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Poultry Feed Resources and Coping Mechanisms of Challenges in Sidama Zone, Southern Ethiopia

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Abstract
The study was conducted in Wondogenet and Shebedino woredas of Sidama zone with the objective of assessing the existing poultry feed resources, challenges and coping mechanisms. Multi stage sampling techniques were used. The potential supplementary feeds used were maize (17.85±2.21), household scraps (10.96±1.36) and cereal debris (9.05±1.08) gram per chicken per day. During the wet season of the year, 89.1% of the respondents feed scarcity was aggravated. Farmers were tackled poultry feed scarcity by feeding Enset (Ensete ventricosum) by-products (30.8%), food left over and household wastes (13.3%), available major green feeds and non-conventional feed resources like growing worms and insect. The feed offered were entirely incomplete and inadequate. Therefore, efforts have to be made to design and implement interventions, aiming at improving poultry feed resource base and practices.
Keywords: Challenges, Coping mechanism, poultry feed, Supplementation

1. Introduction

Poultry production as an integral part of livestock production system plays an important socio-economic role in developing countries (Alders, 2004; Kondombo, 2005). Rising income and urbanization in many parts of the developing world caused a growing demand for animal products. The poultry sector has the potential to provide relatively cheap animal protein to the population and improve nutritional status, create both rural and urban employment and generate income in time of economic difficulty. In Ethiopia, chicken production is both traditional and modern production system in which most widespread and almost every rural family owns chicken, which provide valuable sources of family protein and income (Tadelle et al., 2003). The total chicken population in the country is estimated to be 60.5 million of which 94.33% are the most dominant chicken types of the indigenous, 3.21% hybrid and 2.47% exotic (CSA, 2016).

The major constraints of poultry production are inadequate availability of feed sources in terms of quality and quantity and high cost of the feed ingredients regardless of the production system and geographical location. The feed resource for rural poultry is obtained by scavenging in and around the homesteads and consists of household wastes, anything edible found in the immediate environment, together with a small amount of grain supplements provided by the household (Mehari, 2016). Smallholder poultry feed resources, challenges and coping mechanisms are gaps need to be assessed and intervene. Feed is one of the core stone challenges of poultry production. The available feed resource base and feeding regime of smallholder chicken are identified to aid the rational utilization of locally available feed resources.

This study was undertaken to assess the challenges of poultry feed resources and coping mechanisms of smallholder poultry farmers. The finding of this study address an opportunity and potential to design and implement interventions, aiming at improving poultry feeds technologies that enhance productivity of smallholder chicken producers. Therefore, this research was conducted to assess the challenges of existing poultry feed resources and coping mechanisms of the smallholder poultry farmers; and to address an improvement options for the challenges for enhancing chicken productivity.

2. Materials and Methods

2.1 Description of the study area

Wondogenet Woreda has a total of fifteen Kebeles, out of which five are in mid altitude (1500-2500 masl) and ten in high altitude (>2500 masl). The Woreda is geographically located at 07° 19.1' North latitude, 38° 30' East longitude and an altitude of 1780 meter above sea level. The area receives mean annual rain fall of 1128 mm with minimum and maximum temperature of 11 and 26°c, respectively. The Woreda has a total population of 152,394 of whom 75,365 are men and 77,321 are women and has a total land areas of 14,460.604 hectare. There are two rainy seasons of Belg (February to April) and Meher (June to September). The major crops grown are sugar cane, enset, coffee, maize and haricot bean. The dominant herd structure and size of livestock holding of the smallholder farmers of the study Woredas are indigenous animals. The livestock population in the area is 42,020 chickens, 44,486 cattle, 10,766 sheep, 7,085 goat, 5,016 donkey, 4,122 horse and 2,452 honey bee colonies.

Shebedino Woreda has a total of thirty five Kebeles, out of which thirty two are in mid altitude and 3 in

high altitude. The Woreda is located 27 km far away from Hawassa city, the capital city of the region. The Woreda is situated at 6045` and 7045` latitude to the North and 390 and 400 longitude to the East. The altitude was 1860 meter above sea level. The minimum and maximum rain fall was 900 mm to 1500 mm, respectively. The average temperature was 20.50C.The neighboring woredas are Gorche to the East, Borecha to the West, Dale to the North and Tula to the South. The Woreda has a total population of 294,179 of whom 148,451 are men and 145,728 women; 5.06% of its population is urban dwellers. The Woreda has total land areas of 27,690 hectare. The major land about 26,990 was occupied by rural household farmers while the remaining 700 hectare was hold by urban dwellers. The topography of the Woreda is 8.57% mountain, 90.43 plateau and 1% others. There are two rainy seasons of Belg (February to April) and Meher (June to September). The major crops grown are enset, coffee, maize and haricot bean. The dominant herd structure and size of livestock holding of the smallholder farmers of the study Woredas are indigenous animals. The livestock population of the Woreda is 151,643 chicken, 198,083 cattle, 43,585 sheep, 27,862 goat, 5,946 donkey, 179 horse and 14,525 honey bee colonies.

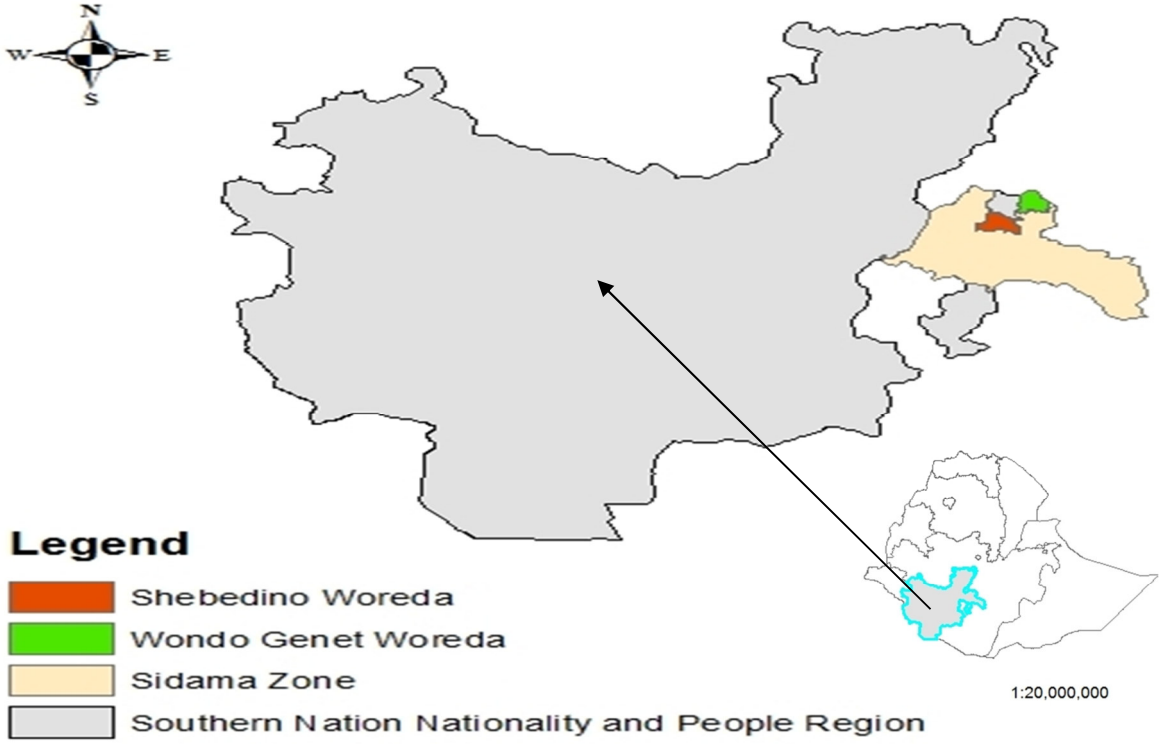

Figure 1. Map of the study Woredas

2.2 Sampling and Data Analysis

2.2.1 Sampling Procedures

Multi stages sampling (purposive and random) were used. Two woredas of Wondogenet and Shebedino were selected purposively based on criteria related to ease of accessibility; woreda's situation in representing the zone and chicken production potential. The numbers of surveyed kebeles were selected from each woreda proportional to the size of the woreda. Three kebeles from Wondogenet and four kebeles from Shebedino woredas were selected randomly making a total of seven kebeles. Village chicken owner of the respondents were selected randomly in each kebele by giving equal chance for those farmers with different flock size, chicken husbandry systems, accessibility and other related practices. To capture gender effects, the sample households in each rural kebeles were stratified into female and male-headed households. Hence, a total of 120 village chicken owner households were interviewed using a pre-tested structured questionnaires.

Secondary data were collected from various sources including the Bureau of Agriculture and Rural Development (BoARD). Primary data were collected through personal and household interviews. Closer visits in and around the residential quarters of selected households was made in order to obtain first hand observation of the districts. Group discussion was made with woredas` Bureau of Agriculture and Rural Development experts and development agents to have an overview about poultry feed resources and its challenges. The survey was conducted by trained enumerators under close supervision and participation of the researcher.

2.2.2 Data Analysis

Qualitative and quantitative data sets were analyzed using statistical analysis procedures of Statistical Package

for Social Sciences (SPSS 2002) version 20. Analysis of Variance model statements were used to investigate poultry feed resource challenges and coping mechanisms of the Woredas.

3. Result and Discussions

3.1 Household characteristics and respondent profiles

3.1.1 Family size and respondents' profile

Smallholder poultry production was undertaken by household family labor. The mean household family size and age of the respondent were 6.88±0.24 and 40.58±0.85, respectively. The average male and female family sizes of the households were 3.43±0.16 and 3.45±0.16, respectively. As indicated on the (Table 1.), household family size of the respondents were lower in Wondogenet than Shebedino woreda. Out of the total respondents (N=120), 82.5% and 17.5% were male and female headed households, respectively.

Table 3. Family size and respondent profile

Variables	Male		Female		Average family size/hh (Mean±SD)	Average age of respondents (Years)
	Family size	Range	Family size	Range		
Wondogenet (41)	3.24±0.27	1-8	3.39±0.34	0-9	6.63±0.47	38.12±1.5
Shebedino (79)	3.52±0.19	1−8	3.48±0.17	1−8	7.0±0.27	41.86±1.0
Total	3.43 ±0.16	1−8	3.45±0.16	0-9	6.88±0.24	40.58±0.85
Sex of respondent households (%)	82.5		17.5			

3.1.2 Educational status

Education is a key for technology adoption and sustainable development. Educational status of the respondent farmers was showed that 40.8% scored grade 5th to 8th, while only 15% were illiterate. About 3.3% of the respondents were above 12th grade.

Table 4. Educational status

Status	Respondents`	
	Frequency	Percent
Illiterate	18	15.0
Read and write	7	5.8
1st – 4th	24	20.0
5th – 8th	49	40.8
9th - 12th	18	15.0
Above 12 grade	4	3.3

3.2 Household labor contribution for smallholder poultry production

The greater labor forces for smallholder agricultural production system that accommodate huge job opportunities were drive from the household. Smallholder poultry production was among the one that provide employment opportunity to rural households. The different labor division of household families (Figure 2) showed that, greater labor contribution for family poultry feeding, watering and house cleaning were made by women (61.3%) and then by the children (27.7%). This indicated the youth; especially females contribute more for smallholder poultry production in the studied area. In Sub-Saharan Africa (SSA) smallholder farmers are the primary producers of agricultural outputs. They account for about 80% of all the farms in SSA. They directly employ about 175 million people, and about 70% of smallholders are women (Africa Agriculture Status report, 2014).

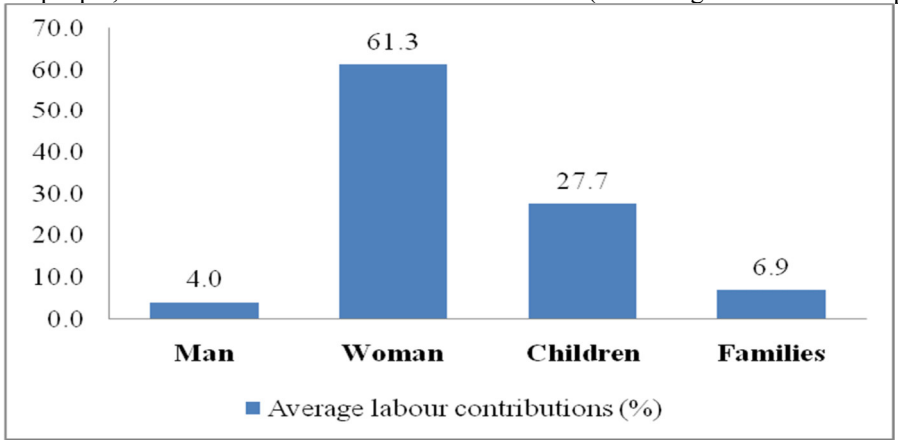

Figure 2. Labor contributions for smallholder poultry husbandry

3.3 Chicken flock size and type per household of study Woredas

Chicken flock size and type per household in the study Woredas presented in Table 3. The average numbers of chicken were 10.49±1.19 and 12.32±0.75 for Wondogenet and Shebedino woredas, respectively. Significantly higher (P<0.01) numbers of local chicken were found in Shebedino than Wondogenet woreda. On the contrary, the result showed that, Wondogenet woreda has large number (P<0.05) of exotic chicken than Shebedino woreda. This might be due to situation of Wondogenet woreda to the nearby city of Hawassa that enables for accessing of technologies. The cock to hen ratio is 1:2.15 for Wondogenet and 1:2.12 for Shebedino woredas.

Table 5. Chicken flock size and types per household in Wondogenet and Shebedino woredas

Chicken flock size/HH	Wondogenet (n=41)		Shebedino (n=79)		Total (N=120)		Sign
	%	Mean±SE	%	Mean±SE	%	Mean±SE	
Number of chicken	30.6	10.49±1.19	69.4	12.32±0.75	100.0	11.69±0.64	Ns
Local male	23.1	1.8±0.0.2	76.9	3.11±0.31	100.0	2.67±0.22	**
Local female	25.0	4.05±0.0.43	75.0	6.16±0.38	100.0	5.45±0.30	**
Exotic male	60.4	1.49±0.44	39.6	0.51±0.1	100.0	0.84±0.17	**
Exotic female	57.0	2.98±0.95	43.0	1.16±0.26	100.0	1.78±0.37	*
Hybrid male	6.7	0.05±0.05	93.3	0.35±0.09	100.0	0.25±0.06	*
Hybrid female	10.5	0.25±0.15	89.5	1.08±0.25	100.0	0.80±0.18	*

Note: HH=Household, n=Woreda sample size, N=Total sample size, SE=Standard error of means

3.4 Chicken property right and sale

In most cases of family poultry, the women owned and managed the birds and controlled the cash from the sales. Indigenous chicken are a means of investment to the welfare of women and children in traditional, low-input farming systems in the tropics (Dana et al., 2010; Okeno et al., 2012). The result of this survey was also revealed that woman ownership and selling power was 49.5% and 75% of the respondent farmers, respectively. However, 40.4% of the respondent chicken household consumption was determined largely by family members. According to (Tadelle and Ogle, 2001), in addition to the small amount of cash income they provide, scavenging chickens have nutritional, cultural and social functions.

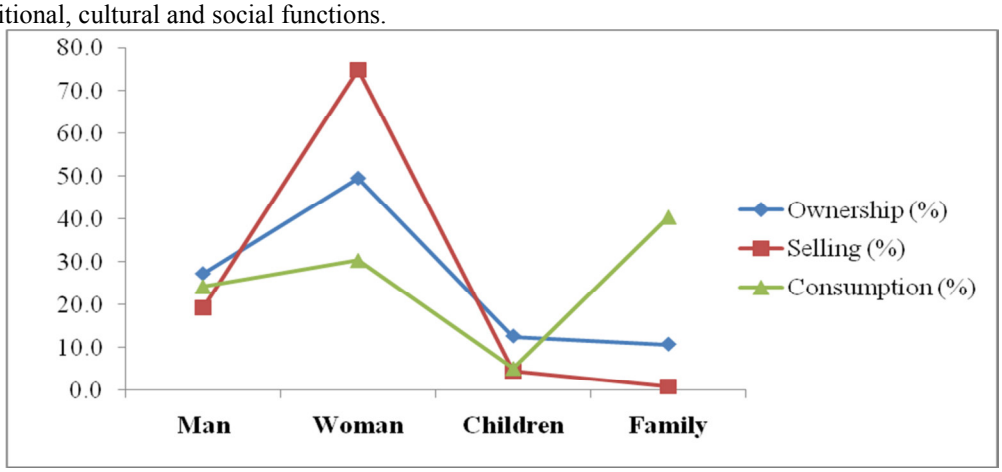

Figure 3. Chicken property right and sale

3.5 Housing system

Poultry production system in Ethiopia is an indigenous and integral part of the farming system that ranges from nil input traditional free ranges to modern production system using relatively advanced technology. Smallholder farmers in Ethiopia keep birds for household consumption, sale and reproduction purposes including other social and cultural roles (Tadelle et al., 2003). Most of the respondent farmers, 60.5% (Table 4.), were shared their house with chicken, while 24.6% and 7% of the respondent farmers were used simple shade and proper chicken house for sheltering, respectively.

Table 6. Housing system

Housing type	Percent
sharing with family	60.5
Simple shade	24.6
Proper chicken house	7.0
Others	7.0
None	0.9

3.6 Smallholder poultry feed resources and feeding practices

3.6.1 Land allocated for crop cultivations

Crops grown and their by-products can be used as a potential source of feed for smallholder poultry farmers. There are two cropping seasons of the short rainy season (Belg) from February to April and the long rainy season (Meher) from June to September. The major crops cultivated by smallholder farmers were maize (87.3%), Ensete ventricosum /enset (77.1%), coffee (65.3%), haricot bean (55.9%), potatoes' (17.8%), tomato (14.4%), linseed (10.2%) and cabbage (9.3%) of the respondents. The potentially available feed resource of the areas could be used efficiently for family poultry feeding.

Table 7. Land allocated for crop cultivations

No.	Crop types cultivated	Land allocated (% respondent)	No.	Crop type cultivated	Land allocated (% respondent)
1	Cereals		4	Root and Tuber	
	Wheat	2.5		Sweet potato	17.8
	Barley	0.8		Potato	17.8
	Teff	3.3		Taro	0.0
	Maize	87.3		Yam	0.0
	Sorghum	1.6		Cassava	0.0
	Rice	0.0		Zinger	0.0
	Oat	0.0		Enset	77.1
2	Pulse		5	Vegetables	
	Haricot bean	55.9		Onion	0.8
	Faba been	0.8		Garlic	0.0
	Field Pea	0.8		Carrot	0.0
	Lentil	0.0		Cabbage	9.3
	Chick pea	0.0		Tomato	14.4
3	Oil crops		6	Fruit and Cash crops	
	Linseed	10.2		Coffee	65.3
	Nouge	0.0		Avocado	8.5
	Sesame	0.0		Mango	1.8
	Safflower	0.0		Banana	7.7

3.6.2 Poultry feed supplement and feeding periods

Smallholder farmers and small scale producers from different corners of the country will have limited access to formulated rations. Purposeful feeding of chicken in confinement practiced by 65.8% of smallholder farmers. Also 99.2% of the respondent were provide supplement to their chicken. Fikre (2001) also suggested that even if scavenging provides the basal feed, almost all the chicken owners provide supplementary feeds such as wheat, maize and sorghum. These cereal grains are home produced with some owner's purchase from the market. The daily grain offered per bird is variable and appears to be offered only during the time of harvest.

Majority of the respondent farmers were provided the available feed supplement ingredients during different periods of the day. The potential supplementary feed resources used by smallholder poultry farmers were indicated in Table 6 that maize comprises about 17.85±2.21, household scraps 10.96±1.36, cereal debris 9.05±1.08 and wheat 11.92±2.21gram per chicken per day. According to Tadelle (1996), 30% production was attained from local chickens by supplementing 15g maize and 15 gram noug (G. abyssinica) cake/bird/day in the short rainy and dry seasons. The same author confirmed that supplementation of 30 gram maize/bird/day resulted a 28% production increment. The author also adds a finding of 20% more production was attained with the supplementation of 30 gram nouge seed cake/ bird/day on the same season. None of the respondent farmers were provide oat grain, meat and bone meal, and salt as a supplement. Non-supplemented local birds under a similar environment produced only about 14% from scavenging only (Tadelle, 1996). The feed offered by almost all rural poultry producers were entirely incomplete, unbalanced and inadequate.

Table 8. Poultry feed resource and feeding

Supplementary feed ingredients	Provision periods (% of respondents)			Average estimated offer (gm/chicken)
	Morning	Afternoon	Evening	
Balanced ration	31.8	29.2	16.7	10.84±2.43
Wheat grain	59.2	53.3	42.5	11.92±2.21
Maize grain	95.8	94.2	82.5	17.85±2.21
Barley grain	9.2	7.5	9.2	0.84±0.47
Oat grain	0.0	0.0	0.0	0.0
Cereal debris	65.8	65.8	57.5	9.05±1.08
Household scraps	80.8	77.5	52.5	10.96±1.36
Bran's	6.7	6.7	2.5	1.67±0.8
Oil seed cake	0.8	0.8	0.0	0.0
Bone meal	0.0	0.0	0.0	0.0
Meat meal	0.0	0.0	0.0	0.0
Salt	0.0	0.0	0.0	0.0
Others (CaCo3, ...)	4.2	4.2	4.2	0.34±0.17

3.6.3 Status of seasonal poultry feed resource availability

Most of the respondent farmers were challenged by seasonal feed shortage. The seasonal feed status showed (Figure 4) that, severity of feed shortage was high from April to September, that mean during the wet season of the year, 89.1% of the respondent farmers' chicken feed scarcity was aggravated. According to Solomon (2008), there is deliberate supplementation of chicken during harvesting of crops (October to March) though the quantities gradually decrease from June to August in which scavenging is the only sources of feed for back yard poultry. Similarly, the result of the study revealed that, there are sufficient feed resources were available from January to March and surplus during November and December of the year. Therefore, smallholder poultry farmers need to apply a means of feed scarcity coping mechanisms, by using the available surplus feed resources for wet seasons of the year.

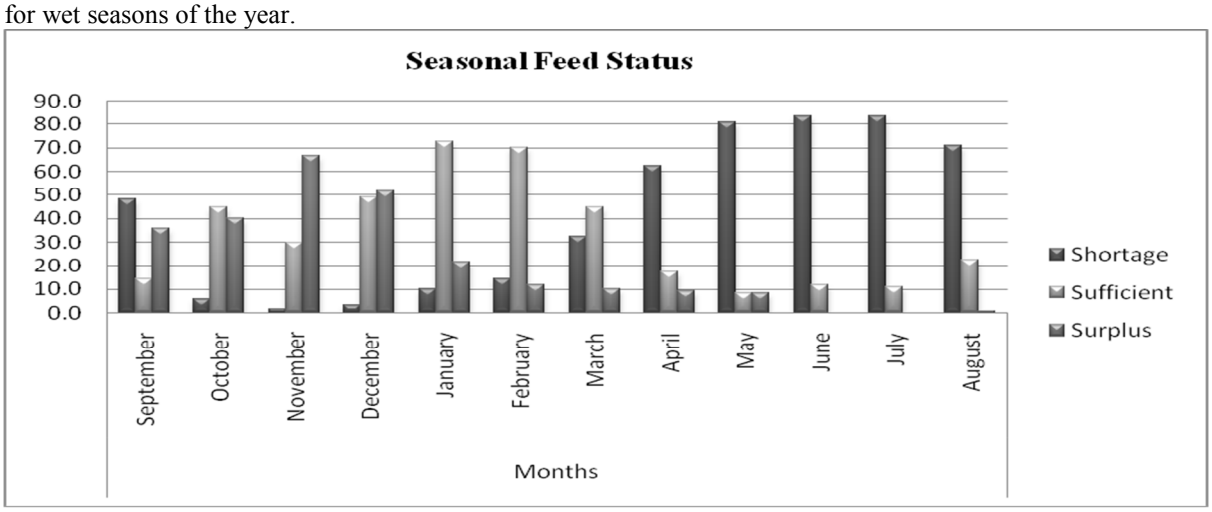

Figure 4. Status of seasonal poultry feed resource availability

3.6.4 Feeding system

The respondent farmers of 50.8% were provide supplement in the morning before scavenging, while 16.7% were provide at the evening after scavenging. About 10.8% and 10.0% of the respondent were provide supplement any time during day times and in the afternoon while scavenging, respectively (Table 7). Majority of the smallholder farmers about 79.0% were provide supplementary feeds on the bare ground and 12.6% in a feeder. About 87.8% of the respondent farmers were practiced group feeding while the remaining 12.2% feed separately to different classes of chicken. According to, Alemu (1995); Alemu and Tadelle (1997), one of the main reason for low productivity of poultry production in Ethiopia is the poor feeding system. The basis for supplementary feeding of chicken of the smallholder farmers were about 54.6% for egg production, 4.2% for meat yield, 27.7% for both egg and meat yield and 7.5% egg yield and broodiness.

Table 9. Feeding system

Feeding Systems	Respondent percent
Time of supplementations (%)	
In the morning before scavenging	50.8
In the evening after scavenging	16.7
Any time during day times	10.8
In the afternoon while scavenging	10.0
Combination of above	9.1
Way of provision (%)	
On the bare ground	79.0
In a feeder	12.6
Combination of above	7.6
Way of feeding (%)	
Group feeding	87.8
Separate to different classes	12.2
Basis for supplementation (%)	
Egg yield	54.6
Meat yield	4.2
Egg and meat yield	27.7
Broodiness/during incubation	0.8
Egg yield and broodiness	7.5
Age	0.0

3.6.5 Priority of poultry feed supplementation at different seasons

Feed deficiency and malnutrition weakened the birds and made them more vulnerable to predators and also increased their susceptibility to disease. Priority of smallholder poultry feed supplementation during different seasons of the year were presented on Table 8. As previously stated that feed scarcity was aggravated during wet seasons of the year. Scavenging feed resource is a base for village chicken, which is not constant and depends very much on both the season of the year and the prevailing rainfall (Tadelle and Ogle, 1996; Alemu and Tadelle, 1997). Smallholder farmers of the respondent were provide first priority of layers supplementation during long rainy season (70.9%), second during short rainy season (53.8%), third during short dry season (64.1%) and fourth rank during long dry season (65.0%) of the year. Similarly, chicken feed supplementation priority of the respondent farmers was ranked first during long rainy season 79.3%, 67.5%, 77.3% for pullet, cock and chicks, respectively.

Table 10. Priority of poultry feed supplementation at different seasons

Season of Supplementation	Respondents` rank (%)			
	1st	2nd	3rd	4th
Layer short rainy season	0.9	53.8	25.6	19.7
Layer short dry season	14.5	17.9	64.1	3.4
Layer long rain season	70.9	14.5	2.6	12.0
Layer long dry season	13.7	13.7	7.7	65.0
Pullet short rainy season	3.4	57.8	20.7	18.1
Pullet short dry season	6.0	31.0	52.6	10.3
Pullet long rain season	79.3	6.0	3.4	11.2
Pullet long dry season	16.4	5.2	23.3	55.2
Cock short rainy season	5.1	53.0	16.2	25.6
Cock short dry season	7.7	23.9	57.3	11.1
Cock long rain season	67.5	18.8	4.3	9.4
Cock long dry season	15.4	5.1	23.1	56.4
Chick short rainy season	5.4	59.5	11.7	23.4
Chick short dry season	6.3	17.1	72.1	4.5
Chick long rain season	77.3	7.3	2.7	12.7
Chick long dry season	10.8	16.2	13.5	59.5

3.7 Feed scarcity coping mechanisms

Feed scarcity coping mechanisms were showed in Table 9. As the Table indicates, most of the respondent farmers (99.2%) were practiced scavenging feeding. Family poultry producer farmers were faced high feed scarcity particularly during the wet season of the year. Smallholder farmers were practiced different coping

mechanisms of feed scarcity. Respondent farmers were tackled poultry feed scarcity by feeding enset by-products of about 30.8%; by feeding of food left over and household wastes of about 13.3%, by feeding bran from market 8.3%, by using feed stored during winter season 7.5% and by purchasing crop by products at surplus time 5%. According to Tadelle (1996), the main feed sources for the village chicken in Ethiopia is scavenging including house wastes, cereals and their by-products, pulses, roots and tubers, oilseeds and shrubs.

Table 11. Feed scarcity coping mechanisms

Copping Systems	Respondent`s percent
Feed scarcity coping mechanisms (%)	
Feed enset by product (amicho meal, bulla, Kocho), sweet potatoes and green leaves	30.8
Feeding food left-over and household wastes	13.3
Feeding bran from market	8.3
Used feeds stored during winter season	7.5
Purchase crop by product at surplus time (during cheap price time) for rainy season	5.0
Combination of above	35.1

Using available green feeds and non-conventional feed resources

Smallholder farmers were used the available major green feeds and non-conventional feed resources like growing worms and insects, and by products (Table 10). Scavenging feed resources of backyard poultry comprises of seeds, plant materials, worms insects and unidentified materials which are found around the home (Tadelle and Ogle, 1996; Tadelle and Ogle, 2000). According to Fisseha et al., (2010) and Solomon (2008), the majority of chicken in Ethiopia under scavenging system is maintained with little input of housing, health care and scavenging as sole sources of feed.

Table 12. Available green feeds and non conventional feed resources

Feed types	Percent of respondent
Using available major green feeds (%)	
Cabbage leaf and grass	42.5
Vegetable, grass, weeds	35.8
Enset by-product, cabbage leaf, grass	16.7
Alfalfa, cabbage, grass	5.0
Using non-conventional feed resources (%)	
Green leaves	25.0
By-products	22.5
Growing worms and insects	10.0
By-products, Growing worms and insects	20.0
Green leaves, by-products	8.3
Green leaves, by-products, growing worms and insects	5.0
Growing worms and insects, by-products	3.3
Didn't use any	5.8

3.8 Farmers interest to expand poultry production

Family poultry has a paramount importance's in low income and food deficient countries. As indicated in Table 11, majority of the respondent farmers have an interest to expand their chicken production for getting additional income (32.5%), due to small capital and area required (17.5%), for their economic importance (16.7%) and to use as income source for financial problem and household consumption (15.8%).

Table 13. Interest of farmers to expand poultry production

Reasons for expanding poultry farm (%)	Respondent`s percent
To get additional income	32.5
Require small capital and area	17.5
Due to their economic importance	16.7
To use as income source for financial problem and household consumption	15.8
To produce more egg and meat	9.2

3.9 Challenges and trends of smallholder poultry production scenario

Smallholder poultry farmers have faced different challenges. Among which disease, feed and predator problems are the most. Respondent farmers of about 37.7% were challenged by disease, predator and thief; while 21.9%

faced disease problems and 13.2% disease and feed scarcity (Table 12). About 63.2% of the respondents have exotic chicken production trends. Based on feather color type of exotic chicken, 49.3% and 50.7% of the respondent were reared white and red feather exotic chicken types, respectively. Among these respondent farmers, 51.3% and 48.7% were got good and very good performance of exotic chicken reared, respectively.

Table 14. Challenges and trends of smallholder poultry production scenario

Challenges and trends of chicken production	Respondent`s percent
Challenges of poultry production (%)	
Disease, predator and thief	37.7
Disease	21.9
Disease and feed scarcity	13.2
Others	27.2
Trend of exotic chick production (%)	
Yes	63.2
No	36.8
Breed type used based on feather color (%)	
White feathers	49.3
Red feathers	50.7
Production performances (%)	
Good	51.3
Very good	48.7

3.10 Feed resources and marketing constraints of smallholder poultry producer farmers at different seasons

Smallholder poultry producer were faced constraints at different seasons of the year. Feed resources and marketing constraints were indicated in Table 13. Among the respondent farmers of 44.9% were faced very high shortages of scavenging resources during short dry season. Shortages of grain supplement were high during short rainy season (46.2%) and very high during long rainy season (40.7%). Disease outbreaks were also identified very high during long rainy season (54.6%). Very high predator attacked were occurred during long rainy season (55.1%) and then during short dry season (30.8%). During long rainy season there were very poor hatchability (65.5% of respondents) and also very high chick mortality (77.9% of respondents). Smallholder farmers of (43.1%) were faced very low market price of eggs and chicken during long-rainy season of the year.

Table 15. Seasonal constraints of feed resources and marketing of smallholder poultry farmers

Constraint at different seasons	Severity of the constraints				
	No	Very high	High	To some extent	Little
Shortage of scavenging resources					
Short-rainy season	0.8	2.5	52.2	40.7	3.4
Short-dry season	2.5	44.9	6.8	25.4	20.3
Long-rainy season	3.4	43.2	5.9	28	19.5
Long-dry season	7.6	11	16.9	9.3	55.1
Shortage of grains supplement					
Short-rainy season	10.1	5	46.2	32.8	5.9
Short-dry season	0	25.4	16.9	39	18.6
Long-rainy season	0	40.7	14.4	28	16.9
Long-dry season	1.7	23.5	16.8	1.7	56.3
Low market price of eggs					
Short-rainy season	21.1	2.8	17.4	32.1	26.6
Short-dry season	20.2	24.8	35.8	11	8.3
Long-rainy season	20.2	43.1	20.2	14.7	1.8
Long-dry season	64.2	4.6	3.7	19.3	8.3
Low market price of chicken					
Short-rainy season	0	7.3	10.1	45.9	36.7
Short-dry season	0	27.5	29.4	22	21.1
Long-rainy season	0	43.1	28.4	23.9	4.6
Long-dry season	48.6	4.6	15.6	11.9	19.3

4. Conclusion and Recommendations

Majority of the smallholder farmers were provide supplementation of available feed resources. The feed offered by almost all family poultry producers were entirely incomplete, unbalanced and inadequate. The most challenge faced by smallholder poultry producers were disease, feed and predator problems. In addition to ethno veterinary practices for poultry disease treatment, respondent farmers were practiced different poultry feed scarcity coping mechanisms of feeding enset by-products, household wastes, bran from market, available major green feeds and non-conventional feed resources like growing worms and insects, and by products. This could be an opportunity and potential to design and implement interventions, aiming at improving poultry feed resources availability and feeding system technologies that enhance production and productivity of chicken. Therefore, efforts have to be made to improve productivity of chicken in a sustainable way through transferring the existing feed resource bases and feeding practices.

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