The Effects of Feed Particle Size on Rambouillet Wether Performance

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ABSTRACT

Ruminants masticate feed to increase surface area available for digestion. Controlling for initial particle size of feed can affect animal performance by affecting intake. Decreasing initial particle size can reduce the need for rumination and increase rate of passage. This can have a net effect of increasing intake and ADG, as seen in this study. Increasing intake and ADG can enhance performance efficiency.

INTRODUCTION

- Ruminants consume complex carbohydrates, such as hemicelluloses, pectins, starches and celluloses for energy.[1,2]
- Mastication decreases feed particle size while concurrently increasing particle surface area for digestion by rumen microorganisms.
- A reduction of feed particle size below a 1.14 mm threshold will increase digestive efficiency.[3]
- Increased efficiency would be evident as increased intake and decreased residual energy in the feces.
- Therefore the possibility for increased intake, increased rates of passage and reduced waste would prove for an increase in animal performance.

LITERATURE CITED

[1]Jung, H. G and Allen, M. S. (1995). Characteristis of plant cell walls affecting intake and digestibility of forages by ruminants. J Anim Sci., 73: 2774-2790.

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[3]Poppia, D., Nortona, B., Minsona, D., & Hendricksen, R. (2009). The validity of the critical size theory for particles leaving the rumen. *The Journal of Agricultural Science*, 275-280.

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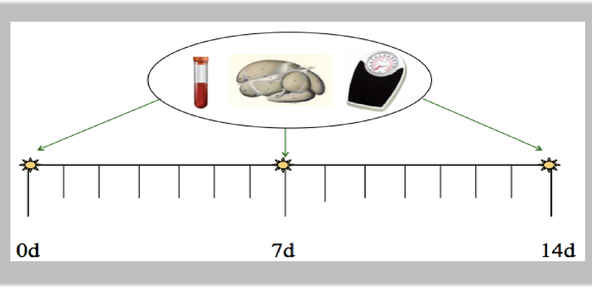
MATERIALS & METHODS




- Rambouillet wethers with an average bw = 30 ± 5 kg were randomly assigned to two treatments for a 14 day trial.


Treatment	Diet Type	Lamb Number
T1	long stem alfalfa	5
T2	alfalfa pellet	5

- Lambs were acclimated to trial facilities, equipment and diet regimen for two weeks.
- During the trial period, all feed fed and refused was weighed and recorded on an individual basis
- Individual fecal outputs were collected, weighed and stored at -20°C.

- Blood samples were submitted to the Montana Veterinary Diagnostic Laboratory (Bozeman, MT) for a complete Large Animal Panel.
- Rumen Contents were extracted for microbial DNA, amplified and sequenced on the Illumina Miseq.
- Nutrient profiles of feed and feces were completed by Dairy One Forage Laboratory (Ithaca, NY).
- Feed and feces were sieved for particle sizes 4,6,8,16,25,40,45,50,70,100,170 and 200mm.
- Statistical analyses between groups were done by two sample t-test.

RESULTS & DISCUSSION

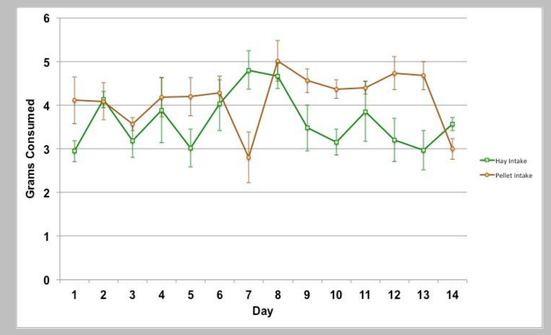


Figure 1: **Trial Intakes.** Line plots of intakes for both the hay (T1) and pelleted feed (T2) regimen. Wethers fed the pelleted diet consumed more across the entire trial than wethers consuming a hay diet (P<0.001).

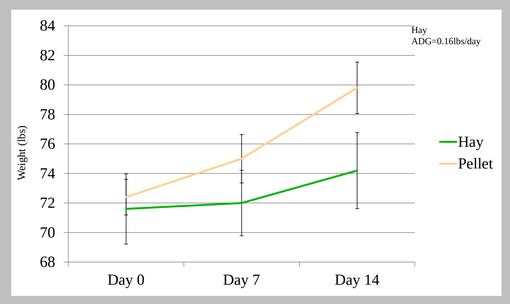


Figure 2: **Trial Weights.** Line plots of weights at day 0. 7 and 14 for both the hay (T1) and pelleted feed (T2) regimen. Wether body weights did not differ at **P > 0.05**, for each sampling time point.

- ADG throughout the trial was greater for wethers consuming the pelleted diet, ***P* = 0.002.**
- Fecal output for wethers consuming the pelleted diet was greater than through out the trial, ***P* < 0.01**.

IMPLICATIONS

- Particle size has a significant effect on gain
- Controlling particle size can increase intake