

Management Practices and Productive Performances of Sasso Chickens Breed under Village Production System in SNNPR, Ethiopia

Aman Getiso, Addisu jimma, Mebratu Asrat, Kebede H/Giorgis, Bereket Zeleke and Teklayohannes Birhanu
South Agricultural Research Institute, Areka Agricultural Research Center, P.O. Box 79

Abstract

A cross sectional study was conducted with the objectives of assessing management practices and to evaluate productive performance of Sasso under village production system in two woredas of Wolaitta zone (Sodo zuria and Boloso sore) and two woredas of Kambata tambaro zone (Angecha and Hadaro tunto), SNNPR, Ethiopia. Totally, 160 randomly selected respondents were included in the study from eight purposively selected Peasant Associations (PAs) from four districts. The data collected were analyzed using descriptive statistics and one way ANOVA. In all study woredas, 64% of the chicken owners provided supplementary feed to the village chicken, especially during feed scarcity seasons. Maize, wheat and "Frushka" were the most common additional supplementary feeds used in feeding poultry in the study woredas, mostly three times a day. About 96.8% of respondents in study areas provided water with free access. The average eggs laid/year/bird was 229.14 ± 52.49 and 54.96 ± 15.65 eggs for Sasso and local chickens, respectively. Average age at first laying was 4.76 ± 0.85 and 6.22 ± 1.26 months for Sasso and local chicken respectively. Presence of diseases, inadequate veterinary services, feed shortage and predators were listed as major constraints in all study woredas. Getting improved chicks at affordable price, provision of vaccination at village level, getting training on poultry rearing, supply of electricity and clean water were mentioned as options to improve chicken productivity in the study woredas. The study showed good performance of Sasso chicken under village production system; suggesting productivity could be increased through improved housing, feeding and health management.

Keywords: Sasso, village poultry production system, productive performances, body weight

1. Introduction

Poultry production has an important economic, social and cultural benefit and plays a significant role in family nutrition in the developing countries. The proportional contribution of poultry to the total animal protein production of the world by the year 2020 is believed to increase to 40%, the major increase being in the developing world (Delgado *et al.*, 1999). It has been estimated that 80% of the poultry population in Africa is found in traditional scavenging systems (Gueye, 2000). In most tropical countries it is based mainly on scavenging production systems, which makes substantial contributions to household food security throughout the developing world (Muchadeyi *et al.*, 2007). Indigenous breeds still contribute meaningfully to poultry meat and egg production and consumption in developing countries, where they make up to 90% of the total poultry population. All over the developing world, these low-input, low output poultry-husbandry systems are an integral component of the livelihoods of most of rural, peri-urban, and some urban households and are likely to continue to meet this role for the foreseeable future (Besbes, 2009). Livestock production covers 40% of agricultural output in Ethiopia, playing an important role in the national economy as it contributes 18% of the total GDP (FAO, 2004). A Central Statistics Agency (CSA) (2015) report revealed that 95.86% of the total poultry population comprises indigenous birds, while 2.79 hybrids and 1.35% are exotic breeds. The poultry sector in Ethiopia can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feed, health, technology, and bio-security. These are large commercial, small scale commercial and village or backyard poultry production system. These production systems have their own specific chicken breeds, inputs and production properties. Each can sustainably coexist and contribute to solve the socio-economic problems of different target societies (Tadelle *et al.*, 2003c).

The backyard (traditional) poultry production system is characterized by low input, low output and periodic destruction of large proportion of the flock due to disease outbreaks (Tadelle *et al.*, 2003b). With the aim of improving poultry productivity, different breeds of exotic chickens (Rhode Island Red, Australorp, New Hampshire and White Leghorns) were imported to Ethiopia since the 1950's. Since then higher learning institutions, research organizations, the Ministry of Agriculture and Non-Governmental Organizations (NGO's) have disseminated many exotic breeds of chicken to rural farmers and urban-based small-scale poultry producers (Solomon, 2008). There has been a substantial effort to introduce improved hybrid layer chickens particularly Isa Brown (IB), Bovan Brown (BB) and dual purpose hybrid Potchefstroom Koekoek (PK) to smallholder farmers under backyard management in our region. However, lack of recorded data on the performance of chicken and all aspects of management, lack of regular chicken health program and market information makes it difficult to assess the importance and contributions of the past attempts to improve the sector (Moges *et al.*, 2010a). In

addition, most of the exotic breeds studied under village production system are not high yielding hybrids type used in the international poultry industry (FAO, 2010). Consequently, there is a need to define the present performance of high yielding layers such as Bovans brown and the chickens that were widely distributed and distributing by Ethio-chicken private naming as Sasso dual-purpose hybrid in selected areas of SNNPR. As a result, systematic study was required to assess management practices used and determine productive performances of improved poultry chicken mainly Sasso breed under village production system. Thus, the present study was conducted in selected districts of the region with the following objectives:

- ☞ To assess management practices for Sasso chicken under village production system
- ☞ To determine the production and productivity performances of Sasso chicken under village production system.
- ☞ To identify constraints and suggest possible interventions under village chicken production system in the study areas.

2. Methodology

2.1. Sampling methods and data collection

2.1.1. Sampling and data collection for production system survey

In this study, four woredas (Sodo zuria and Boloso sore from Wolayita zone; Angecha and Hadaro tunto from Kambata tambaro zone) were purposely selected based on the availability of Sasso birds in the hands of each of selected HH, accessibility of the PAs and intensity of the distribution of the Sasso breed chickens in the study woredas. From each of the selected PAs, 20 households (those possessing Sasso and local breeds) were purposively selected. Accordingly, a total of 160 (20hhs x 2 PAs x 4 woredas) households were used in the survey. Information was gathered through rapid field survey and consultations with the Zonal and districts Bureau of Livestock and Fishery experts, extension agents and farmers who owned and currently had the breed.

A survey questionnaire integrated with Participatory Rural Appraisal (PRA) methods relevant to rural poultry production (ranking of problems, key informants, and group discussions) was used in the data collection process. Information was collected from individual farmers, extension officers (development agents), key informants and village groups using both methods. A single-visit formal survey was employed to collect information on household's management (housing, feed and feeding, vaccination), productivity (egg production, meat production, age at first lay), disease resistance, predator and other problems.

The survey questionnaire was pre tested with three households one from each PA and the necessary adjustment was made prior to actual survey based on the pre-tested questionnaire. The house hold (HH) was taken as a unit of analysis. For the survey, two trained ACGG project enumerators during their off data collection week were used to collect data together with researchers.

2.2. Variables Measured

2.2.1. Mature body weight

Live weight recoding of laying hens was carried out with weighing balance to evaluate body weight performance under rural village conditions. Farmers were told in advance to keep their chicken at their house to make body weight measuring easy. Accordingly, mature body weights of disseminated male and female (20 weeks of age) Sasso breeds and household existing chicken were recorded. The birds' age was determined by "*recalling method*" of interviewed farmers. Women farmers can easily recall the age of their chickens because of the long time interval between two consecutive clutches in indigenous chickens.

2.3. Productive Parameters

2.3.1. Egg production and Age at first laying

Data on egg production and age at first laying were taken by recalling interviewed households. Finally, data on poultry production performance (egg production, number of clutches and age at first egg) including the performance of the distributed Sasso chickens were collected using the questionnaire prepared. Appropriate timing for data collection was fixed after negotiation with respondent, placing special emphasis on women, while interviewing the households.

2.4. Data management and analysis

The qualitative and quantitative data sets were analyzed using appropriate statistical analysis procedures. Statistical Package for Social Sciences (SPSS, 2007) version 16.0 was used and Analysis of Variance (ANOVA) was carried out on some of the quantitative parameters (functional traits). Variables from records on qualitative characters were reported as percentages. Duncan's Multiple Range Test and Chi Square Test were used to compare the results of quantitative traits and to estimate the qualitative variables, respectively.

3. Result and Discussion

3.1. Household characteristics

The average age of the respondents in the study woredas was 36.53 years. This result is in line with the report of Mekonnen (2007) majority of interviewed respondents age group were found within 30 and 40. The overall average family size in the study woredas was assessed to be 6.61 head per household and there was no significant difference ($p>0.05$) in all study woredas (Table 1). The results of this study pertaining to the average family size is similar to the findings of Zemene (2011) and Fisseha *et al.* (2010), in Goncha Siso Enese woreda of Western Amhara region and in Bure woreda of North West Amhara of Ethiopia, respectively. Results showed that from the total of 159 households' interviewed 71.7% were males and 28.3% were females.

Assessment of educational profile of the household heads indicated that the majority were read and write (38.4), followed by who attended formal elementary level (grade 1- 4) (28.9) and 16.4% were illiterate. About 12.9 % of the respondents had attended high school education.

Even though there is significant different ($P\geq 0.05$) between the study woredas almost all respondent households (96.2%) possessed sasso chicken breeds with average number of flock greater than indigenous breeds. The flock size and composition was presented in Table 6.

Table1: Socio-economic characteristics of households in the study woredas (Mean \pm SD) and (Frequency and Chi-square values) in study areas

Parameter	Name of Woreda				Total (N=159)	
	Sodo Zuria (N=39)	Boloso Sore (N=39)	Angacha (N=41)	Hadaro (N=40)		
Age of respondents	37.18 \pm 6.42	37.28 \pm 7.62	37.17 \pm 10.43	34.46 \pm 6.25	36.53 \pm 7.91	<i>ns</i>
Family size of respondents	6.08 \pm 1.85	5.87 \pm 1.85	7.24 \pm 3.85	7.29 \pm 2.60	6.61 \pm 2.71	<i>ns</i>
Sex of respondent						
Male	79.5	69.2	63.4	75.0	71.7	χ^2 7.89*
Female	20.5	30.8	36.6	25.0	28.3	
Educational status						
Illiterate	15.4	30.8	12.2	7.5	16.4	18.99
Read & write	33.3	43.6	36.6	40.0	38.4	
Elementary (1-4)	25.6	17.9	39.0	32.5	28.9	
High School	23.1	2.6	9.8	15.0	12.6	
College and University Education	2.6	5.1	2.4	5.0	3.8	
Currently keeping Sasso breeds						
Yes	94.9	89.7	100.0	100.0	96.2	7.89*
No	5.1	10.3	0.0	0.0	3.8	

3.2. Poultry housing system and facilities

The results of the study (Table 2) showed that the dominant (63.9%) chicken production system in the study woredas is a free range (backyard) or extensive type. chickens were managed mainly on free ranging, utilizing various feed sources searching by their own in the field, with conditional feed supplementation. However, some (36.1%) of the respondent farmers practice semi-intensive type of chicken management using fences around their homestead.

This result is in agreement with various research reports done in different areas. Tadelle *et al.* (2003b) and Solomon (2004) in their study reported, in Ethiopia the smallholder chicken production system is characterized by keeping under free range system with the major feed sources of insects, worms, seed and plant materials. Similarly, Dwinger *et al.* (2003) reported that, family poultry production in Africa survives by scavenging with limited supplementation of household waste feed and grain.

The results indicated that almost all farmers provide night shelter (Table 2) for their chicken in either part of the kitchen (8.9%), separate sheds purpose-made for chickens (10.8%), perch (21.6%) and share the same house (main house) (58.6%). In a group discussion made with key informants and selected farmers the problem of predators, fear of theft and lack of experience were the main reasons for not constructing poultry houses. From the result it could be understood that the housing management in the study area is not suitable for the well being of chicken and their products management, and thus it needs improvement. In support of this

result, Dwinger et al. (2003) reported that in some African countries, a large proportion of village poultry mortality accounted due to nocturnal predators because of lack of proper housing. There is a significant difference ($p < 0.05$) between the study woredas in availability of housing condition for poultry; accordingly purposively constructing of sheds for chicken was high in Angecha (20.5%) followed by Hadaro (12.5) and Sodo Zuria and Boloso sore (5.1%).

Table 2: Poultry housing system and facilities used and Management system in the study areas

Parameters	Name of Woreda				Total	χ^2
	Sodo Zuria	Boloso Sore	Angacha	Hadaro		
Backyard	89.7	94.9	37.5	35.0	63.9	54.09***
Semi-intensive	10.3	5.1	62.5	65.0	36.1	
Available housing condition						
Share the same house with people	87.2	89.7	30.8	27.5	58.6	61.37***
Perch	5.1	2.6	38.5	40.0	21.7	
Separate house for poultry	5.1	5.1	20.5	12.5	10.8	
Kitchen	2.6	2.6	10.3	20.0	8.9	
Constructed based on recommended package						
Yes	17.9	41.0	70.0	57.5	46.8	24.04
No	82.1	59.0	30.0	42.5	53.2	
Dou you provide litter materials in poultry house						
Yes	18.4	46.2	77.5	77.5	55.4	38.2**
No	81.6	53.8	22.5	22.5	44.6	
Type of litter materials used						
Teff straw	42.9	11.1	12.9	9.7	13.8	39.05***
Wheat straw	28.6	77.8	32.3	35.5	42.5	
Teff and wheat straw	0.0	0.0	35.5	41.9	27.6	
Sawdust	14.3	5.6	12.9	9.7	10.3	
Teff straw and sawdust	14.3	0.0	0.0	0.0	1.1	
Enset leaf	0.0	5.6	0.0	0.0	1.1	
Teff straw, wheat straw and sawdust	0.0	0.0	6.5	3.2	3.4	

3.3. Water source and watering

Information recorded for frequency of watering (Table 3) revealed that about 99.4% of respondents provide water with free access in both districts. Only 5.1% provides morning only and 7.7% of them provides morning and evening in Sodo Zuria while respondents in other three study woredas (Boloso Sore, Angacha and Hadaro) (100%) provide water in free access to their chicken. This result is in line with Desalew (2012) revealed that about 96% of respondents provide water with free access in both districts, 1.1% in morning only in Ada'a and a few respondents 2.2 % and 4.4% provide water both in morning and evening in Ada'a and Lume districts of East Shoa zone of Oromia region. Dirsha (2009) also reported that majority (68.89%) of the surveyed households reported that they provide water to their chickens throughout the whole day without limitation in cheha woreda, Ethiopia. and Deneke (2013) revealed that water is provided *ad-libitum* to the birds all year round with particular emphasis during the dry season in Tiyo, Hetossa and Dodota woredas of Arsi Zone, Oromia, Ethiopia.

Regarding source of water for poultry in study woredas, tap (39.5%) and hole water (21%) were the major sources of water for the households to use for their birds (Table 3). Similar to the result of the current study, Bogale (2008) reported that the majority of households included in his study provided water to their chickens and hand-dug well, tap and river were the major water sources used, respectively. Mekonnen (2007) reported that water for chickens in SNNPRS was drawn from river (37%), pond (35%) and bore hole (28%).

Table 3: Frequency and source of water used for chicken in study areas

Source and frequency of watering	Name of Woreda				Total (N=158)	χ^2
	Sodo Zuria (N=39)	Boloso Sore (N=39)	Angacha (N=40)	Hadaro (N=40)		
Providing water for chicken						
yes	100.0	100.0	97.5	100.0	99.4	2.97
No	0.0	0.0	2.5	0.0	0.6	
Frequency of watering						
Free access	87.2	100.0	100.0	100.0	96.8	15.63*
Morning only	5.1	0.0	0.0	0.0	1.3	
Morning and Evening	7.7	0.0	0.0	0.0	1.9	
Water sources						
Hole water	25.6	7.7	28.2	22.5	21.0	66.67***
River	7.7	10.3	2.6	7.5	7.0	
Tap water	56.4	35.9	23.1	42.5	39.5	
Pond Water	2.6	5.1	20.5	0.0	7.0	
Hole water and river	0.0	20.5	23.1	0.0	10.8	
Hole water and tap	7.7	15.4	2.6	17.5	10.8	
River and tap water	0.0	2.6	0.0	0.0	0.6	
Hole, river and tap water	0.0	2.6	0.0	0.0	0.6	
Hole, river and tap water	0.0	0.0	0.0	7.5	1.9	
Tap and pond water	0.0	0.0	0.0	2.5	0.6	

3.4. Feeds and feeding practices

Although scavenging was the major feeding system encountered in all study woredas, 64% of the chicken owners provided supplementary feed to the village chicken, especially during feed scarcity seasons (Table 4). This result is in line with the finding of Halima (2007) who reported that majority of the farmers in North Western Ethiopia provided supplementary feed and Fisseha (2009) also reported that majority of chicken owners in Bureworeda North-West Amhara provided supplementary feeds to village birds. Home produced grains and household and kitchen leftovers were the major kinds of feeds stuffs supplemented by farmers.

Maize, wheat and "*Frushka*" were the most common additional feeds used in feeding poultry in the study woredas. This is because of easily accessible to purchase and produced in house for wheat and maize. The results from farmers group discussion (PRA) revealed that Taro, Sweet potato, "*kocho*" and cabbage were the most additional poultry feed resources in Boloso Sore and Sodo Zuria respectively which is attributed to their availability throughout the year specially for first two listed feeds.

The households who provided supplementary feeds to their birds reported that they gave more supplementary feed during the main rainy season due to critical feed shortage in the scavenging fields. This is an indication to focus on developing strategy and facilitate programs to make available supplementary feed during the period of feed shortage at affordable price to the rural poultry producers. Similar to the current result Bogale (2008) reported that shortage of scavenging feed is common during the rainy season due to the general shortage of grain in the scavenging field.

Generally, the results of the study woredas showed that the dominant chicken production system of the study area is free range system where the indigenous chicken mainly depends on scavenging feed resources with conditional feed supplementation. Regarding frequency of feeding, overall 61.4% of the respondents in the stud woredas, feed their chicken three times per day (morning, afternoon and evening), while 10.1% and 28.5% provide two times per day in the morning and evening; morning and afternoon respectively. This result is in agreement with Desalew (2012) reported frequency of feeding, 81.1% and 76.7% of the respondents in Ada'a and Lume districts, feed their chicken three times per day respectively, while 18.9% and 23.3% provide two times per day in the same order.

Table 4: Feeds and feeding practices in study areas (%)

Feeds and feeding practice	Name of Woreda				Total (158)	X ²
	Sodo Zuria (N=39)	Boloso Sore (N=39)	Angacha (40)	Hadaro (40)		
Feeding system						24.92
Scavenging only	30.8	33.3	40.0	40.0	36	
Scavenging with supplementation	69.2	66.7	60	60	64	
Supplementation with purchased feeds	25.6	46.2	32.5	30	33.6	
Supplementation with home scrubs and kitchen left over	43.6	20.5	27.5	30	30.4	
Additional feed type:						
Maize	33.4	43.6	42.5	45	40.1	34.40
Wheat	38.8	35.9	30	29.5	33.8	
Frushka	21.4	20.5	27.5	25.5	24.2	
Household scrubs	2.6	0	0	0	0.6	
Mill scrub	2.6	0	0	0	0.6	
Sweet potato	1.3	0	0	0	0.6	
Frequency of feeding						
Morning and evening	17.9	10.3	5.0	7.5	10.1	13.07*
Morning and after noon	41.0	30.8	27.5	15.0	28.5	
Morning, afternoon and Evening	41.0	59.0	67.5	77.5	61.4	

3.5. Source of the Sasso chickens

Based on the information gathered from farmers group discussion and individual interviewed most of the farmers obtained Sasso breed chickens purchasing from private farm (Ethio-chicken poultry farm) in the form of cockerels and pullets (42 days age). Accordingly from a total of (158) interviewed 58.20% purchased from private farms and local cooperatives, 24.7% was given by government through livestock development extension system in the form of pullets and cockerels (Table 5). Around 7 % of the respondents disclosed that they bought from local market. The respondents indicated that they can obtain this breeds easily either by government side or by purchasing from locally organized cooperative and the private farm also gave them through credit. The implication of the current result is that in the absence of government source, there is no lack of the supply of Sasso breeds since the private farm (Ethio-chicken poultry farm) gave to them through credit with or without the recognition of government.

Table 5: Source of improved chicks used in the study areas

Sources of chicks	Name of Woreda				Total (N=158)	X ²
	Sodo Zuria (N=39)	Boloso Sore (N=39)	Angacha (N=39)	Hadaro (N=39)		
Birth/hatched on farm	2.60	2.60	0.00	0.00	1.30	67.01***
Purchased from private company and local cooperatives	59	71.8	60	42.5	58.20	
Gift	2.60	0.00	0.00	2.50	1.30	
Given by Government	20.50	0.00	0.02	0.00	5.10	
Given from government (Extension)	12.80	25.6	37.52	22.50	24.70	
Hatched and purchased	2.60	0.00	2.52	22.50	7.00	
NGO and given by government	0.00	0.00	0.00	2.50	0.60	
Purchased and gift	0.00	0.00	0.00	5.00	1.30	
Hatched, purchased and given from government	0.00	0.00	0.00	2.50	0.60	

3.6. Flock size and composition of two breeds

The overall average flock size of respondent farmers in the study districts were 6±6.22 chickens per household for sasso chicken and 3.88±4.685 local chickens per household (Table 6). As the result of this study, almost all respondent households keep all groups of chicken together without age separation for both cross and local breeds.

In agreement with this study, Samson and Endalew (2010) reported that 96% of the village chicken producers keep all ages of chicken together. The flocks were dominated by hens (2.95±3.06) and cocks (1.09±1.82) for cross and local breeds respectively.

The higher proportion of hens in the cross breed flocks is an indication of strong desire for eggs production. The flock size of cross breed (sasso) is greater than local breeds in the study districts which is attributed to the access of purchasing from private farm (Sodo AGP poultry farm). The study revealed that, higher flock size per household was for Hadaro (6.9±0.94; 5.2±0.73) and Angacha (8.74 ± 0.94; 4.49 ± 0.73) districts for cross breeds (sasso) and local breeds respectively. The limits to the number of birds kept by the households were associated with feed resources, disease problems, labor shortage and nuisance with neighbors. Similarly Sonaiya and Swan (2004) stated most common flock size of family poultry ranging from 5 to 20 birds seems to be the limit that can be kept by a family without special inputs in terms of feeding, housing and labor. The result pertaining flock size of the current study for local chicken was less than the results reported by Fisseha et al. (2010) reported the mean flock size of 13 local chicken ecotypes per household in Bure district of Amhara region and (Tadelle et al., 2003b) reported an average flock size of 16 chickens in the central parts of Ethiopia. The current flock size was higher than the study by Mammo (2006) reported the overall flock sizes in Jamma Wereda 4.17±0.7, 1.08±0.3 and 0.2±0.04 for locals, exotics and crossbreds, respectively.

Moreover, the result of this study is in line with the work done by Gueye (1997) who reported that the flock size generally ranged from 5 to 20 fowls per African village household. Besides, Tadelle et al. (2003b) also reported that, chickens are widespread in Ethiopia and almost every rural family keeps all age groups of chicken, aiming for valuable source of family protein and income.

Table 6. The flock composition of local and Sasso breeds of respondents (mean ± SD) in study areas

Stock composition	Sodo (N=32)	Zuria (N=39)	Boloso Sore (N=39)	Angacha (N=39)	Hadaro (N=39)	Over all (N=149)
Sasso						
Total	5.38±1.04 ^{ab}	2.87±0.94 ^a	8.74±0.94 ^b	6.90±0.94 ^b	6±6.22	
Cocks	1.00±0.35	0.72±0.32	2.72±0.32	1.82±0.32	1.59±2.12	
Hens	1.94±0.50	1.36±0.45	4.51±0.45	3.80±0.45	2.95±3.06	
Cockerels	0.50±0.18	0.26±0.16	0.62±0.16	0.72±0.16	0.52±1.03	
Pullets	1.09±0.23	0.44±0.21	0.62±0.21	0.49±0.21	0.64±1.33	
Chicks	0.63±0.18	0.10±0.17	0.31±0.17	0.08±0.17	0.26±1.04	
Indigenous						
Total	2.31±0.80 ^a	2.82±0.73 ^a	4.49±0.73 ^{ab}	5.62±0.73 ^b	3.88±4.68	
Cocks	0.28±0.30	0.62±0.28	1.33±0.28	2.00±0.28	1.09±1.82	
Hens	0.97±0.27	0.85±0.25	1.41±0.25	0.92±0.25	1.04±1.53	
Cockerels	0.13±0.19	0.28±0.17	0.26±0.17	0.92±0.17	0.41±1.10	
Pullets	0.25±0.18	0.41±0.16	0.21±0.16	0.64±0.16	0.38±1.00	
Chicks	0.69±0.43	0.67±0.39	1.28±0.39	1.13±0.39	0.95±2.42	

3.7. Survival of Chicks after introduced by farmers

According to primary data collected from cooperatives organized on day old chicken, mortality recorded on Sasso breeds until 45 day old before dispatched to farmers was 5-10%. The current survey result revealed that mortality recorded at farmers level condition after 45 day old till the age of production was 25% (Table 7) which the mortality could be attributed to predators, poor management condition (feeding, housing and sanitation).

Table 7: Number sasso breeds introduced and survived under farmers condition.

Attributes	Name of districts	N	Minimum	Maximum	Mean ± SD
Number of Sasso breed introduced	Sodo Zuria	37	0	30	6.78±6.07 ^a
	Boloso Sore	35	1	12	4.11±2.52 ^a
	Angacha	40	2	50	12.28±12.37 ^b
	Hadaro	39	1	30	11.95±9.11 ^b
	Total	151	0	50	8.95±9.11
Number of Sasso breeds survived	Sodo Zuria	37	0	25	6.38±5.51
	Boloso Sore	35	1	10	3.00±1.83 ^a
	Angacha	40	1	40	8.70±8.52 ^b
	Hadaro	39	1	24	8.00±6.30 ^b
	Total	151	0	40	6.63±6.46 ^{ab}

3.8. Production and Productivity performances of sasso and local chickens

On the other side, the result of the discussion made with selected farmers (FGD) indicated that all the respondents agree that the egg production performance of sasso chickens is superior to the egg production performance of indigenous chicken under improved management system. This result is in agreement with that of Alemu and Tadelle (1997) who reported that indigenous flocks are considered to be very poor in egg production performance attributed to low genetic potential, poor management and long natural reproductive cycle.

3.8.1. Age at first lay and egg production

Age at the first egg lay or age at sexual maturity is an important trait in egg producing strains. The average age at start of lay and number of eggs per hen per year is given in Table 8. The average age at first lay for the Sasso chickens in the study districts was 4.76 ± 0.85 months where as that of local chickens was 6.22 ± 1.26 months. The result indicated that Sasso chicken breeds reach an age of egg production earlier than local breeds which is attributed to breed type difference. Birds that reach an age of egg production earlier are supposed to be more efficient on feed consumed (Teketel, 1986).

The result of the current study of age at first lay for local chicken is relatively shorter than 6.8 months reported by Tadelle *et al.* (2003a), 6.5 ± 0.93 months reported by Tadelle and Ogle (2001) in the Central Highlands of Ethiopia in local birds, 8 months reported by Udo *et al.* (2001) and 7.07 months reported by Mekonnen (2007). But the current study is in agreement with the findings of Tadelle *et al.* (2003a); Mandal *et al.* (2006); Kugonza *et al.* (2008) and Iqbal and Pampori (2008) who reported 6 - 7 months to be an average age of maturity for female chicken in their respective study areas. Contrary to the present findings the results of studies by Mammo *et al.* (2008) from north eastern part of Ethiopia indicated that the maturity of the chickens was 5.4 months.

The current study revealed average first egg lay of Sasso breeds under farmers management condition is relatively faster than Desalew (2012) reported 5.35 ± 0.45 , 5.52 ± 0.44 and 5.11 ± 0.2 months for Isa Brown, Bovans Brown and Potchefstroom Koekoek respectively under village production system in East Shoa, Ethiopia and Dirsha (2009) reported 6.34 ± 0.46 months for RIR in cheha woreda, Ethiopia.

The results obtained in the current study, 229.14 ± 52.49 eggs per hen per year for revealed that the average number of eggs produced by the Sasso chicken is comparable with Dirsha (2009) reported 225.78 ± 11.58 eggs per hen per year for RIR in cheha woreda, Ethiopia and Desalew (2012) reported $1.87.04 \pm 13.49$ for Potchefstroom Koekoek in East Shoa, Ethiopia. But much greater than the results recorded by a number of investigators who worked on the egg production potential of the indigenous chickens (Tadelle and Ogle, 2001; FAO, 2004) and fall between the results recorded by Tadelle *et al.* (2000) from a typical exotic layers of White Leg Horn chicken at on station experiment. Desalew (2012) also reported 276.1 ± 11.03 , 266.32 ± 8.7 eggs per hen per year for Isa Brown and Bovans brown respectively under farmers management condition in East Shoa Ethiopia which is higher the findings of current study.

The average number of eggs per hen per year (54.96 ± 15.65) of indigenous chicken of the current study is higher than (Tadelle *et al.* 2000) reported in Ethiopia, a local scavenging hen on average lays about 36–40 eggs/year but comparable with Halima (2007) reported an average productivity of 9–19 eggs/clutch with 2–3 clutch periods/hen per year and an average total egg production ranged from 18–57 eggs/year per hen for local hens in North-West Ethiopia. According to Sonaiya *et al.* (1998), Aini (1990) and Gueye (2000), the annual egg production/hen of local hens in village conditions ranged from 20 to 100 eggs.

Table 8: Average age at first lay in months and average number of eggs produced per hen per year of Sasso and local chicken in study areas (Mean \pm SD).

		N	Minimum	Maximum	Mean \pm SD
Age at first egg laying of Sasso (months)	Sodo Zuria	36	3.5	7	4.67 \pm 0.81
	Boloso Sore	32	3.5	7	5.06 \pm 0.86
	Angacha	35	3.5	6	4.54 \pm 0.73
	Hadaro	38	4	7	4.79 \pm 0.93
	Total	141	3.5	7	4.76 \pm 0.85
Number of eggs per hen per year of Sasso	Sodo Zuria	36	120	264	211.83 \pm 36.21
	Boloso Sore	32	120	240	195.38 \pm 32.19
	Angacha	34	120	336	222.41 \pm 48.93
	Hadaro	38	180	360	280.52 \pm 45.34
	Total	140	120	360	229.14 \pm 52.49
Age at first egg laying of (month) Local	Sodo Zuria	27	4	9	6.33 \pm 1.35
	Boloso Sore	20	4.5	7.75	6.41 \pm 1.15
	Angacha	6	2.4	8	5.90 \pm 1.97
	Hadaro	15	4.5	7.5	5.87 \pm 0.88
	Total	68	2.4	9	6.22 \pm 1.26
Number of eggs per hen per year of Local	Sodo Zuria	27	28	108	53.52 \pm 16.87
	Boloso Sore	20	42	80	55.50 \pm 12.60
	Angacha	5	48	60	52.00 \pm 5.66
	Hadaro	15	32	96	57.80 \pm 19.62
	Total	67	28	108	54.96 \pm 15.65

3.8.2. Weight of the Sasso and local chickens at age of sexual maturity

According to the report collected from the households who participated in the survey, sexual maturity of male birds implies the age of start of service. Sexual maturity and body weight determine the acceptance of service for the first time. Mature body weight of Sasso and local chickens in the study districts is presented in Table 9. Based on the information gathered from the study, the body weight of male Sasso chicken at sexual maturity was 2.98 ± 0.70 kg and the weight of female chicken of the same breed at the age of greater than 20 weeks was 2.73 ± 0.53 kg. There was no statistically significant difference ($p > 0.05$) among the both male and female adult live body weight of Sasso among the study districts. The value obtained in the current study for Sasso male and female matured body weight is higher than that of Tadelle and Ogle (2001) who reported average weight of 1 kg in local female bird at start of lay and that of current findings of local chicken. Desalew (2012) reported the adult female body weights of 1.54 kg, 1.55 kg and 1.64 kg for Isa Brown, Bovans Brown and Potchefstroom Koekoek chicken groups, respectively which were lower than the adult female body weights of Sasso in current result. Moreover Dirsha (2009) reported the body weight of male RIR chicken at sexual maturity was 2.3 ± 0.18 kg and the weight of female chicken of the same breed at the age of 20 weeks was 1.78 ± 0.21 kg which was lower than the findings of current study.

There was no significant difference ($p > 0.05$) average weight of mature local males among the study districts. The average weight of mature males (cocks) in this study is higher than the average weight (1.5 kg) of the indigenous chicken of the central highlands of Ethiopia (Alemu and Tadelle) and lower than the mean weight (2.05 kg) of the indigenous chicken in Northwest Ethiopia (Halima et al., 2007). Furthermore the reported mean weight of mature male (1.6 kg) is lower than this result while female (1.3 kg) in Southern Ethiopia is comparable with the current findings (Mekonnen, 2007).

Table 9: Mature body weight of Sasso and local chickens in the study areas (Mean \pm SD).

		N	Minimum	Maximum	Mean \pm SD
Weight of laying hen >20 weeks Sasso (kg)	Sodo Zuria	30	1.2	3.4	2.68 \pm 0.57
	Boloso Sore	33	1.8	3.5	2.63 \pm 0.48
	Angacha	31	1.9	4	2.86 \pm 0.52
	Hadaro	24	2	4.2	2.75 \pm 0.53
	Total	118	1.2	4.2	2.73 \pm 0.53
Weight of matured Sasso Cock (kg)	Sodo Zuria	15	1.5	4.1	3.17 \pm 0.75
	Boloso Sore	13	2	4.5	3.08 \pm 0.61
	Angacha	18	2.2	4.3	3.03 \pm 0.64
	Hadaro	13	1.8	4	2.61 \pm 0.74
	Total	59	1.5	4.5	2.98 \pm 0.70
Weight of Laying hen >20 weeks Local (kg)	Sodo Zuria	16	0.8	2	1.38 \pm 0.42 ^{ab}
	Boloso Sore	21	0.5	2	1.33 \pm 0.38 ^{ab}
	Angacha	15	0.5	2.3	1.17 \pm 0.46 ^a
	Hadaro	13	1.2	3	1.60 \pm 0.47 ^{ab}
	Total	65	0.5	3	1.36 \pm 0.44
Weight of Matured Local male (kg)	Sodo Zuria	9	1.2	2.5	1.77 \pm 0.38
	Boloso Sore	14	1.2	3	2.02 \pm 0.53
	Angacha	14	1	2.75	1.80 \pm 0.40
	Hadaro	10	1.5	2.3	1.89 \pm 0.21
	Total	47	1	3	1.88 \pm 0.41

3.9. Constraints of poultry rearing in the study districts

In the study area, both male and female respondents indicated that the main constraints associated with livestock production are diseases, followed by drought, shortage of grazing land (feed shortage), water shortage and lack of credit (Table 10).

Information collected on constraints in poultry production in the study woredas in general revealed that disease was the most important problem affecting poultry productivity followed by shortage of feeds and predators. According to information from farmers and focus group discussion there was access to sasso breed but lack of market is the constraints facing their production. Similar findings were reported by Moges *et al.* 2010; Dinka *et al.* 2010 and Mengesha *et al.* 2011 under village poultry production, prevailing diseases, predators, lack of proper health care, poor feeding and poor marketing information as the major constraints. The high mortality of chicks under village chicken production in the central highlands of Ethiopia is due to diseases, parasites, predation, lack of feed, poor housing and insufficient water supply (Tadelle, 2001).

Table 10: Constraints for rearing Sasso and local breeds in the study areas (Rank and Index)

Parameters	Sodo Zuria		Boloso Sore		Angacha		Hadaro	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
Disease	0.19	1	0.212	2	0.174	1	0.169	1
Shortage of feeds	0.16	3	0.347	1	0.147	2	0.160	2
Predators	0.18	2	0.132	4	0.145	3	0.138	4
Thieves	0.10	6	0.169	3	0.076	8	0.105	6
Lack of market	0.07	7	0.05	5	0.130	5	0.114	5
Lack of time	0.06	8	0.048	6	0.088	7	0.073	8
Improper vet. service	0.11	5	0.021	7	0.095	6	0.103	7
Lack of knowledge	0.12	4	0.02	8	0.145	4	0.139	3
Total	1		1		1		1	

Index= (8* for rank 1) + (7* for rank 2) + (6* for rank 3) + (5* for rank 4) + (4* for rank 5) + (3* for rank 6) + (2* for rank 7) + (1* for rank 8) divided by the sum of all weighed value mentioned by the respondents

3.10. Trait preferences

Focus group discussion was conducted and farmers identify traits of preference. Ranking of Sasso and indigenous chicken breeds based on some traits are presented in Table 10. Based on the total index obtained by ranking in Sasso chicken breed was appreciated by producing high egg production (if additional feed was supplemented), having large body size, feed efficient and good physical appearance as compared with indigenous chicken breeds. Although indigenous chicken breeds is underestimated mostly due to their poor appearance, relatively low productive and supposed low “commercial” values, indigenous birds have a number

of adoptive traits and genes with special utility in the tropics . Hence during focus group discussion farmers identified traits of preference and ranked first, second and third in their producing chicks with high survival rate, has less illness (highly adaptive) and lives a long time respectively in all study districts for indigenous chicken breeds. This result indicated the need of conservation of indigenous breeds not to be diluted by this widely distributed sasso breeds.



fig 1. Some farmers responding to PRA

Table 10. Farmers' trait preference (% and rank)

No.	Parameters	woreda		
		Sodo Zuria	B/Sore	Hadaro
For Sasso breed				
1	Produces high egg production	40 (1 st)	40 (1 st)	30(2 nd)
2	Has large body size and weight for meat	30 (2 nd)	30 (2 nd)	32(1 st)
3	Feed efficiency	20 (3 rd)	20 (3 rd)	26 (3 rd)
4	Beautiful/good physical appearance	10 (4 th)	10 (4 th)	12 (4 th)
For local breed				
5	Produces better tasting eggs	12 (4 th)	10 (5 th)	8 (5 th)
6	Produces eggs with harder/thicker shell	5 (6 th)	5 (6 th)	4 (6 th)
7	Produces better meat test	8 (5 th)	20 (2 nd)	12 (4 th)
8	Produces chicks with high survival rate	30 (1 st)	35 (1 st)	16 (3 rd)
9	Has less illness	25 (2 nd)	16 (3 rd)	36 (1 st)
10	Lives along time	20 (3 rd)	14 (4 th)	24 (2 nd)

Conclusion and recommendation

Based on focus group discussion and the data collected from households who participated in the current study, the Sasso chickens seem is selected for some traits better than local chicken in terms of egg production, age at first egg laying and matured body weight both hen and cock and producing more meat. But most of the farmers during focus group discussion indicated that sasso breeds consume more feeds and does not give eggs in time if not supplemented. Even though low in production and productivity local chicken has its own advantages and selected by respondents for some traits better than Sasso breeds in terms of disease resistance, having good mothering ability and producing better egg taste.

But the Sasso breeds distributed and currently distributing to the farmers by the company is the cross (F1) of SA51A (female) and T44 (male) without its mandate. Hence there were no information about the F1 distributed and distributing to the farmers concerning production and productivity, management and health guide line at on station before dispatched to the farmers. To have a clear understanding of the performance of Sasso birds, on-farm and on-station controlled experiment on management practices and feeding strategy is important.

Until the sufficient supply of Sasso chicks is not ensured at village level the maintenance of local brooding hens must be assured in order to preserve the continuity of rural poultry as a viable venture. It is important to suggest the multiplication and distribution of other registered dual breeds by the supplier company, till the above experiment result is known and management guideline is developed.

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Questionnaire

Enumerator's Name _____ Date _____ Code no _____ **A. Demographic Characteristics of the Households in the Study Area**

1. Name of Village/Peasant Association _____
2. Name of household head: _____ Sex: _____ Age _____
3. Family size? 1. Male _____ 2. Female _____ 3. Total _____
4. Level of education of the household head? 1. Illiterate 2. Read and write 3. Elementary School 4. High School 5. College and University education
5. Land size? Please indicate the available land in the following table.

No.	Land type	Land unit	
		Hectare (ha)	Local measurement
1	Arable land		
2	Grazing land		
3	Unutilized land		
4	Total		

B. Breeds Adopted

1. Do you currently keep exotic/cross bred birds? { } (0=No, 1= yes)

If yes fill the table bellow accordingly

S/N	General category by breed type	Number per family (use code A)	Main purpose keeps the chicken* (use code B)	Sources of owned(use code C)	How long kept/introduced chicken (use code D)	Rank the most preferred breed type (1, 2, 3.....)	Reason for preferences (use code E)
1	Local						
2	Exotic						
2.1	Isa Brown						
2.2	Bovans Brown						
2.3	Sasso						
2.4	Koekoek						
2.5	Others						

A. 1) Cocks 2) Hens 3) Grower male 4) Grower female (pullet) 5) Chicks

B. purpose 1) Egg consumption, 2) Meat consumption 3) Meat and egg sale, 4) Live bird sale

C. 1) Birth/hatched on farm 2) Purchased 3) Gift 4) NGO 5) given by government bodies 6) Other (specify).....

D. 1) > 5 months 2) 5 months – 1 year 3) 1- 2 years 4) >2 years

E. 1)=produces a lot of eggs, 2)= produces better tasting eggs, 3)= produces eggs with harder/thicker shell, 4)= has a large body size and weight for meat, 5)= produces chicks with high survival rate, 6)= is feed efficient, 7)= has less illness, 8)= lives along time, 9)= is beautiful/good physical appearance, 10) = others (specify)

C. Housing condition

1. Management system used? 1. Backyard 2. Semi-intensive 3. Others _____

2. Available housing condition ? 1. Share the same house with people 2. Provision of night shelter only 3. Separate house entirely constructed for poultry 4. Separate house with other animals 5. Provision of electricity 6. Ventilation facility

3. Did you construct poultry house based on recommended extension packages? 1. Yes 2. No

4. If no in Q.3, specify the reasons _____, _____, _____

5. Do you provide litter material in the poultry house? 1. Yes 2. No

6. If yes Q.5. What type litter martial do you use? 1. *Teff* straw 2. Wheat straw 3. If others (specify)

D. Feeding and Watering

1. How do you feed your birds? 1. Scavenging only 2. Scavenging with supplement 3. Purchased feed 4. Homemade feed (readymade feed)

2. When do you feed your chickens? 1. Morning and evening 2. Morning and afternoon 3. Morning, afternoon and evening 4. Only scavenging

3. Do you provide supplementary feed? 1. Yes 2. No

4. If yes in Q.3., specify the type of supplement? 1. Maize and wheat 2. Furshika 3. Others

5. Do you provide water for your bird? 1. Yes 2. No

6. If yes Q.5. what is the source of water? 1. hole water 2. River 3. Tap water 4. Pond water 5. If others (specify)

7. How frequent do you provide water? 1. Free access 2. Morning only 3. Morning and evening only 4. If other (specify) _____

E. Chicken Productivity

Chicken breed type	Age at first mating (month)	Age at first egg laying (weeks)	Average no of days per clutch	Average no of eggs per clutch	Total number of eggs laid per hen/year
Isa Brown					
Bovans Brown					
Sasso					
Others					
Local					

F. Live weight at various ages

Age category	Live weight (Kg) according to breed type				
	Bovans White	Bovans Brown	Sasso	others	Local
Laying hen (>20 months) (Kg)					

G. Trait preferences of exotic chickens by farmers

Breeds	What do you think are the qualities/attributes of a good chicken (Cock and Hen)? (code A) (In order of importance – 1 st trait = most important, 2 nd = most important, enter up to 5 traits).				
	1 st trait	2 nd trait	3 rd trait	4 th trait	5 th trait
Isa Brown					
Bovans Brown					
Sasso					
others					

A) Qualities/attributes; 1 = produces a lot of eggs, 2 = produces better testing eggs, 3 = produces eggs with harder/thicker shell, 4 = has large body size and weight for meat, 5 = the meat tests better, 6 = produces chicks with high survival rate, 7 = is feed efficient, 8 = is beautiful/good physical appearance, 9 = has less illnesses, 10 = lives a long time, other (specify).

- Do you practice culling of birds? 1. Yes 2. No
- If yes, reasons for culling? 1. Poor productivity 2. Old age 3. Sickness 3. Specify (if others) _____

H. Marketing (Products and production input)

- Do you have market access to buy poultry production inputs? 1. Yes 2. No
- Where do you buy poultry production inputs? 1. NGO 2. Government 3. Private companies 4. If others (Specify) _____
- Do you have market access for your poultry products? 1. Yes 2. No
- When do you sell your poultry products? (Time of selling) 1. Specific wt. gain/age of birds 2. Personal money requirement 3. During holydays and festivals 4. If others (specify) _____
- To whom are you selling your poultry products? 1. Village market 2. Local shopkeepers 3. Selling at own doorstep 4. Retailer 5. Whole sellers 6. If others (specify) _____
- Which breed type meat is most preferred by consumers? 1. Meat from improved breed 2. Meat from local chicken 3. Equally preferred by consumers
- Write your reasons for Q.7 responses? _____

- Which breed type egg is most preferred by consumers? 1. Eggs from improved breeds 2. Eggs from local chicken 3. Equally preferred
- Write your reasons for Q.8 responses? _____

I. Poultry Health

- Do you practice annual vaccination of your chicken? 1. Yes 2. No
- Against which diseases vaccinate your chicken? 1. Newcastle diseases 2. Marek's Disease 3. Fowl thiphoid 4. Gumboro (infectious bursa disease) 5. Infectious bronchitis
- Do you use anti-ectoparasites? 1. Yes 2. No
- Do you practice deworming ? 1. Yes 2. No

J. Extension service

- Do you have access to the extension service? 1. Yes 2. No
- If you say No for Q.1, state the reasons? 1. Have no heard of them 2. cannot easily 55 reach them 3. There is no need 4. If others (specify) _____
- How frequently do you see the extension agent? 1. Once in a week 2. Once in two weeks 3. Once in a month 4. Not Seen
- Do you discuss your production problems with extension agents? 1. Yes 2. No
- Have you ever got any training on poultry production? 1. Yes 2. No
- If yes, for Q. 5. When? 1. Before starting the business 2. After the business started
- Did you get credit service when you start poultry business? 1. Yes 2. No
- If yes, for what purpose did use the credit? 1. Day old chicks 2. Poultry feed 3. Poultry equipment 4. If others (specify) _____

K. List Major Constraints

A. What are constraints in adoption of improved breeds? (Rank 1-8)

1. Presence of disease
2. Shortage of feed from surrounding
3. Attacks of predators (which age group is affected) _____
4. Thieves
5. Lack of market
6. Lack of time due to farm work activities
7. Improper service of veterinary doctors at village level
8. Lack of knowledge about scientific poultry management practices
9. Any other, if any _____

L. What do you suggest to improve your poultry business?
