



# Effects of meat goat breed, salinity of drinking water, and level of protein supplementation on intake and digestion

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## INTRODUCTION

- One aspect of water quality is the level of salinity, partially characterized by the concentration of total soluble salts or solids (TDS).
  - Ruminant livestock frequently consume water moderate to high in TDS.
  - Consumption of saline water can affect many conditions in ruminants to influence performance, notably feed intake and ruminal microbial activity in some instances.
- Effects of consumption of saline water could vary with dietary conditions such as level of N.
  - In one study with sheep consuming low-CP forage, high consumption of salt increased urinary N excretion and decreased plasma urea concentration.
  - In a trial with cattle consuming low-protein forage, soybean meal supplementation alleviated a depression in forage intake caused by high-TDS water.
  - Moreover, because of varying origins and genetic characteristics of breeds of livestock, such responses could differ between Boer and Spanish goats.
- Therefore, objectives were to determine effects of low to moderate levels of salinity in drinking water and level of protein supplementation on intake of feed and water and digestibility in yearling Boer and Spanish wethers.

## MATERIALS AND METHODS

- 36 yearling wethers (1.15 yr) housed individual in 1.22 × 1.22 m elevated pens
  - 18 Boer - 37.9 ± 1.12 kg; 18 Spanish (Span) - 33.5 ± 0.66 kg
- 10-wk experiment; digestibility measured in wk 4 and 8
- Wheat straw consumed ad libitum (4.4% CP and 78.1% NDF)
- Treatments - 2 × 3 × 2 factorial
  - Breed
  - Water treatments – offered at 0700 and 1430 h for 20 min each time
    - Fresh (240 mg/kg TDS) - FRW
    - NaCl added at 5,000 mg/kg – MSW; NaCl added at 10,000 mg/kg - HSW
  - Soybean meal (SBM; 50.4% CP)
    - 0.13-0.14% BW (DM) – Low; 0.27-0.28% BW (DM) - High
- GLM used for variables with one value such as ADG
- Mixed effects model for repeated measures

**BW (kg) and ADG (g) - water**

Item	SBM	Water		
		FRW	MSW	HSW
BW, d 0		36.0	34.8	36.2
BW, d 70		36.4	35.8	37.7
ADG	Low	-1.4 <sup>a</sup>	-12.9 <sup>a</sup>	23.6 <sup>b</sup>
	High	8.7 <sup>ab</sup>	29.3 <sup>b</sup>	7.4 <sup>ab</sup>

**BW (kg) and ADG – breed and SBM**

Item	Breed		SBM	
	Boer	Span	Low	High
BW, d 0	37.9 <sup>b</sup>	33.5 <sup>a</sup>	35.2	36.1
BW, d 70	38.6 <sup>b</sup>	34.7 <sup>a</sup>	35.7	37.6
ADG	7.2	11.1		

**Digestibility (%)**

Item	Breed		Water			SBM	
	Boer	Span	FRW	MSW	HSW	Low	High
DM	58.7	57.4	59.5	57.3	57.4	57.1	59.0
OM	60.7	59.5	61.6	59.3	59.4	59.2	60.9
NDF	60.3	58.8	61.2	59.0	58.4	59.9	59.2
GE	58.1	57.0	58.9	56.7	57.0	56.5	58.6

**Water and DM intake (g/d)**

Item	Breed	Breed		Water			SBM	
		Boer	Span	FRW	MSW	HSW	Low	High
Water		1,351	1,269	1,093 <sup>a</sup>	1,295 <sup>b</sup>	1,541 <sup>c</sup>	1,273	1,347
SBM		79 <sup>b</sup>	71 <sup>a</sup>	75	73	76	49 <sup>a</sup>	101 <sup>b</sup>
Straw							684	692
	Boer			741 <sup>b</sup>	657 <sup>ab</sup>	731 <sup>b</sup>		
	Span			567 <sup>a</sup>	710 <sup>b</sup>	723 <sup>b</sup>		
Total							733	793
	Boer			821 <sup>b</sup>	733 <sup>ab</sup>	811 <sup>b</sup>		
	Span			636 <sup>a</sup>	781 <sup>b</sup>	796 <sup>b</sup>		

## DISCUSSION

- The increase in water intake as salinity rose is a fairly common finding.
- Factors responsible for relatively low straw and total DMI for Span-FRW are unclear.
- Total DMI tended (P = 0.068) to be greater for High than for Low as a result of similar straw DMI and the difference in intake of SBM.
- The lack of difference between SBM treatments in straw DMI probably relates to N intake with Low at or near the maintenance requirement and adequate for normal ruminal microbial activity and digestion, as supported by no differences in digestibilities.
- In conclusion, these yearling meat goats displayed considerable tolerance of drinking water high in salinity as varied by NaCl addition, without consistent breed differences.
- Future research should address animals with greater nutrient and energy demands and sources of saline water with various mineral arrays.