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WATER INTAKE OF YANKASA RAMS FED VARIOUS INCLUSION LEVELS OF GINGER AS FEED ADDITIVE

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ABSTRACT

Twenty Yankasa rams aged 12-18 months and weighing between 30-40kg were randomly allotted into four treatment groups designated as T1, T2, T3, and T4 comprising of five replicates with one animal per replicate. Four complete experimental diets were formulated with graded levels of ginger at 0, 2.5, 5 and 7.5g/kg inclusion levels. Water was offered at 9 litres per ram daily. Water refusal and left-over feed were recorded separately on a daily basis before feeding in the morning. Samples of feed and feaces were analyzed for proximate constituents. Live weight changes were also measured. Results showed that the rams offered the highest level of the test ingredient consumed more water than the rams on the other treatments. However, there was no significant difference ($P>0.05$) in water consumption between treatments 3, 2 and 1, but treatment 4 was significantly different ($P<0.05$) from the other treatments. Though the feed conversion ratio increased ($P<0.05$) with increase in water intake and the test ingredient, the live weight gain proved otherwise but with significant difference ($P<0.05$). Yankasa rams offered high level of ginger (7.5g/kg) required about 4.5litres/head/day even though more effective nutrient intake and digestibility were observed in treatment 2 with about 3.5 liters/head/day.

Keywords: Water intake, ginger, weight gain, Yankasa rams.

INTRODUCTION

Water is the cheapest and most available nutrient. Water is not just a nutrient; it also regulates body temperature, and is vital for organ functions such as digestion, waste removal and the absorption of nutrients (Ward and Mckague, 2007). It also functions to give the body its shape and turgidity, it is a constituent of all living cells and it is also required for specific production need (Osuhor *et al.,* 2009). The daily water requirement of livestock varies significantly among the animal species. The animal's size and growth stage will have a strong influence on daily water intake (Ward and Mckague, 2007). Water consumption of animals depends on several factors such as activity, environmental temperature, dryness of feed, type of production like lactation which requires much water, relative humidity (Aduku, 2004). Providing adequate amount of balanced ration to the animals is not a yardstick for its utilization if clean water is not provided in the required quantity, hence providing enough quality water is essential for good livestock production. Addition of ginger in the diet of livestock is expected to increase their water intake due to the nature of the ginger's phyto-chemicals which are responsible for its pungent smell and hot nature (Akoachere *et al.,* 2000).

Table 1: Climatic condition

Seasons	Average daily rainfall, mm	Temperature, ^{0}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, 2018.

Table 2: Gross composition of the experimental diet fed to Yankasa rams.

	Treatments			
Ingredients (%)	1	2	3	4
Maize grain	20.46	20.46	20.46	20.46
Cowpea husk	12.55	12.55	12.55	12.55
Cotton seed cake	10.98	10.98	10.98	10.98
Rice offal	12.65	12.65	12.65	12.65
Cowpea hay	39.86	39.86	39.86	39.86
Salt	0.50	0.50	0.50	0.50
Bone meal	2.50	2.50	2.50	2.50
Premix	0.50	0.50	0.50	0.50
Total	100	100	100	100
Ginger inclusion levels (g/100kg)				
	0	**250**	**500**	**750**
Calculated chemical composition				
Energy (ME/Kg)	2600	2600	2600	2600
Crude protein (%)	12.00	12.00	12.00	12.00
Crude fibre (%)	23.82	23.82	23.82	23.82

Table 3: Proximate composition of the experimental diet and test ingredient (%)

Nutrients	*Digitaria smutsii* hay	Concentrate	Ginger
DM	90.04	96.16	96.09
Ash	2.65	11.21	7.37
E E	0.54	4.94	5.90
C F	30.05	25.13	12.28
CP	5.36	9.20	11.36
NFE	61.40	49.52	63.09

DM=dry matter, E E=ether extract, C F=crude fiber, CP=crude protein, NFE=nitrogen free extract.

Over 70% of households in Nigeria keep sheep (Adu *et al.*, 1993). And over 80% of the 22 million sheep in Nigeria are found in the dry savannah region of the country (FDLPCS, 1992). This is why it became necessary to evaluate the water consumption of the Yankasa (the most numerous and widely distributed among the sheep in Nigeria; FDLPCS, 1992) by using ginger as feed additive in their diet.

MATERIALS AND METHODS

The experiment was conducted at the National Animal Production Research Institute (N.A.P.R.I.), Ahmadu Bello University (ABU), Shika, Zaria, Nigeria. Shika is geographically located at latitude 11º 12'N and longitude 7º 33'E at an altitude of 640 meters above sea level (GPS, 2017).

Twenty healthy intact male of Yankasa breed between 12-18 months of age and weighing between 30-40 kg were used for the experiment. The animals were obtained from the Small Ruminant Research Programme of N.A.P.R.I. The animals were put on adaptation to their new housing for two weeks. Four experimental diets were formulated (Table 1) with graded levels of ginger at 0, 2.5, 5 and 7.5g/kg inclusion levels. The diets were designated as diets 1, 2, 3 and 4 in the experiment.

A completely randomized experimental design (CRD) was used in the experiment with number of animals representing replication and graded levels of ginger representing treatments. Five animals were allocated to each treatment and their pens were disinfected prior to the commencement of the experiment. The initial weights of the animals were balanced according to treatments.

The experimental diet and test ingredient were analyzed at N.A.P.R.I. They were analyzed for moisture, crude protein, nitrogen free extract, crude fibre, ether extract and ash. The analysis for proximate composition was done as outlined by the Association of Official Analytical Chemists (AOAC, 2007).

RESULTS AND DISCUSSION

The rams offered the test ingredient at the highest level (7.5g/kg) consumed more water with significantly ($p<0.05$) highest values than the rams on the other treatments (Table 4) (Fig 1). This coincides with T4 that recorded the highest FCR with significant difference ($p<0.05$). Also, the water consumption in this experiment is a bit higher than the values (2.2-3.5 l/head/day) reported by Abdulwaheed (2014) where water intake of Yankasa rams was measured. This could be attributed to the fact

that ginger has some secondary metabolites in its rhizome that are broadly divided into volatile compounds and nonvolatile phenolic compounds which are responsible for its spicy and hot nature (Patra and Saxena, 2010). Even though the FCR increased ($P<0.05$) with increase in water intake and the test ingredient, the LWG proved otherwise but with significant difference ($P<0.05$).

The decrease in average daily gain as a result of decrease in concentrate intake might be as a result of the ginger's pungent smell and hot nature induced by the nature of phyto-chemicals as observed by Akoachere *et al.* (2000), Sarica *et al.* (1995) and Greathead (2003). The animals ate more of the basal diet as the level of ginger inclusion increased to compensate for lower concentrate intake. Thus, increase in grass intake with increasing level of the ginger might be due to the effort of the animals to compensate for lower concentrate intake. This phenomenon of compensation was also observed by Muhammad *et al.* (2011). Decreased feed intake for animals in treatment 4 (7.5g/kg ginger) might be attributed to high inclusion of ginger which could affect microbial activities. Antimicrobial properties of ginger have been reported (Habsah *et al*., 2000; Guptha and Ravishankar, 2005; Nanasembat and Lohasupthawee, 2005).

Table 4: Growth Performance of Yankasa rams fed graded levels of *Z. officinale*

	Treatments with varying inclusion levels of ginger (g/kg)				
Parameters	(0)	(2.5)	(5)	(7.5)	SEM
Water consumption (l)	297.40^{d}	311.40^{c}	370.40^{b}	403.20^{a}	3.51
Initial body weight (kg)	34.20	34.80	34.20	34.20	1.07
Final body weight (kg)	44.60	43.60	42.30	41.50	2.03
Weight gain (kg)	10.40^{a}	8.80^{ab}	8.10^{ab}	7.30^{b}	1.21
Average daily weight gain (g/day)	123.81^{a}	104.77^{ab}	96.43^{ab}	86.91^{b}	14.37
Feed conversion ratio	12.49^{b}	13.42^{ab}	13.07^{ab}	13.77^{a}	0.58
Feed intake (kg/day)	1.87	1.86	1.76	1.69	0.08
Overall concentrate intake (kg)	128.16^{a}	123.61^{ab}	115.83^{ab}	112.57^{b}	6.49
Overall grass intake (kg)	28.54	32.23	32.35	29.53	2.81

Means within the same row with different subscripts are significantly different ($p<0.05$).

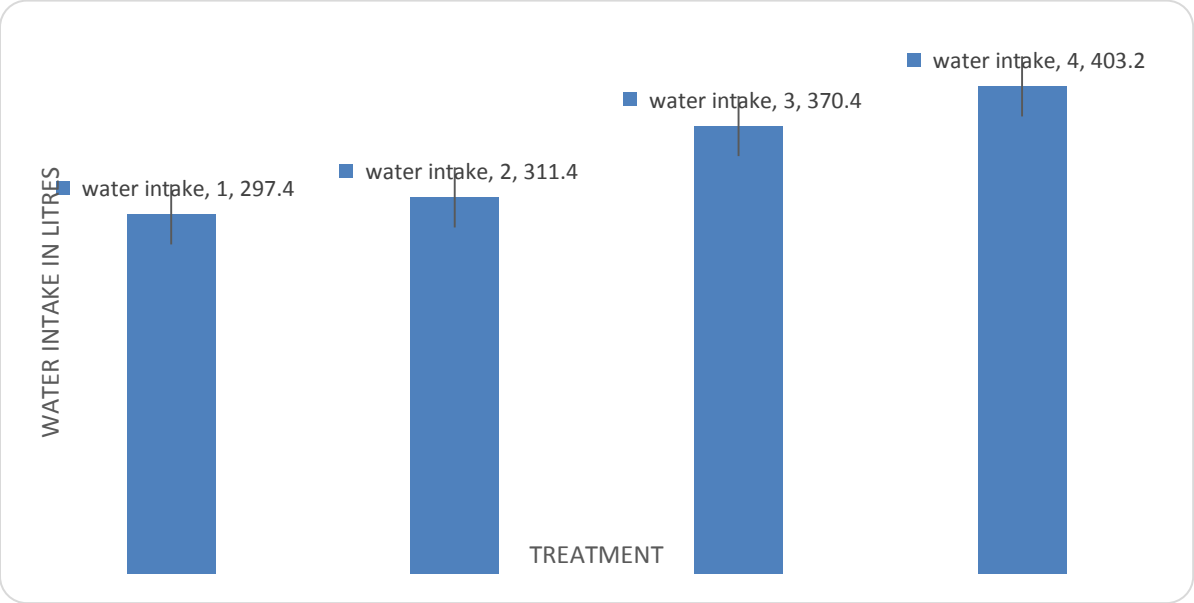


Figure 1: A graph showing the water intake across the treatments in litres.

CONCLUSIONS

This study revealed that Yankasa rams fed diets supplemented with ginger had a decrease in feed intake, live weight gain and ADG with increasing level of the test ingredient. But even with that, the feed conversion efficiency was highest in treatment 4 (highest level of ginger) which shows the efficiency of the animals in utilizing the feed given to them. Water intake of the experimental animals increases as the level of dry matter intake also increases. Based on the results of this study, Yankasa rams fed different inclusion levels of ginger needed about 4.5 litres of water per head per day for optimum utilization of the feed.

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