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Feed Intake and Grazing Behaviour of Sheep in Response to Decreasing Herbage Allowances

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Abstract

Herbivores are known to modify their grazing behaviour in response to decreasing forage availabilities. This might enable them to maintain their feed intake, but will increase their energy expenditures and thus, reduce feed use efficiency in pastoral livestock production. The objective of this study was therefore to determine the effects of decreasing herbage allowances (HA) on organic matter (OM) intake and behaviour of grazing sheep.

The experiment was conducted in the Inner Mongolian steppe in August 2010. Six different HA classes were established on two plots each ranging from >12 kg (HA 1) to ≤1.5 kg (HA 6) dry matter per kg of animal liveweight (LW). In four ewes per plot OM intake was determined using titanium dioxide to quantify fecal excretion and the crude protein content in feces to estimate diet digestibility. For this, fecal samples were collected during five consecutive days. Global positioning system loggers were fitted to two sheep per plot during four days. The devices recorded the animals' position every second when sheep were moving and every 15 s when no change in their position was detected. Horizontal and vertical walking distances were calculated and the time sheep spent for resting, grazing, and walking was derived from walking speed using velocity thresholds of ≤0.05, >0.05–0.7, and >0.7 $m\,s^{-1}$, respectively. Mean values of the sampled sheep per plot were used for the statistical comparisons between HA classes by SAS 9.2.

Horizontal distances (±standard deviation) averaged 3.6±0.99, 3.3±0.70, 4.7±0.92, 4.2±0.51, 4.0±0.92, and 3.7±0.51 $km\,d^{-1}$ at HA classes 1–6, respectively ($p > 0.05$). Similarly, vertical distances of 174–435 $m\,d^{-1}$ did not differ between HA classes ($p > 0.05$). The mean time animals spent for resting, grazing, and walking (±standard deviation) of 17.8±1.04, 4.9±0.95, and 0.9±0.33 $h\,d^{-1}$, respectively, was also not affected by HA class ($p > 0.05$), indicating that sheep did not compensate for the decrease in forage availability by prolonging their grazing time or daily walking distances. Nevertheless, daily OM intake of 68.1–73.5 $g^{-1}\,kg^{-0.75}$ LW was almost identical despite the decrease in HA, showing that sheep must have adopted other strategies i.e. increasing their bite rates.

Keywords: Feed intake, GPS, grazing behaviour, small ruminants

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