FEED INTAKE AND NITROGEN BALANCE OF SHEEP FED WHEAT, BARLEY, TRITICALE AND RYE STRAWS GROWN WITH THREE RATES OF NITROGEN FERTILIZER

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Cereal straws can vary widely in their nitrogen (N) content, as demonstrated in a single wheat cultivar by Schultz and French (1978), though little attempt has been made to determine what influence this may have on the value of crop residues as feed for sheep.

Single cultivars of wheat (W), barley (B), triticale (T) and rye (R) were grown with 0, 70 and 140 kg N/ha in four randomized blocks on a red-brown soil as desribed by Graham *et al.* (1983). At harvest the straw was cut about 10 cm above ground level and collected as it emerged from the harvester. Straw from the individual plots was coarsely milled and randomly allocated within four liveweight strata to 48 individually penned Merino wethers weighing 40±3.4 kg. The sheep were previously fed a common hay diet (5.5% crude protein) *ad libitum* to provide covariate values for analysis of variance. The sheep were fed the straw as the sole diet but had access to a salt-mineral mixture. The straw was fed at 110% of expected daily feed intake based on mean intake during the previous three days. The sheep were harnessed for collection of faeces and urine. Feed intake, dry matter digestibilty (DMD) and N balance were measured over 7 days following 10 days of preliminary feeding.

Increasing rates of N fertilizer significantly increased the N content of straw ($P<0.001$). Barley and wheat straw had higher N contents than the other cereals ($P<0.001$) while triticale straw contained the least N ($P<0.001$) and there was no interaction between nitrogen rate and crop genera (Table 1). Nitrogen fertilization also increased DM and N intakes ($P<0.001$) by sheep but had no effect on DMD. Increasing N rate improved N balance in sheep fed W, B and T straw ($P<0.01$) but had no effect on the N balance of sheep fed rye straw although sheep fed all straws grown at the highest N rate were still in negative N balance. Sheep ate significantly more triticale straw ($P<0.001$) despite it having a similar digestibilty to wheat straw and significantly less N than the other straws. There is no obvious explanation for this effect but sheep fed triticale straw ate with more apparent enthusiasm than did the other sheep and further evaluation of the feed and grazing value of triticale residues would appear worthwhile. Lack of response in DMD to fertilizer N is in agreement with Round and Fotherigham (1996) who found no effect of N fertilization on DMD of straw of a durum wheat.

Table 1. Mean feed dry matter intake (DMI) and digestibility (DMD), N intake, and N balance by sheep fed straw of four genera grown at three rates of nitrogen fertilizer (N)

Treatment	Straw N (%)	DMI (g/d)	DMD (%)	N intake (g/d)	N balance (g/d)
NO	0.53^{c}	486^{b}	42.2^{a}	2.63^{c}	-2.62^{b}
N70	0.61^{b}	520^{ab}	41.5^{a}	3.14^{b}	-2.43^{b}
N140	0.84^{a}	546^{a}	43.7^{a}	4.60^{a}	-1.79^{a}
s.e.d.	0.038	20.9	1.95	0.228	0.275
W	0.70^{b}	516^{b}	45.1^{a}	3.78^{a}	-2.01^{a}
B	0.81^{a}	507^{b}	39.7^{b}	3.98^{a}	-2.28^{a}
T	0.44^{c}	575^{a}	43.6^{a}	2.65^{c}	-2.26^{a}
R	0.69^{b}	479^{b}	39.2^{b}	3.41^{b}	-2.57^{a}
s.e.d.	0.044	24.1	2.25	0.264	0.318

Within columns, means within N and crop genera with different superscripts, differ significantly ($P<0.05$).

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