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Spatial distribution of forage intake by grazing beef cows on an alpine pasture in Japan

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Key words : alpine pasture ,forage intake ,grazing cattle ,grazing site

Introduction In an extensive grazing system ,estimating spatial distribution of forage intake by cattle can provide valuable information for pasture management and cattle nutritional management . Animal distribution and movement can be traced using global positioning system (GPS) units along with a geographic information system (GIS) . Grazing behavior such as biting and chewing can be successively recorded by acoustic biotelemetry (Laca et al . ,2000) . Forage intake by grazing cattle under an extensive system can be estimated by the single-pulse dose method (Nakano *et al* . ,2008) . Combining these methods may enable us to estimate spatial distribution of forage intake by grazing cattle . The aim of this study was to estimate spatial distribution of forage intake by cattle and to discuss the influence of seasonal distribution patter of grazing behavior on forage intake .

Materials and methods The experiment site was the alpine woodland pasture (121 ha) ,located in central Japan (36°9′ N , 137°6′E ; altitude ,1500 m) . The details of the pasture and procedure for estimating forage intake by grazing cows (mention procedures briefly for readers) as described in previous reports (Yayota et al . ,2008) . On day three of each experimental period ,a handy type GPS (Map 60 ,Garmin) placed in a PVC pipe was fitted on one cow using a hand-made collar (number of cows as well as GPS should be mentioned . With only one cow the results would not be authentic) . The GPS was configured to record animal location at intervals of 15 s . All sounds related to biting and chewing were recorded using a digital voice recorder (ICR-S310RM ,SANYO) with a wired microphone (ECL-TL1 ,Sony) . The microphone was protected by rubber foam and was placed on the cow's jawbone and fastened to a hand-made halter . The GPS points ,which were matched with the time of occurrence of the ingestive chews ,were overlaid on GIS raster layers . Daily forage intake by the cow was divided by the number of chews on each grazing point .

Results The cow gradually expanded her daily grazing site from early-to late-grazing season (Figure 1) . Conversely ,the grazing time gradually decreased from early-to late-grazing season (Table 1) . The number of chews was almost the same in early-and late-grazing seasons ,but increased fairly in the mid-grazing season (Table 1) . Both the intake and intake/chew clearly decreased in mid-and late-grazing seasons ,when compared with early-grazing season (Table 1) .

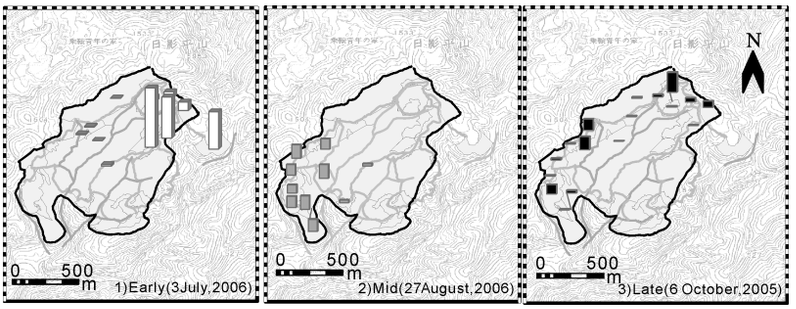

Figure 1 *Spatial distribution of forage intake by the grazing cow during early- , mid- , and late-grazing season .*

Table 1 *Grazing time , number of chew , intake and intake/chew by the grazing cow .*

	Early	Mid	Late
Grazing time (min/d)	682	646	603
Number of chew (/d)	28145	42618	28454
Intake (kg DM/d)	9 .7	5 .0	5 .3
Intake/chew (g DM)	0 .34	0 .12	0 .19

Conclusions A combination GPS/GIS technology ,acoustic biotelemetry ,and daily forage intake is a feasible approach to estimate spatial distribution of forage intake by grazing cattle . The cow frequently moved across the pasture ,but ingested forage inefficiently during mid-and late-grazing seasons . Thus ,daily forage intake decreased in mid-and late-grazing seasons .

Reference

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