Estimating Common Salt Requirement of Sheep for Optimum Performance

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ABSTRACT

The study estimated the effect and quantity of salt that will promote optimum dry matter intake, average daily weight gain, water consumption and feed conversion ratio in sheep. A total of eight (8) sheep weighing between 9.0kg and 16.5kg were used and grouped into 4 of 2 animals per group balanced for body weight. Four dietary supplements containing 0%, 0.05%, 0.10% and 0.15% common salt were prepared. Elephant grass (Pennisetum purpureum) was offered ad libitum as basal diet. The concentrate supplement was supplied at 2kg/group once daily. The animals were exposed to the experimental ration for 56 days. Pre-experimental body weights were collected and forth-nightly collected after 14-16 hours overnight fasting to avoid error due to gut-filled weights. Results obtained indicated that 0.10% common salt in the diet of sheep promoted optimum dry matter intake (6.22% body weight), average daily weight gain (63.39g/day), water consumption (1.12L/day/animal) and feed conversion ratio (0.05) while sheep fed control diet (0% salt) exhibited the poorest performance. For optimum performance of sheep, 0.10% salt is recommended in the concentrate supplement

Keywords: Common salt, Requirement, Sheep, Performance and Experiments

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1. INTRODUCTION

All animals require salt and have been credited with ability to select and regulate salt intake. Free choice feeding of salt either in block form or loose form is common practice with cattle and sheep production. These animals will travel great distances to find 'saltlick' if they are otherwise deprived of salt (Underwood, 1981). Common salt (NaCl) occupies a unique position among mineral supplements because it is palatable and attractive to most animals. A mineral imbalance arises in an animal because the mineral contents of its feed is either deficient or in excess. The mineral requirements of sheep depend on their age, productivity and adaptation to the area (Gatenby, 2006). Feeds fed to animals in tropical countries are low in minerals and vitamins, however, the amount of supplemental salt needed varies with the amount in feed and water consumed by the animals. All legume forages, high protein by-products, cereals and grasses are low in sodium (0.01-0.1%) (Steele, 1996). Sodium, together with potassium and chlorine, are concerned with the control of osmotic pressure in the body fluids. Chlorine is required for the synthesis of hydrochloric acid used in the digestive system. Salt deficiency causes loss of appetite. Sodium deficiency is most likely to occur in sheep when their salt losses are high as a result of heat stress or lactation.

Deficiency of sodium has been reported to precipitate retardation of growth, impaired digestion, lack of appetite and reduced efficiency of feed utilization in growing animals (Steele, 1996). Supplementation of sodium (Na) using salt is common as ruminants ingest the right quantity to satisfy their own requirements. Excess salt reduces feed intake and feed conversion efficiency. The tolerance level is between 0.7 and 5% salt in the dry matter depending on the availability of water, breed of sheep, type of diet and the concentration of other ions (Gatenby, 1986), therefore this study estimated salt requirements of sheep for optimum performance.

2. MATERIALS AND METHOD

The animals were grouped into 4 of 2 animals per group balanced for body weight, fed 2kg of concentrate and elephant grass with 4 litres of water daily. The animals were fed the different experimental diets (T1-0%, T2-0.05%, T3-0.10%, and T4-0.15% salt) for 56 days.

2.1 Chemical Analysis

Each treatment samples (T1-T4) were subjected to proximate analysis according to the standard method of (AOAC , 2001) to determine the percentage Crude Protein (CP), Ether Extract (EE), Crude Fibre (CF), Moisture content, Ash content and Nitrogen Free Extract (NFE).

2.2 Statistical Analysis

Data obtained were analysed and subjected to analysis of variance procedure (ANOVA) of SAS 2012. Significant means were separated by Duncan's Multiple Range Test of the same package.

3. RESULTS

Table 1: Proximate Composition of Experimental Diets

Parameters	T1	T2	T3	T4
Dry matter	88.50	88.50	88.28	89.45
Crude protein	16.80	22.17	22.65	26.43
Ether extract	3.01	2.26	0.76	0.80
Nitrogen free extract	50.32	46.44	44.30	40.87
Crude fibre	16.67	13.66	15.23	15.32
Ash	1.70	3.97	5.34	6.00

T1=0% , T2=0.05%, T3=0.10%, T4=0.15% salt

Table 2: Performance of Sheep on different levels of salt treatment

Parameters	T1	T2	T3	T4
Daily weight gain (g/day)	14.29	29.46	63.39	17.86
Total dry matter intake (% body weight)	5.51	7.64	6.22	7.83
Feed conversion ratio	2.01	1.00	0.50	1.62
Water consumption (L/day)	0.70	1.09	1.12	1.13

Table 3: Values of Correlation Coefficient

Parameters	Correlation Coefficient (r)	Level of Significance (5%)
Salt/DMI (% body weight)	0.64	P<0.05
Salt/Weight gain (kg)	0.26	p>0.05
Salt/WC (L/day)	0.85	P<0.05
Salt/FCR	0.32	p>0.05

DMI= Dry Matter Intake, WC= Water Consumption, FCR= Feed Conversion Ratio

4. DISCUSSION

The result of proximate composition of the experimental diets is presented in Table 1. It was observed that there were significant variations in the values of determined nutrients with the exception of dry matter (DM). The dry matter DM of the experimental diets ranged from 88.28 in T3 to 89.45g/100g in T4 while crude protein CP of the diets ranged from 16.80 to 22.65g/100g, it was observed that crude protein and ash contents increased as the level of salt increased which implied that the diets could be good sources of protein and minerals that would meet the requirement of small ruminants for growth and production. The improved crude protein CP values observed agreed with the findings of Ezenwa and Aken'ova (1988).

The crude fibre values observed in this study ranged from 13.66 (T2) – 16.67g/100g (T1) which were lower than the values (47.80 – 51.20%) reported by (Ifut, 1987). T4 had the highest ash value (6.00g/100g) which was lower than the value reported by Fajemisin et al, (2015). The lowest Nitrogen Free Extract value (40.87g/100g) observed in T4 was significantly ($P < 0.05$) different from the values recorded for other treatments.

Table 2 showed the performance of sheep on varying levels of salt. Treatment 3 (0.10% NaCl) significantly induced the highest average daily gain (63.39g/day) while water consumption rate was highest in T4 (1.13L/day). Increasing salt levels in the diets increased average daily weight gain and water consumption ($p<0.05$). Results further showed that dietary inclusion of 10g salt per day provoked the highest growth rate which then witnessed a decline (17.86g/day) beyond 10g inclusion. However, the difference observed between the growth rate of sheep fed 5g and 15g salt (29.46 and 17.86g/day respectively) were not significant. In like manner, average daily weight gain observed for sheep on the control diet and those fed 15g salt per day were not significant (14.29 and 17.86g/day respectively). It appears that there was a limit to which salt addition to sheep diets could induce performance beyond which further dietary increase would reduce performance.

Ten gram salt rate also promoted optimum Dry matter intake (6.22% body weight) and feed conversion ratio (0.50). There was a significant positive correlation ($r=0.85$: $p<0.05$) between water consumption and salt inclusion in the concentrate feed. The increasing water consumption could be attributed to the increasing salt rates, since salt induces thirst (Adu, 1981). The responses of sheep on the control (0% salt) were the lowest in terms of mean values of daily weight gain (14.29g/day), dry matter intake (5.51% body weight), water consumption (0.70L/day) and feed conversion ratio (2.01). Responses also suggested that addition of salt in sheep rations improved performance and feed utilization (Steele, 1996).

5. CONCLUSION AND RECOMMENDATION

It can be concluded from the result obtained in this study that animals on diet 3 (0.10% NaCl) exhibited better performance in terms of average daily weight gain, dry matter intake of 6.22% body weight for gaining body weight of 63.39g/day than other levels of salt inclusion. Therefore, 0.10% salt should be included in the concentrate diets of sheep for optimum performance.

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