Grassland monitoring system for sustainable utilisation in Inner Mongolia, China. 3. The estimation of herbage intake of sheep during grazing the natural grassland

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Introduction Grassland condition depends on a balance between growth rates of grasses and herbage intake by animals. In the previous two reports the general concept was described of the monitoring system using satellite data, GPS and GIS and real-time monitoring of grass biomass and quality and animal behaviour. This paper reports the estimation of herbage intake by sheep which had been raised by a farmer in the Inner Mongolia steppe under a typical grazing system with no supplement feeds except salt and also estimation of the growth rate of young sheep.

Material and methods The farmer raised a flock of 720 sheep (360 female, 60 castrated and 300 under 1 year old) on about 5.01 km^2 of typical grazing grassland near the Xilin River Basin in Inner Mongolia. The sheep grazed from about 6 a.m. to 8 p.m., and walked 10 to 12 km a day. Of the herd, five sheep (one under 1 year old, one castrated male of 2 years old and three females of 2 to 4 years old) were selected for the estimation of herbage intake and five sheep under 1 year old for the estimation of growth rate. The experiment for herbage intake was done from 8 to 19 July, 2004, and the experiment for growth rate was from 1 June to 1 July, 2004. Herbage intake was estimated from faecal output and *in vitro* digestibility of the herbage (Tilley & Terry, 1963), determined on samples from seven areas of grazed grassland. Total faeces was estimated by the dilution method, with chromic oxide administered every morning and evening.

Results Dominant species of herbage in the grazed grassland are shown in Table 1. Dry matter (DM) digestibility of the mixed grasses from areas 1 to 7 ranged from 58.8 to 65.0 %. Herbage DM intake of the sheep was 2.18 to 4.46% of body weight, but the value for sheep 47 was low, because the sheep was born in early spring this year. She grazed with her mother all day, and sometimes suckled. Herbage intake of the other four sheep was from 2.9 to 4.5% of body weight. Body weight gain of the sheep under 1 year old was 0.203 kg/day.

Table 2 Daily herbage dry matter intake of the sheep

sheep	age,	BW.	DM herbage intake	
No.	sex	kg	g/day	% of BW
35	3F	42.33	1793	4.24
42	4F	48.33	2155	4.46
44	4F	56.28	1834	3.26
47	1F	28.88	629	2.18
56	2C	45.44	1318	2.90

Table 1 Dominant grass of the area and its *in vitro* digestibility

	dominant	digestibility (%)	
area	grasses [1)]	dry matter	crude protein
1	1, 2, 3	64.5	79.9
2	2, 3, 7, 8	65.0	80.0
3	1, 2, 7	62.0	80.4
4	2, 5	63.5	80.9
5	2, 3, 4, 7	61.6	81.4
6	5, 6, 9	63.5	74.5
7	5, 9	58.8	78.0
mean		62.7	79.3

1) Figures show dominant grasses in the area
1 *Stipa* spp.
2 *Cleistogenes squarrosa* (Trin.) Keng
3 *Agropyron cristatum* (L.) Gaertn
4 *Carex* spp.
5 *Artemisia frigida* Willd.
6 *Leymus chinensis* (Trin.) Tzvel.
7 *Potentilla acaulis* L.
8 *Potentilla tanacetifolia* Willd. ex Schlecht.
9 *Salsola collina* Pall.

Conclusion A combination of above-ground biomass and animal behaviour monitored using satellite data, GPS and GIS (described in the two previous reports) and herbage intake, digestibility and animal growth rate as estimated here gives a mathematical tool for the real-time monitoring of this precious ecosystem .

References

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