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Original article

Growth performance and carcass characteristics of Yankasa rams fed varying levels of *Panicum maximum* - concentrate mix under intensive feedlot in South Western Nigeria

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ABSTRACT

Consumption of animal protein in Nigeria is far less than recommended level for adequate growth and development in humans. There is the need to beef up livestock production, especially in the sub humid zone through intensive system using bigger breeds for improved nutritional status. The objective of this study was to evaluate the growth performance and the carcass characteristics of Yankasa rams fed Panicum maximum fodder supplemented with concentrate mix under intensive feedlot. Twenty yearling Yankasa rams of an average body weight of 21.33±0.50 kg were randomly assigned into five treatment groups with four animals per group in a randomized completely block design (RCBD) after being quarantined for 30 days. The experimental diets consisted of Panicum maximum fodder as the basal diet at 3% body weight of the rams. Concentrate diet was formulated using maize (25.00%), brewers dried grains (40.50%), moringa leaf meal (16.00%), urea (2.70%), rice husk (14.50%), vitamin-mineral premix (1.00%) and common salt (0.30%). The concentrate mix served as the supplement to and replaced the basal diet at 0, 0.5, 1.0, 1.5 and 2.0% body weight of the rams respectively in treatment 1, 2, 3, 4 and 5. The amount of feed offered was adjusted weekly based on average body weight from the preceding week. The dry matter, crude protein (CP)

constituents and the gross energy (GE) value of concentrate were higher than that of the forage. However, the crude fibre (CF) of forage was greater than the CF of concentrate mix. There were no significant ($p>0.05$) differences among the means of the feed intake in the treatments. The average daily weight gain and metabolic weight gains increased significantly ($p<0.05$) with increased supplements. Significantly ($p<0.05$) higher feed conversion ratio (FCR) was recorded for rams in T1 (24.07±1.12) while T5 had lowest value (8.35±0.80). Carcass yield was increased with increasing level of supplementation while integrity of the relative organs characteristics were maintained. The best result was obtained when Yankasa rams were fed with 2% concentrate mix as percentage body weight of the rams. Supplementing Panicum maximum with varied levels of concentrate mix resulted in improved rams' productivity.

1. Introduction

The consumption of animal protein in Nigeria has always fallen short of expectation (Nkwocha *et al*., 2010). The total recommended protein intake for growth and development in man is 85.9 per caput per day and 39g should be from animal origin. According to FAO (2005), an average Nigerian consume only about 33g of protein per caput per day. This is 52.9g below the recommended level. Therefore, there is need for increase in livestock production in order to improve the nutritional status of Nigerians through the provision of high quality animal protein such as meat and milk. Sheep is an excellent food source for human consumption because mutton is a nutrient dense food that provides high quality protein, essential minerals and vitamins such as iron, zinc, vitamin B_{12} and omega -3 (Babiker *et al*., 1990; Ozung *et al*., 2011).

Sheep breeds in Nigeria include West African Dwarf (WAD), Ouda, Yankasa and Balami. The predominant and indigenous breed of sheep in south western Nigeria is the WAD. They are smaller in evolution as an adaptation to adverse condition to other breeds (Agaviezor *et al*., 2013) which make products derivable from them to be smaller in quantity compared to other Nigerian breeds. Cost of transporting mature rams from the north to the south to meet protein demand is prohibitive due to increasing prices of fuel and motor parts. Meeting the rising demand for animal protein in south western Nigeria may include among other measures the rearing of northern bigger breeds. Mature rams have been transported and used to meet the shortfall in supply of the much needed animal protein for consumption in the southwest and for slaughter during Muslim festival (Sarma and Ahmed, 2011).

Yankasa breed of sheep is not traditionally managed in the sub-humid southern zone of Nigeria, but is a meat breed found in northern parts of Nigeria, which is believed to have descended from a common ancestor to the WAD sheep and can be managed in the sub-humid southern environment (Osaiyuwu *et al*., 2010; Yunusa *et al*., 2013). This sheep breed is mostly raised under semi intensive and extensive system. These feeding systems affect sheep productivity, resulting in economic loss due to seasonality in availability of feed, adverse weather condition and poor management system (Ngere *et al*., 1979).

Genetic makeup and feeding systems play important roles in productivity, health and profitability of animal production enterprises. Even with potentially bigger breeds, poor feeding system such as the traditional extensive management system commonly practiced in this area (whereby small ruminant mainly roam around and eat natural pastures and household waste) result in poorer weight gain and cause the animal to reach market size at a longer period (Mahajan *et al*., 1976). It is pertinent to use appropriate supplements and basal diets as a feeding strategy in order to balance the nutrient needs of the rumen microorganisms and the animals (Lakpini, 2002).

To achieve improved productivity in ruminants, several strategies have been advanced (Manso *et al*., 2006; Jabbar and Anjum, 2008; Kabir *et al*., 2012). Some fattening systems are based on pasture such as *Panicum maximum*, *Pennisetum purpureum*, *Cynodon* species and *Digitaria decumbens* which are abundant during the wet season and concentrate fed *ad-libitum*; some are based on the supply of feed and forage fed *ad-libitum* depending

on farm facilities, consumer preference and economic circumstances (Bodas *et al*., 2014). Another feeding strategy to achieve fattening objective is to develop a system of feeding with high energy and protein supplements (Konlan *et al*., 2012). It is the appreciation of this that gives rise to fattening Yankasa ram using *Panicum maximum* and concentrate using locally available ingredients. According to Mahgoub *et al*. (2000), increase body weight is highly correlated with feed consumption because dry matter intake is a key determinant of growth. An understanding of carcass analysis is imperative in accessing the quality of feed fed to animals among other things.

This study was carried out to evaluate the growth performance and the carcass characteristics of Yankasa rams fed *Panicum maximum* fodder supplemented with concentrate mix under intensive feedlot in south western Nigeria.

2. Materials and methods

2.1. Experimental site

The experiment was conducted at the small ruminant section of the teaching and research farm, Ekiti State University, Ado Ekiti south western Nigeria. The state lies entirely within the tropics and located between Longitude $4^0$45' to $5^0$45' East of the Greenwich meridian and latitude $7^0$15' to $8^0$5' North of the equator. Seasonal distribution of rainfall is approximately 0.1% for late dry (January-March), 25.8% for early wet (April-June), 69.6% for late wet (July-September) and 4.5% for early dry (October-December) seasons. The mean annual rainfall is 1247 mm with relative humidity of 70 to 85%. The location is situated at about 437mm above sea level with a mean annual temperature of 26.2^0C

2.2. Experimental animals and management

Twenty yearling Yankasa rams of an average body weight of 21.33±0.50 kg were procured from ruminants' market in Kwara state, north central Nigeria. Prior to implementation of the experimental protocol, the rams were quarantined for 30 days according to NAPRI (1984) method. The animals were treated against ectoparasites using ivermectin injection, were dewormed with Albendazole Bolus to take care of endoparasites and also injected intra-muscularly with Oxytetracyline-long acting broad spectrum antibiotic as a precautionary measure against bacterial infections. The animals were later allotted into five treatment groups and fed for a pre-treatment period of two weeks to enable them adapt to the experimental diets and the environment before the commencement of the actual experiment. Water was provided *ad-libitum*.

2.3. Experimental procedure

The rams were randomly assigned into five treatment groups with four animals per group in a randomized completely block design (RCBD). The experimental diets consist of *Panicum maximum* fodder as the basal diet at 3% body weight of the rams. Concentrate diet was formulated using maize (25.00%), brewers dried grains (40.50%), moringa leaf meal (16.00%), urea (2.70%), rice husk (14.50%), vitamin-mineral premix (1.00%) and common salt (0.30%). The concentrate mix served as the supplement to and replaced the basal diet at 0, 0.5, 1.0, 1.5 and 2.0% body weight of the rams respectively in treatment 1, 2, 3, 4 and 5. The amount of feed offered was adjusted weekly based on average body weight from the preceding week. Water was provided *ad-libitum*.

2.4. Data collection

Experimental diets were supplied *ad-libitum*, twice daily at 8:00 hr and 16:00 hr. Feed offered and feed refused were recorded for each animal in each group daily while animal weights, using a spring balance were taken weekly. Average daily feed intake and average daily weight gain were calculated over the 84 days experimental period. Average daily gain (ADG) was obtained by the difference between the final body weight and the initial body weight (kg) divided by the numbers of days in feed.

At the end of the experiment two rams from each treatment were randomly selected from each treatment and fasted for 24 hours to determine their fasted weights. Slaughtering operation was conducted using local method by severing the jugular veins and the carotid arteries at the atlanto-occipital articulation. The carcasses were properly bled after which processing and weighing were carried out according to the methods described by Adu and Brickman (1981) and Fasae *et al*. (2011). Records taken in this study included weight before bleeding, weight after bleeding, eviscerated weight, carcass length, chest depth, left carcass, right carcass, hind leg, hind

shank, right shoulder, right leg, ribs, breast, fore shank, fore leg, flank, loin, head, neck, tail, scrotum and internal organs.

2.5. Chemical analysis

Feed samples were oven dried to constant weight. The proximate composition for crude protein, crude fibre, ether extract and ash of the experimental diets were conducted according to AOAC (2000).

2.6. Statistical analysis

The data were analysed using one way ANOVA using SAS (2008) method with diet as the source of variation, where significant differences exist, Duncan multiple range test was used to separate the means.

3. Results and discussion

The analysed proximate composition of the concentrate mix and *Panicum maximum* forage are presented in Table 1. The dry matter of the concentrate (92.15 g/100g) was higher than that of the forage (72.28 g/100g). The crude protein (CP) constituents of concentrate mix (16.65 g/100g) was higher compared to the CP of the forage (9.42 g/100g). The gross energy (GE) value of concentrate (13.53 MJ/kg) exceeded the GE value of forage (9.58 MJ/kg). However, the crude fibre (CF) of forage (31.58 g/100g) was greater than the CF of concentrate mix (26.48 g/100g). The proximate composition of the experimental diets is depicted in Table 2. The crude protein content of *Panicum maximum* - concentrate mix in treatment 1 to 5 (3.0:0, 2.5:0.5, 2.0:1.0, 1.5:1.5, 1.0:2.0% body weight of rams) ranged from 11.64 to 14.97 g/100g respectively. The NFE were 44.01, 44.01, 44.24 and 44.65 g/100g in treatments 2 to 5 respectively. While GE varied from 12.90 to 13.35 MJ/kg in treatment 2 to 5 respectively.

Table 3 shows the summary of the growth performance of Yankasa rams fed *Panicum maximum* -concentrate mix in intensive feedlot. There were no significant differences ($p>0.05$) among the means of the feed intake (656±32.2 g/day - 689±61.10 g/day) in all the animals. There were significant differences ($p<0.05$) among the means of the final weight and metabolic weight gains in the rams in all the treatment groups. The values increased from the rams fed T1 (2.35 kg and 1.76 $kg^{-0.75}$) to rams fed T5 (10.96 kg and 6.75 $kg^{-0.75}$) respectively. The average daily weight gain (ADG) increased significantly ($p<0.05$) as the concentrate mix increased in the diet from 27.96±0.53 g/d to 80.35±4.06 g/din T1 to T5 respectively. Significantly ($p<0.05$) higher feed conversion ratio (FCR) was recorded for rams in T1 (24.07±1.12) while T5 had lowest value (8.35±0.80) for FCR.

Table 4 shows the carcass characteristics of Yankasa rams fed *Panicum maximum* - concentrate mix in intensive feed lot. Rams fed concentrate mix had significantly ($p<0.05$) higher pre-slaughter weight, slaughter weight, hot carcass weight, cold carcass weight, empty GIT weight, dressing percent, shoulder, neck, breast, leg, flank, mesenteric fat, kidney fat, rank, loin and shank percent weight relative to the control treatment. Ram fed with the highest level of concentrate daily gave the highest weights of 31.02 kg, 29.82 kg, 16.63 kg, 14.92 kg, 4.92 kg, 50.38%, 26.22%, 16.32%, 18.32%, 32.0%, 4.6%, 3.82%, 1.68%, 9.4%, 17.02% and 16.21%, for all the above mentioned carcass weights respectively. However, statistical similarities ($p>0.05$) were obtained between the skin, head and testes weights of rams across all the treatments. In Table 6, the relative organs characteristics of Yankasa rams fed *Panicum maximum* - concentrate mix in intensive feedlot show similar ($p>0.05$) values among all the parameters investigated.

Table 1
Proximate composition of *Panicum maximum* - concentrate mix fed to Yankasa rams.

Parameters	*Panicum maximum*	Concentrate
DM	72.28	92.15
CP	9.42	16.65
CF	31.58	26.48
EE	3.30	4.23
Ash	11.36	7.6
NFE	44.34	45.04
Gross E^0 (Kcal/kg)	9.56	13.53

DM - Dry matter, CP - Crude protein, CF - Crude fibre, EE = Ether extract, NFE - Nitrogen-free extract.

Table 2
Proximate composition of *Panicum maximum* - concentrate mix fed to Yankasa rams under intensive feedlot.

	Level of concentrate (% BW of rams)				
Parameters	**0**	**0.5**	**1.0**	**1.5**	**2.0**
DM	72.28	80.11	82.62	85.71	86.11
CP	9.42	11.64	12.92	14.52	14.97
CF	31.58	29.11	29.01	27.46	26.78
EE	3.30	5.76	5.4	5.86	6.06
ASH	11.36	9.48	8.66	8.01	7.54
NFE	44.34	44.01	44.01	44.24	44.65
GE(MJ/ kg)	12.96	12.90	13.09	13.16	13.35

GE - Gross energy.

Table 3
Growth performance of Yankasa rams fed *Panicum maximum* - concentrates mix in intensive feedlot.

Parameters	**Level of concentrate (% BW of rams)**				
Feed intake g/d	**0**	**0.5**	**1.0**	**1.5**	**2.0**
Panicum maximum	673	595	476	400	325
Concentrate	0	94	180	268	346
Total Fl (g/d)	673±53.32	689±61.10	656±32.2	668±50.10	671±34.4
Initial live weight (kg)	20.83±1.36	21.10±1.50	21.56±2.0	21.20±1.68	21.98±2.06
Final live weight	$23.18±0.65^{d}$	$25.29±2.16^{c}$	$26.32±1.81^{c}$	$28.29±1.33^{b}$	$31.02±2.79^{a}$
Mean live weight gain	$2.32±0.20^{d}$	$4.19±0.31^{c}$	$4.76±0.76^{c}$	$7.09±0.32^{b}$	$9.04±0.76^{a}$
Metabolic live weight gain (w/g 0.75)	1.76^{d}	3.14^{c}	3.57^{c}	6.31^{b}	6.75^{a}
Average daily weight gain	$27.96±0.53^{d}$	$37.38±1.32^{c}$	$42.5±2.06^{c}$	$63.22±3.22^{b}$	$80.35±4.06^{a}$
Feed Conversion Ratio	$24.07±1.12^{d}$	$18.43±0.63^{c}$	$15.43±0.68^{b}$	$10.56±1.02^{a}$	$8.35±0.80^{a}$

Means with difference superscripts a, b, c, d along the same row are significantly different.

Table 4
Carcass characteristics of Yankasa rams fed *Panicum maximum* - concentrate mix in intensive feedlot.

	Level of concentrate (% BW of rams)				
Parameters	**0**	**0.5**	**1.0**	**1.5**	**2.0**
Pre-slaughter weight (kg)	$23.20±1.76^{d}$	$25.29±1.55^{c}$	$26.32±1.61^{c}$	$28.29±1.57^{b}$	$31.02±1.71^{a}$
Slaughter weight (kg)	$21.83±1.22^{d}$	$23.89±1.16^{c}$	$24.62±1.23^{c}$	$26.78±1.34^{b}$	$29.82±1.54^{a}$
Hot carcass weight (kg)	$10.30±1.16^{c}$	$12.12±1.09^{b}$	$12.68±1.19^{b}$	$13.93±1.13^{b}$	$16.63±1.15^{a}$
Cold carcass weight (kg)	$10.10±1.10^{d}$	$11.83±1.21^{c}$	$12.02±1.26^{c}$	$13.02±1.24^{b}$	$14.92±1.74^{a}$
Empty GIT weight (kg)	4.30±1.01	4.62±1.06	4.72±1.14	4.80±1.07	4.92±0.98
Dressing percent (%)	$44.20±0.70^{c}$	$47.92±0.81^{b}$	$48.17±0.56^{b}$	$49.24±0.66^{a}$	$50.38±0.58^{a}$
Skin (%)	26.70±0.54	27.62±0.37	27.00±0.44	29.02±0.62	28.82±0.71
Head (%)	22.60±0.46	21.82±0.35	21.83±0.57	22.20±0.58	24.02±0.63
Shoulder (%)	$20.80±0.39^{d}$	$21.62±0.66^{cd}$	$22.23±0.54^{c}$	$24.06±0.53^{b}$	$26.22±0.34^{a}$
Neck (%)	$9.80±0.76^{e}$	$10.60±0.73^{d}$	$12.02±0.37^{c}$	$14.06±0.58^{b}$	$16.32±0.45^{a}$
Breast (%)	$8.30±0.22^{e}$	$10.6±0.15^{d}$	$13.06±0.21^{c}$	$15.32±0.30^{b}$	$18.32±0.29^{a}$
Leg (%)	$24.40±0.68^{d}$	$27.0±0.22^{c}$	$28.6±0.28^{c}$	$30.6±0.43^{b}$	$32.0±0.55^{a}$
Flank (%)	$3.00±0.25^{b}$	$3.2±0.19^{b}$	$3.6±0.31^{b}$	$4.0±0.12^{ab}$	$4.6±0.26^{a}$
Mesenteric fat (%)	$1.20±0.21^{c}$	$1.9±0.18^{b}$	$2.02±0.20^{b}$	$3.42±0.14^{a}$	$3.82±0.16^{a}$
Kidney fat (%)	$0.40±0.76^{b}$	$1.0±0.16^{a}$	$1.2±0.12^{a}$	$1.6±0.13^{a}$	$1.68±0.11^{a}$
Rack (%)	8.60±0.07	9.0±0.13	9.0±0.08	9.2±0.10	9.4±0.09
Loin (%)	$10.12±0.21^{e}$	$12.1±0.61^{d}$	$13.60±0.58^{c}$	$15.21±0.61^{b}$	$17.02±0.59^{a}$
Shank (%)	$8.31±0.21^{e}$	$12.0±0.09^{d}$	$13.06±0.16^{c}$	$15.01±0.18^{b}$	$16.21±0.14^{a}$
Testes (%)	1.50±0.76	1.4±0.76	1.6±0.76	1.7±0.76	1.7±0.76

Means with difference superscripts a, b, c, d along the same row are significantly different.

Table 5
Relative organ characteristics of Yankasa sheep fed *Panicum maximum* - concentrate mix in intensive feedlot.

	Level of concentrate (% BW of rams)				
Parameters	**0**	**0.5**	**1.0**	**1.5**	**2.0**
Stomach	13±0.12	15±0.06	15.80±0.02	15.2±0.05	16.40±0.04
Kidney	1.10±0.10	1.26±0.04	1.11±0.03	1.2±0.03	1.20±0.06
Liver	3.80±0.07	4.00±0.06	4.20±0.05	4.0±0.04	4.10±0.08
Lung	4.80±0.08	4.60±0.01	4.60±0.04	4.8±0.05	5.00±0.02
Spleen	0.61±0.11	0.58±0.03	0.49±0.03	0.62±0.04	0.62±0.04
Heart	1.60±0.09	1.70±0.07	1.58±0.02	1.62±0.03	1.82±0.03
Small intestine	7.50±0.10	8.00±0.04	7.40±0.04	7.1±0.03	8.60±0.01
Large intestine	5.30±0.05	5.48±0.04	5.76±0.03	6.20±0.06	6.50±0.05
Caecum	1.50±0.07	2.00±0.06	1.78±0.02	1.8±0.04	2.00±0.06

Means with no superscript along the same row are similar (p>0.05).

The crude protein (CP) constituent of *Panicum maximum* (Pm) used in this study (9.42 g/kg) was less than 12.17 g/kg obtained by Fadiyimu *et al*. (2016) but more than 5.87 g/kg obtained by Oluboyede *et al*. (2007). However, the CP value was above the normal range of 7.7% which is the critical level recommended for small ruminants (ARC, 1985). The crude fibre (CF) of Pm (31.58 g/kg) was lower than the CF (37.47 g/kg) obtained by Fadiyimu *et al*. (2007). Also, the nitrogen free extract (NFE) value in this study (44.35 g/kg) was higher than 34.47 g/kg obtained by the above two researchers. The reasons for these differences could be due to age and harvest season which may affect proximate analysis.

The concentrate used in this study had dry matter of 92.15 g/kg which was between the ranges of 86.5 g/kg to 94.54 g/kg as reported by Adegbola (1980). The crude protein (16.65 g/kg) content of the concentrate diet was above 12% minimum value recommended for growing small ruminants (Gatemby, 2002). The CP content of the concentrate mix used in this study was higher than the CP of most grasses including Pm but lower than the CP of 20.11 g/kg used to supplement confined lambs which were kept on *Bracharia brizantha* grass pastures (Prado *et al*., 2014). The CP values in the experimental treatments 1 to 5 fell within the limit of 9 to 14% recommended for growing sheep (Aduku, 2005). Concentrates usually means high quality low fibre diets of less than 18% CF (Van, 2006), but the CF of 26.97 g/kg to 29.11 g/kg with moderate CP and a high NFE of the concentrate mix in this study could make it a high energy supplement with moderate CP (Oyedele *et al*., 2016).

The nonsignificant differences in feed intake in this study shows that rams supplemented with concentrate mix did not consume more feeds than the control diet. This is not in agreement with the work of Nyako (2015) who fed Yankasa rams with concentrate and reported significant differences in intake from unsupplemented to supplemented from 766.70 to 850.53 g/d. Mubi *et al*. (2008) also observed higher feed intake in supplemental group than the control group without supplement in growing heifers. Higher protein in diet has been implicated in higher intake (Babayemi *et al*., 2006). Even though the CP in this study increased from treatment 1 to 5, the overall result of this study did not agree with the findings of other researchers. This reason for this may be due to moderate level of CP (14.97 g/kg) in T5 which was less than 20% and higher CF(>18%) than a typical concentrate diet (Oyedele *et al*., 2016). According to Van (2006), concentrates mix usually mean high quality low fibre diets of less than 18% CF. However, the CF values of 26.97 g/kg to 29.11 g/kg in T2 - T5 of this study could be due to the inclusion of rice husk, brewers dry grains and leaves of *Moringa oleifera* which are high fibre and energy ingredients.

The significant increase in body weight gain (27.96$\pm$0.53 - 80.35$\pm$4.06 g/d) in this study as the concentrate mix increased from 0% to 2.0% was in consonant with the result obtained by Nyako (2015) who observed a significant increase from 66.07 to 96.4 g/head/day when Yankasa rams were fed cowpea hay with different supplements. The values in the T1 to T4 fell below 80-93 head/day reported for Yankasa rams fed gamba grass supplemented with cowpea vines (Nyako *et al*., 2012). However, the weight gain of rams supplemented with concentrate mix in this study was higher than the average of 38 g/day recorded by Ikeobi and Faleti (1996) for Yankasa sheep semi intensively fed on pasture and supplemented with browse. This could be due to the supply of an adequate energy and protein that are required for optimum growth performance in rams in T2 to T5. According to Gatemby (1995), quality of food available has a marked effect on growth of animals. Results of other authors also showed that

growth performance improved as level of concentrate increased in sheep diet similar to this study (Jabbar and Anjum, 2008; Mubi *et al*., 2012).

The highest FCR (24.07±1.12) in this study was recorded in T1. This means that animals fed the control diet had the poorest FCR. Similar trend was observed in the study conducted by Oluboyede *et al*. (2007) who observed poorest FCR in WAD rams fed basal Pm fodder supplemented with three types of concentrate. This implied that supplementation has positive effect on the live weight gain and FCR through maintenance of good rumen activities of sheep as reported by Jabbar and Anjum (2008) and Kabir *et al*. (2012). The increasing FCR as the level of concentrate increased indicated that the supplemented diets were being utilized as CP increased and resulted in improved total live weight gain and feed conversion ratio (Okoruwa *et al*., 2013).

The carcass characteristics of the rams in this study increased significantly ($p<0.05$) with increased levels of concentrate mix with variations among the treatments as concentrate mix levels increased. Rams treated on 2.0% concentrate mix exhibited significantly ($p<0.05$) higher values in all the carcass traits except for the skin, head, testes and all relative organs. This is corroborated by the findings of Osuhor *et al*. (2009) which revealed high carcass weights and dressing percentage for Yankasa rams fattened with highest level of dried poultry litter and maize. The result of dressing percentage range of 44.20 - 50.38% in this study was comparable with 43 - 48.2% obtained when Washera sheep were fed urea treated straw supplemented with graded levels of concentrate mix at increasing levels (Abebe *et al*., 2011). The increasing values of mesenteric and kidney fat in this study is in consonant with the outcome of a study by Kumari *et al*. (2012) that fat content of meat was linearly increased with increasing proportion of concentrate fed to lambs.

Succinctly, the result indicated that concentrate supplementation has positive effect on live weight gain of sheep and dressing percentage which may be due to differences in the nutritional composition of the experimental diets in terms of crude protein and energy (Okoruwa *et al*., 2013). Relative organs maintain their integrity independently of feeding in this study. Similar effect was also observed by Carvalho and Medeiros (2010) who used diets with different energy levels and found no difference among treatments for organ weights.

4. Conclusion

From the results of this study, it has been established that supplementing *Panicum maximum* with varied levels of concentrate mix yielded no increase in feed intake, but improved FCR, total live weight gain and carcass yield. However, the best result was obtained when Yankasa rams were fed with 2% concentrate mix as percentage body weight of the rams.

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