SWARD STRUCTURE UNDER CONTINUOUS AND ROTATION GRAZING

V. Pavlu[1] and J. Velich[2]
[1]ÚZPI, Grassland Research Station, Liberec 11, 460 11, The Czech Republic
[2]Czech University of Agriculture, Department of Forage Production, Praha 6, 165 21, The Czech Republic

ABSTRACT
Sward structure under continuous (CG) and rotational (RG) grazing system was studied at an experimental pasture in the Jizerské hory mountains. Herbage mass and vertical distribution was assessed by cutting ten quadrats (0.1 x 0.5 m) and separated into grass, white clover, dandelion, other forbs and dead material. The proportions of grasses was higher at RG (on average 51% of the pasture mass) than at CG (41%). In the years with normal amount and distribution of precipitation the proportion of white clover was higher at CG (17%) than at RG (9%). The lack of summer precipitation damaged more significantly the clover at CG than at RG and it reduced its proportion also in spring of the following year. The proportion of other dicotyledons was at both RG and CG similar. The average accumulation of the total pasture mass in the sward layer of 0-30 mm reached 45% at RG and 65% at CG. The average rate of dead material in the pasture mass was higher at CG (26%) than at RG (22%). The differences in sward structure did not have significant influence on the heifer production.

KEYWORDS
Continuous grazing, rotation grazing, sward structure, vertical distribution, heifers

INTRODUCTION
Comparisons between grazing management systems can be found in profusion throughout world literature. The present grazing research in the Czech Republic has studied fertilization, production of forage, quality of forage and production characteristics of grazing animals, but the sward structure in the Czech Republic has been studied only on a meadow by Rychnovská et al. (1987, 1993). The present study was carried out to investigate the effect of different grazing management systems on the sward structure in uplands.

MATERIALS AND METHODS
The experiment was carried out in 1993 and 1994 at an experimental pasture in the Jizerské hory mountains (lat. 51°20' N, long. 15° 02' W). The altitude of the experimental pasture is 420 m. Average annual precipitation for the area is 918 mm. The mean annual temperature is 7.1°C. The dominant species are couch grass (*Agropyron repens*), ryegrass (*Lolium perenne*), white clover (*Trifolium repens*) and dandelion (*Taraxacum officinale*). No fertilizers have been applied since 1992.

There were two treatments: rotation grazing (RG) and continuous grazing (CG), both of them on 1.0 ha. The areas were grazed by 5 Czech Pied young heifers in 1993 and by 6 Friesian x Czech Pied young heifers in 1994 and 1995. The average initial weights of heifers on RG and CG were about 178 in 1993, 138 in 1994 and 137 kg in 1995. The average stocking rate during the grazing season was approximately 1500 kg.ha^{-1} live weight. The area of RG was divided into six paddocks and heifers were grazed from one paddock to another. The sward at CG was maintained at a height of 5-7.5 cm during the grazing season. The grazing season lasted from beginning of May to the middle of October.

Herbage mass was assessed in spring and late summer. Ten random quadrats (0.1x0.5 m) were cut with electric shears on each treatment site. The vertical distribution of herbage within the sward canopy was measured 2x during the summer by cutting 10 quadrats (0.1x0.5 m) per treatment (layers- 0-3 cm, 3-10 cm, 10-20 cm, 20-30 cm, 30-50 cm). The samples were stored frozen then separated into grass, white clover, dandelion, other species and dead material. All components were dried and weighed.

RESULTS AND DISCUSSION
The average daily live weight gain of heifers during the whole grazing season in 1993-1994-1995 was not significantly higher (781-542-556 g) than at RG (718-528-549 g).

The pasture systems (RG, CG) influenced considerably both the composition of the aboveground biomass of the pasture sward (Fig. 1) and its vertical distribution (Fig. 2). The rate of grasses was higher at RG (51% of biomass) than at CG (41%). The improved access of light into lower layers at the continuously grazed sward was favourable for the growth of white clover. The proportion of clover in the years with normal amount and distribution of precipitation was higher at CG, especially in late summer (on average 17%) than lower, but during the growing season of vegetation more balanced proportion was found at RG (9%). Nevertheless, with lower summer precipitation (1994), the clover was more damaged at CG than at RG. The reduction of its proportion still showed up at the beginning of the next season of vegetation. Owing to the fast regeneration its rate in late summer was again higher than at RG. The proportion of dandelion and other forbs was similar at RG and CG (13 and 14% respectively).

The average amount of dead material and its proportion of the total aboveground biomass was similar at RG and CG in spring (189 and 186 kg.ha^{-1} DM, 13 and 12% respectively). These values increased during the season of vegetation and reached the average levels of 459 kg.ha^{-1} DM at RG and 387 kg.ha^{-1} DM at CG which represented 31 and 40% of the pasture herbage respectively. The higher rates of dead material were reached on both treatment sites in late summer and were probably caused by increased senescence in August and September, which were similar in rotational grazing by Kanneganti et Kafka (1995) and in continuous grazing by Gibb et al. (1989). The higher proportion of dead material in pasture mass at CG in September decreased the quality of forage and could have been one of the causes of the slightly lower gains of the heifers at CG.

The vertical distributions of swards showed that 50% of biomass at RG and 70% at CG were accumulated in the layer of 0-3 cm (Fig. 2), but Milne et al. (1982) reported this rate on grass/clover sward at about 30-40%. The differences between these results were caused by more heterogeneous (about 20 species) and less dense (about 4 000 tilers.m^{-2}) sward in our experimental pasture. The forty per cent of the total biomass in both treatments were created by dead material, 90% from which was the grass component.
The heifers' production was similar on both treatment sites. It confirms the conclusions of a lot of authors, that using rotation or continuous grazing system has a minor influence on the performance of grazing animals.

ACKNOWLEDGMENTS
The work was supported by The Grant Agency of the Czech Republic (under no. 503/95/0899).

REFERENCES
Gibb, M. J. and R. D. Baker. 1989. Effect of changing grazing severity on the composition of perennial ryegrass/white clover swards stocked with beef cattle. Grass Forage Sci., **44**: 329-334.

Kanneganti, V. R. and S. R. Kafka. 1995. Forage availability from a temperate pasture managed with intensive rotational grazing. Grass Forage Sci., **50**: 55-62.

Milne J. A., J. Hodgson, R. Thompson, W. G. Souter and G. T. Barthram. 1982. The diet ingested by sheep grazing swards differing in white clover and perennial ryegrass content. Grass Forage Sci., **50**: 48-54.

Rychnovská, M. et al. 1985. Ecology of meadows. Academia, Praha. (in Czech).

Rychnovská, M. [ed.]. 1993. Structure and functioning of semi-natural meadows. Academia, Praha.