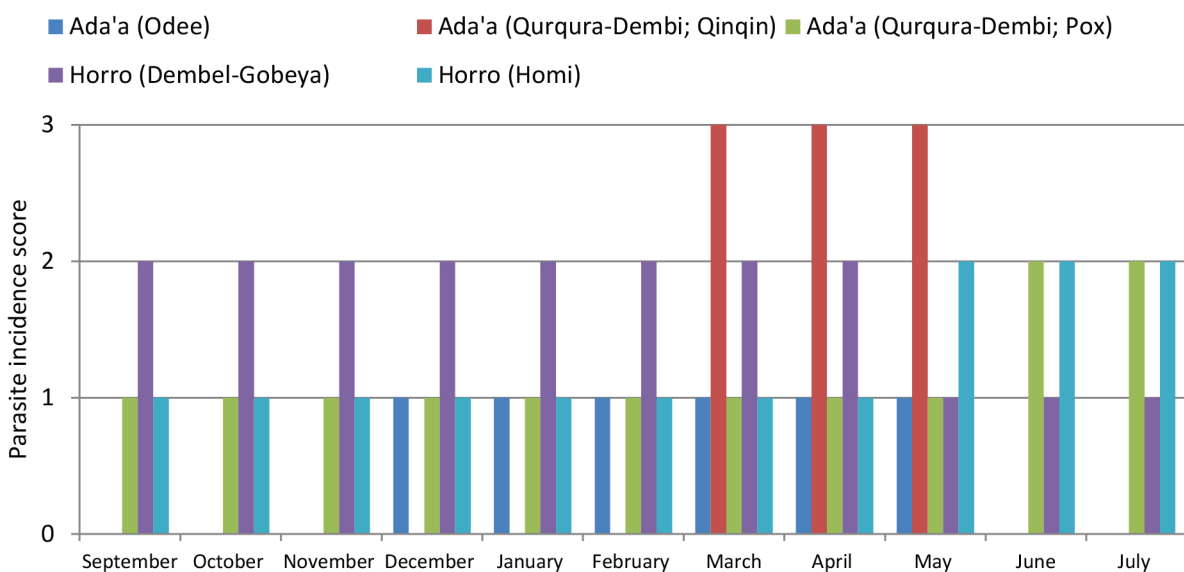


Figure 7. Farmers' scoring of seasonal severity of external parasite occurrences bronchitis (0 is low, 3 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a *woredas* (Qurqura and Odee villages)

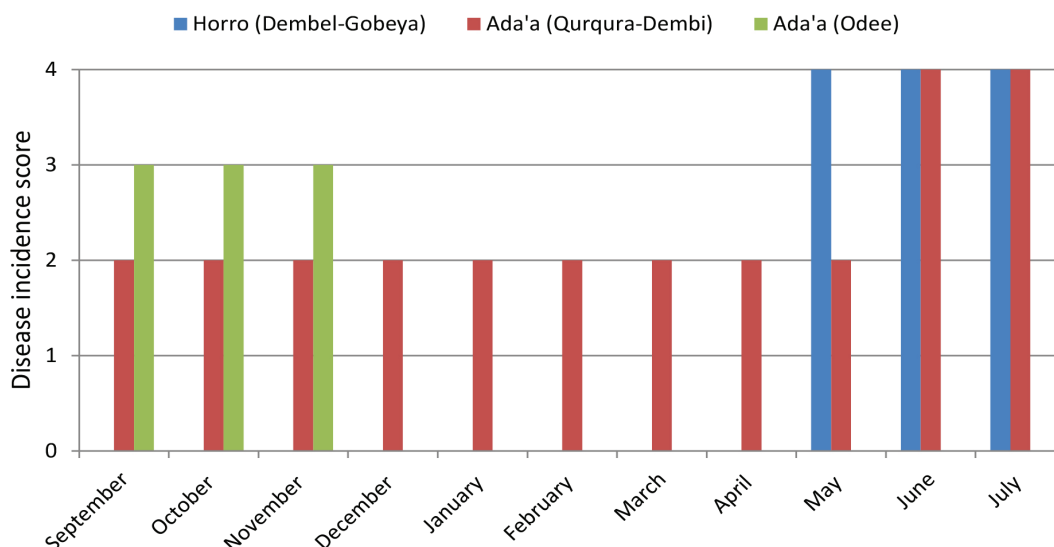


Figure 8. Farmers' scoring of seasonal severity of Avian cholera bronchitis (0 is low, 4 is high) in Horro (Homi and Dembel Gobeya villages) and Ada'a *woredas* (Qurqura and Odee villages)

Support services for chicken production

Services to livestock production are provided by governmental, non-governmental organizations and private service providers. The governmental services include provision of advice, training, supplies (mainly breeding stocks), and health services through the livestock extension service department and veterinary clinics at *woreda* and village levels.

In Horro *woreda*, the *woreda* and village offices of the Bureau of Agriculture provide commendable technical support on village chicken production. There are veterinary clinics and drug vendors located 5 to 10 km from Homi village, and 3 km from Dembel Gobeya village. There are no private service providers or NGOs working on village chicken production in the area. The health service is not yet operational to provide advisory services, training, or supply of stocks for chicken production. The health service is considered by farmers as poor, as their chickens are not vaccinated before or during disease outbreaks, despite the good efforts by the veterinary staff. This is mainly due to lack of required facilities for vaccination and inadequate supply of vaccines.

In Ada'a *woreda*, advisory services and training are provided by the extension workers in the area, although some farmers (Odee village) are not satisfied with the services. Although there are veterinary clinics in the studied villages, there is no full-fledged government clinic providing services for poultry. Vaccination and medicines for chickens are largely provided by private clinics, as in Qurqura Dembi village that charges Birr 0.50 and 1.00 per vaccine for chickens and cattle, respectively. In Odee village, farmers must travel about 7 km to access veterinary services for their birds, since the nearby government clinic does not provide services for chickens. Farmers rated the veterinary service as poor, which they ascribed to lack of facilities, vaccines and medicine, poor disease diagnosis and efficiency of drugs, high charges, and poor commitment of clinic staff. Farmers in both villages reported that local chickens have never been vaccinated.

In addition to the Bureau of Agriculture, government research institutes and the private sector also provide services to village chicken production in Ada'a *woreda*. In order of importance, the following provide exotic chicks and compound feed: Debre Zeit Agricultural Research, Alema Poultry Farm, Genesis Farm Ethiopia, and Ethio-Investment.

Gender and chicken production

Division of household labour

In some societies, men and women may have different roles in social and economic activities, access to and control over resources, decision-making authority and opportunities. In Horro and Ada'a *woredas*, men and women play different roles and take different responsibilities in poultry production and marketing. Farmers in both *woredas* confirmed that, while the husband, wife and children all play important roles in chicken production and marketing, women and girls have greater responsibilities compared to men, being involved in house cleaning, feeding, watering, and selling of birds and eggs. Men and boys are mainly responsible for shelter construction and procurement of breeding chickens. There are minor variations in gender roles between *woredas*. For instance, in Ada'a *woreda* the husband decides on the sale and purchase of chickens for consumption and reproduction, while wives are responsible for sale of eggs and may participate in marketing activities with supervision of the husband. Degree of participation in or contributions to chicken production and marketing activities is depicted in Figure 9, taking Odee village in Horro *woreda* as an example.

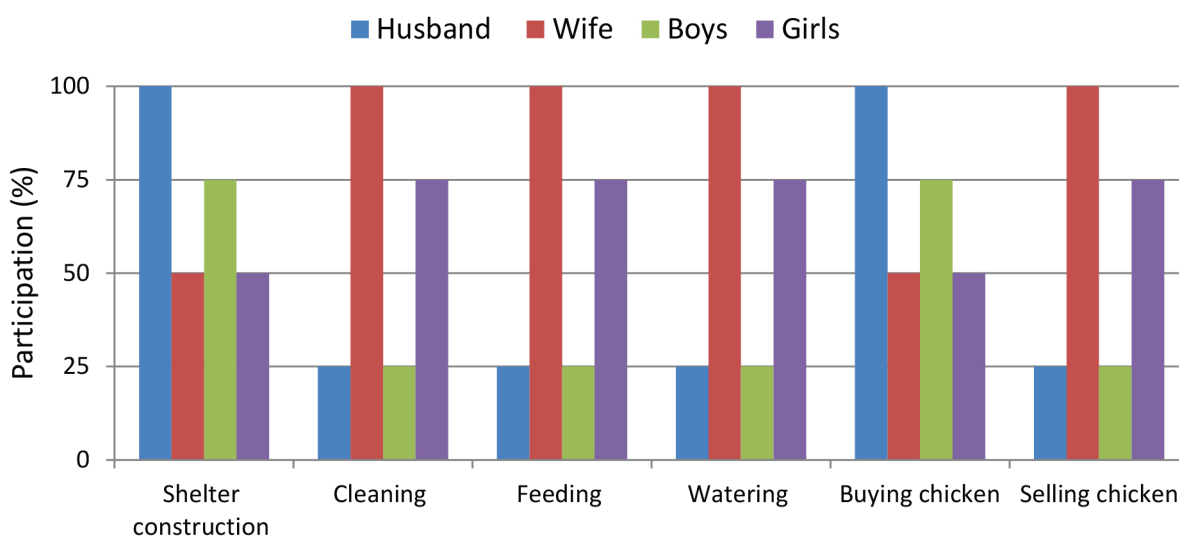


Figure 9. Household division of labour in chicken husbandry and marketing activities in Horro *woreda*

Gender daily calendar

The daily routines for women and men during the wet and dry seasons are shown in Tables 10 and 11 for Horro *woreda*, and Tables 12 and 13 for Ada'a *woreda*. The analysis showed that there are variations in the type of activities and length of working time between men and women, and between seasons. Women work for longer periods than men do, and both men and women spend more time at work during the wet season. The longer working hours for women is due to the extra workload on women in addition to farming activities. The extra work for women includes nursing children, and daily sustenance of the labour force through cooking, cleaning, and washing.

Table 10. Gender daily calendar in Horro *woreda*, dry season (24 hr clock)

Homi village				Dembel Gobeya village			
Men		Women		Men		Women	
Time	Activity	Time	Activity	Time	Activity	Time	Activity
05:00	Wake up time	05:00	Wake up time	04:00	Wake up time	06:00	Wake up time
05:00–07:00	Keeping out cattle and feeding	05:00–07:00	Breakfast preparation and feeding the chickens, making coffee	04:00–07:00	Keeping out the cattle and feeding	06:00–09:00	Breakfast preparation and feeding the chickens, making coffee Milking, cleaning houses and livestock houses fetching water
07:00–08:00	Taking breakfast and coffee	07:00–11:00	Milking, cleaning houses and livestock houses fetching water	07:00–08:00	Taking breakfast and coffee	09:00–14:00	Preparation of lunch Making coffee, provide lunch, washing dishes
08:00–12:00	Working in the farm; depends on the cycle of season	11:00–12:00	Preparation of lunch	10:00–13:00	Working in the farm; depends on the cycle of season / irrigation	14:00–16:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children
12:00–15:00	Taking lunch, coffee, rest	12:00–15:00	Making coffee, provide lunch, washing dishes	13:00–15:00	Taking lunch, coffee, rest		
15:00–18:00	Keeping and feeding animals, fencing, and other agricultural activities	15:00–21:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children	15:00–21:00	Keeping and feeding animals, fencing, and other agricultural activities Rest, dinner and going to bed		
18:00–21:00	Rest, dinner and going to bed						
Total working hrs	9 hrs		16 hrs		14 hrs		16 hrs

Table II. Gender daily calendar in Horro *woreda*, wet season (24 hour clock)

Homi village				Dembel Gobeya village			
Men		Women		Men		Women	
Time	Activity	Time	Activity	Time	Activity	Time	Activity
04:00	Wake up time	05:00	Wake up time	04:00	Wake up time	05:00	Wake up time
04:00– 07:00	Keeping out the cattle and feeding	15:00– 07:00	Breakfast preparation and feeding the chickens, making coffee	04:00– 05:00	Keeping out the cattle and feeding	05:00– 08:00	Breakfast preparation and feeding the chickens, making coffee
							Milking, cleaning houses and livestock houses fetching water
07:00– 08:00	Taking breakfast and coffee	07:00– 09:00	Milking, cleaning houses and livestock houses fetching water	05:00– 07:00	Taking breakfast and coffee	08:00– 12:00	Farming
08:00– 15:00	Working in the farm	09:00– 14:00	Farming	07:00– 14:00	Working in the farm	12:00– 15:00	Preparation of lunch
							Making coffee, provide lunch, washing dishes
15:00– 17:00	Taking lunch, coffee, rest	14:00– 15:00	Preparation of lunch	14:00– 16:00	Taking lunch, coffee, rest	15:00– 16:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children
17:00– 19:00	Keeping and feeding animals, fencing, and other agricultural activities	15:00– 17:00	Making coffee, provide lunch, washing dishes	16:00– 21:00	Keeping and feeding animals, fencing, and other agricultural activities		
							Rest, dinner and going to bed
19:00– 21:00	Rest, dinner and going to bed	17:00– 23:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children				
Total working hrs	12 hrs		17 hrs		14 hrs		17 hrs

Table 12. Gender daily calendar in Ada'a woreda, dry season (24 hour clock)

Qurqura Dembi village				Odee village			
Men		Women		Men		Women	
Time	Activity	Time	Activity	Time	Activity	Time	Activity
06:00	Wake up time	06:00	Wake up time	05:30	Wake up time	12:00	Wake up time
06:00– 06:30	Keeping out the cattle and feeding	06:00– 08:00	Breakfast preparation and feeding the chickens, making coffee, sending the children to school	06:00– 07:00	Keeping out the cattle and feeding	12:00– 08:00	Breakfast preparation and feeding the chickens, making coffee, sending the children to school
06:30– 08:00	Taking breakfast and coffee	08:00– 13:00	Milking, cleaning houses and livestock houses, fetching water, preparation of lunch	07:00– 08:00	Taking breakfast and coffee	08:00– 13:00	Milking, cleaning houses and livestock houses, fetching water, preparation of lunch
08:00– 13:00	Working in the farm depends on the cycle of season	13:00– 16:00	Making coffee, provide lunch, washing dishes	08:00– 12:30	Working in the farm depends on the cycle of season	13:00– 16:00	Making coffee, provide lunch, washing dishes
13:00– 15:00	Taking lunch, coffee, rest	16:00– 21:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children	12:30– 14:30	Feeding and giving water for cattle, taking lunch, coffee, rest	16:00– 21:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children
15:00– 21:00	Keeping and feeding animals, fencing, and other agricultural activities, dinner and going to bed			14:30– 20:00	Keeping and feeding animals, fencing, land clearing and other agricultural activities, dinner and going to bed		
Total working hrs	10.5 hrs		15 hrs		12.5 hrs		15 hrs

Table 13. Gender daily calendar in Ada'a *woreda*, wet season (24 hour clock)

Qurqura Dembi village				Odee village			
Men		Women		Men		Women	
Time	Activity	Time	Activity	Time	Activity	Time	Activity
05:00	Wake up time	05:00	Wake up time	05:00	Wake up time	05:00	Wake up time
05:00–07:30	Keeping out the cattle and feeding	05:00–07:00	Breakfast preparation and feeding the chickens, making coffee	05:00–07:30	Keeping out the cattle and feeding	05:00–07:00	Breakfast preparation and feeding the chickens, making coffee
07:30–08:00	Taking breakfast and coffee	07:00–09:00	Milking, cleaning houses and livestock houses fetching water	07:30–08:00	Taking breakfast and coffee	07:00–09:00	Milking, cleaning houses and livestock houses fetching water
08:00–12:00	Working in the farm	09:00–14:00	Farming	08:00–14:30	Working in the farm and taking lunch	09:00–14:00	Farming
12:00–15:00	Keeping and feeding animals, fencing, and other agricultural activities, dinner and going to bed	14:00–15:00	Preparation of lunch	14:30–20:00	Keeping and feeding animals, fencing, land clearing and other agricultural activities, dinner and going to bed	14:00–15:00	Preparation of lunch
		15:00–17:00	Making coffee, provide lunch, washing dishes			15:00–17:00	Making coffee, provide lunch, washing dishes
		17:00–22:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children			17:00–22:00	Collection of fire wood, preparing dinner, milking, feeding chickens, providing dinner for husband and children
Total working hrs	12.5 hrs		17 hrs		13 hrs		17 hrs

Chicken and egg marketing

The major actors involved in the chicken marketing chain are rural and urban chicken producers, primary collectors, secondary collectors or traders, retailers, shops, hotels and restaurants, and consumers. Farmers may sell their chickens and eggs directly to rural and urban consumers, rural chicken collectors and retailers, hotels and restaurants, and rural and urban chicken producers. In Horro *woreda*, farmers sell both chickens and eggs at the farm gate, at the nearby local market (Homi mazoria, Dembel Gobeya markets), and nearest urban market (Fincha/Batu market). Homi village farmers have a better access to a bigger market at Shambu town. Farmers in Homi village may also sell directly to secondary collectors or traders who supply to Addis Ababa, Bako and Nekemt markets. The main market channels are similar for both Homi (Figure 10) and Dembel Gobeya villages.

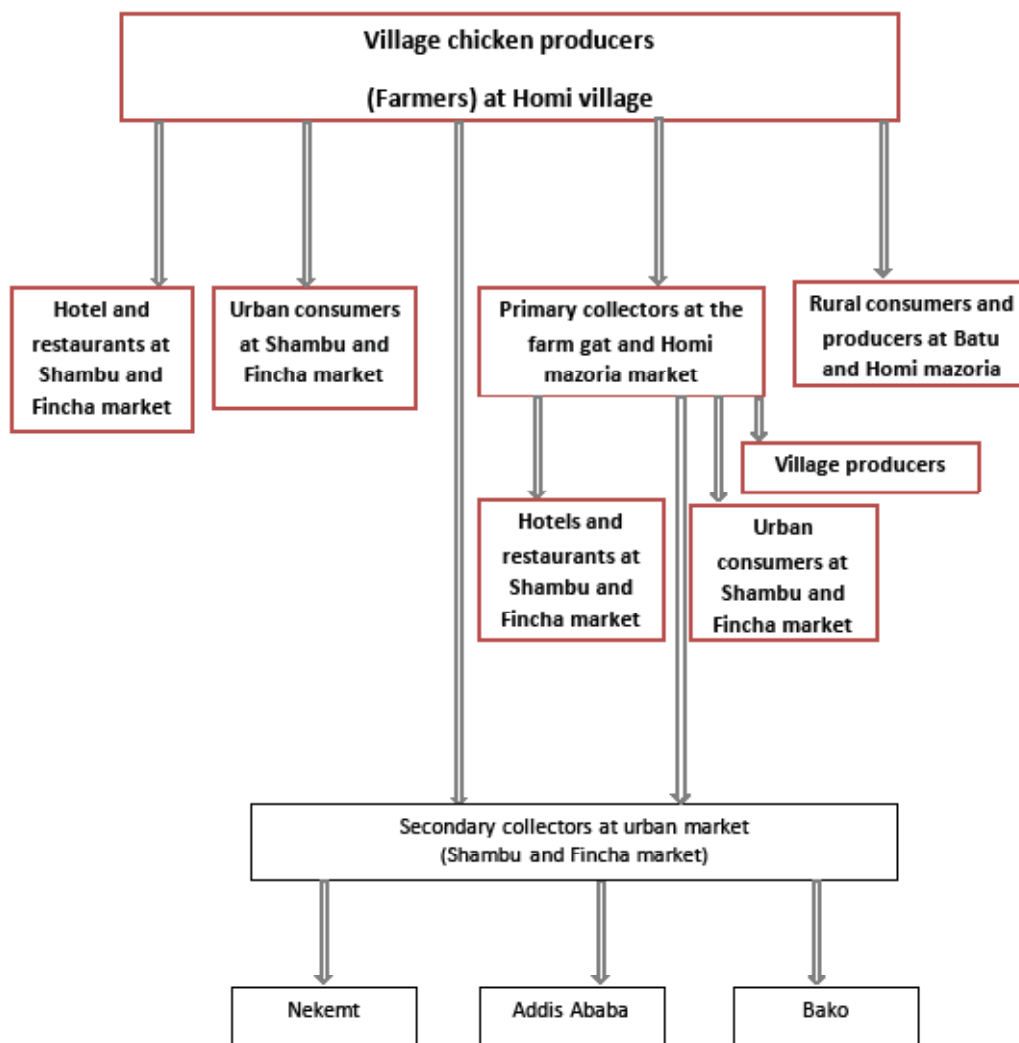


Figure 10. Marketing channels for chickens and eggs for Homi village

Farmers mostly sell their products during holidays. Wives and girls are responsible for the sale of chickens and eggs. Chickens are also sold during disease outbreaks and to provide immediate cash. The selling price of chickens varies with season, but generally comb type, weight and colour, in that order, determine prices of chickens sold for consumption. Price is determined through bargaining between buyers and sellers, and varies with season, being low during the wet season and high during the dry season, especially during holidays. Eggs from the local chicken breed are preferred over those from the exotic breeds, but large-sized eggs are generally most preferred. The farmers' only source of market prices is through their neighbours.

In Ada'a *woreda*, the market channels for the two study villages are similar, and represented here by Qurqura Dembi village (Figure 11). Qurqura Dembi villagers have better access to markets for their chickens and eggs, due to their proximity to Debre Zeit town. The villagers may sell their products to rural consumers and producers as well as primary collectors at the farm gate and local market (Qurqura Dembi market), and to hotels and restaurants at the urban market (Debre Zeit market). Exotic chickens are marketed differently. Farmers may deliver semi-processed exotic chickens to collectors at Debre Zeit market, who will then distribute the chickens to hotels and restaurants at Addis Ababa and Adama towns, although farmers in Odee village sell only live birds.

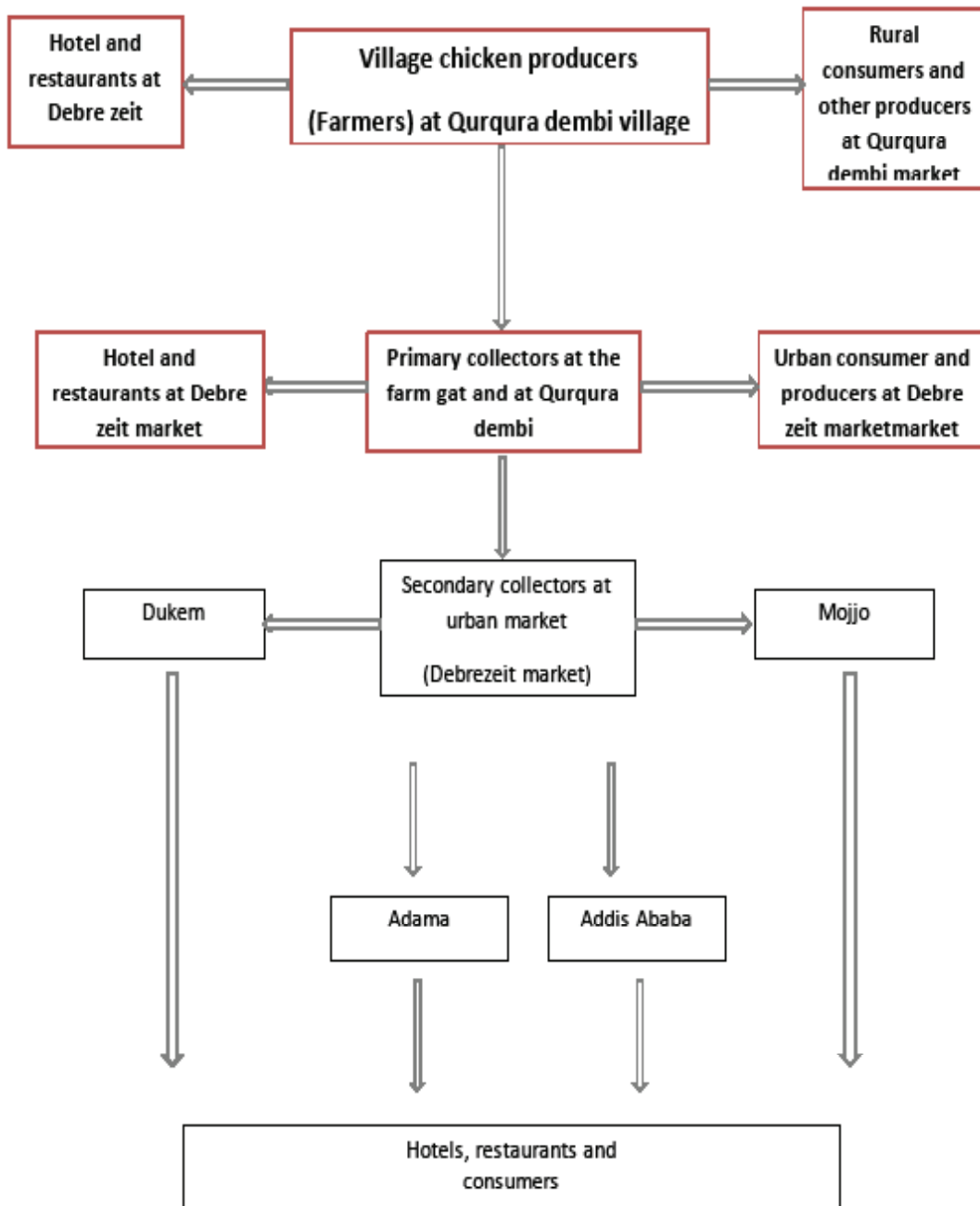


Figure 11. Marketing channels for chickens and eggs for Qurqura Dembi village

Opportunities, constraints and solutions

Opportunities

There is a large potential for genetic improvement through recurrent selection of the local chicken breeds as there is a large within-breed genetic variability in the traditional breeds in developing countries. Furthermore, the village chicken production practice is found to be a low-input system. This indicates that a significant increase in chicken productivity and production can be achieved with a small improvement in management and input levels.

Currently, village chicken production is a major source of poultry meat and egg supply in Ethiopia. The village system will continue to dominate the market for the near future in view of the slow growth being witnessed in the commercial poultry sector. This scenario presents significant opportunities for village chicken production development. While chickens are kept by almost all farmers, they are the poor farmers' enterprise according to the wealth-ranking study in this report. This can be considered as an opportunity as most development programs are pro-poor, including the CGIAR livestock and fish research program and government development programs.

Chickens require much less investment, compared to other farm enterprises, and can be managed even by the poor. They also do not require scarce agricultural resources, notably land. The domestic market for chicken meat and eggs is yet to be satisfied. Prices for chickens and eggs are becoming increasingly attractive to producers and traders alike. There are also unflinching festival markets—chicken being a popular festival food in the Ethiopia.

Constraints

Constraints to crop production

The crop production sector is constrained by diseases, pests, weed infestation, and high cost of herbicides and pesticides. Furthermore, according to the focus group discussion with farmers, the herbicides available in the market are reputed to be ineffective. The cost of fertilizers is also mentioned as a major problem that leads to application of fertilizers at below the recommended rates.

Constraints to livestock production

According to farmers in Horro *woreda*, the major problems hampering livestock development include diseases of sheep and goat (liver fluke, contagious bovine pleuropneumonia and contagious caprine pleuropneumonia), shortage of grazing land, and lack of an animal health and extension service in Homi village. In Dembel Gobeya village, shoaat parasites, predators (tiger, fox), cattle disease (Pasteurellosis), and shortage of grazing land are the major problems mentioned by the farmers in the FGD.

In Ada'a *woreda*, according to villagers in Qurqura Dembi, the livestock sector is characterized by poor productivity and performance. This is attributed to:

- poor performance of the local breed;
- limited supply and high price of improved breeding stocks;
- poor health service, lack of proper health facilities and medicines;
- lack of appropriate and timely vaccination;
- poor AI service;
- livestock diseases and parasites;
- lack of well-trained health professionals;
- high price and shortage of feed and supplements;
- lack of access to credit;
- seasonality of markets;
- lack of knowledge and skills;
- unfair practice of private health service providers.

Similarly in Odee village, it is reported that lack of improved breeds, poor AI service, shortage of feed, shortage of land, parasites (ticks), and low price for animal products (milk) are the main problems in the livestock sector.

Constraints to poultry production

The major problems affecting chicken production in both villages in Horro *woreda* are essentially the same. In Homi village, the major problems are diseases (mainly New Castle disease) and external parasites, predators (domestic cats, rats, and wild birds), poor management practices (housing, feeding and disease control), lack of proper institutional support (poor health service and vaccination schedules, supply of medicines and vaccines, and lack of credit), lack of capital to expand chicken production, shortage of feed, and marketing problems (seasonality of price, lack of market information and market linkages). In Dembel Gobeya village, the villagers mentioned diseases and external parasites, predation, lack of proper extension and livestock health services (vaccines and medicines), shortage of land, shortage of feed, and marketing problems (seasonality of prices, poor market-information system and transportation services) as the major constraints facing village chicken production.

In Ada'a *woreda*, the major problems hindering village chicken production are similar to Horro *woreda*. Specific problems to Ada'a are lack of capital, electric power supply, high cost of commercial feeds, and lack of exotic poultry breeding and husbandry skills to expand exotic chicken production. Similar constraints have been found elsewhere in the highlands of Ethiopia (Hailemichael 2007).

Farmers' solutions

Solutions suggested by farmers in the FGD for the problems constraining the adoption of various livelihood options are presented in Table 14. For alleviating the specific problems constraining chicken production, the farmers in Horro *woreda* suggested that: the health service should be improved in terms of equipment, drugs, and vaccines; improved poultry technologies should be provided to the villagers at an affordable price; access should be available to credit services with a fair interest rate for the rural poor; and a marketing-information system should be establishment. In Ada'a *woreda*, the solutions suggested by the farmers were largely related to exotic chicken production, including access to advanced technologies. They also suggested organizing the community as chicken producers, working on contract agreements with retailers and hotels, and negotiating access to credit services to expand their businesses. Provision of efficient health services and regular vaccinations, affordable compound feeds, continuous follow up and training by the extension service are mentioned as important factors in the decision to adopt exotic chicken production.

Table 14. Livelihood options, problems and solutions in Horro and Ada'a *woredas*

Livelihood activities	Problems	Solutions
Horro <i>woreda</i>, Homi village		
Crop production		
Cereals (wheat, maize, teff, barley)	Disease (Yellow rust/wag), pests (ramo) and weed (gomene)	Timely and more supply of pesticides and herbicides
Pulses (field pea, faba bean)	Lack of institutional support on pest control	Access to credit for both fertilizer and chemicals
Oil crop (noug)	Agricultural inputs (high price for fertilizer, chemicals)	
Livestock production		
Cattle	Disease on sheep and goat (liver fluke, contagious bovine pleuro pneumonia and contagious caprine pleura pneumonia)	So far no solution for disease except slaughtering
Shoat		Feeding straws
Poultry		
Fishing	Shortage of range land Poor animal-health and extension service No local market for fishes Shortage of fishing materials (fishing boat, other) Lack of capital	
Non-farm income		
Petty trade	Lack of transportation Lack of capital	
Off-farm income		
Sale of labour (non-agricultural wage)	Low wage rate and poor job security	
Horro <i>woreda</i>, Dembel Gobeya village		
Crop production		
Cereals (wheat, maize, teff, barley)	Disease (yellow rust/wag), Pests (Ramo) and weed (gomene)	Weeding No solution for yellow rust
Pulses (field pea, faba bean)	Lack of institutional support on pest control,	No solution for pest
Oil crop (noug)	High price for fertilizer, chemicals 24D is not working	Using fertilizer at less than recommended rate, following the land
Livestock production		
Cattle	Parasite on shoat	Feeding straws
Shoat	Predator (tiger, fox) on shoat	Going to health clinic
Poultry	Pastrolosis on cattle	
Fishing	Shortage of range land	
Off-farm income		
Sale of labour (non-agricultural wage)	Low wage rate and poor job security	

 Ada'a woreda, Qurqura Dembi village

Crop production		
Cereals (teff, wheat, barley) Pulses (field pea, lentil, faba bean, haricot bean)	Disease (yellow rust /wag/), Pests on pulse Weed <i>Setaria pumila</i> (yewisha sendedo) Input shortage (fertilizer, chemicals, seed) High price for fertilizer, quality seed, chemicals Shortage of land	Using compost Timely and better supply of pesticides and herbicides Reach of credit for both quality seed and chemicals Technologies on agronomical practices
Livestock production		
Cattle Fattening Shoat Poultry	Disease and parasites (tick) in dairy, blanket treatment of diseases and parasites High price and shortage of feed and supplements Shortage of land, lack of improved breed Lack of electricity for exotic poultry production Lack of credit access, seasonality of market, lack of skill Poor health service, free ranging	Using supplements for dairy and fattening (poultry litter, hay, and molasses) Improve institutional support (credit service for improved service, training and education to create awareness, improve health service in both quality and facility, improving marketing access) Improved forage development
Non-farm income		
Handcrafting Remittance Petty trade Horse and cart	Seasonality of market	
Off-farm income		
Sales of fire wood Rent of land Sale of labour (agricultural and non-agricultural wage)	Low wage rate and low job security	

 Ada'a woreda, Odee village

Crop production		
Cereals (teff, wheat, barley) Pulses (chickpea, field pea, faba bean, lentil)	Disease (Yellow rust on a variety of wheat called Qumisa) Weed <i>Setaria pumila</i> (yewisha sendedo) Lack of institutional support on pest control High price for fertilizer, quality seed, and chemicals Poor supply of quality seed and chemicals Lack of knowledge and skill Shortage of land	Crop rotation Use proper sowing date Using compost Improve supply of chemicals In kind credit service
Livestock production		
Cattle Dairy cow Fattening Shoat Poultry	Lack of improved breed and expensive price Poor AI service Shortage and high price of feed Reproductive problems (repeated mating) Shortage of land Lack of skill on poultry husbandry	Research on breed improving Training for health technician and farmers on AI service Credit service Forage development Technologies for land shortage
Trade		
Horse cart service		
Off-farm income		
Sale of labour (non-agricultural wage)	Low wage rate and low job security	Integration to the community

Strategies to improve village chicken production

Improved breeding

In Ethiopia, smallholder village production is the major source of chicken supply. Large-scale commercial chicken production is insignificant, accounting for only 1% the national chicken production (Tadelle et al. 2002). The village system offers many people the opportunity to improve their livelihoods, suggesting that improvement of chicken breeding needs to focus on the village system.

The genetic improvement strategy adopted to improve chicken productivity and production in Ethiopia focuses mainly on importation and dissemination of exotic breeds and crossbreeding. Utilization of the exotic resources needs to be rationalized so that distribution of exotic chickens is limited to commercial farms and villages with adequate access to production inputs, such as compound feeds, and close to markets that are generally located around urban areas (e.g. the villages in Ada'a *woreda* in this study). The exotic-chicken breeding system has been unsustainable requiring continual supply of production germplasm, until recently when grand-parental stocks were imported. A more sustainable option for utilization of the exotic resources is formation of a self-replacing straight-breeding synthetic population based on the imported exotic genetic material.

Collaborations with internationally operating poultry breeding companies are also required. Recurrent selection within the indigenous populations could facilitate conservation of the adapted indigenous genetic resources, which are at risk from the indiscriminate dissemination of the exotic breeds into villages. Improvement of the genetic merits of indigenous chicken ecotypes through breeding has been absent until recently when a nucleus-breeding program for Horro chicken was set up at Debre Zeit Research Centre (Dana 2011). Recurrent selection breeding schemes suited to smallholder village conditions are usually difficult to design. One approach could be to disseminate improved cocks from the nucleus flock at Debre Zeit to villagers organized in a cooperative breeding program. Improved birds in the nucleus flock could also be used alternatively in crossbreeding where they are crossed with exotic sires to produce crossbred hens and cocks to be distributed to villages.

Another option for genetic improvement through recurrent selection could be village- (or community-) based cooperative breeding programs. This involves implementing selection in village flocks without a defined nucleus flock, but there are difficulties to implement such breeding programs. Small population sizes are not appropriate for recurrent selection, so that farmers with only a few chickens cannot consider their flock as a breeding population in isolation. On the other hand, the whole set of flocks in a village (*got*) would be considered as a breeding population if they work together. Cooperation among neighbouring farmers is thus essential to implement effective selection and management of a sustainable breeding population.

Based on experiences from cooperative village-based sheep-breeding programs in Ethiopia (Gizaw et al. 2009; Gizaw et al. 2011), village breeding schemes for chickens could be designed. Breeding schemes suited to village conditions involving simple exchange of breeding roosters among cooperating villagers to more complex selection schemes involving pedigree records and performance evaluation need to be assessed for their feasibility and efficiency to bring about genetic improvement in local breeds.

Improving the production environment

Genetic improvement programs need to be coupled with improvement of the production environment. Feed shortages and diseases are mentioned by the surveyed farmers as major problems. Compound commercial feeds are currently very costly. Research on low-cost poultry rations based on farm produce is urgently required. Diseases, particularly New Castle Disease, remain to be a major problem for village chicken production, though preventive measures are now available. Controls for this persistent disease problem need to be addressed.

Improving farmers' access to inputs and markets

Effective solutions for disease, such as thermostat vaccines for New Castle Disease, and for feed shortage, such as compound feeds, have not yet had an impact on the problems reported by farmers in this survey. The reasons could be inefficiency of the input provision system. Farmers' cooperatives could facilitate access to such inputs as commercial feeds and vaccines.

Farmers in this study complained of chicken marketing problems, including difficult access to profitable markets. Improving farmers' profitability would encourage farmers to adopt better chicken-production practices. Problems across the chicken meat and egg value chain, particularly the marketing segment, need to be addressed to ensure farmers a fair share of the profit margin.

Concluding remarks

Characterization of the chicken production system in Horro and Ada'a *woredas* has shown that chickens contribute immensely to the livelihoods of farmers in the area. Chickens are primarily the source of income and empowerment to the rural women in the study area. At present, chickens are predominantly produced under a scavenging, low input-output system. The breeding practices are also traditional with limited improvement in the genetic merits of the indigenous genetic resources. There are also a number of management and marketing constraints identified by the farmers.

It is recommended to introduce market-oriented production practices that enhance the contribution of chicken production to farmers' livelihoods. Efficient systems for the provision of inputs, access to more profitable markets and training of farmers are the major interventions for enhancing market orientation of farmers. Interventions need to target women who are found to be the main actors in village chicken production.

Technical interventions in village chicken production would include introduction of improved breeding practices to improve the genetic merits of the indigenous genetic resources through recurrent selection within the indigenous population and crossbreeding with exotic breeds. Feasibility and efficiency of nucleus versus village-based breeding schemes need to be evaluated. Rational utilization of the exotic chicken resources and introduction of sustainable exotic chicken multiplication and dissemination strategies need to be adopted. Management interventions including control of diseases, particularly NCD, and improved feeding and housing need to be strengthened.

References

- Dana, N. 2011. Breeding programs for indigenous chicken of Ethiopia. PhD thesis. Wageningen, the Netherlands: Wageningen University.
- Dessie, T. and Ogle, B. 2001. Village poultry production system in the central high lands of Ethiopia. *Tropical Animal Health and Production* 33:521–537.
- Gezahegn, A. and Rich, K.M. 2010. *Poultry value chains and HPAI in Ethiopia*. Africa/Indonesia Team Working Paper 25. Washington, DC, USA: International Food Policy Research Institute (IFPRI).
- Gizaw, S., Awigchew, K. and Yami, A. 2011. *A practical guide for village-based sheep and goat cooperative breeding scheme*. ESGPIP Technical Bulletin 42. Addis Ababa, Ethiopia: ESGPIP.
- Gizaw, S., Komen, H. and van Arendonk, J.A.M. 2009. Optimal village breeding schemes under smallholder sheep farming systems. *Livestock Science* 124:82–88.
- Hailemichael, A. 2007. Village poultry in Ethiopia: Socio-technical analysis and learning with farmers. PhD thesis. Wageningen, the Netherlands: Wageningen University.
- Jull, M.A. 2008. *Poultry husbandry*. 3rd ed. Jodhpur, India: J.V. Publishing House.
- USAID (United States Agency for International Development). 2010. *Partnership for safe poultry in Kenya (PSPK) program: Value chain analysis of poultry in Ethiopia*. Addis Ababa, Ethiopia: USAID.

Annex I: List of PRA discussion facilitators

- Tadelle Dessie (PhD)—Animal breeding and genetics
- Wondmenehe Esatu (MSc)—Animal Physiology and poultry production
- Fisseha Zegeye (MSc)—Rural development
- Mekdes Teka (BSc)—Animal scientist
- Gadisa Yadete (DVM)—Veterinary medicine
- Biratu Daba (Dip)—Village extension worker
- Misganaw Abdena (Dip)—Village extension worker
- Debelo Tilaw (Dip)—Village extension worker
- Ababe Mengiste (Dip)—Socio-economist
- Zebenaye (Dip)—Village extension worker
- Bogalech (Dip.)—Village extension worker

Annex II: List of farmers included in PRA exercise in Horro woreda

No	Name of participants	Sex	Age	Village
1	Daba Tamune	M	26	Homi
2	Abdela Ahimed	M	43	Homi
3	Muzaye Ebrahim	M	45	Homi
4	Zayir Ahimed	M	30	Homi
5	Mohammad Siraj	M	40	Homi
6	Takele Wagira	M	28	Homi
7	Kuli Mokonin	F	35	Homi
8	Chaltu Alemayehu	F	24	Homi
9	Wolela Tadese	F	25	Homi
10	Emiyu Aleka	F	35	Homi
11	Wudine Aman	F	45	Homi
12	Alemitu Demisse	F	33	Homi
13	Kibitu Tesfaye	F	25	Homi
14	Dirriba Kenene	M	25	Dembel Gobeya
15	Fanta Korabi	M	50	Dembel Gobeya
16	Asfaw Bineya	M	30	Dembel Gobeya
17	Zelalem Keda	M	25	Dembel Gobeya
18	Hamisalu Kifle	F	35	Dembel Gobeya
19	Kumashi Wakjira	F	33	Dembel Gobeya
20	Etensh Mengsitu	F	25	Dembel Gobeya
21	Gudaye Lemi	F	25	Dembel Gobeya
22	Zeytu Worku	F	28	Dembel Gobeya
23	Debele Lijisa	F	40	Dembel Gobeya

Annex III: List of farmers included in PRA exercise in Ada'a woreda

No	Name of participants	Sex	Village
1	Tesfaye Gadisa	M	Qurqura Dembi
2	Eshetu Nigusu	M	Qurqura Dembi
3	Merdasa Adugna	M	Qurqura Dembi
4	Alemu Tufa	M	Qurqura Dembi
5	Hailu Assefa	M	Qurqura Dembi
6	Milsha Mamao	F	Qurqura Dembi
7	Zeyitu Weyocha	F	Qurqura Dembi
8	Yeshi Jemi	F	Qurqura Dembi
9	Welansa Weyocha	F	Qurqura Dembi
10	Shewaye Bekele	F	Qurqura Dembi
11	Fikirte Dibaba	F	Qurqura Dembi
12	Tilahun Shame	M	Odee
13	Kefeni Balcha	M	Odee
14	Engida Kelikile	M	Odee
15	Tesema Alemayahu	M	Odee
16	Bogale Bekele	M	Odee
17	Wendu Seifu	M	Odee
18	Getachew Beshada	M	Odee
19	Hirut Ayele	F	Odee
20	Yeshamu Molla	F	Odee
21	Beshadu Dadi	F	Odee
22	Demekech W/Tsadike	F	Odee
23	Roza Endale	F	Odee

Annex IV: PRA Checklist

Kebele exercise	Date Place/location	Time of day (public space or private)	Duration of the
--------------------	------------------------	------------------------------------------	-----------------

Name of key informant

I. General

I. Livelihood activities, success factors, problems, and solutions

- What are major livelihood activities in this area?
- Which livelihood activities are exercised by poor/rich people?
- For each of the activities, what are problems faced?
- For each of the activities, what are success factors?
- What are livestock species that households keep in this area?
- Major livestock development problems in the area?

II. Specific to poultry subsector

2. Flock characteristics

- Number of birds in an individual flock. Sex ratio. Numbers of chicks at any time.
- Breeds of bird—local, exotic, crossbreds
- Colour of local bird
- Sources of foundation stock: Market, bought directly from acquaintances, gifts
- If from acquaintances—are these in the same village or a different village?
- How many poultry would they typically buy to start with?
- What age birds will they buy?
- If they wish to increase their flock size, will they hatch their own chicks, or do they ever buy more in? If so, where do these birds come from?
- If they wish to replace any birds that are lost or sold, will they hatch their own chicks, or do they ever buy more in? If so, where do these birds come from?

- Are there particular times of year when they will buy/ not buy birds?
 - Can we get an idea of what time(s) of year they have the most birds in the village?
 - Can we get any idea of how often people are bringing new birds into the village (from the market or from other villages)?
3. Housing
- Housing types, construction materials, any bedding/ lining used
 - Separate house
 - How often is it cleaned?
 - How is waste dealt with? (Burning, fertilizer, etc.)
4. Breeding
- How many eggs are produced in a year per bird?
 - Are there times of year when birds produce more or less eggs?
 - How many will be used for sale? For hatching?
 - Are there particular times of year when they will set/ not set eggs for hatching?
 - How many eggs are set at a time? How many of these hatch?
 - How many chicks reach adulthood?
 - What happens with broody birds?
5. Feeding, feeding system and watering
- What feeding system is used? Only scavenging or any supplementation?
 - What are the feed resources? Vegetation, insects, grain, oil seed, kitchen waste, agricultural products, concentrate (pellets), minerals, vitamin supplements. Composition, if possible?
 - How do the feed resources change at different times of year?
 - How far will birds travel to scavenge? Do most people keep them only around their own yards or will they wander much further? Does this change at different times of year?
 - Are there periods during the year when birds are not allowed out to scavenge, such as planting harvesting, or in bad weather?
 - If supplementary feed is given, how often? Does this change at different times of year? Are big differences between what individual households do?
 - What are the water sources for the village? Do birds access water sources, or do people provide them with water in their own yards? Does this vary between the wet and dry season?
 - Are there any containers used for feed? For water? What? How often are they cleaned?
6. Health management and disease
- How many different diseases do people recognize?
 - What are the local names for different diseases (including parasites)?
 - How would you rank these in importance?

- Do different diseases affect the chicks and the adult birds?
- Are different diseases important at different times of year? Can you make a calendar of which diseases (including parasites) happen throughout the year?
- What is the history of diseases in the village over the last few years? Are there outbreaks every year, more than once a year, etc.?
- Do they ever see many deaths in wild birds during the rainy season, or at other times of year?
- What treatments are used against diseases? Against parasites?
- Are losses in adult birds more commonly single or multiple deaths? Can you describe symptoms?
- Are losses in chicks usually single or multiple deaths? Can you describe symptoms?
- What happens to birds that die from disease? Consumption, burial, burning, left out for scavengers? If carcasses are eaten, what happens to the visceral organs that are not consumed?
- What are the other causes of loss in adults? In chicks? (accidents, predators, theft etc.)

7. Willingness to pay analysis

- How much would you be willing to pay for improved poultry breeds?

8. Extension /animal health service

- Is there advisory service on poultry production know-how?
- Is there animal healthcare providers/clinic/ around private, government's, NGOs? How far is it?
- Do these livestock health clinics provide vaccine service for poultry?
- Are producers willing to pay to vaccinate their poultry periodically?
- Is there livestock drug store in your area? How far is it?
- Have your poultry ever got vaccine service during or pre disease outbreak?
- How would you judge the quality of livestock healthcare providers in your area?
- What are major problem related to livestock health service providers?

9. Poultry production and marketing

- Why do households keep poultry compared with other farm/and livestock/ activities?
- Which social group often keep poultry poor, non-poor, rich?
- Which traits of chicken do people consider when buying chicken for reproduction?
- Which traits of chicken do people consider when buying chicken for consumption?
- Can you rank these traits/ for reproduction and consumption separately/?
- Does the community participate in exotic poultry production?
- What supports do chicken supplier and other institutions provide to exotic poultry adopters? Is there similar support for indigenous poultry producers?
- Where do households sell poultry and egg/separately/? Is there any sort of support from buyers/information, credit etc.?
- Do they know who is buying birds—and for what purpose? For example, if a hen is sold, will it be for

consumption, or to someone who will use it for egg production

- What are major differences between exotic and indigenous poultry?
- What are major problems related to poultry production/capital, feed, marketing, etc.? What do you suggest?
- What poultry value chain looks like?

ISBN: 92-9146-341-8



The International Livestock Research Institute (ILRI) works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a member of the CGIAR Consortium, a global research partnership of 15 centres working with many partners for a food-secure future. ILRI has two main campuses in East Africa and other hubs in East, West and Southern Africa and South, Southeast and East Asia. ilri.org



CGIAR is a global agricultural research partnership for a food-secure future. Its science is carried out by 15 research centres that are members of the CGIAR Consortium in collaboration with hundreds of partner organizations. cgiar.org