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Effect of improved roughage quality on rumen fill

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Background: Rumen fill is an important indicator for long-term control of roughage intake in ruminants. Its measurement and prediction is very crucial to productivity of livestock industry.

Aim: This study determined the effect of roughage quality on digesta load in the rumen (rumen fill).

Methodologies: Veld hay was untreated (PRQ), improved (IRQ) by treating with 4% urea (w/w) or semi-improved by spraying with 2.5% (w/w) urea (SIRQ). Experiment 1 used sheep to measure rumen fill considering the effect of time lapse after feeding while Experiment 2 used goats to measure rumen fill considering the effect of period of day at meal termination. Experiment 1 was divided into three sub-experiments: Experiment 1a, four rumen-fistulated sheep were used to determine *in-sacco* degradability; Experiment 1b, nine sheep (37.6 ± 9.34 kg) were blocked by body weight and randomly allocated to IRQ (n=4) and PRQ (n=5) to determine *in-vivo* digestibility; Experiment 1c, sixteen sheep (36.5 ± 9.46 kg) were blocked by body weight and randomly allocated to IRQ (n=8) and PRQ (n=8) to determine rumen fill at time lapse of 0, 6, 12 and 24 h after feeding (slaughter replicates per IRQ and PRQ treatment per time lapse, n=2). In Experiment 2, eighteen goats (25.4 ± 9.08 kg) were blocked by body weight and randomly allocated to IRQ (n=6), SIRQ (n=6) and PRQ (n=6) to determine *in-vivo* digestibility and rumen fill during morning, afternoon and evening, at meal termination (slaughter replicates per treatment per time lapse, n=2).

Results: Rate of degradation and effective degradability were enhanced by IRQ. Roughage quality had no effect on digestibility [IRQ ($P<0.01$) and SIRQ ($P<0.001$)], but digestibility was higher in goats than sheep. Time lapse after feeding had no effect on rumen fill but period of day at meal termination influenced the rumen load ($P<0.05$). NDF load for goats were above 2.03 kg/100 kg BM for all diet treatments.

Discussion: The results in the experiment with goats are similar to other studies. Rumen fill levels reach their first maximum after the main morning meals, with a daily maximal rumen fill being reached after the evening meal. High rumen load after termination of the evening feeding bout compared with morning and afternoon period may indicate presence of physiological and feeding behavioural control mechanisms on rumen load.

Conclusion/Recommendation: Following starvation, time lapse had no effect on emptying of rumen load, however, further studies need to establish rumen fill at zero hour of meal termination.