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Water Consumption of Yankasa Rams Fed a Basal Diet of Maize Stover-lablab Mixture

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Abstract: Sixteen Yankasa rams aged 18-24 months, weighing 25.4-31.0 kg were randomly divided into 4 treatment groups labelled A, B, C and D, each treatment comprising of 4 rams. Maize stover-lablab hay mixture in a 2:1 maize stover; lablab ratio was offered at 2, 4, 6 and 8% as body weight to treatments A, B, C and D respectively, in addition to 300g of concentrate per head per day in an individual feeding trial. Water was offered at 4kg per ram daily. Water refusal and left-over feed were recorded separately daily, before feeding in the morning. Samples of feed and faeces were analyzed separately for proximate constituents. Live weight changes were measured and used to adjust the levels of the basal diet throughout the 90 days duration of the trial. Results showed that the rams offered the higher level of the feed consumed more water than the rams on the other treatments. However, there was no significant difference ($P>0.05$) in water consumption between treatments D and C, and between treatments B and A. But treatment D was significantly different ($P<0.05$) from treatments B and A. Daily water consumption was 2.65, 2.63, 1.87 and 1.75 kg per ram for treatments D, C, B and A respectively. Yankasa rams offered high levels of maize stover-lablab hay mixture required about 3 litres of water per head day for optimum utilization of the feed.

Key words: Water, Yankasa rams, maize stover, lablab

Introduction

Water which represents about 70% of total body weight of growing sheep is the simplest of all substances in food and yet the most important and probably the most neglected of all the nutrients (Church, 1979; Singal and Mudgal, 1981; Aganga, 1987). It is a dietary essential for all classes of livestock.

Water is not just a major requirement for growth, it also functions to give the body its shape and turgidity, acts as a solvent for the transportation of nutrients and waste products, helps to regulate body temperature because of its high specific heat and high latent heat of vaporization, important in digestion and many biochemical reactions in the body as well as a good lubricant and a component of blood and tissues. It is a constituent of all living cells. Apart from specific production needs, water is constantly needed to balance the continuous fluid losses from the kidneys, the intestinal tract, the skin and the lungs.

Type of animal, feed and weather variables especially temperature have influence on water consumption (McFarlane *et al.,* 1966; Aganga, 1987; El-Badawi and Gado, 1998). High temperature coupled with low relative humidity imposes a lot of water stress on animals and therefore constitute a great threat to livestock production. The supply of adequate amount of balanced ration is not a guarantee to its utilization if water is not provided in the required quantity.

Maize stover-lablab hay mixture as feed for ruminants is gaining wide acceptance in the savanna region of Nigeria (Latitude 8^{o}N-11^{o}N). Lablab has long been introduced as food for humans and livestock particularly small ruminants in Nigeria. Several scientists have reported that feeding about 200 g of chopped lablab hay/head/day was adequate for average daily Live weight gain of about 30 g in sheep and goats grazing cereal stover or fed stover *ad libitum* (NAPRI, 1992; Adu *et al.,* 1993; Makun-Lugard, 1995; Otaru *et al*., 1998; Otaru *et al.,* 1999). But all these studies did not consider water consumption as it affected the utilization of the feed by the animals.

Tarawali (1994); Jabbar (1996) reported that the future of lablab in farming systems in sub-saharan Africa appeared to even be brighter with time. Tanko *et al*. (1998; 1999) have shown that the introduction of lablab to maize plots at various stages of growth of the maize, has a strategic place in the crop-livestock farming systems around Shika (latitude 11E 12TST, longitude 7E 33'E, altitude 610m, 1100-1200 mm annual rainfall). The annual dry season in this region lasts for about 7 months from October to April and during this period water is scarce for human and animal consumption. Over the years, there has been no conscious effort at studying water economy as it affects small ruminants production in this area. This ought not to be so because water is becoming scarce and more expensive. Gone are days when water was taken for granted.

Over 70% of the households in Nigeria keep sheep

Table 1: Climatic Condition

Seasons	Average daily Rainfall, mm	Temperature, °C		Relative Humidity %	
		Max.	Min.	Max.	Min.
Dry Hot (March-April)	Nil	39	21	67	13
Wet (June-August)	6.28	28	17	82	71
Dry Cool (Oct-Jan)	Nil	30	15	71	19

Source: IAR/ABU Samaru weather Station report.

Table 2: Chemical analysis of the maize stover and lablab on dry matter basis

Proximate Component	Maize Stover	Lablab
Dry matter %	92.2	93.7
Crude Protein %	2.6	12.8
NDF %	74.6	58.4
Lignin %	8.6	6.5
Ash %	7.4	12.9
Gross Energy Kcal ME/g	1.21	0.85

Table 3: Chemical analysis of the concentrate offered to the rams

Proximate Component	
Dry matter %	92.34
Ash %	4.97
Ether Extract %	4.01
Crude Fibre %	13.20
Nitrogen %	2.51
Crude Protein %	15.72
Gross Energy Kcal ME/g	2.61

(Adu *et al*., 1993). And over 80% of the 22m sheep in Nigeria are found in the dry savannah region of the country (FDLPCS, 1992). Given the above scenario, it therefore become necessarily imperative to evaluate the water consumption of the Yankasa (the most numerous and the most widely distributed of the 22m sheep in Nigeria; FDLPCS, 1992) fed a basal diet of maize stover-lablab hay mixture.

Materials and Methods

The study was carried out at the Experimental Unit of the Small Ruminants Research Programme NAPRI Shika-Zaria, Nigeria, latitude 11E12'N, longitude 7E33'E. The altitude of the area is 610 m and the annual rainfall is about 1150 mm.

Sixteen Yankasa rams aged 18-24 months and weighing 25.4-31.0 kg were randomly divided into 4 treatment groups, A, B, C and D. A mixed forage consisting of maize stover (MS) and lablab (LL) hay in a 2:1 MS:LL ratio was offered at 2, 4, 6 and 8% as body weight to treatments A, B, C and D respectively in addition to 300 g of concentrate per head per day. Equal amounts of clean water was offered at 4 kg per ram in the individual feeding trial which lasted for 90 days.

A preliminary period of 10 days was allowed for the animals to adjust to the pens and to the feed and water proceeding commencement of measurements. The parameters measured were water refusal, feed refusal and Live weight changes which were recorded separately. Water and feed refusals were recorded each morning before feeding at 700 h while Live weight changes were recorded every 10 days. The Live weight changes were used to adjust the amount of feed offered to maintain the levels of feeding the MS:LL hay accordingly i.e. at 2, 4, 6 and 8% as body weight. All the rams were dewormed 7 days to commencement of the experiment.

Samples of feed and faeces were analyzed separately for proximate constituents using the AOAC (1990) method. Weight gain was worked out as the difference between the initial and final Live weight measurements.

Results and Discussion

Table 1 shows the climatic condition under which the experiment was conducted. The trial was done in December 2000 which falls in the Dry cool season when rainfall was nil, temperature high and relative humidity low. The other results are shown in Table 2, 3 and 4.

The chemical analyses of the MS and LL (Table 2) and concentrate (Table 3) showed that the feed contained the requirements of energy and protein for growing rams as recommended by ARC (1980). And although the mineral contents of the feed was not determined, reports (Alhassan *et al.,* 1984; Agishi, 1985; Alhassan, 1985) indicated that the mineral content of LL was adequate to offset mineral deficiency in MS especially in terms of Ca and P.

The rams offered the feed at higher levels consumed more water than the rams on the other treatments (Table 4). This can be explained. The feed was offered dry. The higher level of feeding corresponded with higher level of dry matter intake which was expected to stimulate the animals to drink more water. However, there was no significant difference ($P>0.05$) in water consumption between treatments D and C and between treatments B and A. But treatment D was significantly different ($P<0.05$) from treatments B and A. Again, treatment C was significantly different ($P<0.05$) from treatments B and A. Daily water consumption was 2.65, 2.63, 1.87 and 1.75 kg per ram for treatments D, C, B and A respectively (Table 4).

Table 4: Feed intake, water consumption, Live weight gain and average daily gain of the experimental rams

	Treatment groups			
	A	B	C	D
Feed intake, g/head/day				
Lablab	185.0±3.1	365.0±7.7	558.0±6.9	766.5±11.2
Maize stover	370.0±7.2	730.0±10.5	840.2±21.6	820.2±25.8
Water consumption, kg / head / day	1.75[a]	1.87[a]	2.63[b]	2.65[b]
Live weight gain, kg				
Initial Live weight	27.7±1.1	28.4±1.2	27.9±1.4	27.6±1.2
Final Live weight	32.4±1.2	34.2±1.0	35.9±1.2	36.3±1.4
Weight gain	4.7	5.8	8.0	8.7
Average daily gain, g ', .	52.2[a]	64.4[b]	88.9[cd]	96.7[d]

a,b,c,d = Means in the same row with similar superscript differ significantly at p = 0.05

All the rams gained in Live weight. This is an indication that the feeding was in excess of maintenance requirements. However, there was no significant difference (P>0.05) in average daily gain between treatments C and D rams. In practical fattening schemes therefore, it may wasteful to feed MS-LL hay at 8% as body weight. However, the emphasis of the study was on water consumption of Yankasa rams fed on MS-LL hay mixture.

The study has shown that rams offered high levels of MS-LL hay mixture required about 3 litres of water per head per day for maintenance and production. This can be translated to about one-fifth (1/5) of 15 liter capacity bucket or 5 rams per 15 liter bucket per day for optimum utilization of the feed. Since most local fanners in Nigeria now have access to buckets of 15 liter capacity, this result can be considered as farmer-friendly.

In humid areas where fresh forage is available year-round, water is not normally a limiting factor to small ruminants production. This is in agreement with the reports of McFarlane *et al.* (1966); El-Badawi and Gado (1998) which stated that sheep do not need to drink water when pasture is 60-70% moisture. The results of this study have very important implications in the drier savanna region of Nigeria in which over 70% of the country's sheep and other livestock are found. This region has about 7 months of dry spell from October to April. The droughts alternate with seasonal and often short rainy periods making livestock to experience serious difficulties in finding and consuming sufficient herbage to maintain growth, reproduction and normal sustenance. The perennial seasonal water shortages have such overbearing effects that the water requirements of livestock especially sheep should be accorded the attention that it deserves.

Water is lost from the body via the faeces, as urine and through evaporative loss from the respiratory tract. Evaporation is correlated with environmental temperatures; 50% of total heat loss may occur through evaporation at environmental temperature around 35^{o}C (Church, 1979). And the dry savanna region of Nigeria which is the major sheep producing area of the country records even higher temperatures particularly during the dry hot season from March to April as shown in Table 1. High temperatures coupled with the perennial seasonal water shortages may depress productivity and production in sheep as a result of heavy evaporative loss.

Sheep can survive for several days without feed but not without water which is the most important nutrient that interplays with the metabolism of all other nutrients in the body. French (1956) reported that starving animals may lose nearly all the glycogen and fat reserves, half their body protein and about 40% of their body weight and still live while the loss of only 10% of body water causes serious disorders and farther losses may quickly lead to death. Water is healthy productive life. Therefore restrictions in the quantity of water consumed by sheep can drastically affect the productive and reproductive performance.

The importance of water to sheep production cannot therefore be overemphasized. The nutrient must be supplied in the recommended quantity particularly in dry areas for optimum performance. It is hoped that the results of this study will inspire more work in the area of water economy including the conservation and utilization by sheep in particular and livestock in general.

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