Meat Quality of Sasso Chicken Fed Rations from Locally Available Ingredients at Nekemte, Ethiopia

[1]Yosef Tariku, *[2]Diriba Diba, [3] Gameda Duguma and [2]Hasan Yusuf

[1]Jimma Horro District Agricultural Office, Kellem Wollega zone, Western Ethiopia
[2]Faculty of Agriculture, Wollega University, P.O. Box: 395, Nekemte, Ethiopia.
[3]School of Veterinary Medicine, Wollega University, P.O. Box: 395, Ethiopia
*Correspondence: Diriba Diba (Email:dnazerawi2010@gmail.com)

ABSTRACT

An experiment was conducted to evaluate meat quality of Sasso chickens fed rations from locally available ingredients in Nekemte city, Ethiopia. Four separate dietary treatments were used for the grower and finisher rations with varying the proportions of experimental diets used. A total of 120 male Sasso T44 chickens with 42 day-old were randomly assigned to treatment diets prepared separately for grower phase (8 weeks of age) and finisher phase (12 weeks of age) in a completely randomized design. The dietary treatments for the grower and finisher phases were formulated from the same feed sources (Table 1) but different in proportion of ingredients to satisfy both ME and CP requirements of the chickens. The four dietary treatments were: T1 [maize + soybean + lupine + nougseed cake + limestone + salt coded as MSL]; T2 [Wheat grain + soybean + lupine + nougseed cake + limestone, salt + premix coded as WSL]; T3 [maize , wheat +soybean + lupine + nougseed cake + limestone + salt + premix coded as MWS] and T4 [Commercial ration, positive control coed as CR]. Before formulating the treatment diets, composition were done for percentages dry matter (DM%), crude protein (CP%), Crude Fiber (CF%), ether extracts fat (EE%) and total ash (ash%) from ingredients: maize, wheat, roasted? soybean, nougseed cake and roasted? lupin and were also mashed in to 3-5 mm sieve size to be palatable for the chickens. The treatments were replicated three times with 30 chickens per treatment. The General Linear Model (GLM) Procedures of the Statistical Analysis System (SAS, 2008) were used to analyze the data. Fifty consumer panelists involved in testing the sensory property of the meat. The sensory preference data were analyzed using the mixed model of the Statistical Analysis System (SAS, 2008) with the treatments taken as fixed effects and the sense of panelists as random effects. No significant ($p > 0.05$) difference was observed among chickens fed on the different experimental rations in most of the sensory meat quality parameters evaluated. Similarly, there was no significant ($p>0.05$) difference in chemical composition of meat among Sasso chickens fed on the different dietary treatments, except for pH. The pH of Meat from chickens fed on MSL and WSL were significantly lower than those fed on MWS and CR. However, meat quality of Sasso chickens fed on both CR and MWS was almost similar, based on their pH values, but lower than those which fed WSL. From this it can be concluded that WSL can be used as an alternative feed source to CR in broilers' ration without any adverse effects on meat quality of Sasso chickens in the study area and areas with similar agro-ecologies of the country.

Keywords: Chemical composition; Dietary treatments; Ration; Organoleptic Property

INTRODUCTION

In Ethiopia, chicken production is a mainstay for many smallholder households owing to the minimum initial capital requirement, fast turnover rate and available family labor. Gulilat et al. (2021) reported that chicken add significant socio-economic impacts on food security, income generation and serve religious and other purposes. From 57 million Ethiopian chicken population about 78.85% is indigenous chicken kept under low-input and output production systems (Nebiyu Yemane et al., 2014). The indigenous chicken are low in production performance attributed to

(among others) poor genetic potential and availability and quality of feed (Yizengaw Mengesha et al., 2022). Small scale broiler production with the use of exotic breed of chicken is not exceptional to the poultry nutritional problem under the current Ethiopian condition.

According to Wilson and Beyer (2000) feed cost accounts for about 60-70% of the total cost of poultry production. Moreover, availability and quality of feed makes poultry production more difficult in some parts of Ethiopia. This is particularly true for western part of the country, where there is no single modern feed processing plant. Exotic breed of chicks (Sasso T44) have been distributed to smallholder farmers of this region aimed at increasing family income. Farmers complained that the distributed chicks are not viable and profitable due to unavailability of balanced poultry ration in the area. Some attempts have been made to purchase commercial ration either from Bishoftu or Addis Ababa, which was found to be beyond the reach of farmers and smallholder producers. Thus availability, quality and cost of feed are the major constraints to poultry production in the region regardless of the system of production adopted. This situation warrants the better utilization of locally available feed resources (DZARC, 1997). Therefore, this experiment was conducted to determine the effect of homemade rations using locally available ingredients on meat quality of Sasso T44 breed of chicks in Lekemt town.

MATERIALS AND METHODS

Description of the Study Area

The present study was conducted in Wollega University main campus located at a distance of 328 Km south west of Addis Ababa, Nekemte city, East Wollega Zone of Oromia Regional State, Ethiopia. The area is located at $9^0$5' North latitude and $36^0$33' East longitude with altitude of 2,088 meters above sea level (m.a.s.l.). The mean annual rainfall of the study area is about 1998 mm, relative humidity ranges from 31% - 110%, and the minimum and maximum temperatures are 8^oC and 30^oC, respectively. The mean minimum and maximum air temperature of the area is 8^0C and 30^0C, respectively (Nekemte Metrology Agency, 2020).

Table 1: Experimental layout and Ingredients used in each treatment

	MSL	WSL	MWS	CR
1	Maize	Wheat grain	Maize grain	Commercial Ration
2	Soybean toasted?	Soybean toasted?	Wheat grain	
3	Lupine toasted?	Lupine	Soybean	
4	Nougseed cake	Nougseed cake	Lupine	
5	Limestone	Limestone	Nougseed cake	
6	Salt	common salt	limestone	
7		premix	common salt	
8			premix	

Experimental Feed Preparation and Chemical Analysis

Preparation of feed ingredients

The rations were prepared from locally available feed ingredients such as maize, wheat, soybean, lupins (*L. albus*), nougseed cake and also mineral and vitamin sources such as premix, limestone and salt following NRC (1994) standard (see Experimental Ration Formulation section). Both Lupine and Soybean grains were not roasted. The feed ingredients were purchased from open markets in and

around Nekemte city. Commercial poultry ration (CR) was purchased from Ethio-Chicken *PLC* to use as positive control.

Chemical analysis of feed ingredients and experimental rations

All the fed ingredients (Table 1) and the commercial ration used in the current study were purchased from different locations and transported to the experimental site. Representative samples of feed ingredients were milled to pass through 1mm sieve and stored in paper bags until required for analysis. Feed dry matter (DM), ether extracts (EE), crude fiber (CF) and ash contents were determined following A.O.A.C. (1990) procedures. Nitrogen concentration was determined by Kjeldahl procedure and crude protein (CP) was calculated through multiplying the nitrogen content by 6.25. The calcium (Ca) concentration was determined by atomic absorption spectrophotometer after dry ashing. The ME value was calculated using the following equation suggested by Wiseman (1987).

ME (Kcal/Kg DM) = 3951 + 54.4 EE – 88.7 CF – 40.8 Ash

Table 2: Chemical composition of feed ingredients used to formulate experimental rations

Ingredients	**Parameters (gm/kg)**						
	DM	**CP**	**CF**	**EE**	**Ash**	**Ca**	**ME (kcal/ kg DM)**
Maize	884.00	88.00	33.90	48.90	14.00	66.30	3858.90
Wheat	898.00	135.00	46.70	44.70	31.20	27.80	3652.50
Soybean	906.30	380.00	46.30	146.30	40.80	18.60	4169.30
Lupine	924.00	322.00	128.80	70.80	41.10	12.60	3025.90
NSC	940.00	374.60	181.20	92.60	89.70	8.90	2481.30
Limestone	999.00	-	-	-	969.30	10.50	-

Note: DM=Dry Matter, CP=Crude Protein, CF=Crude Fiber, EE=Ether Extract, E=Metabolizable Energy.

Experimental Ration Formulation

Three treatment rations presented in Table 1 were formulated based on the results of laboratory chemical analysis. The feed ingredients and treatment rations were ground by local grinder (miller) to improve palatability and digestibility at a recommended particle size depending on the age of the experimental chicks. The growers and finisher treatment rations were formulated to contain a minimum of 3000Kcal/kg of metabolizable energy and 19% crude proteins and 3200Kcal of metabolizable energy and 18% of crude proteins, respectively using feed win software (Embaye *et al*., 2018 and Kasech *et al*., 2019). Commercial starters and finishers rations purchased from Ethio-chicken PLC were used as positive control treatments. Proportion of the experimental feed ingredients and their respective calculated composition are presented in Table 3 and 4.

Table 3: Proportion of ingredients and calculated composition (%) used in experimental rations

Ingredients (%)	**Grower Rations**				**Finisher Rations**			
	MSL	**WSL**	**MWS**	**CR**	**MSL**	**WSL**	**MWS**	**CR**
Maize	60	-	20		60	-	35	
Wheat	-	70	50		-	70	35	
Soybean	24	10	23		6	1.5	10	
Lupine	6	10	-		24	24.5	-	
Nougseed Cake	8	8	5		7.5	1.5	17.5	
Limestone	1.25	1.25	1.25		1.65	1.65	1.65	
Salt	0.25	0.25	0.25		0.35	0.35	0.35	
Vitamin Premix*	0.5	0.5	0.5	Commercial Ration	0.5	0.5	0.5	Commercial Ration
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Chemical composition (%)								
Dry Matter	89.34	90.17	89.61	90	89.68	90.25	90.25	90
Crude Protein	19.33	19.47	19.12	19	18.10	18.47	18.16	18
Ether Extract	7.61	6.04	7.04	9	6.20	5.22	5.22	8
Crude Fiber	5.37	6.47	4.99	5.5	6.76	6.77	6.77	5.5
Total Ash	4.00	4.93	4.44	6.17	4.34	4.97	5.17	6.168
Ca mg/kg	4.60	2.36	3.21	3.25	4.49	2.33	2.33	3.65
ME (kcal/kg DM)	3701	3505	3710	3725	3512	3432	3424	3647

Note: MSL=Maize, Soybean, Lupine, Nougseed cake, Limestone, Salt and Premix; WSL= Wheat, Soybean, Lupine, Nougseed cake, Limestone, Salt and Premix; MWS= Maize, Wheat, Soybean, Nougseed cake, Limestone, Salt and Premix; CR=Commercial Ration. *=25kg Broiler premix contai ns, Vitamin A 1000 000IU, Vitamin D3 200 000 IU. Vitamin E 1000 mg, Vitamin K3 225 mg, Vitamin B1 125 mg, Vitamin B2 500 mg, Vitamin B3 1375 mg, Vitamin B6 125 mg, Vitamin B 12 2mg, Vitamin PP(niacin) 4, 000 mg, Folic Acid, 100 mg, choline chloride 37,500 mg, Ca 29.7 %, Fe 0.4 %, Cu 0.05 %, Mn 0.6%, Z 0.7%, I 0.01 %, Se 0.004 %.

Experimental Animal Management

A total of 120 male 42day-old, Sasso T44 dual purpose chicks with an average initial live body weight of 552.0±1.20gm were purchased from '*Ethio-Chicken'*PLC and kept for five months in Wollega University, Nekemte Campus. The chickens were allowed to adapt to the rations and environment for one week prior to the commencement of the actual data collection. They were vaccinated against Mareks, Gumboro, Fowlphox, Fowl typhoid and Newcastle diseases with Mareks, Gumboro, Fowlphox, Fowl thyphoid, HB1 and Lasota vaccines. Other health precautions and disease control measures were taken throughout the study period. The chicks were grouped into four groups each with 30 chickens. Each group was further subdivided in to three groups each with 10 chicks. Each group was randomly assigned to the four treatments in Completely Randomized Design (CRD) with three replicates for feeding period of 5 months as shown in Table 2.

Each group was housed in an individual pen with an area of 0.96m^2/ chicken. The floors of the pens were covered with of 5cm deep wood shaving. The pens were properly cleaned and disinfected. Poultry house equipment i.e. Feeder, waterer provided. The treatment feed was offered twice a day and water was made available all the times. The chickens were weighed individually to determine initial body weights before commencement of the trial

Experimental Design and Treatments

The chickens were weighed individually to determine initial BW before commencement of the trial. One hundred twenty chickens were grouped into four treatments of 30 chickens each and randomly assigned to the four different dietary treatments. Each treatment group was further sub-divided into three replicates of 10 chickens per replicate and kept in 3m x 3m wire mesh partitioned pens.

Table 4. Experimental treatments

Treatments	Birds/treat	Rep/treat	Birds/Rep
Maize based broiler ration (MSL)	30	3	10
Wheat based broiler ration (WSL)	30	3	10
Maize + Wheat based broiler ration (WWS)	30	3	10
Commercial broiler ration (CR)	30	3	10

Meat Sample Collection and Chemical Analysis

A total of 48 chickens, twelve chickens from each treatment, were randomly selected and slaughtered at the end of the feeding trial. They were starved for twelve hours before slaughter to ensure empty crop. Then, each chicken was weighed, killed and bled for 180 seconds. The slaughtered chickens were immersed in a bucket of hot water (63°C) for approximately 120 seconds, and de-feathered by hand plucking. Meat samples were collected from the three commercial muscles (breast, thigh and drumstick), dried, coded, milled with pistol and mortar, packed and sent to the National Veterinary Institute (NVI) at Bishoftu, Ethiopia for its chemical composition analysis. Accordingly, AOAC (1990) was used for chemical analysis of DM, EE, CF, and ash contents. The Kjeldhal technique was followed to determine N content of the meat where N*6.25 was used to calculate CP content of the meat. The present experiment lasted for a period of five months during which daily feed intake and weekly body weight (BW) were monitored. All measurements on meat quality were recorded using laboratory for chemical analysis and consumer panelists for testing meat.

Organoleptic quality evaluation

The sensory evaluation was done on similar carcass cuts: breast, drumstick and thigh muscles for all chickens slaughtered for each treatment. Both roasted and non-roasted samples were (3 roasted and 3 non-roasted samples from breast, thigh and drumstick per treatment) taken and evaluated by 46 volunteer consumer panelists recruited to take part in the sensory analysis. The panelists were from both genders and aged between 24 and 40 years. Orientation was given to the panelists to make the testing effective. The panelists were arranged to sit individually in separate places free of any sound, smells or sight that could disturb their sensory perceptions. They were provided with water to rinse their mouths between tasting samples. The meat samples were roasted for five minutes using frying pan and coded before presented with white and clean ceramic dishes to consumer panelists individually. Carcass appearance (color), aroma/flavor, taste, juiciness, tenderness and overall acceptability were the sensory parameters evaluated using a nine-point hedonic scale (1= dislike extremely, 2 =dislike very much, 3 = dislike moderately, 4= dislike slightly, 5 = neither like nor dislike, 6 = like slightly, 7= like moderately, 8= like very much, 9= like extremely) following AMSA (2016).

Measuring the pH Value of Meat

The pH value of the meat was measured at different times postmortem starting immediately from slaughter (30 min., 24 hr, 48 hr, 72 hr) in meat samples 2 cm depth. The pH value of meat was

measured using digital pH meter. The digital pH meter was equipped with an electrode calibrated at pH 7.0 in 100 ml distilled water dissolved with buffer tablet before measuring. The pH meter was read and recorded for the first three days.

Moisture content of meat

For moisture content analysis, samples were collected from the three major muscles (Breast, Thigh and Drumstick) and oven dried at 105˚C for three hours. The samples were allowed to cool in a desiccator and then re-weighed. Repeated drying and cooling was done until no further change in weight was recorded. The percentage of moisture content was calculated by expressing the loss in weight after drying as a fraction of the initial weight of sample used and multiplied by 100.

$$\text{MC (\%)} = \frac{Wi - Wo}{Wi} x100$$

Where:
MC (%) = percentage of moisture content,
Wo = loss in weight (gm) on drying and
Wi = initial weight of sample (gm)

Statistical Analysis

The data on meat quality were analyzed using the General Linear Model (GLM) procedure of the Statistical Analysis System (SAS, 2008) with the treatments taken as fixed effects and the sense of panelists as random effects (Næs *et al*., 2010). Means differences were compared using the Tukey's honestly significant difference (HSD) at $p< 0.05$. The following statistical model was fitted to analyze the data:

$Yij= \mu + ti + eij$

Where:
Yij = response variables (Organoleptic properties of meat, Chemical compositions of meat, Moisture content of meat and pH of meat) taken under treatment i).
μ= the overall mean
ti= the i^{th} treatment effects (1=MSL, 2= WSL, 3= MWS, 4= CR)
eij = is a random error

RESULT AND DISCUSSION

Chemical Composition of Feed Ingredients

The chemical compositions of feed ingredients used in the study are presented in Table 2. Results of the current study indicated that nougseed cake, non-roasted soya bean grain and non-roasted lupine were superior to others in DM, CP and CF contents in their order of importance whereas maize was the least in most of the parameters considered, except for Ca and ME which were 6.63% and 3858.9kcal/kg DM.. The DM content for nougcake, soyabean and lupine was 94%, 92.4% and 90.6%, respectively while that of maize was 88.4%. The CP values were 37.4%, 32.2%, 38%, 13.5% and 8.8% for nougcake, lupine, soyabean, wheatand maize, respectively. Soya bean grain, on the other hand, was superior to others in CP (38%), EE (14.6%) and ME 4169.3 kcal/kg DM) followed by nougseed cake and lupine in CP and EE contents, but followed by maize and wheat in ME content. From the results it could be observed that different ingredients used in the formulation of the rations contained different nutrients. This means the nutrient missed by one of the ingredients could be complemented by the other one and vice versa (see Table 3).

The chemical compositions of maize, soybean and nougseed cake were in line with the values reported in the literature (Melkamu, 2016; Eyesus Tekulu, 2018; Yared Alemayehu, 2019). The chemical or nutrient compositions of lupine in the current study were in agreement with the value noted by Catootjie (2009) who reported for lupine in the range of 89.5 to 94.4% DM, 30.6 to 41.0% CP, 5.9 to 14.6% EE, 2.6 to 4.1% Ash and 1.5% Ca. These similarities of chemical composition between feed ingredients in this experiment and other reports indicated that those ingredients are found in acceptable ranges.

Chemical Composition of Experimental Rations

Chemical compositions of the four dietary treatments of grower and finisher rations are presented in Table 3. The rations were formulated to meet nutrient requirements of broiler chickens as outlined by national research council (NRC, 1994) and to contain a minimum of 3000 kcal/kg DM ME, 190 gm CP/kg and 3200 kcal ME, 180 gm CP/kg in the grower and finisher rations, respectively. The DM and CP contents of the experimental rations were similar for grower rations as well as for finisher rations. The similarity in CP content between the locally formulated and commercial rations implies that the rations were formulated based on the CP requirements of broiler at grower and finisher stage which are 19% and 18%, respectively (NRC, 1994). Generally, in the experimental ration formulation, efforts were done particularly to make the experimental rations iso-nitrogenous with the commercial ration. The highest ash content was observed in CR (103.7 gm/kg) for grower rations followed by WSL (77.6 gm/kg), MSL (72.4 gm/kg) and MWS (62.5 gm/kg), respectively. However, ash content of CR was the least (62.1 gm/kg) for finisher ration.

In this study, the highest crude fiber contents of 46.5 gm/kg and 39.9 gm/kg were observed in MSL and WSL for grower and finisher rations, respectively whereas the least crude fiber values of 4.3 gm/kg and 20.6 gm/kg were observed in CR for grower and finisher rations, respectively. ME Was highest in CR (3737.22 kcal/Kg) and MWS (4030.67Kcal/ Kg) for grower and finisher rations, respectively. This implies that the highest EE in CR (45.5gm/kg) and MWS (118.1gm/kg) for grower and finisher rations respectively must have contributed to the highest values of ME observed in both rations. The highest fiber contents of MSL (46.5 gm/kg) and WSL (39.9 gm/kg) could be attributed by inclusion of lupine grain which contains high fiber content (128.8 gm/kg) unlike that of MWS.

Organoleptic Property of Meat from Sasso Chickens

Organoleptic property of meat from Sasso chickens is presented in Table 5. During the current study, significant ($p > 0.05$) differences were not observed among chickens fed on the different experimental rations in most of the parameters evaluated, except for meat color and overall acceptability. There was significant difference ($p < 0.015$) in meat color between chickens fed on WSL and MWS. No significant ($p>0.05$) difference observed among chickens fed on WSL, MSL and CR with regard to meat color. Similarly, there was no significant ($P>0.05$) difference among those fed on MWS, CR and MSL in meat color. Based on panelists preference, the highest score in meat color was obtained from chickens fed on MWS (8.47) followed by CR (8.22). In contrast, chickens fed on WSL scored the least consumer preference (7.80) in meat color. With regard to the overall acceptability of meat from Sasso chickens, significant ($p <0.01$) difference was observed between chickens fed on WSL and those fed on MWS and CR. However, there was no significant ($p > 0.05$) difference between groups fed on WSL and MSL. Similarly, no difference was observed among those groups fed on CR, MWS and MSL. Based on sensory evaluation, chickens fed on WSL were the least preferred both in meat color and the overall acceptability.

Table 5.Organoleptic property of meat from Sasso chickens

Sensory preference parameters	**Treatments**				**SEM**	**P-value**
	MSL	**WSL**	**MWS**	**CR**		
Color	8.15^{ab}	7.80^{b}	8.47^{a}	8.22^{ab}	0.09	0.0152
Flavor	7.80	7.95	8.20	7.99	0.13	0.3124
Taste	7.85	7.57	8.02	7.86	0.12	0.2029
Tenderness	7.91	7.51	8.09	7.95	0.13	0.0924
Juiciness	7.80	7.53	7.71	7.73	0.12	0.5379
Overall Acceptability	7.90^{ab}	7.67^{b}	8.10^{a}	7.95^{a}	0.05	0.0098

Note: ^{ab} means with a different superscript in a row are significantly different ($p<0.05$); MSL=Maize, Soybean, Lupin, Nougseed cake, Limestone, salt and premix: MSL= Wheat, Soybean, Lupine, Nougseed cake, Limestone, salt and premix; MWS=Maize, Wheat, Soybean, Nougseed cake, Limestone, salt and Premix; CR=Commercial Ration; SEM=standard error of the mean

Meat from Sasso chickens fed both on MWS (8.10) and CR (7.95) had got best perception in overall acceptability by consumers while meat from MSL (7.90) and WSL (7.67) was moderately accepted by consumers. This might be due to differences in nutrient utilization between chickens fed on different dietary treatments although nutrient contents among the treatment rations were nearly similar.

Values obtained for color (7.80-8.47), flavor (7.80-8.20), taste (7.57-8.02), tenderness (7.51-8.09) and juiciness (7.53-7.80) from panelists' preference in the current study were in disagreement with the 6.37, 5.12, 5.25 and 4.62 consumers' preference values reported by Franco *et al.* (2012) for color, flavor, taste and tenderness for Sasso T44 evaluated at 6 months of age, respectively. These differences could be attributed by nutritional differences between the rations used in the previous and the current study. Generally, in the present study, meat from Sasso chickens fed on all the experimental rations recorded similar points (point 7 and above) on all sensory parameters. From this, it can be said that feeding of Sasso chickens with rations from locally available ingredients against commercial ration did not affect consumer preference.

Chemical Compositions of Meat from Sasso Chickens

The chemical compositions of meat from Sasso chickens fed different dietary treatments are presented in Table 6. The result of the current study indicated that there was no significant ($p>0.05$) difference in chemical composition of meat among Sasso chickens fed on the different dietary treatments, except for pH. The pH of Meat from chickens fed on MSL and WSL were significantly different from those fed on MWS and CR. The highest meat pH values of 6.36 and 6.33 were obtained from chickens fed on MWS and CR, respectively. The lower pH values of 6.17 and 6.18 were obtained from chickens fed on MSL and WSL, respectively. Franco *et al*. (2012) obtained slightly lower value of pH of 5.95 than the present study. However, pH values reported in the current study were in agreement with the 6.19 pH value reported by Diaz *et al*. (2010) for castrated Sasso T44.

Table 6: Chemical compositions of meat from Sasso chickens (gm/kg)

Chemical composition (gm/kg)	**Treatments**				**SEM**	**P-Value**
	MSL	WSL	MWS	CR		
Dry Matter	270.2	264.5	272.1	272	0.32	0.3629
Crude Protein	219	220.7	218.3	218.3	0.97	0.0967
Ether Extract	48.2	35.5	81.3	36	1.04	0.0606
Ash	48.9	48.3	44.2	43.8	0.14	0.0767
Ca	9.9	12.5	13.3	5.4	0.19	0.0860
pH	61.7^{b}	61.8^{b}	63.6^{a}	63.3^{a}	0.01	<0.0001
Moisture (%)	72.99	73.55	72.79	72.80	0.32	0.3632

Note: ^{ab} means with a different superscript in a row are significantly different ($p<0.05$); MSL = Maize, Soybean, Lupine, Nougseed cake, Limestone, Salt and Premix: WSL = Wheat, Soybean, Lupine, Nougseed cake, Limestone, Salt and premix; MWS = Maize, Wheat, Soybean, Nougseed cake, Limestone, Salt and Premix; CR = Commercial Ration; SEM = standard error of the mean

The pH of broiler meat is the function of amount of glycogen in the muscle prior to slaughter and the rate of glycogen conversion into lactic acid after slaughter. After death, due to lack of oxygen supply lactic acid production occurs resulting into decline of pH which causes protein denaturation, loss of protein solubility and in an overall reduction of reactive groups available for water binding on muscle proteins (Wismer-Perdersen, 1986). Muscles with $pH \geq 6.0$ are characterized by minimal protein denaturation, low light scattering and hence translucent appearance. However, muscles with $pH \leq 6.0$ undergo greater protein denaturation, causing increased light scattering and opaqueness (Anadon, 2002). Therefore, the pH values of meat obtained from Sasso chickens fed on the different dietary treatments in the present study were in the acceptable range ($pH \geq 6.0$), indicating better shelf life (storage value) of meat due to the meat minimal protein denaturation and low light scattering attributed by the higher pH values ranging from 6.17 – 6.36.

The likely explanation for the non-significant ($p> 0.05$) differences in DM contents among meat from Sasso chickens fed on the different dietary treatments may be due to similarity of the DM contents of all experimental rations and also the same breed of chicken used in the current study. The non-significant difference in CP contents (218.3 gm/kg-220.7 gm/kg) reported in the current study might be due to the fact that the different experimental rations used were iso-nitrogenous. Though, literature reports (Quentin *et al*., 2003; Lyon *et al*., 2004; Kavouridou *et al*., 2008) indicated that types of cereals used in the chickens' diet had an impact on the amount of fat deposited and FAs proportion, no significant difference was observed in EE among chickens fed on different dietary

treatments composed of different cereals. The results of chemical composition of meat obtained in the current study, except for the 218.3 gm/kg -220.7 gm/kg CP , were in disagreement with the values of 74.1%, 21.7%, 0.5% and 1.2% reported for DM, CP, EE and ash, respectively by Franco *et al*. (2013) for Sasso T44 chickens slaughtered at the age of eight months. The possible reasons for these differences may be age of chickens and experimental feed ingredients in which they used corn in comparison with non-described commercial ration. The mean values of CP (218.3 gm/kg -220.7 gm/kg) in the present study were in general agreement with the mean protein values of 21.2% and 20.6% reported by Franco *et al*. (2012b) and Wattanachant *et al*. (2004) for Sasso T44 chickens slaughtered at 6 months of age and broilers, respectively.

Values for moisture contents of meat (72.79%-73.55%) observed in the current study were slightly at lower range of the 74.40% meat moisture content value reported by Franco *et al*. (2012) for sasso T44. In addition, the current values with regard to moisture content were lower than the 74%-76%) reported by Wattanachant *et al*. (2004) for improved hybrid of commercial breeds. These differences could be due to age and breed differences (Sasso T44 Vs improved hybrid of commercial breeds). Karaolgu and Durdag (2005) reported that slaughter age have a significant effect on chemical composition of chicken meat.

CONCLUSION

Among chickens fed on rations prepared from locally available ingredients, meat quality in terms of the contents of protein, lipid and pH values was obtained from those chickens fed on WSL where wheat, soybean and lupine were used as source macronutrients. The ration MWS (maize-wheat-soya bean) had also resulted in similar effect with WSL in terms of nutrient composition of the meat. The meat produced from birds fed on MWS (maize, wheat and soybean major ingredients) was the most preferable ration with the desirable color and overall acceptability of meat from Sasso chickens. Particularly for the study area and areas with similar production systems, replacing CR with MWS in Sasso chickens' ration is important according to this experiment.

ACKNOWLEDGEMENTS

The authors thank National Veterinary Institute of Ethiopia for their support in chemical analysis of feed and meat samples. Besides, we would also like to thank Mr. Waseyehun Hassen and Mr. Temesgen Minamo of Jimma University' for sharing us their good experience on feedwins software application. Finally, we would like to say thanks to Wollega University for providing us its poultry experimental facility and financial support.

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