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Chicken Health and Ethno-veterinary Practices in Benishangul-gumuz Regional State, Ethiopia

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Abstract: This research aimed to assess village chicken production systems, health constraints, and ethno-veterinary practices in the three agro-ecologies of the Benishangul-Gumuz regional state. The woredas included were Assosa and Bambasi for midland, Kamash, and Dembie for lowland, and Maokomo special woreda for highland agro-ecologies. They were selected purposively based on agro-ecology, chicken production potential, and accessibility. The respondents who have experience in chicken production were included. Semi-structured interviews, field observations, and group discussions were used to collect data. About 91 respondents participated in the survey study. All of them were extensive chicken producers, and the average flock size was 10, ranging from 3 to 43 chicken per household, with a hen to cock ratio of 0.8:1, 2.46:1, and 2.3:1 for hybrid, local, and exotic chicken respectively, with the overall hen to cock ratio of 2.37:1. Only 22% of respondents construct proper chicken houses. The major constraints identified in the area were chicken diseases (54.8%), lack of improved breeds, feed shortages, lack of veterinary service, and loss of chicken by predators. Diarrhea and respiratory signs were the major symptoms observed during infection. Disease occurrence was higher in the wet (69.8%) than in the dry (30.2%) season, and the severity of disease as a constraint was higher in the long-rainy season. About 46.4% and 44.3% of respondents visit veterinary clinics and use traditional medicines respectively to treat their chicken. Plant species from the families Alliaceae (23.9%), Rutaceae (23.9%), Solanaceae (21.1%), and Zingiberaceae (11.1%) were commonly used in traditional medicine practices to treat infected chicken. Common chicken predators identified in the area were the accipitrine, wild cat, and eagle. Prevention methods practiced are keeping chicken in the house, and making the area clean. And a large body of information has been generated regarding traditional practices in the area to take care of their chicken. Thus, further studies should be conducted to evaluate the chemical composition and efficacy of active ingredients against chicken pathogens to facilitate the discovery of alternative medicines. Proper chicken management, improvement of veterinary service, and the introduction of improved chicken are mandatory for better chicken performance. Extra care is also recommended in the rainy than the dry season.

Keywords: Benishangul-Gumuz Region, Chicken, Ethno-veterinary Practice, Health

1. Introduction

The total chicken population in Ethiopia is estimated to be 60.5 million, of which 94.33% are indigenous, 3.21% hybrid, and 2.47% exotic chicken [1]. Chicken production systems practiced in Ethiopia are large-scale, small-scale, and village production systems. Chicken production is attractive in the context of poverty alleviation and quality protein supply [2]. Poultry products constitute an important component of the human diet [3]. Village chicken production plays an important role in enhancing the socio-economic status of smallholder farmers and creating employment opportunities in rural areas [4, 5]. Food security can be achieved at the smallholder farmer level through chicken production since it can be started with low capital investment and turnover is short [6]. However, the major challenges faced by smallholder chicken producers are diseases, poor quality and quantity of feed resources, and lack of appropriate management practices [7]. Among these constraints, the prevailing chicken diseases are the principal bottle necks of chicken performance, causing high economic losses for resource-poor farmers.

Most livestock raisers are geographically far away from the sites of animal clinic stations in Ethiopia, and those closer to the sites may not afford fees for services. Insufficient funding at the national level for animal disease prevention and control aggravates the issue, especially among pastoralists who live in the remote arid and semi-arid lowland parts of the country [8]. So, traditional methods of treatment appear to be a viable alternative to addressing the problem due to inadequate animal health services and the development of drug resistance. Traditional medicine (TM) that is used for animal healthcare reduces costs and is readily available to the ordinary farmer. Before the introduction of modern medicine, all livestock keepers relied on traditional practices. In particular, rural tribal people depend on plants for curing their livestock. They complement modern medicine and they are socially acceptable remedies from inexpensive resources [9-11]. Users of medicinal plants benefit economically by paying less and spending less time looking for alternative treatments.

Modern veterinary medicine is not well developed in the country, and drugs aren't available adequately to fight animal diseases. So, TM has become a major source of health care [12]. It is the total of knowledge and practices used in the diagnosis, prevention, and elimination of physical, mental, or social imbalances that passes from generation to generation, whether verbally or in writing [13]. Traditional remedies are the only source of therapeutics for nearly 80% of the human population and 90% of livestock in Ethiopia, and 95% of them are of plant origin. The application of TM to veterinary medicine is called ethnoveterinary medicine (EVM). EVM practices for animal health care are as old as the domestication of various livestock species. They comprise beliefs, knowledge, practices, and skills that help for healthcare and the management of livestock [9, 12].

Ethiopia is believed to be home to about 6,000 species of higher plants with approximately 10% endemism [14]. Pastoralists, agro-pastoralists, and other small-holder farmers in East Africa have engaged in a long tradition of EVM practices to prevent and treat their animals from different diseases [15, 16]. Ethiopian farmers and pastoralists rely on traditional knowledge and practices, especially plants, which are used to control domestic animal diseases [8]. Farmers know about the medicinal properties of plants [17]. Ethno-veterinary practices are primarily used by householders of chicken-keeping farmers [6]. Even though potential benefits are gained from the practice of traditional medicine, limited studies have been conducted in Ethiopia on documenting the traditional use of medicinal plants [16].

The use of medicinal plants in the treatment of diseases needs to be scientifically explored. Traditional knowledge is a basis for phytochemical and pharmacological studies [14]. That knowledge and practices are mostly handed down orally from generation to generation, and they may disappear because of rapid socioeconomic, environmental, and technological changes. The collection of information about the natural flora and its importance is essential since it is economical, culturally acceptable, and ecologically sound. Therefore, this study was conducted to assess village chicken production systems, health constraints, and different indigenous knowledge practices to maintain chicken health in the area.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted at Assosa and Bambasi woredas of Assosa zone; Kamash and Dembie woredas of Kamash zone; and Maokomo special woreda of Benishangul-Gumuz region, Western Ethiopia. Assosa is the capital city of the region. The state has diverse topography and climate. Classified as kola, dega, and woyna dega. About 75% of the State is classified as kola (low lands) which is below 1500 meters above sea level. The altitude ranges from 550 to 2,500 meters above sea level. The average annual temperature reaches from 20-25°C. During the hottest months (January - May) it reaches 28 - 34°C. The annual rainfall amount ranges from 500-1800mm and the rainy season spreads from May to October. Kamash zone is with lowland agroecology and it covers part of the southern bank of the Abay River. The majority of ethnic groups in the zone are the Gumuz people and significant Oromo and Amhara people. It is 240 Km South of Assosa town. Agriculture and mining is the dominant economic activity in the zone. The study woredas are indicated in Figure 1 below.

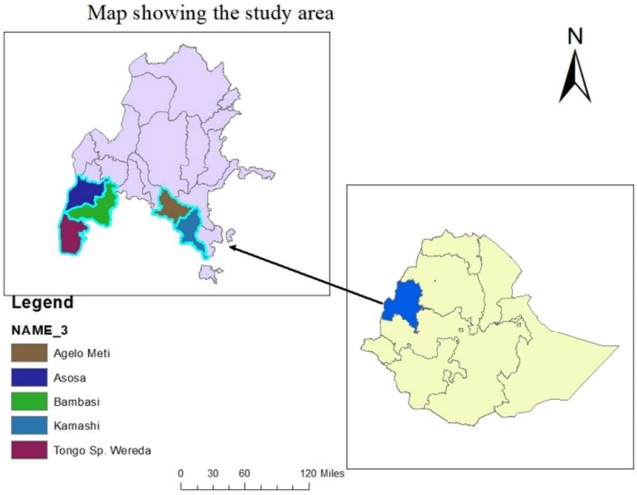

Figure 1. *Map of the study areas.*

NB: Agalo Meti is the former name for Dembie, Tongo special woreda for Maokomo.

2.2. Sampling Methods and Data Collection

A cross-sectional survey study was conducted to investigate how smallholder farmers manage chicken, challenges in chicken production, and healthcare practices in the study areas. The woredas included were selected purposively based on agro-ecology, chicken production potential, and accessibility. The respondents were smallholder farmers who have experience in chicken

production. They were selected by kebelle agricultural experts. The data were collected using semi-structured interviews, field observations, and group discussions. All of them were extensive chicken producers. A total of 91 small-holder farmers were included in the study.

2.3. Data Management and Analysis

The collected data was entered into the Microsoft Excel spreadsheet and then it was analyzed using IBM SPSS Statistics version 20 software. Descriptive statistics like mean, frequency, and percentage were used for data review.

3. Result and Discussions

3.1. Socio-economic Characteristics of Respondents

About 91 respondents from five woredas in the three agro-ecologies participated in this survey study. The socio-economic characteristics of the respondents were summarized in Table 1 and Table 2. The sex of respondents was 73.6% and 26.4% for male and female-headed households respectively. There was a high level of illiteracy (32.2%) among the respondents who participated in this survey study.

Table 1. *Sex, family size and average age of respondents.*

Agro-ecology	Woreda	Number of respondents (%)	Sex of respondents		Average family size (Mean±SD)	Average age of respondents (Years) Mean±SD)
			M	F		
Lowland	Kamash	11 (12)	7 (63.6)	4 (36.4)	5.91±1.97	32.91±11.88
	Dembie	3 (3.3)	2 (66.7)	1 (33.3)	4.33±1.5	33.67±6
Mid-altitude	Assosa	19 (21)	12 (63.2)	7 (36.8)	7.28±5.4	40.68±13.26
	Bambasi	21 (23)	13 (61.9)	8 (38.1)	7.05±3.3	38.57±12
Highland	Maokomo	37 (40.7)	33 (89.2)	4 (10.8)	7.51±2.86	36.46±10.55
Total		91 (100)	67 (73.6)	24 (26.4)	7.06±3.53	37.31±11.58

Table 2. *Educational level of respondents.*

Education level of respondent (%)	Assosa	Bambasi	Kamash	Dembie	Maokomo	Overall mean (%)
Illiterate	2 (10.5)	9 (42.9)	2 (20)	1 (33.3)	15 (40.5)	29 (32.2)
Read and write	6 (31.6)	0 (0)	1 (10)	0 (0)	2 (5.4)	9 (10.0)
Grade 1-4	4 (21)	4 (19)	2 (20)	0 (0)	12 (32.4)	22 (24.4)
Grade 5-8	3 (15.8)	7 (33.3)	4 (40)	0 (0)	7 (18.9)	21 (23.3)
Grade 9-12	4 (21)	1 (4.8)	0 (0)	1 (33.3)	1 (2.7)	7 (7.8)
Above grade 12	0 (0)	0 (0)	1 (10)	1 (33.3)	0 (0)	2 (2.2)

3.2. Flock Size and Type of Breed

Improved chickens introduced in the area are Bovans brown, Koekoek, and RIR. Those chicken breeds are not introduced in Kamash and Dembie woreda of Kamashi zone and this may be due to its farness from cities and towns to access chicken technologies easily. In this study, the average flock size was 10, ranging from 3 to 43 chicken per household, with a hen to cock ratio of 0.8:1, 2.46:1, 2.3:1 for hybrid, local and exotic chicken respectively; with an overall hen to cock ratio of 2.37:1. In other reports, the average flock size per household was 13 (ranged 1 - 57), with a hen to cock ratio of 3.7:1 [18].

3.3. Chicken Housing System

Chicken housing in smallholder chicken production is mostly built with locally available materials. It is characterized by little inputs [19], and 42% of the respondents in this study, use simple shade to house their chicken, and only 22% of them construct a proper chicken house. It is presented in Table 3 below. This finding was comparable with the report of Moges and his colleagues [18] in Bure district, North West Ethiopia, 22.1% provided a separate overnight chicken house; but 77.9% kept their chicken in various night sheltering places. Yemane and his colleagues also reported that in Halaba district of southern Ethiopia, 12.1% of the respondents kept their chicken in a separate room [20].

Table 3. *Chicken housing system in the study area.*

Housing type	Woredas of respondents					Overall mean (%)
	Assosa	Bambasi	Kamash	Dembie	Maokomo	
Simple shade	9 (47.4)	10 (47.6)	7 (63.6)	2 (66.7)	11 (29.7)	39 (42.9)
Proper chicken house	7 (36.8)	8 (38.1)	2 (18.2)	0 (0)	3 (8.1)	20 (22)
Sharing with family	2 (10.5)	3 (14.3)	2 (18.2)	1 (33.3)	23 (62.2)	31 (34)
Others	1 (5.3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1.1)

Priority of management practices for different chicken types differs across seasons. In this study, the respondents treat layer and chick in the first place more than other chickens. About 49.5% and 33%; and 37.4% and 31.9% of respondents primarily manage layer and chick in wet and dry seasons respectively. Those management practices for different chicken types are presented in percentage in Table 4 below.

Table 4. *Priority of management practices for different chicken types across season.*

Season	Chicken type	1st priority	2nd priority	3rd priority	4th priority
Wet season	Layer	49.5	37.4	5.5	6.6
	Grower	7.7	28.6	49.5	7.7
	Cocks	4.4	14.3	28.6	44
	Chick	33	13.2	9.9	35.2
Dry season	Layer	37.4	37.4	15.4	6.6
	Grower	12.1	24.2	42.9	15.4
	Cocks	13.2	12.1	18.7	49.5
	Chick	31.9	19.8	16.5	22

3.4. Constraints of Chicken Production in the Study Area

The major constraints of Ethiopian smallholder chicken producers identified were diseases, feed shortage, lack of proper healthcare, and predators [19]. In the current study diseases were the major constraint of chicken production in all the study areas. Lack of improved chicken breeds was identified as a common challenge in low-land agro-ecologies (Kamash and Dembie woredas). Feed shortage and lack of veterinary service were common in midland (Assosa woreda) and high land (Maokomo woreda) agro-ecologies. Loss of chicken by predators is also the major constraint in Kamash and Maokomo woredas. About 11% of the respondents in this study said that predator attack is a constraint for their chicken production. But it is lower than the report of Meskerem [21], 32% of respondents reported that losses were by predators attack. This may be related to a lack of management skills and provision of housing, which were the major constraints identified in that area compared to this study site. The major constraints listed by respondents are indicated in Table 5 below.

Table 5. *The major constraints of chicken production in the study woredas.*

Major constraints (%)	Woreda of respondents					
	Assosa	Bambasi	Kamash	Dembie	Maokomo	Total
Financial shortage	0 (0)	1 (4.8)	0 (0)	0 (0)	0 (0)	1 (1.4)
Lack of improved breeds and low performance	0 (0)	0 (0)	4 (50)	1 (50)	0 (0)	4 (6.9)
Lack of veterinary service	0 (0)	1 (4.8)	0 (0)	0 (0)	6 (25)	7 (9.6)
Loss of chicken by predators	0 (0)	1 (4.8)	2 (25)	0 (0)	5 (20.8)	8 (11)
Poultry diseases	9 (50)	15 (71.4)	2 (25)	1 (50)	13 (54.2)	40 (54.8)
Poultry diseases and feed shortage	9 (50)	3 (14.3)	0 (0)	0 (0)	0 (0)	12 (16.4)

3.5. Severity of Constraints in Different Seasons of the Year

In scavenging chicken production: a shortage of feed resources, disease, predators, and other challenges in the study areas are described in Table 6 below. In this study, 47.2% of the respondents considered poultry diseases as a major constraint in the long rainy season for their chicken production. This finding was comparable with a report by Yemane and his colleagues [20], diseases were a major constraint in the rainy season of the year in village chicken production performance under the scavenging system in the Halaba district of Southern Ethiopia. In addition to poultry diseases, predators and feed shortages are also the major constraints for village poultry production in Ethiopia [19]. Predator attack is severe in the long rainy season than the long dry season.

Table 6. *Constraints in different seasons of the year.*

Constraints in different seasons	Severity of the constraints				
	Very high	High	Some extent	Limited	No problem
Disease as a constraint					
Long-rainy season	42 (47.2)	34 (38.2)	8 (9.0)	2 (2.2)	3 (3.4)
Long-dry season	33 (37.1)	21 (23.6)	19 (21.4)	3 (3.4)	13 (14.6)
Predator attack					
Long-rainy season	13 (14.6)	25 (28.1)	31 (34.8)	18 (20.2)	2 (2.3)
Long-dry season	2 (2.3)	9 (10.2)	45 (51.1)	19 (21.6)	13 (14.8)
High chick mortality					
Long-rainy season	9 (10.3)	36 (41.4)	16 (18.4)	12 (13.8)	14 (16.1)
Long-dry season	3 (3.4)	8 (9.0)	35 (39.3)	17 (19.1)	26 (29.2)
Shortage of scavenging resources					
Long-rainy season	8 (9.0)	11 (12.4)	17 (19.1)	9 (10.1)	44 (49.4)
Long-dry season	12 (13.5)	19 (21.4)	22 (24.7)	15 (16.9)	21 (23.6)
Shortage of grains for supplementing chicken					
Long-rainy season	15 (16.9)	30 (33.7)	26 (29.2)	12 (13.5)	6 (6.7)
Long-dry season	1 (1.1)	5 (5.6)	21 (23.6)	24 (27.0)	38 (42.7)

3.6. Chicken Diseases Occurred and Therapeutic Measures Taken in the Study Woreda

All interviewees responded that there are repeatedly occurring poultry diseases in their area. Even though they didn't know the type of disease that occurred, they described the disease symptoms observed. The season of occurrence, symptoms observed, and preventive measures taken are summarized in Table 7. About 90.7% of the respondents had the experience of treating infected chicken and it is in agreement with the studies conducted in the Northern and Southern parts of Ethiopia [20, 22], 87.27% and 90% of respondents treat their chicken from the Western zone of Tigray and Halaba district respectively.

During disease occurrence in chicken, 46.4% and 44.3% of respondents visit veterinary clinics and use traditional medicines respectively to treat their chicken. The usage of traditional medicine in this survey study was comparable with the report of Dinka and his colleagues [4], 44% of farmers in the rift valley of Oromia usually treat sick chicken using traditional medicine. While it was lower than the report of Yemane and his colleagues, and Markos [20, 22], 75.58% and 72.1% of respondents treated their chicken using traditional treatment.

Table 7. *The major poultry disease symptoms and preventive measures taken.*

Variables	Assosa	Bambasi	Kamash	Dembie	Maokomo	Total
Symptoms observed (%)						
Respiratory signs/cough, breath difficulty, watery mucus	0 (0)	0 (0)	0 (0)	0 (0)	21 (56.8)	21 (24.1)
Diarrhea/green, yellow, white in colour	3 (16.7)	8 (38.1)	8 (100)	3 (100)	11 (29.7)	33 (37.9)
Darken head, raffled feather, depression	12 (66.7)	12 (57.1)	0 (0)	0 (0)	5 (13.5)	29 (33.3)
Sudden death	3 (16.7)	1 (4.8)	0 (0)	0 (0)	0 (0)	4 (4.6)
Measures taken during chicken disease outbreak (%)						
Visit Vet clinic	7 (38.9)	7 (33.3)	5 (55.6)	1 (33.3)	21 (56.8)	41 (46.4)
Apply traditional medicines	9 (50)	12 (57.1)	3 (33.3)	2 (66.7)	13 (35.1)	39 (44.3)
Sale infected chicken	0 (0)	0 (0)	0 (0)	0 (0)	1 (2.7)	1 (1.1)
No measures taken	2 (11.1)	2 (9.5)	1 (11.1)	0 (0)	2 (5.4)	7 (8)
Who administers drugs during treatment?						
The owner (myself)	11 (64.7)	12 (63.2)	3 (42.9)	1 (33.3)	9 (25)	36 (43.9)
Animal health personnel	6 (35.3)	7 (36.8)	4 (57.1)	2 (66.7)	27 (75)	46 (56.1)
Treatment provided for (%)						
All chicken	13 (76.5)	11 (57.9)	2 (25)	1 (33.3)	16 (44.4)	43 (51.8)
Only sick chicken	4 (23.5)	8 (42.1)	6 (75)	2 (66.7)	20 (55.6)	40 (48.2)
Effectiveness of treatments						
Yes	16 (88.9)	18 (94.7)	4 (57.1)	1 (33.3)	16 (44.4)	55 (66.3)
No (partial)	2 (11.1)	1 (5.3)	3 (42.9)	2 (66.7)	20 (55.6)	28 (33.7)
Have you lost all of your chicken due to an outbreak?						
Yes	13 (72.2)	10 (47.6)	1 (11.1)	1 (33.3)	26 (70.3)	51 (58)
No	5 (27.8)	11 (52.4)	8 (88.9)	2 (66.7)	11 (29.7)	37 (42)
Season of disease outbreak						
Wet	8 (44.4)	11 (55)	8 (100)	3 (100)	30 (81.1)	60 (69.8)
Dry	10 (55.6)	9 (45)	0 (0)	0 (0)	7 (18.9)	26 (30.2)

Usage of medical drugs is also common for chicken treatments as indicated in Table 8. Medical drugs have been used by many poultry producers and in this survey, 39.1% of respondents used those drugs to treat their chicken.

Table 8. *Conventional human drugs used in chicken production in the study area.*

Name of the drug	Frequency (%)	Used to treat	Frequency (%)	Way of administration	Frequency (%)	Effectiveness	Frequency (%)
Tetracycline	16 (48.5%)	Diarrhea	24 (72.7%)	With feed	9 (27.3%)	Cures all	8 (24.2%)
Ampicillin	15 (45.5%)	Respiratory signs, cough	9 (27.3%)	With water	24 (72.7%)	Cures partially	22 (66.7%)
Amoxicillin	2 (6%)					No cure	3 (9.1%)

Traditional medicines are used for the treatment of improved chicken and in this study, 61.5% and 3.3% of the respondents use ethno-veterinary practices to treat local and improved chicken breeds respectively. These ethno-veterinary practices in the area are presented below in Table 9. Smallholder farmers had the experience to treat chicken using medicinal plants and non-plant materials. Tobacco leaf, lemon juice, and table oil were the common traditional medicines administered with drinking water in Halaba district [20]. But, Neem tree leaf, garlic, and lemon juice were the commonly used traditional medicines in this study area to treat sick chicken.

Table 9. *Traditional medicines used for the treatment of chicken in the study areas.*

Study woredas	Name of traditional medicine	Respondents (%)	Used to treat	Preparation	Way of administration	Effectiveness
Assosa	Nechi shenkurt/garlic + lemon juice	20	Cough, diarrhea	Grinding, pressing, and squeezed	With water	Cures partially
	Neem tree leaf	26.7	Diarrhea, and all other diseases	Chopping of fresh leaf	With water	Cures partially
	Neem tree leaf + Garlic + lemon juice	6.7	Diarrhea	Grinding, pressing, and squeezed	With water	Cures partially
	Berbere/pepper	13.3	Cough diarrhea, fungal diseases	Grinding and mix with feed or water	With feed and water	Cures permanently
	Pepper + garlic	13.3	Diarrhea, fowl pox	Grinding	With feed and water	Cures partially
	Pepper + garlic+ lemon juice	6.7	Diarrhea	Grinding, pressing, and squeezed	With water	Cures partially
	Pepper + lemon juice	13.3	For all diseases	Grinding, pressing, and squeezed	With water	Cures partially
	Local alcohol (‘Araki’)	6.7	For all diseases	-	Drenching	Cures partially
Bambasi	Jinjibel/ginger + Garlic	13.3	Fowl pox and all diseases	Grinding and mixing with feed	With feed	Cures partially
	Garlic + pepper	20	Diarrhea, fowl pox	Grinding and mixing with feed	With feed and water	Cures partially
	Lemon juice	26.7	For all diseases, diarrhea	Pressed and squeezed	With feed and water	Cures permanently
	Neem tree leaf	6.7	For all diseases, diarrhea	Grinding	With water	Cures partially
	Neem + garlic + lemon juice	6.7	Diarrhea	Grinding, pressing, and squeezed	With water	Cures partially
	Moringa leaf	20	For all diseases	Grinding	With feed and water	Cures permanently
Kamashi	Local alcohol (‘Araki’) + Amed/ash	50	Diarrhea	Mixing these two	Drenching	Cures partially
	Garlic + ginger + Amed/ash	50	Diarrhea	Grinding and mixing them	Drenching	Cures permanently
Dembie	Neem tree leaf	100	Diarrhea	Grinding	With water	Cures partially
	Enset	5.3	Diarrhea	Grinding	With feed	Cures permanently
	Bahirzaf/Eucalaptus leaf	5.3	Diarrhea	Grinding	With water	Cures partially
	Garlic	26.3	Cough, diarrhea, dropping, and paralysis	Grinding	With water	Cures partially
	Garlic + ginger + pepper	5.3	Respiratory infections	Grinding	Drenching	Cures partially
	Ginger	5.3	Cough	Grinding	Via feed	Cures partially
	Ginger + pepper	5.3	Cough	Grinding	With water	Cures partially
Maokomo	Lemon juice	10.5	Diarrhea and all diseases	Pressed and squeezed	With feed and water	Cures permanently
	Lemon juice + ginger	10.5	Cough	Grinding, pressing, and squeezed	With water	Cures partially
	Lemon juice + pepper	5.3	For all diseases	Grinding, pressing, and squeezed	With water	Cures partially
	Lemon juice + garlic	5.3	Cough, diarrhea	Grinding, pressing, and squeezed	With water	Cures partially
	Moringa leaf	5.3	For all diseases	Grinding	With feed and water	Cures permanently
	Pepper	10.5	Cough, diarrhea, and fungal diseases	Grinding	With feed and water	Cures permanently

The medicinal plants used for the treatment of diseased chicken: Alliaceae, Rutaceae, Solanaceae, and Zingiberaceae plant species families were commonly used in the area. Herbaceous and tree growth habits of medicinal plant species were identified and it comparable with the report of Markos [22] from the Western zone of Tigray. The plant parts used for the preparation of the medicine are also described in Table 10 below. About 23.9% of the respondents use the fruit of lemon (Citrus limon) and bulb of garlic (Allium sativum) to treat their chicken when they get an infection.

Table 10. *Vernacular name, growth habit, and family name of medicinal plants.*

Vernacular/local name	Scientific Name	Family	Growth habit	Parts used	Frequency (%)
Lemon	Citrus limon	Rutaceae	Tree	Fruit	17 (23.9)
Neem	Azadirachta indica	Meliaceae	Tree	Leaf	8 (11.3)
Moringa	Moringa stenopetala	Moringaceae	Tree	Leaf	4 (5.6)
Berbere/pepper	Capsicum frutescens	Solanaceae	Herb	Fruit	15 (21.1)
Jinjibl/ginger	Zingiber officinale	Zingiberaceae	Herb	Rhizome/root	8 (11.3)
Bahirzaf/Eucalyptus	Eucalyptus globulus	Myrtaceae	Tree	Leaf	1 (1.4)
Nechi shenkurt/garlic	Allium sativum	Alliaceae	Herb	Bulb	17 (23.9)
Enset	Ensete ventricosum	Musaceae	Herb	All parts	1 (1.4)

Table 11. *Major predators of chicken identified by respondents in the study sites.*

Predators	Respondents woreda					
	Assosa	Bambasi	Kamash	Dembie	Maokomo	Total (%)
Accipitrine and wild cat	18 (100)	21 (100)	1 (12.5)	0 (0)	0 (0)	40 (48.8)
Cat, Eagle and honey bedgar	0 (0)	0 (0)	0 (0)	0 (0)	4 (12.5)	4 (4.9)
Eagle	0 (0)	0 (0)	0 (0)	0 (0)	12 (37.5)	12 (14.6)
Eagle, cat, fox and snake	0 (0)	0 (0)	4 (50)	0 (0)	0 (0)	4 (4.9)
Eagle, cat, foxes, dogs and wild cat	0 (0)	0 (0)	1 (12.5)	1 (33.3)	0 (0)	2 (2.4)
Eagle, honey bedgar, cat, foxes, dogs and wild cat	0 (0)	0 (0)	0 (0)	0 (0)	7 (21.9)	7 (8.5)
Eagle and wild cat	0 (0)	0 (0)	0 (0)	2 (66.7)	9 (28.1)	11 (13.4)
Eagle, wild cat and fox	0 (0)	0 (0)	1 (12.5)	0 (0)	0 (0)	1 (1.2)
Wild cat	0 (0)	0 (0)	1 (12.5)	0 (0)	0 (0)	1 (1.2)

Table 12. *Prevention method of chicken predators practiced.*

Prevention methods practiced	Respondents woreda					
	Assosa	Bambasi	Kamash	Dembie	Maokomo	Total
Cleaning the environment	1 (5.6)	0 (0)	0 (0)	0 (0)	2 (6.3)	3 (4)
Keeping chicken in the house	8 (44.4)	4 (19)	0 (0)	0 (0)	15 (46.9)	27 (35.5)
Make the area clean and keep them in the house	9 (50)	13 (61.9)	0 (0)	0 (0)	0 (0)	22 (29)
Fencing and rearing by dog	0 (0)	4 (19)	0 (0)	0 (0)	3 (9.4)	7 (9.2)
Fencing and keep them at house	0 (0)	0 (0)	0 (0)	0 (0)	9 (28)	9 (11.8)
Guarding	0 (0)	0 (0)	4 (100)	1 (100)	0 (0)	5 (6.6)
Keeping by dog	0 (0)	0 (0)	0 (0)	0 (0)	3 (9.4)	3 (4)

3.7. Major Chicken Predators in the Area

Common chicken predators identified in the area were accipitrine, wild cat, and eagle as indicated in Table 11. But the major causes of losses of chickens in the Halaba district of southern Ethiopia were predation by hawks, foxes, and wild cats [20]. The prevention method of chicken predators practiced by smallholder farmers in this study is presented in Table 12.

4. Conclusion and Recommendations

All the respondents were extensive chicken producers in the present study. Improved chicken breeds are not introduced into the low-land agro-ecologies of the Benishangul-Gumuz region. The disease was the major constraint for smallholder poultry production, especially in the wet season. Traditional medicines play a great role in the management of chicken health, and a large body of information has been generated regarding traditional practices in the area to take care of their chicken. This serves as a basis to facilitate the discovery of alternative pharmaceuticals. Predators and disease occurrence are preventable by housing and cleaning. Therefore, proper chicken management, improvement of veterinary service, and the introduction of improved chicken are mandatory for better chicken performance. Extra care is required in the rainy than the dry season. Further studies should be conducted to evaluate the composition and efficacy of active ingredients against chicken pathogens.

Competing Interests

The authors declare that they have no competing interests.

Author Contributions

DA proposed, designed, and executed the study. He analyzed the data and interpreted.

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References

[1] CSA. Agricultural sample survey. Addis Ababa, Ethiopia. 2016; 2 (583): 20-21.

[2] Fitsum M. Poultry Production System and Role of Poultry Production in Tigray Region, Northern Ethiopia: A Review. J Biol Agric Healthc. 2014; 4 (27): 154–60.

[3] FAO. Review of the new features of the Ethiopian poultry sector Biosecurity implications. 2008; (March): 1–24.

[4] Dinka H, Chala R, Dawo F, Bekana E, Leta S. Major constraints and health management of village poultry production in rift valley of Oromia, Ethiopia. Glob Vet. 2010; 5 (1): 6–10.

[5] Emebet M, Harpal S, Tesefaye S, Anna Maria J. Phenotypic Characterization of Indigenous Chicken Population in South West and South Part of Ethiopia. Br J Poult Sci. 2014; 3 (1): 15–9. https://doi.org/10.5829/idosi.bjps.2014.3.1.8370

[6] Yirgu T, Adamu M, Amare A. Small-scale Poultry Production in Sidama Zone: Challenges, Ethnoveterinary Practices and Coping Mechanisms. African J Basic Appl Sci. 2016; 8 (4): 212–219. https://doi.org/10.5829/idosi.ajbas.2016.212.219

[7] Yirgu T, Tesfaye E, Assefa G. Poultry Feed Resources and Coping Mechanisms of Challenges in Sidama Zone, Southern Ethiopia. Food Sci Qual Manag. 2017; 60: 77–86.

[8] Giday M, Ameni G. An Ethnobotanical Survey on Plants of Veterinary Importance in two woredas of southern Tigray, Northern Ethiopia. Ethiop J Sci. 2003; 26 (2): 123–36.

[9] Balaji NS, Chakravarthi P V. Ethnoveterinary Practices in India: A Review. Vet World. 2010; 3 (12): 549–51. https://doi.org/10.5455/vetworld.2010.549-551

[10] Eshetu GR, Dejene TA, Telila LB, Bekele DF. Ethnoveterinary medicinal plants: Preparation and application methods by traditional healers in selected districts of southern Ethiopia. Vet World. 2015; 8 (5): 674–84. https://doi.org/10.14202/vetworld.2015.674-684

[11] Moliso MM, Tessema F, Yilma M, Getachew T, Asrat M. Documentation of Ethno Veterinary Practices in Selected Sites of Wolaita and Dawuro Zones, Ethiopia. Glob J Sci Front Res D Agric Vet. 2016; 16 (5): 1–9.

[12] Tekle Y. An ethno-veterinary botanical survey of medicinal plants in Kochore district of Gedeo Zone, Southern Nations Nationalities and Peoples Regional State (SNNPRs), Ethiopia. J Sci Innov Res. 2014; 3 (4): 433–45.

[13] Oyda S. Review on Traditional Ethno-Veterinary Medicine and Medicinal Plants Used By Indigenous People in Ethiopia: Practice and Application System. Int J Res [Internet]. 2017; 5 (8): 109–19. http://dx.doi.org/10.29121/granthaalayah.v5.i8.2017.2193

[14] Menegesha A. A Review on Ethno-Veterinary Medicine Practices and Indigenous Knowledge. J Vet Med Anim Sci. 2020; 3 (1): 1–10.

[15] Teklay A, Abera B, Giday M. An ethnobotanical study of medicinal plants used in Kilte Awulaelo District, Tigray Region of Ethiopia. J Ethnobiol Ethnomed. 2013; 9 (65): 1–23. https://doi.org/10.1186/1746-4269-9-65

[16] Dulo F, Mekonnen A. Ethnoveterinary Medicine Practices in Ethiopia: Review. Adv Biol Res (Rennes). 2017; 11 (3): 154–60. https://doi.org/10.5829/idosi.abr.2017.154.160

[17] Ravikumar RK, Kumar V, Khuman LY, Kinhekar AS, Thakur D, Kumar V. Integrating Indigenous Knowledge Research System (IKRS) and/ with Livestock Health Intervention Program to Complement Natural Resource Conservation. Adv Anim Vet Sci. 2016; 4 (1s): 32–42.

[18] Moges F, Melesse 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. African J Agric Res. 2010; 5 (13): 1739–48.

[19] Mohammed A. Major Constraints and Health Management of Village Poultry Production in Ethiopia: Review School of Veterinary Medicine, Jimma University, Jimma, Ethiopia. Int J Res Stud Microbiol Biotechnol. 2018; 4 (1): 1–10. https://doi.org/10.20431/2454-9428.0401001

[20] Yemane N, Tamir B, Belihu K. Characterization of village chicken production performance under scavenging system in Halaba district of southern Ethiopia. EthiopVetJ. 2013; 17 (1): 69–80.

[21] Meskerem A. Major health constraints and ethno-veterinary practices of small scale and backyard chicken production in some selected regions of Ethiopia. Rev Méd Vét. 2017; 1–3 (168): 63–71.

[22] Markos S. Ethno Veterinary Medicine and Common Diseases of Chicken Producers in Western Zone of Tigray, Northern Ethiopia. J Agric Ecol Res Int. 2019; 20 (1): 1–17. https://doi.org/10.9734/JAERI/2019/v20i130096