



Assessment of Locally Available Poultry Feed Resources and Their Chemical Analysis in Central Zone of Tigray; Ethiopia

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Background: In case of Ethiopia, there is a large demand of poultry products (meat and eggs); this phenomenon hinders to commence and expansion of modern poultry farms throughout the country; particularly in pre-urban and urban areas. Progressively population growth and improvement of people income is a driving force. Food self-sufficiency is to be achieved and combat malnutrition in developing countries, particularly in Ethiopia, there is a need to give due attention to poultry production. Whereas, poultry production in rural areas of Ethiopia is dominated with traditional practices; which makes the sector to remain with low production and productivity. Therefore, it needs such interventions to enhance production and productivity of poultry.

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Objective: To assess the major locally available poultry feed used as supplement for poultry in smallholder farmers and to undertake their chemical analysis

Methodology: Five districts were selected purposively from central zone of Tigray Regional State, northern Ethiopia and considering their road accessibility by giving equal chance for farmers who have different chicken flock size.

Results: Based on the ranking index, the major locally available feed resources in the study arrears were maize, sorghum, wheat, barley and hanfets. In addition to this, based on the rapid assessment conducted in three towns (Axum, Adwa and Enticho) of central zone commercial poultry feed, Wheat bran, wheat middling, noug seed cake, sesame seed cake, limestone and salt were available in the hand of animal feed traders. According to the lab result, the grains where farmers supplemented to their chickens were considered as energy feeds.

Conclusion: Those grains may not satisfy the protein demand of chickens. In this case, those chickens which are allowed to scavenge around the homestead may have a probability of getting additional protein-rich feed through scavenging. Whereas, farmers who do not give the chance to scavenge their chicken should supplement the protein-rich feed resources purchasing from the local market.

Recommendation: conducting experimental research by using list cost feed formulated from locally available feed resources to evaluate its importance on poultry production enhancement is mandatory.

Keywords: Respondents; districts; chicken; supplementary; flock.

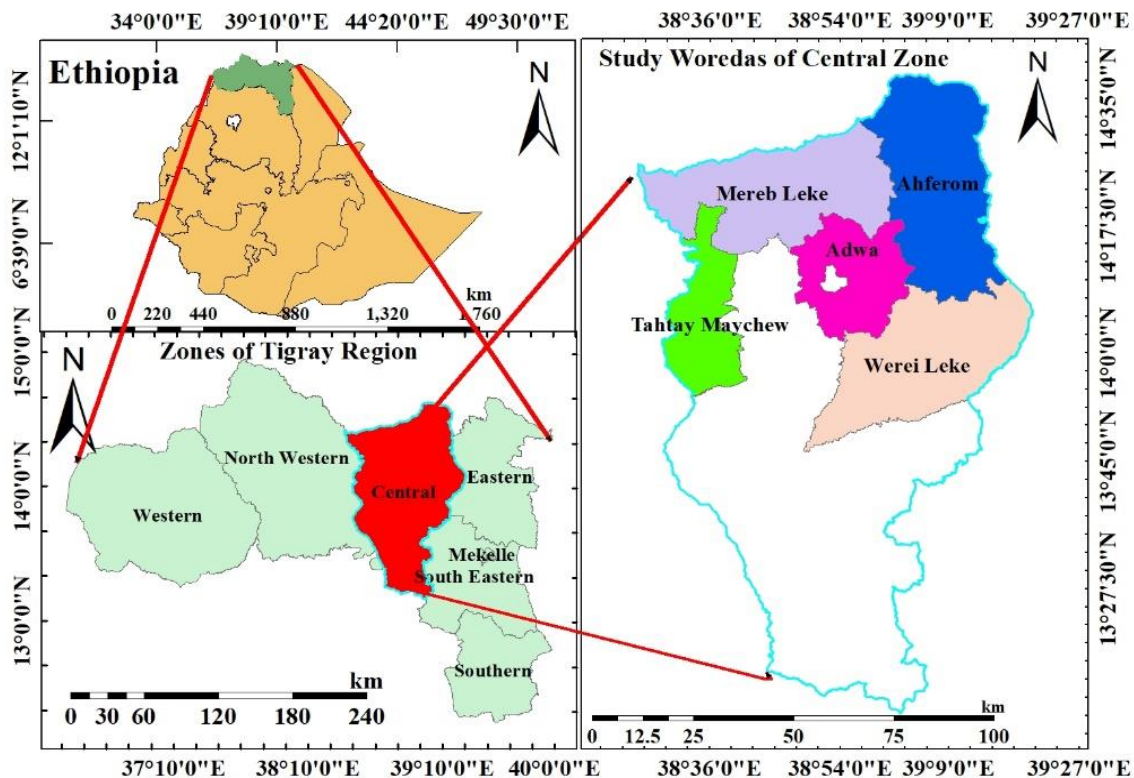
1. INTRODUCTION

Poultry meat and eggs are among the animal source foods most of the time eaten worldwide level [1]. In case of Ethiopia, there is a large demand of poultry products (meat and eggs); this phenomenon hinders to commence and expansion of modern poultry farms throughout the country; particularly in pre-urban and urban areas [2,3]. Expansions of farms have a crucial contribution to create job opportunity, improving family nutrition, as well as increasing women with economic income [4]. Rising income and urbanization in many parts of the developing world leads a growing demand for animal products. The poultry sector has a 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. Progressively population growth and improvement of people income is a driving force. Food self-sufficiency is to be achieved and combat malnutrition in developing countries, particularly in Ethiopia, there is a need to give due attention to poultry production [5]. In fulfilling the protein requirements of people, source of poultry products play a significant role. Poultry meat is healthier than other meats; because it contains less overall fat and more beneficial mono-saturated fats [2].

The total chicken population in the country is estimated to be 56.53 million and of these 94.3 % indigenous which are mainly kept by small holder farmers in scavenging environments CSA [6]. From the economic perspective, around 70% of the expense of poultry production is feed; which indicates economic feasibility of poultry production is mostly a combination of quality and quantity of nutrients with proper science of feeding. Kebede [7] reviewed that, 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 and the potential supplementary feed resources used by small holders poultry producers are maize grain, household scraps, cereal debris and wheat Yirgu et al. [8]. Feed is a crucial commodity in which poultry species compete; and it is major pillar towards ensuring the economic, social and environmental goals of poultry production [9]. Similarly in our case poultry feed is a big challenge, and it needs an intervention to minimize the production gap. Therefore, this work was aimed to assess the major locally available poultry feed resources used for supplementation of chickens and their nutritional content as well as considering protein rich raw materials found in the local markets in the case of central zone of Tigray.

2. MATERIALS AND METHODS

2.1 Study Area



Map 1. The study was conducted in selected districts of Central Zone of Tigray regional State, northern Ethiopia

2.2 Sampling Procedure

Random and purposive sampling was applied to select the districts, considering agro ecologies. The selected districts were Ahferom, W/Lheke, Adwa, M/Lheke and T/Maichew. From each districts two Kebelles (Villages) were selected. Then, respondents were selected randomly in each Kebele (village) by giving equal chance for those farmers with different flock size, husbandry systems, and other related practices. Hence, a total of 194 village chicken owner households were interviewed using a pre-tested structured questionnaire. In addition to this, the local markets were also assessed focusing on the feed traders in the towns of Axum, Adwa and Enticho.

2.3 Data Analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS)

software version 20 [10], and simple descriptive statistics and ranking index were applied to compare the means.

3. RESULT AND DISCUSSION

3.1 Summary Information of the Respondents

Socio-economic characteristics of the respondents: The total number of respondents from the five districts were 194, of which 52.5%, 47.5% were male and female respectively. In terms of household heads, 89.7% were male and 10.3% were female (Table 1). According to the respondents in the study areas, the responsibility for rearing chickens was predominantly associated with women; however, this phenomenon has changed over time. The current study aligns with Assefa et al. [11], who reported that 91% of the respondents were male-

headed households in the Delo district, Jimma Zone, north-western Ethiopia. In contrast, this result contradicts the findings of Getu and Birhan [12], who reported that 57.8% of respondents in North Gondar Zone were female.

The educational status of the respondents in the current study was as follows: illiterate (41.2%), religious school (7.2%), able to read and write (5.2%), primary school (39.2%), high school (6.7%), and college and above (0.5%), as shown in Table 2. The current results contradict with Getu & Birhan [12], who reported that the majority of respondents were illiterate (73.3%), able to read and write (16.7%), and that 6.7% and 3.3% had completed the first and second cycles of primary school, respectively, in North Gondar Zone, Ethiopia. The current results showed both similarities and differences compared to those reported by Assefa et al. [11], who found that 25% of respondents were illiterate, while literate respondents comprised 19.4%, 23.9%, 25.6%, and 6.1% across the categories of able to read and write, primary first cycle, primary second cycle, and high school respectively. The differences may be attributed to increased awareness regarding education and variations in

access to educational infrastructure across the study areas.

Poultry feed resources of smallholder farmers and feeding practices: The major poultry feed resources in the assessed districts were maize grain, sorghum grain, wheat grain, barley grain, and hanfets grain (Table 3). In addition, some of the scavenging poultry feed included insects, grasses & herbage, sand, and feces (Table 4). Most of the respondents allowed their chickens to scavenge, with 94.8% (184), whereas 5.2% (10) respondents were not allowed their chickens to scavenge around the homestead. Based on a rapid assessment conducted, commercial poultry feed, wheat bran, wheat middling's, noug cake, sesame cake, limestone, and salt were available in the hand of animal feed traders in the urban and pre-urban areas of the central zone. The current results were consistent with those of Mazengia et al. [13], Tadesse [14], Bezabih & Zewdu [15] and, Bekele [16] who reported that the most common feed supplements for chickens at the farmer level are sorghum, maize, wheat, hanfets, and kitchen leftovers. Due to their production accessibility in different areas, there is a difference in priorities, as reported by Bekele [16], Abera & Manjura [17].

Table 1. Sex and household head of respondents

Variables	Respondents			
	Male (%)		Female (%)	
	Frequency	percent	Frequency	percent
Sex of respondents	101	52.1	93	47.9
Household head	174	89.7	20	10.3

Table 2. Educational status

Status	Respondents	
	Frequency	Percent
Illiterate	80	41.2
Religious school	14	7.2
read and Write	10	5.2
Primary school(1-8)	76	39.2
High school (9-12)	13	6.7
Collage and above	1	0.5

Table 3. Major cereal grains and their ranking index as sources of poultry feed

Source of feed	Index	Rank
Maize	0.36	1
Sorghum	0.32	2
Barley	0.14	3
Wheat	0.12	4
Hanfets	0.05	5

Table 4. Some scavenging poultry feed recourses and their ranking index

Scavenging items	Index	Rank
Insect	0.45	1
Grasses & herbage	0.38	2
Sand	0.13	3
Faces	0.04	4

Table 5. Major poultry feed ingredients and lab result of their nutritional content

Ingredients	Parameters									
	DM	ME	CP	Lys	Meth	M+C	EE	CF	Ca	P
Maize	90.01	3905.13	11.85	0.22	0.20	0.35	4.04	2.08	0.04	0.30
Sorghum	89.86	3920.79	9.75	0.23	0.16	0.35	5.65	2.78	0.03	0.30
Barley	92.30	3608.21	11.33	0.38	0.20	0.42	5.68	5.54	0.07	0.36
Wheat	90.81	3842.68	12.65	0.35	0.18	0.48	4.65	2.65	0.07	0.35
Hanfets	91.49	3715.35	11.25	0.37	0.19	0.45	4.39	3.94	0.07	0.35
Noug cake	94.54	1617.74	21.09	0.97	0.63	0.11	7.2	28.19	0.33	1.08
Sesame cake	93.76	3679.84	43.10	1.11	1.24	2.17	7.99	3.32	2.31	1.29

Frequency of feed supplementation and feeding condition: Feed supplementation was common among all respondents; however, the frequency of supplementation was varied among farmers. Out of the total respondents, 93.3% (181) supplement every day, 4.1% (8) every three days, and 2.6% (5) were unknown. Most farmers were provide feed for their chickens on bare ground 86.6% (168), while the remaining 13.4% (26) were used different feeders, such as earth plots and plastic materials. The frequency of feed and the feeding system for chickens under traditional village production in Ethiopia are not planned Yosef et al. [18] and, Abera & Manjura [17]. The current results were aligned with those reported by Reso & Blay [19], Bekele [16] and Tadesse [14].

Chicken flock size in the study area: The respondents participated in the interviewee were owned different flock size of chickens. Minimum 1 chicken and maximum 91 chicken with a mean of 7.88 ± 0.86 (SEM) chickens per household. This result was in line with Kassa et al. [20] reported that overall mean number of chickens per household was 7.4 in western Amhara, Ethiopia and Assefa et al. [21] also reported that the overall mean flock size was 7.93 in Arbegona Woreda, Sidama Zone, southern Ethiopia. Whereas, the current report was lower than the report of Resom & Belay [19] the overall chicken flock size of the study area was 17.66 in Eastern and South eastern zones of Tigray, Northern Ethiopia In addition, Assefa et al. [11] the overall mean flock size was 10.9 in Dedo district Jima Zone, south west Ethiopia and Salo et al. [22] reported that overall mean flock size of chickens

per household was 17.23 in Lemo district Hadiya zone, Ethiopia. On the other hand the current result was higher than the national average chicken flock size 4.1 reported by CSA [6].

4. CONCLUSION AND RECOMMENDATIONS

The major supplementary feed resources for chickens available in the study area were almost all energy rich feeds. Those feed grains may not be satisfied the protein demand of chickens. In this case those chickens which allowed to scavenge around the homestead may have a probability to get additional protein source feeds through scavenging. Whereas, farmers who do not give chance to scavenge their chicken should supplement with protein rich feed resources from the local market. In addition it is important farmers to consider nutritional content of the feed sources available in their localities. Therefore, Farmers can formulate a moderate chicken feed with an addition of some locally available protein rich raw materials. Since the major sources of poultry feed found in the hand of farmers are energy rich, then, it is mandatory to mix with some protein rich raw materials available in the local market. Based on the rapid assessment revealed that wheat bran is dominantly available in the local market which it can optimize the demand of the chicken above 50% except for the demand of calcium. Protein rich feed materials were available in the hand of feed traders in the urban and pre-urban areas. Feed formulation and conducting experimental research is a mandatory to evaluate the productivity

enhancement of poultry by using feed formulated from locally available feed resources.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. FAO. Meat market review: Over view of global meat market development in 2020. March 2021. Rome; 2021.
2. Geleta A. Review on poultry production, processing, and utilization in Ethiopia. *Int J Agric Sc Food Technol*, 2022; 8(2): 147-152. DOI:<https://dx.doi.org/10.17352/2455-815X.000156>.
3. Feed the Future (FTFE). Value chain activity: Partnering with the agriculture growth program: Poultry market price brief 01. Life of project report, January 2017-June 2022; 2022.
4. FAO. Poultry Sector in Ethiopia. FAO Animal production and health livestock country reviews. No. 11. Rome; 2019.
5. Bezabih A. effect of feeding different levels of dried tomato pomace on the performance of Rhode Island Red grower chicks. *International Journal of Livestock Production*, 2013;4:35-41.
6. CSA (Central Statistics Agency). The federal democratic Republic of Ethiopia. Agricultural Sample Survey. Vol. II. Report on Livestock and Livestock Characteristics (Private Peasant Holdings). Addis Ababa, Ethiopia: CSA; 2017.
7. Kebede M. Poultry production systems and its feed resources in Ethiopia: A research review. *Sci. J. Ani. Sci.* 2016;5(2):220-227.
8. Yirgu T, Tesfaye E, Assefa G. Poultry feed resources and coping mechanisms of challenges in Sidama Zone, Southern Ethiopia. *Food Science and Quality Management*. 2017;60:77-86. Available:www.iiste.org.
9. Makkar H. Animal nutrition in a 360-degree view and a framework for future R&D work: towards sustainable livestock production. *Animal Production Science*. 2016;56:1561-1568. Available:<http://dx.doi.org/10.1071/AN15265>.
10. SPSS (Statistical Package for Social Sciences) SPSS 20.0 for Windows User's Guide Release; Chicago, SPSS Inc; 2011.
11. Assefa M, Bekuma A, Tadesse T. Characterization of village chicken production and husbandry practices in Dedo District, Jimma Zone, South West Ethiopia. *International Journal of Veterinary Science and Agriculture Research*. 2019;1(1):13-21. Available:www.ijvsar.com.
12. Getu A, and Birhan M. Chicken production systems, performance and associated constraints in North Gondar Zone, Ethiopia. *World Journal of Agricultural Sciences*. 2014;10(1):25-33. DOI: 10.5829/idosi.wjas.2014.10.1.1768.
13. Mazengia H, Siraw G, and Nega M. Challenges and prospects of village-based exotic chicken development strategy in Amhara Regional State, North-west Ethiopia. *Global Journal of Science Frontier Research Agriculture and Veterinary Sciences*. 2012;12. Available:<https://www.researchgate.net/publication/267069578>.
14. Tadesse A. Rural poultry production and health management practices in central zone of tigray, Ethiopia. *Scientific Journal of Animal Science*, 2013; 2(12):340-354. Available:<https://www.researchgate.net/publication/274640448>.
15. Bezabih M, and Zewdu A. Performance evaluation of local chicken at Enebsie Sar Midir Woreda, Eastern Gojjam, Ethiopia. *Global Journal of Agriculture and Food Sciences Research*. 2014;1(2):1-8. Available:www.gbjournals.org.
16. Bekele B. Assessment of locally available poultry feeds, feeding practices and health

- in Sidama Zone and Halaba Special Woreda in SNNPR. *Journal of Biology, Agriculture and Healthcare*, 2016;6(7):104-110.
Available:www.iiste.org.
17. Abera A, and Manjura M. Chicken feed resource and feeding trends in Konso Zone and Derashe special district, South Ethiopia. *Canadian Journal of Agriculture and Crops*. 2023; 8(2):44-53.
Available:https://creativecommons.org/licenses/by/4.0/.
18. Yosef K, Tarekegn K, and Abate Z. Feed and feeding practice of village chicken at Kafa and Bench Maji Zone, South West Ethiopia. *European Journal of Biological Sciences*. 2015;7(4):203-208.
DOI: 10.5829/idosi.ejbs.2015.7.04.1110.
19. Resom M, and Belay S. Chicken rearing practices in Tigray, Northern Ethiopia. *Asian Journal of Research and Review in Agriculture*. 2024;6(1):199-214.
Available:https://jagriculture.com/index.php/AJRRRA/article/view/96.
20. Kassa B, Tadesse Y, Esatu W, and Dessie T. Village chicken flock characteristics and performances in Western Amhara, Ethiopia. 2020: 1-11.
Available:https://doi.org/10.21203/rs.3.rs-31050/v1.
21. Assefa F, Tadesse T, and Dancho A. Challenges and opportunities of village poultry production in Arbegona Woreda, Sidama Zone, Southern Ethiopia. *Developing Country Studies*. 2015;5(11): 71-78.
22. Salo S, Tadesse G, and Hilemeskel D. Village chicken production system and constraints in Lemo District, Hadiya Zone, Ethiopia. *Poultry, Fisheries & Wildlife Sciences*. 2016;4(2):1-5.
DOI: 10.4172/2375-446X.1000158.

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