

Review Article
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Reviewing Locally Available Chicken Feed Resources at Different Agro-Ecologies (High, Mid and Low Land), Formulating According To Growth Stage (Growers and Layers) Of Chicken and Its Average Price in SNNPR

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ABSTRACT

As discussed at the result part, this study has done by reviewing different research papers conducted in southern region peoples nations and nationalities regional state, research institute on poultry feed resource availabilities at different agro-ecologies with its' average cost variability and formulated based on growers and layers feed by considering nutrient content of it. Accordingly, most common feed types identified at highland areas were Kocho, Taro root and Barley midland areas Kocho, Taro root, Barley, maize and sorghum, sweat potato and lowland area maize, Sweat potato. Not only the locally available feed but also concentrated feeds (noug cake, wheat bran, premixes, salt and minerals) were investigated depending on their accessibility/availability. Therefore, considering these all conditions formulation was done with 100% supplementation of feed to overcome with the feed shortage problems of chicken and to enhance production and productivity of them by using those feed types that available at three different agro ecologies (highland, midland and lowland) in the region.

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Introduction

Poverty is both a cause and a consequence of inability to cope with shocks. The poor are often considered more vulnerable to shocks because of the assumed lack of diversification in their income and/or asset portfolio. In low income countries of Sub-Saharan Africa (SSA) this vulnerability of the poor to various shocks is considered to be of utmost importance for policy targeting. In the limited livelihoods diversification that poor households tend to have, livestock constitutes an important source of income and in general comprises the most important asset. The potential livelihoods impacts of a shock that affects the livestock sector, particularly the type of livestock kept by the poorest and most vulnerable, such as poultry, is therefore of paramount importance to policy makers.

The proportional contribution of poultry to the total animal protein production of the world by the year 2020 is believed to increase to 40%, the major increase being in the developing world. However, most communities lack the required husbandry skills, training and opportunity to effectively improve their household chicken production. In Ethiopia, chicken are widespread and almost every rural family own indigenous chicken, which provide a valuable source of family protein and income. The total chicken population in the country is estimated at 50.38 million [1-5]. The majority (97%) of these chickens are maintained under a traditional system with little or no inputs for housing, feeding or health care. The most

dominant chicken types reared in this system are local ecotypes, which show a large variation in body position, color, comb type and productivity [3, 6, 4]. Despite their low productivity, the indigenous chickens are known to possess desirable characters such as thermo tolerant, resistant to some disease, good egg and meat flavor, hard eggshells high fertility and hatchability [7].

The greater part of the feed for village chicken is obtained through scavenging, which includes the household cooking waste, cereal and cereal by products, pulses, roots and tubers, oilseeds, shrubs, fruits and animal proteins [8-10]. Poultry production plays a major role in bridging the protein gap in developing countries where average daily consumption is far below than recommended standards. However, the productivity of poultry in the tropics has been limited by scarcity and consequent high prices of the conventional protein and energy sources. Protein sources are especially limiting factors in poultry feed production in the tropics. Hence, there is a need to search for locally available alternative sources of protein for use as feed supplement to poultry. One possible source of cheap protein to poultry is the leaf meal of some tropical legume plants and multipurpose trees [11-14].

Thesamily in south region, there is potential and diversified livestock species, among that poultry holds greater part for rural poor household income and nutrition part. However, their production and productivity passes through challenging paths for feeding, health and housing, from that feed in quantity and quality the major problem to enhance the sector. Therefore, currently

conducted chicken feed resource assessment that regionally available and utilizing and non-utilizing with concentrate was based on ecology (high, mid and low land), type of chicken (grower and layer) and average or relative price of feeds aimed to solve/minimize the feed shortage problem of chicken with following objects.

General objective

- To identify regionally available and accessible chicken feed resource in different ecology.

Specific objectives

- To assess locally and commercially available poultry feed resources in the region.
- To identify the average price of available feed ingredients of chickens in different agro-ecology at farmer level.
- To recommend appropriate formulating level and feeding systems at different growth stages of chicken.

Methodology

The source of feed resources

Different feed resources available locally and accessible in local market in different agro-ecologies of southern region was assessed. The assessment study was conducted considering three agro-ecologies i.e. highland, midland and lowland selecting 5 zones i.e. Sidama, Wolaita, Gamo Gofa, Silte and Kafa zones and different stakeholders of research centers, woreda and kebele expertise, assessing local markets, reviewing of written documents at different institutions and website and non-governmental organizations as well as interviewing farmers engaged on poultry production. During the study, first ranked locally available, usable and accessible at local market feed resources were ranked and selected for the aim of our study according to the three different ecologies. In addition to that, while the assessing the feeds their current price at local market and their nutrient content also reviewed. Finally, the formulation of them was conducted depending on nutrient content and stage of chickens i.e. growers and layers in each ecology with considering their economic feasibility at farmer level.

Results

Table 1: Types of Feeds and Its Formulation for High Land Grower Chickens

No	List of Ingredients	Percentage	Nutritive value of the feed									Price/kg (Birr)	
			ME (kcal/kg)	CP (%)	Lys (%)	Meth (%)	M+C (%)	EE (%)	CF (%)	Ca (%)	P (%)		
1	Kocho	5	3800	3.6	0.55	0.17			0.36	7.5	0.41	0.12	7.3
2	Taro root	6	3650	8	1.02	0.08			2.5	2.4	0.43	0.11	
3	Noug cake	15	2400	34.6	1.15	0.65	1.25		7.1	17.2	0.26	0.65	
4	Wheat bran	8	1710	15.2	0.61	0.25	0.59		9.2	3.6	0.11	1.15	
5	Wheat	10	2980	12.1	0.35	0.18	0.48		1.8	2.2	0.07	0.35	
6	Maize	31	3340	8.7	0.22	0.2	0.35		3.6	2.1	0.04	0.3	
7	Dicalcium phosphate	1	-	-	-	-	-		-	-	24	18	
8	Limestone	1.2	-	-	-	-	-		-	-	38		
9	Premixes	0.5	-	-	-	-	-		-	-	38		
10	Salt	0.5	-	-	-	-	-		-	-			
11	Barley	8.8	2790	10.6	0.38	0.2	0.42		2.4	4.5	0.07	0.36	
12	Soybean toasted	13	3310	35	2.27	0.51	1.02		5.8	18.8	0.23	0.52	
Ration		100	2915.02	16.46	0.74	0.34	0.56		5.47	5.86	1.04	0.61	

Note: Lys = lysine, meth = methionin, cp = crude protein CF = crude fiber ME = metabolizable energy, EE = Ether extract, P= phosphorus, Ca = calcium

As indicated above table, different feed resources that usable and accessible at southern region were assessed at different agro-ecologies and growth stages of chicken with average value of costs locally practicable. At the table indicated, Kocho, Taro, wheat, Barley and maize were main chicken feed resources of high land ecology with the concentrate feeds. Therefore their formulation was done for layers feed considering nutrient content of them. While formulating those feed resources using latest feed win 2016 software, concentrate (Noug cake, wheat bran, salt, limestone and premixes) feeds available locally with their cost at current market per kilogram was highly considered to assure its feasibility for rural poor. Therefore, average cost for all feeds as dry matter basis to formulate growers feed at high land environment was 7.3 price/KG (Birr) averagely.

Table 2: Formulation of Feed Resources at High Land for Layers

No	List of Ingredients	Percentage	Nutritive value of the feed									Price/kg (Birr)
			ME (kcal/kg)	CP (%)	Lys (%)	Meth (%)	M+C (%)	EE (%)	CF (%)	Ca (%)	P (%)	
1	Kocho	7	3800	3.6	0.55	0.17		0.36	7.5	0.41	0.12	7.8 birr
2	Taro root	2	3650	8	1.02	0.08		2.5	2.4	0.43	0.11	
3	Noug cake	11.3	2400	34.6	1.15	0.65	1.25	7.1	17.2	0.26	0.65	
4	Wheat bran	6	1710	15.2	0.61	0.25	0.59	9.2	3.6	0.11	1.15	
5	Wheat	7	2980	12.1	0.35	0.18	0.48	1.8	2.2	0.07	0.35	
6	Maize	30.8	3340	8.7	0.22	0.2	0.35	3.6	2.1	0.04	0.3	
7	Dicalcium phosphate	2.3	-	-	-	-	-	-	-	24	18	
8	Limestone	6.5	-	-	-	-	-	-	-	38		
9	Permises	1.6	-	-	-	-	-	-	-	38		
10	Salt	0.5	-	-	-	-	-	-	-			
11	Barley	4.1	2790	10.6	0.38	0.2	0.42	2.4	4.5	0.07	0.36	
12	Soybean toasted	21	3310	35	2.27	0.51	1.02	5.8	18.8	0.23	0.52	
Ration		100	2759.6	16.6	0.81	0.31	0.55	6.37	5.27	3.73	0.81	

Note: Lys = lysine, meth = methionin, cp = crude protein CF = crude fiber ME = metabolizable energy, EE = Ether extract, P= phosphorus, Ca = calcium

As indicated above table, different feed resources that usable and accessible at southern region were assessed at different agro-ecologies and growth stages of chicken with average value of costs locally practicable by reviewing different materials written and documented in universities, colleges, research institutions or centers and private industries about the southern region poultry feed resources. In addition to that, dealing, discussing and sharing different data of feeds from zones and special woredas were gathered using direct and indirect communication with the respective expertise at zonal and woreda level. So, at the table indicated, Kocho, Taro root, wheat, Barley and maize were main chicken feed resources of high land ecology with the concentrate feeds. Therefore their formulation was done for layers feed considering nutrient content of them. While formulating those feed resources using latest feed win 2016 software, concentrate (Noug cake, wheat bran, salt, limestone and permises) feeds available locally with their cost at current market per kilogram was highly considered to assure its feasibility for rural poor. Therefore, average cost for all feeds as dry matter basis to formulate layers feed at high land environment was 7.8 price/KG (Birr) averagely.

Table 3: Formulation of Feed Resources at Mid Land for Growers

No	List of Ingredients	Percentage	Nutritive value of the feed									Price/kg (Birr)
			ME (kcal/kg)	CP (%)	Lys (%)	Meth (%)	M+C (%)	EE (%)	CF (%)	Ca (%)	P (%)	
1	Kocho	7	3800	3.6	0.55	0.17		0.36	7.5	0.41	0.12	6.27
2	Taro root	2	3650	8	1.02	0.08		2.5	2.4	0.43	0.11	
3	Noug cake	12	2400	34.6	1.15	0.65	1.25	7.1	17.2	0.26	0.65	
4	Wheat bran	12	1710	15.2	0.61	0.25	0.59	9.2	3.6	0.11	1.15	
5	Sorghum	21.25	3260	10	0.23	0.16	0.35	2.1	3.1	0.03	0.3	
6	Maize	15	3340	8.7	0.22	0.2	0.35	3.6	2.1	0.04	0.3	
7	Dicalcium phosphate	0.9	-	-	-	-	-	-	-	24	18	
8	Limestone	1.5	-	-	-	-	-	-	-	38		
9	Permises	0.25	-	-	-	-	-	-	-	38		
10	Salt	0.5	-	-	-	-	-	-	-			
11	Cassava	5	3090	2	0.07	0.03	0.05		3.3	0.15	0.1	
12	Soybean toasted	17.6	3310	35	2.27	0.51	1.02	5.8	18.8	0.23	0.52	
Ration		100	2895.01	16.3	0.76	0.29	0.54	5.90	5.88	1.03	0.6	

Note: Lys = lysine, meth = methionin, cp = crude protein CF = crude fiber ME = metabolizable energy, EE = Ether extract

As indicated above table, kocho, Taro root, Cassava, sweat potato, sorghum and Maize are locally available chicken feed resources at mid-land in the region. In addition to that the others were also available or accessible in the local market and farmers use them easily by buying. Most of the commercial feeds that available at local markets were principally the sources of vitamins and minerals which support their limitations at energy source feeds of maize, sorghum, kocho and Taro. From the concentrated feeds, lime stone, premixes, salt and dicalcium phosphate are basically the source vitamins and minerals. Unconventional feeds of sweet potato with the conventional feeds of Soybeans and Noug cake fulfils the gap of proteins. However, the rest of them are i.e. maize, Kocho, sorghum, cassava and Taro roots are basically the sources of energy. when we say the source of energy they have also the potential of protein and visversa and the formulation was done based on the nutrient content and the requirement of chickens or in this case, growers chicken type with feasible cost to enhance poultry production and productivity. So, the average cost or price for the preparation or formulation of layers feed at mid-land in the region was 6.27 Birr/Kg.

Table 4: Formulation of Feed Resources at Mid Land for Layers

No	List of Ingredients	Percentage	Nutritive value of the feed									Price/kg (Birr)
			ME (kcal/kg)	CP (%)	Lys (%)	Meth (%)	M+C (%)	EE (%)	CF (%)	Ca (%)	P (%)	
1	Kocho		5.4	3800	3.6	0.55	0.17		0.36	7.5	0.41	7.56 birr
2	Taro root	4	3650	8	1.02	0.08		2.5	2.4	0.43	0.11	
3	Noug cake	10	2400	34.6	1.15	0.65	1.25	7.1	17.2	0.26	0.65	
4	Wheat bran	8	1710	15.2	0.61	0.25	0.59	9.2	3.6	0.11	1.15	
5	Cassava	2	3090	2	0.07	0.03	0.05		3.3	0.15	0.1	
6	Maize	23	3340	8.7	0.22	0.2	0.35	3.6	2.1	0.04	0.3	
7	Dicalcium phosphate	2.3	-	-	-	-	-	-	-	24	18	
8	Limestone	6.5	-	-	-	-	-	-	-	38		
9	Permises	0.5	-	-	-	-	-	-	-	38		
10	Salt	0.5	-	-	-	-	-	-	-			
11	Soybean toasted	23	3310	35	2.27	0.51	1.02	5.8	18.8	0.23	0.52	
12	Sorghum	10.8	3260	10	0.23	0.16	0.35	2.1	3.1	0.03	0.3	
Ration		100	2749.98	16.44	0.84	0.31	0.53	6.6	5.18	3.74	0.81	

Note: Lys = lysine, meth = methionin, cp = crude protein CF = crude fiber ME = metabolizable energy, EE = Ether extract

As indicated above table, kocho, Taro root, Cassava, sweat potato, sorghum and Maize are locally available chicken feed resources at mid-land in the region. In addition to that the others were also available or accessible in the local market and farmers use them easily by buying. Most of the commercial feeds that available at local markets were principally the sources of vitamins and minerals which support their limitations at energy source feeds of maize, sorghum, kocho and Taro. From the concentrated feeds, lime stone, premixes, salt and di-calcium phosphate are basically the source vitamins and minerals. Unconventional feeds of sweet potato with the conventional feeds of Soybeans and Noug cake fulfils the gap of proteins. However, the rest of them are i.e. maize, Kocho, sorghum, cassava and Taro roots are basically the sources of energy. When we say the source of energy they have also the potential of protein and visversa and the formulation was done based on the nutrient content and the requirement of chickens or in this case, layers chicken type with feasible cost to enhance poultry production and productivity. So, the average cost or price for the preparation or formulation of layers feed at mid-land in the region was 7.56 Birr/Kg.

Table 5: Formulation of Feed Resources at Low Land for Growers

No	List of Ingredients	Percentage	Nutritive value of the feed									Price/kg (Birr)
			ME (kcal/kg)	CP (%)	Lys (%)	Meth (%)	M+C (%)	EE (%)	CF (%)	Ca (%)	P (%)	
1	Noug cake	9	2400	34.6	1.15	0.65	1.25	7.1	17.2	0.26	0.65	6.84 Birr
2	Wheat bran	15	1710	15.2	0.61	0.25	0.59	9.2	3.6	0.11	1.15	
3	Maize	54.4	3340	8.7	0.22	0.2	0.35	3.6	2.1	0.04	0.3	
4	Dicalcium phosphate	0.2	-	-	-	-	-	-	-	24	18	
5	Limestone	1.4	-	-	-	-	-	-	-	38		
6	Permixes	0.5	-	-	-	-	-	-	-	38		
7	Salt	0.5	-	-	-	-	-	-	-			
8	Soybean toasted	8	3310	35	2.27	0.51	1.02	5.8	18.8	0.23	0.52	
9	Fish meal	5	3320	70	5.39	2.03	2.66	8	0	3.5	2.6	
10	Sweet potato	6	2960	3.8	0.18	0.07	0.12	0.7	2.7	0.12	0.15	
Ration		100	2896.13	16.6	0.8	0.4	0.6	5	4.7	1	0.6	

Note: Lys = lysine, meth = methionin, cp = crude protein CF = crude fiber ME = metabolizable energy, EE = Ether extract

As indicated above table, there is locally available poultry feed resources on top of concentrated feed. Such as sweet potato, maize and fish meal. The reason that the fish meal was considered in lowland area, most of lakes are found at low a land area and it serve as protein source not only for chicken but also for human being. Then as a formulation indicated depending on available feed resources either conventionally or unconventionally, there is the fulfillment of the requirement of growers feed according to the low land environment with feasible cost for rural farmers and commercial producers. Therefore, it is viable or feasible either economically or requirements of chicken. So, this should be practicable under all poultry producers.

Table 6: Formulation of Feed Resources at Low Land for Layers

No	List of Ingredients	Percentage	Nutritive value of the feed									Price/kg (Birr)
			ME (kcal/kg)	CP (%)	Lys (%)	Meth (%)	M+C (%)	EE (%)	CF (%)	Ca (%)	P (%)	
1	Noug cake	7.9	2400	34.6	1.15	0.65	1.25	7.1	17.2	0.26	0.65	7.11 Birr
2	Wheat bran	10	1710	15.2	0.61	0.25	0.59	9.2	3.6	0.11	1.15	
3	Maize	47.2	3340	8.7	0.22	0.2	0.35	3.6	2.1	0.04	0.3	
4	Dicalcium phosphate	1.8	-	-	-	-	-	-	-	24	18	
5	Limestone	6	-	-	-	-	-	-	-	38		
6	Permixes	2.1	-	-	-	-	-	-	-	38		
7	Salt	0.5	-	-	-	-	-	-	-			
8	Soybean toasted	16.5	3310	35	2.27	0.51	1.02	5.8	18.8	0.23	0.52	
9	Fish meal	3	3320	70	5.39	2.03	2.66	8	0	3.5	2.6	
10	Sweet potato	5	2960	3.8	0.18	0.07	0.12	0.7	2.7	0.12	0.15	
Ration		100	2730.83	16.4	0.8	0.32	0.58	6	4.36	3.71	0.8	

Note: Lys = lysine, meth = methionin, cp = crude protein CF = crude fiber ME = metabolizable energy, EE = Ether extract

Thesamely here, as discussed above there was the formulation of feeds for layers at lowland area. So, in addition to the commercial feed there was unconventional locally available especially southern region feed resources called sweet potato that is protein source. While formulating the feed ingredients, different things were considered i.e. availability/accessibility of feeds, economical feasibility and importance/balancement for chickens. Therefore, as indicated on the above table, 7.11 birr was calculated considering current price of ingredients for 1k.g. of feeds. So that it is very economical for layers feed formulation and it is maximum price but it may decreases depending on the environment.

Summary

Poultry is the first step on the ladder for poor households to tackle poverty. But, different factories determine their production. Among that, feed cost covers up to 70% and its' nutritional value/content limits their production and productivity in the region as well as country level specially protein and energy sources. Rural poultry production in Ethiopia represents a significant part of the national economy in general and the rural economy in particular. However, providing low input and expecting yield is one of the great problems in most of the rural farmers. But there is promising condition that is different studies has conducted on locally available feed resources but skills about unconventional feed resource use for farmers have limited. So, in this investigation or review, different locally available, economically feasible chicken feed resources identified and feeding systems have designed at 100% supplementation based on ecologies called dega, woina dega and kola and chicken types of starter, grower and layers with its' relatively minimum cost ration formulation at regional level.

Recommendations

In many times, different studies have conducted from different university, colleges, research institutes and NGO's about locally available chicken feed resource to mitigate the problems of poultry production in the region. But still there is no any applicability of local chicken feed resource usage at farmers' level. Therefore, to tackle the problem encountered a couple of years; this investigation should have emphasis and applicability to the farmer's level. Before formulation locally available rations that meet the nutrient requirements of the chicken, farmers should be trained and village poultry technology packages should be provided to them with list of feed ingredients with their proportions and farmers' observation on the effects of feed resources on chicken feed preference and layers egg production performance should be studied further.

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