Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Management Practices and Breeding Objectives of Indigenous Chicken Keeping Farmers in Awi Zone, Amhara Regional State, Ethiopia

Ayana Birhanu

ayanabirhanu2011@gmail.com

Kabri Dehar University

Mengistie Taye

Bahir Dar University

Kefyalew Alemayehu

Bahir Dar University

Research Article

Keywords: breeding objective, indigenous chicken, selection criteria, management system

Posted Date: September 4th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10580039/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Understanding management practices and production objectives is crucial for designing sustainable breeding and improvement programs. This study aimed to characterize the indigenous chicken management systems and breeding objectives of farm households in three districts of the Awi Zone, Amhara Region, Ethiopia. A total of 180 chicken-owning households were randomly selected from nine peasant associations and interviewed using a semi-structured questionnaire. The collected data were analyzed using SPSS software. The results indicated that poultry housing was widely practiced, with 93.9% of households providing some form of shelter to protect chickens from predators, disease, theft, and adverse weather. Supplementary feeding was common, as 92.2% of households provided additional feed to improve egg production, meat yield, chick growth, and brooding performance. About 86% of households reported disease outbreaks, mainly due to limited access to vaccination services and poor poultry health management. The primary purpose of chicken keeping was income generation through the sale of live birds, followed by household consumption of meat and eggs and cultural or ceremonial uses. Farmers applied multiple criteria when selecting breeding stock. Egg production, body weight, and disease resistance were the most important traits for breeding hens, while body weight, comb type, plumage color, and disease resistance were emphasized for breeding cocks. Disease, predation, and feed shortage were identified as the major production constraints, highlighting the vulnerability of the free-ranging production system. Overall, the findings suggest improved health services, better housing, and targeted genetic improvement strategies to enhance indigenous chicken productivity.

1. Introduction

Indigenous chicken production is globally recognized as an effective strategy for wealth accumulation, poverty alleviation, and reducing malnutrition and hunger, particularly among resource-poor households [1]. According to CSA [2], the estimated chicken population in Ethiopia is 57 million, of which 78.85% are local chickens, 12.02% are crossbreeds, and 9.11% are exotic breed types. In Ethiopia, most rural communities manage indigenous chickens under scavenging systems due to diverse agro-climatic conditions that allow for the maintenance of various indigenous chicken breeds [3, 4].

However, the production performance of indigenous chickens is often poor, characterized by slow growth, late maturity, small eggs, low clutch sizes, broodiness, and high chick mortality [5–7]. The low production performances of local chicken breeds as managed by smallholder farmers might be influenced by husbandry practices such as housing, feeding, healthcare, and the efficiency of extension services toward improved management [8–10]. Additionally, the current changes in the world's climate, such as variations in humidity and temperature, have a significant impact on the availability of water and animal feed, trigger seasonal disease outbreaks, and modify the entire production system. Furthermore, the stability of the current poultry production systems has been severely challenged by increases in the market demand for animal products resulting from population expansion and urbanization, especially in the tropics [11–13].

Over recent years, the importation of exotic chicken breeds for commercial purposes has increased due to the rising local demand for chicken products, leading to a continuous flow of genes from exotic to

indigenous chickens, which in turn has led to the genetic erosion of indigenous breeds. The dilution of indigenous chickens by exotic breeds and uncontrolled breeding practices poses a significant threat to the existence of native chicken breeds on the smallholder farms, potentially leading to their extinction [14]. In this regard, safeguarding the genetic resources that are adaptive to the local environmental conditions and resilient to the changing climatic conditions is of paramount importance. Therefore, characterization and understanding of the local chicken production and management systems, production objectives, and trait preferences of smallholder farmers are critical for identifying the adaptive and genetic merits of indigenous chickens and for designing appropriate breeding strategies for their improvement and conservation [9]. Although related studies have been conducted in other parts of Ethiopia, information specific to the Awi Zone remains limited. This study provides additional evidence by documenting agroecology-based differences in trait preferences among smallholder farmers and showing how priorities vary between production and adaptation traits across environments. It also examines the balance between production objectives and selection criteria, reflecting farmers' decision-making processes. Based on these findings, the study offers context-specific considerations for the development of a breeding program for indigenous chicken in the Awi Zone, thereby contributing to the existing body of knowledge.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted in Awi Zone, Amhara Regional State, Ethiopia (Fig. 1). Topographically, Awi Zone is relatively flat and fertile, with elevations that vary from 1,200 to 3,100 meters above sea level. The average annual rainfall is 1750 mm, while the average monthly temperature ranges from 17 to 27°C [15]. This zone is crossed by about nine permanent rivers, which drain into the Abay River (Blue Nile); other water features include two crater lakes, Zengena and Tirba, and Zimbiri Marsh, which are located 5 km southwest of Addis Kidam.

2.2. Sampling Techniques and Sample Size Determination

Three districts were selected to represent the three different agro-ecological zones (highland, midland, and lowland). These districts, namely Banja, Dangila, and Jawi, were purposively selected from the highland, midland, and lowland, respectively, based on their potential for chicken production and accessibility. Further, discussing with the district agricultural office, considering the indigenous chicken population size, chicken production potential, and road accessibility, three peasant associations from each district were selected purposively for the survey. Finally, a total of 180 households (60 from each district) were selected using a simple random sampling technique (20 households per peasant association). The number of sampled households in the study area was determined using the formula described by Heinisch [16].

$$N = \frac{Z^2 * (p)(q)}{e^2}$$

Where: N = required sample size; Z^2 is the abscissa of the normal curve; e^2 = is the margin of error (± 0.05%, margin of error for confidence level of 95%). Accordingly, a total of 180 households were interviewed.

In addition, a total of nine Focus Group Discussions (one per peasant association, with a range of 8 to 10 discussants), were held to complement the questionnaire survey data. The discussants included youngsters, women, village leaders, and socially respected individuals.

2.3. Data collection

A semi-structured questionnaire survey was used for data collection. The questionnaire was designed to collect data on household characteristics, chicken management practices, chicken production objectives, replacement chicken selection criteria of indigenous chicken-keeping households, and indigenous chicken production challenges. Prior to data collection, the questionnaire was reviewed by experts and translated into the local language (*Amharic*) for ease of communication with the farmers. Further, it was pretested on 10 households in a community with similar socio-economic and production characteristics but outside the study area to check the clarity, relevance, and sequencing of questions. Based on feedback from the pretest, several revisions, including rephrasing unclear questions, adjusting the order of questions to improve logical flow, and refining response categories, particularly for trait preference rankings and management practices, were made.

In addition, focus group discussions focusing on the overall chicken production, history of chicken production in the area, major constraints of chicken production, and related issues, were held using a checklist and used to complement the questionnaire survey data. Secondary data on geographical locations and human and livestock populations were collected from the zone and district livestock offices.

2.4. Data Management and Statistical Analyses

The collected field data were organized and analyzed using MS Excel and Statistical Package for Social Sciences (SPSS) version 22. Preliminary data analysis, such as the normality test, was employed before conducting the main data analysis. Descriptive statistics, such as mean, frequency, and percentage, were utilized for the analyses and presentation of the data. The Pearson chi-square test was employed to compare the qualitative variables between different agro-ecologies. Ranking analyses were used for computing data on the rating variables, including farmers' trait preferences, selection criteria of breeding hens and cock, and the purpose of keeping chickens. Indexes were used to calculate data collected from ranking using weighted averages by using the formula as employed by Kosgey [17].

Index = Σ of [(3 * the number of interviewees ranked 1st) + (2 * the number of interviewees ranked 2nd) + (1 * the number of interviewees ranked 3rd)] given for a particular variable divided by Σ of [(3 * sum of

interviewees ranked 1st) + (2 * sum of interviewees ranked 2nd) + (1 * sum of interviewees ranked 3rd)] for all the variables considered.

3. Results and Discussions

3.1. Household Characteristics

The household characteristics of the interviewed indigenous chicken owners are presented in Table 1. From the total of interviewed households (180), 68.9% of them were male-headed, while the rest 31.9% were female-headed. Overall, most of the respondents were illiterate (34.4%), with occupation of farming (95%), and married (70.6%). The mean age and family size of the respondents were 45.03 ± 7.5 years and 5.51 ± 1.17 individuals, respectively.

Table 1
Household characteristics of local chicken keepers in different agroecologies of Awi zone

Parameter	Agroecology			Overall (N = 180)
	Highland (N = 60)	Midland (N = 60)	Lowland (N = 60)	
Sex of respondents, N (%)				
Male	41 (68.3%)	39 (65.0%)	44 (73.3%)	124 (68.9%)
Female	19 (31.7%)	21 (35.0%)	16 (26.7%)	56 (31.1%)
Educational Background, N (%)				
Illiterate	19 (31.7%)	15 (25%)	28 (46.7%)	62 (34.4%)
Read & Write	18 (30%)	20 (33.3%)	15 (25%)	53 (29.4%)
Grade 1 to 4	12 (20%)	13 (21.7%)	10 (16.7%)	35 (19.4%)
Grade 5 to 8	10 (16.7%)	12 (20%)	5 (8.3%)	27 (15%)
Grade 9 to 12 complete	1 (1.7%)	-	2 (3.3%)	3 (1.7%)
Occupation, N (%)				
Farmers	57 (95%)	57 (95%)	57 (95%)	171 (95%)
Construction	1 (1.7%)	1 (1.7%)	1 (1.7%)	3 (1.7%)
Unemployed	2 (3.3%)	2 (3.3%)	2 (3.3%)	6 (3.3%)
Marital Status, N (%)				
Married	42 (70%)	43 (71.7%)	42 (70%)	127 (70.6%)
Single	15 (25%)	12 (20%)	14 (23.3%)	41 (22.8%)
Widow	3 (5%)	5 (8.3%)	4 (6.7%)	12 (6.7%)
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age of respondent	45.95 ± 7.27	44.75 ± 7.07	44.38 ± 8.21	45.03 ± 7.5
Family size	5.32 ± 1.17	5.35 ± 1.26	5.86 ± 1.03	5.51 ± 1.17
N = Number of respondents				

3.2. Indigenous Chicken Management Practices

3.2.1. Poultry housing systems

As shown in Table 2, 93.9% of the respondents in the study area had some form of poultry housing. This high rate of poultry housing is likely due to its importance in protecting chickens from predators, theft,

disease transmission, and extreme weather conditions such as rainfall, sunlight, and winds. In specific housing arrangements, 43.2% of the respondents keep their chickens perched inside the main house, 16.6% of them house chickens in other animal shelters, 11.2% of them in the kitchen, and 6.5% on the veranda. In line with this, Shanku and Amanuel [18] reported that 50.55% of the respondents keep poultry on a perch at one corner of a common house in the Angecha and Damboya Districts of the Kembata Tembaro Zone, Southern Ethiopia. Only 22.5% of the respondents had constructed separate poultry houses in the study area. In contrast, previous scholars [19–21] reported separate poultry housing in regions such as North Gondar, North Shewa, Central Tigray, and the Lume district of the East Shewa zone in Oromia.

The lower percentage of separate poultry houses in the current study area may be attributed to factors such as small flock sizes, limited awareness, and concerns about predator attacks. Among those who did not build separate housing, the main reasons referred to were limited attention to poultry (36.4%), fear of predators (27.3%), lack of knowledge and awareness (27.3%), and concern over theft (9.1%).

Table 2
Housing type and management of local chickens in different agroecological conditions of Awi zone

Parameter	Agroecology			Overall	X^2 value /P value
	Highland	Midland	Lowland	N = 180	
	N = 60	N = 60	N = 60		
Availability of chicken house					138.69/0.000
Yes	58(96.7%)	57(95%)	54(90%)	169(93.9%)	
No	2(3.3%)	3(5%)	6(10%)	11(6.1%)	
Housing type					68.84/0.000
Separate shelter	15(25.9%)	11(19.3%)	13(24.1%)	38(22.5%)	
Perch in the main house	25(43.1%)	23(40.4%)	24(44.4%)	73(43.2%)	
Perch in other animals' house	9(15.5%)	12(21.1%)	7(13%)	28(16.6%)	
Perch in the kitchen	5(8.6%)	7(12.3)	7(13%)	19(11.2%)	
Perch in the veranda	4(6.7%)	4(7%)	3(5.6%)	11(6.5%)	
Reason for not having separate chicken house					1.727/0.631
Lack of knowledge	-	1(33.3%)	2(33.3%)	3(27.3%)	
Less attention given	1(50%)	1(33.3%)	2(33.3%)	4(36.4%)	
Risk of predator	1(50%)	1(33.3%)	1(16.7%)	3(27.3%)	
Risk of theft	-	-	1(16.7%)	1(9.1%)	

N = *number of respondents*

3.2.2. Feed Resources and Feeding Practices

Table 3 presents the main feed types and feeding practices used for chickens in the study area. Overall, 92.2% of respondents reported providing supplementary feed to their chickens. The reasons for offering supplementary feed include enhancing egg production, improving meat quality, boosting chick growth, and supporting brooding hens for better egg hatchability. In line with, previous scholars [3, 6, 22–24] reported higher supplementation rates of 98.6%, 97.5%, 99.4%, 98.7%, and 94.7% in different parts of Ethiopia.

In this study, among those providing supplementary feed, 39.8% used maize, 30.7% used wheat, 16.9% used barley, and 12.7% used a mixture of grains. The predominance of maize may be due to its wide availability across all agro-ecological zones in the study area. These findings are in line with those of Goraga et al [25], who reported that 78.7% of respondents fed chickens with cereals such as maize, wheat, and barley. The daily frequency at which chickens were given supplementary feed varied among

respondents. Specifically, 13.2% provided feed only in the morning, 18.6% in the evening, 13.2% in the afternoon, 29.3% in both the morning and evening, and 25.7% provided feed three times a day: morning, afternoon, and evening. The frequent feeding practices likely aim to enhance egg production in hens and improve the growth performance of chicks. These findings are consistent with those of Getu and Birhan [19], who found that 27.78% of respondents offered supplementary feed to their chickens three times a day: morning, afternoon, and evening.

Table 3
Feeding, feed resource, frequency of feeding for chickens across different agroecological zones in Awi Zone

Parameter	Agroecology			Overall	X^2	P
	Highland	Midland	Lowland	N = 180	Value	Value
	N = 60	N = 60	N = 60			
Provision of supplemental feed					128.36	0.000
Yes	56(93.3%)	57(95%)	53(88.3%)	166(92.2%)		
No	4(6.7%)	3(5%)	7(11. 7%)	14(7.8%)		
Type of supplemental feed					31.16	0.000
Maize	23(41.1%)	20(35.1%)	23(43.4%)	66(39.8%)		
Wheat	16(28.6%)	17(29.8%)	18(34%)	51(30.7%)		
Barely	10(17.9%)	11(19.3%)	7(13.2%)	28(16.9%)		
Mixture	7(12.5%)	9(15.8%)	5(9.4%)	21(12.7%)		
Feeding time and frequency					18.00	0.001
Morning only	8(14.3%)	9(15.8%)	6(11.3%)	22(13.2%)		
Evening Only	11(19.6%)	11(19.3%)	9(17%)	31(18.6%)		
Afternoon only	7(12.5%)	8(14%)	7(13.2%)	22(13.2%)		
Morning and evening	17(30.4%)	14(24.6%)	17(32.1%)	49(29.3%)		
Morning, afternoon & evening	13(23.2%)	15(26.3%)	14(26.4%)	43(25.7%)		
Feed provision					9.64	0.002
Using feeding trough	35(62.5%)	33(57.9%)	36(67.9%)	103(62%)		
On the ground	21(37.5%)	24(42.1%)	17(32.1%)	63(38%)		
Seasons of feed shortage					24.20	0.000
Rainy season	38(63.3%)	45(75%)	40(66.7%)	123(68.3%)		
Dry season	22(36.7%)	15(25%)	20(33.3%)	57(31.7%)		
Classes of chickens priority for supplementary feed					53.88	0.000
Chicks	24(42.9%)	20(35.1%)	21(39.6%)	65(39.2%)		
Pullet	5(8.9%)	10(17.5%)	6(11.3%)	21(12.7%)		

N = Number of respondents;

Parameter	Agroecology			Overall	χ^2	P
	Highland	Midland	Lowland	N = 180	Value	Value
	N = 60	N = 60	N = 60			
Hen	15(26.8%)	15(26.3%)	14(26.4%)	44(26.5%)		
Cock	8(14.3%)	7(12.3%)	8(15.1%)	23(13.9%)		
Cockerel	4(7.1%)	5(8.8%)	4(7.50%)	13(7.8%)		

N = Number of respondents;

3.2.3. Water resources and watering

As shown in Table 4, all respondents (100%) reported providing water to their chickens, with 67.2% allowing *ad libitum* access, 21.1% offering water twice daily, and 11.7% providing water once per day. However, watering frequency varied significantly across agroecological zones ($P < 0.001$). The predominance of AdLibtum watering suggests that most households recognize the benefits of unrestricted water access for maintaining feed intake, egg production, and overall bird health. The significant variation in watering practices among agroecological zones further indicates that water availability and management are influenced by local environmental conditions and resource accessibility. Similarly, Addisu et al [26] noted universal water provision among chicken keepers in North Wollo, Amhara Region. These findings are consistent with Fitsum [20], who reported that 62.4% of respondents provided water ad libitum, while 22.3% and 15.3% did so once and twice daily, respectively. Similarly, Getu and Birhan [19] found that nearly all respondents offered unrestricted water access to their chickens.

In relation to water sources, 57.8% of respondents used river water, 41.1% used tap water, and 1% used pond water. This result was similar to the report of Shanku and Amanuel [18] that the major source of water for chickens was the river in the Angecha and Damboya Districts of the Kembata Tembaro Zone, Southern Ethiopia.

Table 4
Provision of water, watering frequency, watering trough, and sources of water for chicken in different agroecologies of Awi zone

Parameter	Agroecology			Overall (N = 180)	X^2 Value	P Value
	Highland (N = 60)	Midland (N = 60)	Lowland (N = 60)			
Provision of water						
Yes	60(100%)	60(100%)	60(100%)	180(100%)		
Frequency of water provision					95.43	0.000
Once per day	8(13.3%)	7(11.7%)	6(10%)	21(11.7%)		
Twice per day	13(21.7%)	12(20%)	13(21.7%)	38(21.1%)		
Ad libitum	39(65%)	41(68.3%)	41(68.3%)	121(67.2%)		
Types of watering troughs					78.53	0.000
Broken Material	26(43.3%)	28(46.7%)	29(48.3%)	83(46.1%)		
Stone made	7(11.7%)	5(8.3%)	6(10%)	18(10%)		
Plastic made	22(36.7%)	23(38.3%)	20(33.3%)	65(36.1%)		
Wooden trough	5(8.3%)	4(6.7%)	5(8.3%)	14(7.8%)		
Source of water					91.60	0.000
Pond Water	1(1.7%)	-	1(1.7%)	2(1.1%)		
River	34(56.7%)	35(58.3%)	35(58.3%)	104(57.8%)		
Tap water	25(41.7%)	25(41.7%)	24(40%)	74(41.1%)		
N = Number of Respondents						

3.2.4. Chicken Diseases

In the study area, approximately 86% of respondents confirmed the occurrence of disease outbreaks across the agroecological zones, as shown in Table 5. The causes of these outbreaks could be attributed to a lack of access to vaccination (82.2%) and insufficient attention given to poultry health by the households. Similar findings were reported by Habte et al [27] in the Amaro district of the Southern Nations and Nationalities Peoples Regional State, Ethiopia, where most respondents identified fungal infections and cholera as the primary poultry diseases. Similarly, Mahoro et al [28] reported that the majority of respondents (70.4%) experienced chicken disease outbreaks in Rwanda. The limited access to vaccination in this study is in line with the findings of Fitsum [20]. In line with this, Mahoro et al [28] reported that nearly all (98.1%) indigenous chicken owners do not vaccinate their birds against any disease.

Table 5
Prevalence of poultry diseases, access to vaccination and treatment, and measures taken by farmers for sick chickens in different agroecologies of Awi Zone

Variable	Agroecology			Overall	X^2	P Value
	Highland	Midland	Lowland	N = 180	Value	
	N = 60	N = 60	N = 60			
Prevalence of disease					93.88	0.000
Yes	50(83.3%)	55(91.7%)	50(83.3%)	155(86.1%)		
No	10(16.7%)	5(8.3%)	10(16.7%)	25(13.9%)		
Chicken vaccination available					74.76	0.000
Yes	6(10%)	10(16.7%)	16(26.7%)	32(17.8%)		
No	54(90%)	50(83.3%)	44 (73.3%)	148(82.2%)		
Reasons for not vaccinating chicken					32.15	0.000
Lack of attention	28(51.9%)	25(50%)	23(52.3%)	70(47.9%)		
Lack of access	20(37%)	19(38%)	15(34.1%)	59(40.4%)		
Lack of Awareness	6(11.1%)	6(12%)	6(13.6%)	17(11.6%)		
Measures taken for sick chickens					119.7	0.000
Treatment at veterinary clinic	15(29.4%)	12(24%)	10(22.7%)	39(27.1%)		
Treat themselves at home	30(58.8%)	32(64%)	28(63.6%)	88(61.1%)		
Culling by selling	1(2%)	-	1(2.3%)	2(1.4%)		
Cull (throwing out)	5(9.8%)	6(12%)	5(11.4%)	15(10.4%)		
N = Number of Respondents;						

3.3. Indigenous Chicken Production Objectives

The results of this study reveal that households in the study area keep chickens for multiple purposes, as summarized in Table 6. Across all agroecological zones, income generation through the sale of live birds was identified as the primary objective, with the highest index value (0.39). This highlights the important role of indigenous chickens in supporting household livelihoods and providing a readily accessible source of cash, particularly during periods of financial need. Home consumption of chicken meat ranked second (index value = 0.26), indicating the contribution of chickens to household nutrition and food security. Egg production was also an important objective (index value = 0.23), reflecting the value placed on eggs as a source of high-quality protein for family consumption and, in some cases, small-scale sale. In addition, chickens were kept for cultural and ceremonial purposes (index value = 0.12), such as use in traditional

rituals, religious celebrations, and social events, underscoring their social and cultural significance within the community. The relatively consistent ranking of production objectives across different agroecological zones suggests similar livelihood strategies and cultural practices among households in the study area. Overall, these findings demonstrate that indigenous chicken production is a multifunctional enterprise, contributing not only to income generation but also to household nutrition and socio-cultural practices. These results are consistent with those of Muluneh et al [22] and Begna et al [29], who reported that the main reasons for keeping local chickens were income generation, breeding for replacement stock, meat consumption, and egg production in different parts of Ethiopia.

Table 6
The production objectives of local chicken-keeping households in different agroecologies of Awi zone

Variable	Agroecology												Overall
	Highland				Midland				Lowland				
	R1	R2	R3	Ix	R1	R2	R3	Ix	R1	R2	R3	Ix	Ix
Purpose of keeping chickens													
Cash from the sale of birds	25	23	20	0.39	26	20	22	0.39	25	21	19	0.38	0.39
Home consumption (Meat)	15	17	20	0.28	19	18	15	0.30	12	12	15	0.21	0.26
Egg production	8	11	15	0.17	15	15	11	0.24	16	18	20	0.29	0.23
Cultural/ ceremonies	12	9	5	0.16	0	7	12	0.07	7	9	6	0.13	0.12
Purpose of egg production													
Hatching for replacement	23	21	20	0.36	20	23	25	0.36	27	30	27	0.47	0.40
Home consumption	16	19	21	0.30	19	17	15	0.29	8	7	13	0.14	0.24
Cash income from egg sales	21	20	19	0.34	21	20	20	0.34	25	23	20	0.39	0.36

Index = Σ of [(3 R1) + (2*R2) + (1* R3)] given for a particular variable divided by Σ of [(3*sum of R1) + (2*sum of R2) + (1* sum of R3)] for all the variables considered; Ix: Index; R1 = first rank; R2 = second rank; R3 = third rank*

3.3.1. Indigenous Chicken Selection Criteria for Breeding Hen and Cock

The selection criteria for breeding hens are presented in Table 7. The primary traits considered by farmers when selecting breeding hens in the study area included; egg production potential of the hen, body weight, disease resistance, plumage color, hatchability, and broodiness, with respective index values of 0.29, 0.21, 0.19, 0.16, 0.10, and 0.05. Among these, egg production emerged as the most important criterion across all agro-ecological zones, with index values of 0.27 in the highlands, 0.28 in the midlands, and 0.30 in the lowlands. Overall, egg production is consistently prioritized by households, followed by body weight and disease resistance. The preference for egg production potential likely stems from the several direct benefits egg production provides, such as household consumption, income generation, and maintaining flock size through replacement. These findings are in line with those of Muluneh et al [22] and Kassa et al [23], who reported egg production as the top selection trait in deferent parts of Ethiopia. Similarly, Dana et al [9] highlighted the importance of egg production across various Ethiopian regions. Comparable observations were made by Addisu et al [26], noting that egg production, meat yield, and disease resistance were the preferred traits targeted for improvement in the North Wollo Zone.

For breeding cocks, the traits most commonly used for selection were body weight, comb type, plumage color, and disease resistance, with index values of 0.33, 0.26, 0.24, and 0.18, respectively. The current result was in contrast with the report of Muluneh et al [22], who reported that the primary selection criterion of breeding cocks was plumage color with an overall index value of 0.27 in Northwest Ethiopia. However, the current findings were consistent with Teshome [30], who reported that body weight (55.6%), comb type (34.3%), and plumage color (10.1%) were the key traits targeted for genetic improvement in the Seka Chekorsa and Kersa districts, Jimma Zone. Similarly, Kassa et al [23] found that producers in western Amhara prioritized traits such as body conformation (0.39), live weight (0.20), and disease resistance (0.21). The current results also correspond with Addisu et al [26], who reported body conformation (0.168), live weight (0.165), and adaptation to disease (0.115) as the most preferred traits for selecting breeding cocks in North Wollo, Amhara Region. In conclusion, economically significant traits such as egg production in hens and body weight in cocks are critical for developing effective breeding objectives aimed at improving indigenous chicken populations in the study area.

Table 7
The selection criteria of breeding hens and cocks in different agroecologies of Awi zone

Variable	Agroecology												Overall
	Highland				Midland				Lowland				
	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I	I
Breeding hen													
Egg number	16	18	14	0.27	18	17	13	0.28	20	18	14	0.31	0.29
Body weight	14	12	10	0.21	14	12	15	0.23	12	12	10	0.19	0.21
Plumage color	9	10	11	0.16	8	10	10	0.15	9	10	11	0.16	0.16
Hatchability	7	6	8	0.11	5	5	9	0.09	7	6	8	0.11	0.10
Disease resistance	12	11	12	0.19	13	13	8	0.20	10	11	12	0.18	0.19
Broodiness	2	3	5	0.05	2	3	5	0.05	2	3	5	0.05	0.05
Breeding cock													
Body weight	21	20	18	0.37	19	20	18	0.32	18	20	18	0.31	0.33
Comb type	16	15	15	0.26	17	15	15	0.27	16	15	15	0.26	0.26
Plumage color	13	14	18	0.24	13	14	18	0.24	13	14	18	0.24	0.24
Disease resistance	10	11	9	0.17	11	11	9	0.18	13	11	9	0.19	0.18

Index = Σ of [(3 R1) + (2*R2) + (1* R3)] given for a particular variable divided by Σ of [(3*sum of R1) + (2*sum of R2) + (1* sum of R3)] for all the variables considered; I: Index; R1 = first rank; R2 = second rank; R3 = third rank*

3.3.2. Farmers' Trait Preferences for Genetic Improvement of Indigenous Chicken

The results indicate that farmers place the highest priority on egg production, followed by body weight, disease resistance, and plumage color when targeting traits for the genetic improvement of indigenous chickens (Table 8). The strong emphasis on egg production (index = 0.30) reflects the importance of eggs as a regular source of household income and nutrition, particularly in smallholder systems where chickens serve as a readily marketable asset. Body weight (0.20) was the second most preferred trait, highlighting farmers' interest in improved meat yield and better market value of birds. Disease resistance (0.16) ranked among the top traits, underscoring the high disease pressure and limited access to

veterinary services in village production systems. Preference for plumage color (0.15) and comb type (0.10) suggests that market demand, cultural values, and farmers' ability to easily identify preferred birds play important roles in selection decisions. In contrast, hatchability (0.06) and mothering ability (0.03) received lower priority, possibly because natural brooding remains common and these traits are perceived as less limiting under traditional management. Overall, the results emphasize that breeding programs should prioritize productivity and survivability traits while accounting for farmers' aesthetic and market-driven preferences to enhance adoption and sustainability. These findings are closely in line with reports by Addisu et al [26] and Markos et al [31], who identified egg production per clutch, body weight (meat yield), and disease resistance as the most preferred traits for breeding improvement in the North Wollo and Tigray regions. Similarly, Moges et al [6] and Alem and Yayneshet [32] reported that plumage color and comb type were important selection criteria among chicken producers in Bure, Fogera, and central Tigray. These traits were valued not only for their relevance to production but also for their influence on consumer preferences and marketability.

Table 8
Farmers' trait preferences for genetic improvement in different agroecological zones of Awi zone

Variable	Agroecology												Overall
	Highland				Midland				Lowland				
	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I	I
Egg number	20	19	17	0.33	19	16	15	0.29	17	15	18	0.28	0.30
Body weight	13	10	13	0.21	12	10	13	0.19	14	8	13	0.20	0.20
Plumage color	9	8	10	0.15	10	8	10	0.15	10	8	10	0.16	0.15
Disease resistance	8	12	7	0.16	9	11	8	0.16	10	11	8	0.17	0.16
Comb type	5	6	6	0.09	6	6	7	0.10	6	6	7	0.10	0.10
Hatchability	2	2	3	0.04	2	8	6	0.08	1	7	3	0.06	0.06
Mothering ability	2	1	1	0.02	2	1	1	0.03	2	5	1	0.04	0.03

Index = Σ of [(3 R1) + (2*R2) + (1* R3)] given for a particular variable divided by Σ of [(3*sum of R1) + (2*sum of R2) + (1* sum of R3)] for all the variables considered; I: Index; R1 = first rank; R2 = second rank; R3 = third rank*

3.4. Challenges of Chicken Production

Table 9 presents the major challenges affecting chicken production in the study area. The results indicate that disease is the most significant constraint, reported by 55% of the respondents, highlighting the high vulnerability of local chickens to infectious and parasitic diseases. This is followed by wild predators, which were identified by 27.2% of respondents as a major problem, reflecting the risks associated with

inadequate housing and protection. Feed shortage was reported by 17.8% of respondents, suggesting limitations in feed availability and supplementation. These constraints are largely attributed to the predominant free-ranging management system practiced in the area, which exposes chickens to disease-causing pathogens, increases their susceptibility to predation, and limits controlled feeding. Consequently, these factors collectively contribute to low productivity and high mortality of local chickens in the study area. This result was in line with Musa et al [33], who revealed that disease and predators were the first main constraints that devastated local chicken productivity in the Doba and Mesala districts, respectively. Mamo et al [34] also worked in Northern Gondar, where the major constraints identified included disease as the top challenge, followed by predators, lack of supplementary feed, inadequate poultry housing, and limited access to veterinary services.

Table 9
The major challenges of indigenous chicken production in different agroecologies of Awi Zone

Parameter	Agroecology			Overall	X^2	P Value
	Highland	Midland	Lowland	N = 180	Value	
	N = 60	N = 60	N = 60			
Major production challenges					40.433	0.000
Disease incidence	33(55%)	32(53.3%)	34(56.7%)	99(55%)		
Predator	16(26.7%)	18(30%)	15(25%)	49(27.2%)		
Feed shortage	11(18.3%)	10(16.7%)	11(18.3%)	32(17.8%)		
N = total number of respondents;						

4. Conclusions and Recommendations

The study revealed that indigenous chicken production in the study area is predominantly managed under traditional free-ranging systems with minimal inputs and management interventions. Although most households provide basic housing, supplementary feed, and water, productivity remains constrained by high disease incidence, predation, and feed shortages. Farmers keep chickens mainly for income generation, household consumption, and egg production, highlighting their multifunctional role in rural livelihoods. Trait preferences showed strong emphasis on economically important attributes such as egg production, body weight, and adaptive traits, particularly disease resistance.

These findings indicate that improving extension support on housing, feeding, and breeding management could enhance productivity. Moreover, the identified breeding objectives and selection criteria provide a basis for designing a farmer-preferred breeding program focusing on egg production, body weight, and disease resistance to sustainably improve indigenous chicken productivity.

Declarations

Ethics approval and consent to participate

The research proposal was presented to and approved by the Research Ethics Committee under the School of Postgraduate Studies of the College of Agriculture and Environmental Sciences, Bahir Dar University, under approval number Ref. CoAES/RCS/02/2020. At that time, ethical approval letters were issued through the Postgraduate Coordination Office. Therefore, the ethical approval for this study was initially granted by the School of Postgraduate Studies of the College of Agriculture and Environmental Sciences, Bahir Dar University. The approval was subsequently reviewed and endorsed by the Bahir Dar University Institutional Review Board (IRB), with Reference No. 27/BDU/IRB/2026. All procedures involving human participants adhered to relevant local regulations and institutional guidelines. Informed consent (verbal) was obtained from all participants prior to their involvement in the study.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

Not applicable

Author Contribution

Ayana Birhanu: Writing – original draft, Visualization, Validation, Software, Methodology, Formal analysis, Data curation. Mengistie Taye: Writing – review & editing, Visualization, Validation, Software, Methodology, Formal analysis, Data curation. Kefyalew Alemayehu: Writing – review & editing, Validation, Conceptualization.

Acknowledgement

The authors would like to thank the chicken owners in Dangila, Banja, and Jawi districts for their willingness to participate in the study. We also sincerely appreciate the support of Kebele livestock experts, district livestock experts, and zonal experts who contributed to the data collection process in the study area.

Data Availability

Data will be made available on request. For requesting data, please write to the corresponding author.

References

1. Besbes B. Genotype evaluation and breeding of poultry for performance under sub-optimal village conditions. World's Poult Sci J. 2009;65(2):260–71. https://doi.org/10.1017/S0043933909000221.
2. CSA CSA. Agricultural Sample Survey 2013 E.C. Volume II, Report on Livestock and Livestock Characteristics (Private Peasant Holdings).39–40. https://www.statsethiopia.gov.et/wp-content/. (2021).
3. Tadele A, Melesse A, Taye M. Production systems, productive performances, constraints and rate of inbreeding of indigenous chicken populations in Kaffa Zone, South Western Ethiopia. J Biology Agric Healthc. 2019;9(5):54–63. 10.7176/JBAH.
4. Tegegne A, Gebremedhin B, Hoekstra D. Livestock input supply and service provision in Ethiopia: Challenges and opportunities for market-oriented development. (2010).
5. Kibret B. In situ characterization of local chicken eco-type for functional traits and production system in Fogera woreda, Amhara Regional State. MSc, Haramaya University, Haramaya, Ethiopia (2008).
6. Moges F, Mellesse A, Dessie T. Assessment of village chicken production system and evaluation of the productive and reproductive performance of local chicken ecotype in Bure district, North West Ethiopia. Afr J Agric Res. 2010;5(13):1739–48. https://doi.org/10.1080/23311932.2022.2164662.
7. Molla M. Characterization of village chicken production and marketing system in Gomma Wereda, Jimma Zone, Ethiopia. Jimma, Ethiopia: Jimma University; 2010.
8. Ayalew H, Chanie D, Fentahun T, Yinnesu A, Dagnew Y, Moges D. Agro ecological base differences of village based local chicken performance and household product consumption in Amhara Region, Ethiopia. Cogent Food Agric. 2023;9(1):2164662. https://doi.org/10.1080/23311932.2022.2164662.
9. Dana N, Van der Waaij LH, Dessie T, van Arendonk JA. Production objectives and trait preferences of village poultry producers of Ethiopia: implications for designing breeding schemes utilizing indigenous chicken genetic resources. Trop Anim Health Prod. 2010;42(7):1519–29. https://doi.org/10.1007/s11250-010-9602-6.
10. Abera D, Abebe A, Alebachew H. Assessment of poultry feed and handling mechanisms of poultry production challenges in Benishangul-Gumuz Region, Western Ethiopia. Cogent Food Agric. 2024;10(1):2313254. https://doi.org/10.1080/23311932.2024.2313254.
11. Lee K-W, Michiels J, Choi Y-H. Editorial: Impact of climate change on poultry metabolism. Front Veterinary Sci. 2021;8:654678. 10.3389/fvets.2021.654678.
12. Mottet A, Tempio G. Global poultry production: current state and future outlook and challenges. World's Poult Sci J. 2017;73(2):245–56. https://doi.org/10.1017/S0043933917000071.
13. Bettridge JM, Psifidi A, Terfa ZG, Desta TT, Lozano-Jaramillo M, Dessie T, Kaiser P, Wigley P, Hanotte O, Christley RM. The role of local adaptation in sustainable production of village chickens. Nat Sustain. 2018;1(10):574–82. https://doi.org/10.1038/s41893-018-0150-9.

14. Kadim I, Al-Marzooqi W, Al-Waheebi S, Mahgoub O. *Improving egg and meat production of Omani local chicken through genetic and phenotypic selection programmes*, in *Sultan Qaboos University, Muscat, Oman (Annual Project Report)*. 2009.
15. Kebede N, Fetene T. Population dynamics of cattle ectoparasites in western Amhara national regional state, Ethiopia. J Veterinary Med Anim Health. 2012;4(1):22–6.
16. Heinisch O. Cochran, WG: sampling techniques, 2. Aufl. John wiley and sons, New York, london 1963. Preis s. Wiley Online Library; 1965.
17. Kosgey IS. Breeding objectives and breeding strategies for small ruminants in the tropics. Wageningen University and Research; 2004.
18. Shanku E, Amanuel E. Assesment of Production and Management System of Village Chicken Reared Under Farmers Condation in Angecha and Damboya Districts of Kembata Tembaro Zone, Southern Ethiopia. Cross Curr Int J Agric Veterinary Sci. 2023;5(5):62–74.
19. Getu A, Birhan M. Chicken production systems, performance and associated constraints in north Gondar zone, Ethiopia. World J Agricultural Sci. 2014;10(1):25–33. http://dx.doi.org/10.4172/2332-2608.1000115.
20. Fitsum M. Phenotypic characterization of local chicken ecotypes in the central zone of Tigray in northern Ethiopia. Jimma, Ethiopia: MSc, Jimma University; 2015.
21. Alemayehu G. Characterization of scavenging and intensive chicken production and marketing system in Lume district, East Shoa zone, Oromia region state, Ethiopia. An MSc. MSc. Ethiopia: Haramaya University, Haramaya; 2017.
22. Muluneh B, Taye M, Dessie T, Wondim DS, Kebede D, Tenagne A. Selection criteria and husbandry practices of indigenous chicken producers in Northwest Ethiopia. Heliyon. 2024;10(16). https://doi.org/10.1016/j.heliyon.2024.e36094.
23. Kassa B, Tadesse Y, Esatu W, Dessie T. On-farm comparative evaluation of production performance of tropically adapted exotic chicken breeds in western Amhara, Ethiopia. J Appl Poult Res. 2021;30(4):100194. https://doi.org/10.1016/j.japr.2021.100194.
24. Demissu H, Gebeyehu G, Berhan T, Gemeda D. Assessment on rural poultry production and marketing system of Horro chicken ecotypes in Western Ethiopia. J Agricultural Ext Rural Dev. 2019;11(12):248–59. https://doi.org/10.5897/JAERD2019.1046.
25. Goraga Z, Caron L, Wilbert C, Brockmann GA. Characterization of village chicken production systems and challenges across agro-climatic zones in Ethiopia. Int J Livest Prod. 2016;7(11):94–105. https://doi.org/10.5897/IJLP2016.0320.
26. Addisu H, Hailu M, Zewdu W. Indigenous chicken production system and breeding practice in North Wollo, Amhara Region, Ethiopia. Poult Fisheries Wildl Sci. 2013;1(2):108. http://dx.doi.org/10.4172/pfw.1000108.
27. Habte M, Debele S, Admassu B, Yinnessu A. Village chicken production performances assessment under scavenging management system in Amaro district, SNNPRS of Ethiopia. Int J Innovative Res Technol Sci. 3(3) (2015).

28. Mahoro J, Muasya T, Mbuza F, Habimana R, Kahi A. Characterization of indigenous chicken production systems in Rwanda. Poult Sci. 2017;96(12):4245–52. http://dx.doi.org/10.3382/ps/pex240.
29. Begna D, Bacha T, Boki S, Bekana K. Breeding practices of indigenous chickens in the Liban Jawi District of the West Shewa Zone, Ethiopia: A qualitative and quantitative analysis. Poult Sci. 2025;104(1):104536. https://doi.org/10.1016/j.psj.2024.104536.
30. Teshome F. Indigenous chicken farmers' traits preferences, breeding objectives and marketing systems in Seka Chekorsa and Kersa Districts of Jimma Zone, Southwest Ethiopia. Ethiopia: MSc, Jimma University, Jimma; 2018.
31. Markos S, Belay B, Dessie T. Village chicken breeding practices, objectives and farmers' trait preferences in western zone of Tigray, Northern Ethiopia. *E3 Journal of Agricultural Research Development*. 6 (2016) 1–11. http://dx.doi.org/10.18685/EJARD(6)1_EJARD-15-015
32. Alem A, Yayneshet G. Rural poultry marketing systems and associated marketing constraints in two agro-ecological zones of central Tigray, Northern Ethiopia. Sci J Anim Sci. 2013;2(6):150–9.
33. Musa S, Kebede K, Yusuf Y. Identification of Farmers' Breeding Objective and Traits Preferences of Local Chicken in Doba and Mesala Districts, West Hararghe Zone, Ethiopia. Int J Veterinary Sci Res. 2024;10(3):034–45. https://dx.doi.org/10.17352/ijvsr.000148.
34. Mamo W, Melaku M, Tamir B. Characterization of urban poultry production system in Northern Gondar, Amhara regional state, Ethiopia. Agric biology J North Am. 2013;4(3):192–8.

Figures

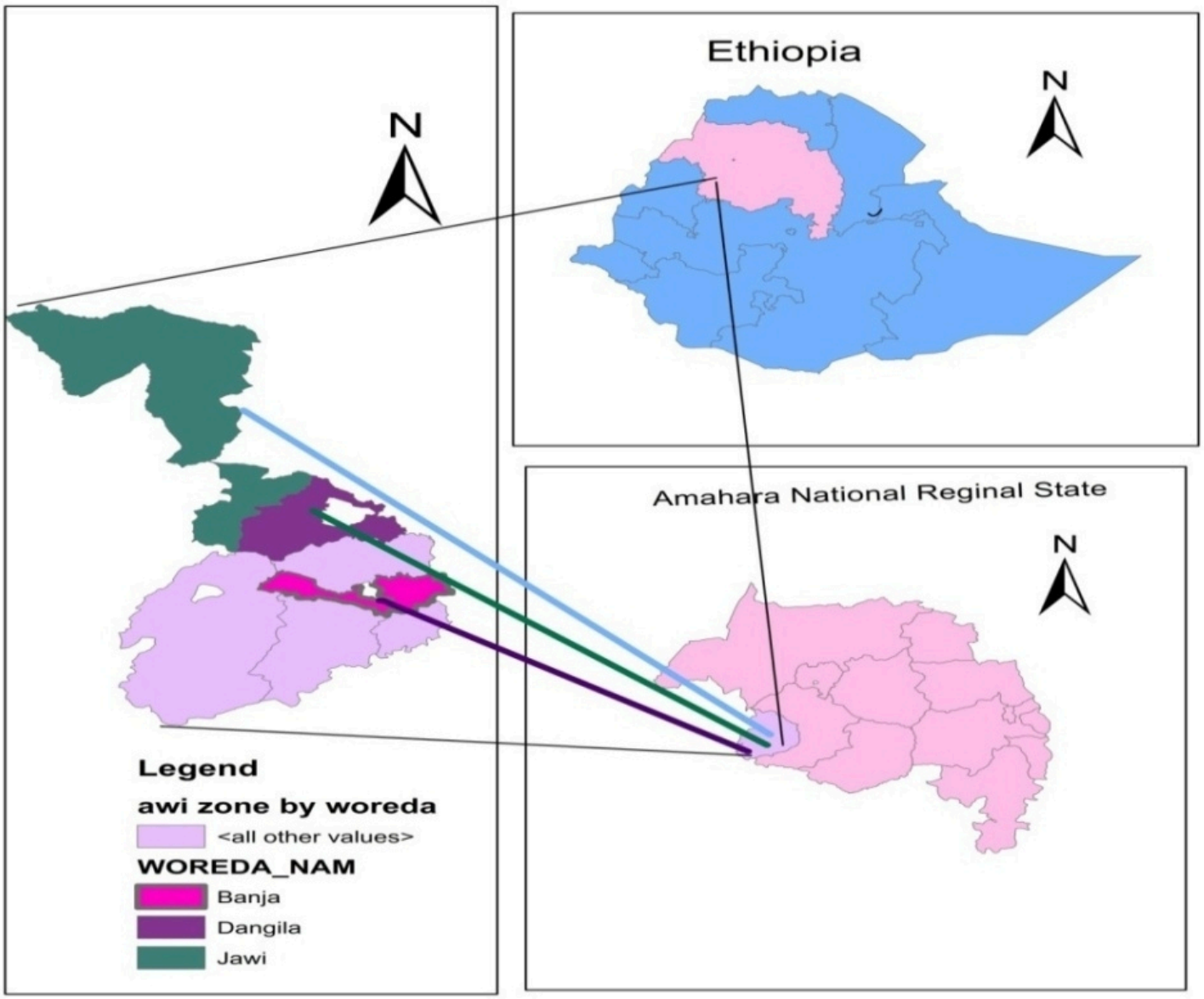


Figure 1

Map of the study districts in Awi zone, Amhara region