ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS
SBORNÍK MENDELOVY ZEMĚDĚLSKÉ A LESNICKÉ UNIVERZITY V BRNĚ

Ročník LVI 27 Číslo 1, 2008

THE IMPACT OF SHEEP PASTURING ON THE ENERGY AND ORGANIC NUTRIENTS LEVELS IN THE STEPPE VEGETATION OF THE *MOHELNO SERPENTINE STEPPE* NATIONAL NATURAL RESERVE

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Received: September 12, 2007

Abstract

VESELÝ, P.: *The impact of sheep pasturing on the energy and organic nutrients levels in the steppe vegetation of the Mohelno Serpentine Steppe National Natural Reserve*. Acta univ. agric. et silvic. Mendel. Brun., 2008, LVI, No. 1, pp. 229–236

The aim of this research was to assess the implications of sheep grazing for the nutritional value of the vegetation in the *Mohelno Serpentine Steppe* National Nature Reserve (NNR). A free pasture controlled by an electric fence was practised from 1997 to 1998. The German Merino sheep were grazing on an area of 4.25 and 6 ha with a pasture load of 6.8–9.4 sheep per 1 ha in 1997 and 6.7–8.7 sheep per 1 ha in 1998. The steppe vegetation samples were collected from five different sites reflecting the phytocenological composition typical of the individual steppe areas. The vegetation samples were collected on an area of 3×1 m^2 during the growing season at two-week intervals. The collected samples were tested for the amount of dry matter, fibre, nitrogenous substances, fat, ash, nitrogen-free extractive substances (NFES), gross energy (GE), metabolic energy (ME), lactation net energy (LNE), fattening net energy (FNE), PDIN and PDIE (PDI – referring to the factually digestible nitrogenous substances in the small intestine of the ruminants). During pasture there was a decrease in the dry matter levels but its average levels remained high (35.45–46.78%). The effect on the nitrogenous levels became apparent ($P < 0.05$) mainly in the second year of grazing (10.00–10.94% compared to 11.64–19.35% in the vegetation dry matter). However, in comparison with the pasture vegetation the effect remained less significant. A similar situation was observed in relation to the fluctuation of PDIN and PDIE (64.60–70.71 compared to 75.18–124.98 g/kg of the dry matter and 79.03–82.71 compared to 89.41–29.27 g/kg of the dry matter respectively). The fat levels (3.80–4.02%) were not affected by the site ($P < 0.05$) but the specific utilization. The grazing brought about a marked increase in the fat levels ($P < 0.001$). The amount of the fibre during the first year was affected only in terms of its decreased site variability (29.60–31.31%). The conclusive evidence ($P < 0.05$) of the decrease did not appear until the second year of grazing (21.76–27.88%). In the course of the pasture the ash levels identified in the dry matter were fluctuating between 8.74–10.19% depending on the site conditions and the form of utilization. Considerably high levels ($P < 0.05$) were recorded on more intensely grazed areas. NFES levels in the step areas (45.16–47.26%) were steady both in terms of the site conditions and the form of utilization.

The energy levels did not reflect the site variability. The ME, LNE and FNE levels (9.39–9.79; 5.52–5.80 and 5.34–5.69 MJ per kg of the dry matter respectively) were affected by the form of utilization. During the pasture the site variability of the energy levels decreased. There was also a substantial increase in the amount of energy established in the dry matter, which rose to the levels usual for pasture vegetation.

sheep pasture, protected areas, nutritional value

The distinctive micro-climatic conditions of the *Mohelno Serpentine Steppe* – the prevailing south orientation and the specific geological foundation – determine the occurrence of some rare plant associations and the abundance of various species. This territory is of an extreme importance for the preservation of both the Czech and Central European gene pool. That's why the Ministry of Education, Science and Art declared it on 11 December 1952 the *Mohelno Serpentine Steppe* NNR (VESELÝ, 2002b). The long-term measurements carried out over the last years have shown a gradual increase in the shrub and tree cover, and an overgrowing vegetation cover on the plateau. Subsequently, it has been found that the biodiversity is smaller and the autochthonous xerotermic associations are on the decline. This has been put down to the shading trees, changing inter-species relationships in the plateau's biocenosis, changing qualities of the soil (acidification), changing humidity of the environment, creation of humus, etc. (HANZL and KAPOUNOVÁ, 1994). This development has brought up the possibility of re-opening the plateau and steppe for grazing. This proposal was for the first time considered in 1987 during the debate over the Steppe Care Plan. The Mohelno Serpentine Steppe Conservation Plan drawn up for the period 1988–1990 encompassed a foundation of an extensive grazing area on the upper part of the steppe where the maximum pasture load of the land was not to exceed 10 head of cattle. The sheep grazing did not start until 1997 (VESELÝ, 2002b).

The submitted work is a part of a long-term project (1995–2006) which has, among other things, provided material for the Mohelno Serpentine Steppe Care Plan (to be in force as of 2006).

The aim of this work was to assess the implications of the sheep grazing for the energy, nutrients and ash levels in the plateau vegetation of the *Mohelno Serpentine Steppe* NNR during the first two years of pasture.

MATERIALS AND METHODS

The study of the sheep grazing in the *Mohelno Serpentine Steppe* NNR considered the nutrients levels variability in relation to the site conditions, the impact of pasturing on the vegetation quality and its comparison to the nutrients levels in the meadow and pasture vegetation cited in the selected European databases. The impact of grazing was assessed in relation to the nutritional value of the vegetation as it had been stated over a two-year period prior to the project (VESELÝ, 2002a).

The free grazing organised between 1997 and 1998 was controlled by an electric fence. Over the whole pasturing period the breed structure of the herd was based on the merino sheep. The area grazed in the course of the two years amounted to 4.25 and 6 ha with the pasture load of 6.8–9.4 sheep per ha in 1997, and 6.7–8.7. sheep per ha in 1998.

The steppe vegetation samples were collected from five different sites reflecting the phytocenological composition typical of the individual steppe areas.

The area C5 is situated in the western part of the plateau. The steppe vegetation here blends in with a more eutrophic vegetation of the grass-covered protective zone. The prevailing local varieties were Galium verum, Festuca ovina and Festuca valesiaca, whereas the steppe vegetation was dominated by Avenula pratensis.

The area D8 is situated in the western part of the amphitheatre, on the plateau near the edge of a continuous stretch of a piny wood, which, however, has already been cut down. The prevailing varieties here were Festuca ovina, Avenula pratensis, Galium verum and sporadically also Carex praecox.

The area C10 is a draining cone situated roughly in the middle of the western part of the plateau. It shows signs of eutrophization due to the nutrients draining from the field cultures lying above the analysed territory. The prevailing varieties were Poa pratensis, Arrhenatherum elatius and Galium verum.

The area C12 characterizes the plateau vegetation to the east of the site C10. It is, in essence, a more intensive variation of the area D8.

The site B17 includes the mound called "U Antoníčka" and the area bellow it stretching to the east. The typical plateau vegetation (the elevated mound) mixes here with a slightly wet and eutrophized vegetation which developed due to a moderately falling terrain. In addition to that, there were some varieties of the field weed. None of the species attained the qualities of a dominant variety. The vegetation grew more in a sort of mosaic of varieties, distributed locally according to the ecological conditions of the site.

The vegetation was sampled during the vegetation season at two-week intervals from the area of $3 \times 1\ m^2$. There were 8 samplings carried out in 1997 and 13 in 1998. The samplings were launched and closed in both years with regard to the state of the vegetation. From the mowed vegetation that had been duly weighed a proportionate sample was taken to establish its nutritional value. The samples were then dried up (ANONYM, 2001) and tested in laboratories for the levels of the dry matter, fibre, nitrogenous substances, fat and ash. The levels of the nitrogen-free extractive substances (NFES) were established by subsequent calculations, whereas the LNE levels (lactation net energy), PDIN and PDIE (PDI – referring to the factually digestible nitrogenous substances in the small intestine of the ruminants) were established by means of the regressive equations (VESELÝ and ZEMAN; 1995, 1997).

The sampling on the steppe area was carried out on the basis of an exception granted by the Ministry of Environment on 8.7.1996 whereby the collection of vegetation samples in the *Mohelno Serpentine Steppe* NNR was legally permitted.

The mathematically statistic analysis comparing the nutritional values of the samples collected on the individual sampling areas and the results achieved during the two years, was based on the ANOVA methods, and the significance of the differences established between the average values was stated by means of Tukey's method (SNEDECOR and COCHRAN, 1971).

RESULTS AND DISCUSSION

Before the pasture the dry matter levels ($P < 0.05$) established in the most intensive areas were considerably lower (VESELÝ, 2002a). Having said that, the average dry matter levels in the steppe vegetation before grazing were generally quite high as the plateau vegetation boosted by the spring growth had gradually dried down. During the first year of grazing the differences between the dry matter levels on different sites became less obvious. During the second year of grazing by far the lowest dry matter levels ($P < 0.05$) were again established in the most intensive areas (C5 and C10). The pasture did not bring any significant overall decrease either (see Tab. I). A high proportion of the dry matter in the vegetation was heavily affected by the arid character of the analysed biotope and it can be presumed that it will always substantially exceed the dry matter levels in the pasturing cultures as mentioned by ZEMAN et al. (1991, 1995), BUCHGRABER et al. (1998) and MARTIN and SIEBOLD (1997), i.e. the values ranging between 16.0–23.4%. The proportion of the dry matter in the steppe vegetation is going to approach the dry matter levels in the extreme vegetations. For instance BUCHGRABER et al. (1998) state that the proportion of the dry matter in the extensive once-mowed vegetation towards the end of blooming and over-mature extensive vegetation amounts to 33.0 and 44.4 respectively.

The discrepancies between the proportion of the nitrogenous substances in the steppe dry matter before grazing were inconclusive (VESELÝ, 2002a). A similar tendency was also observed during the first year of grazing. In the second year of grazing there was a considerable rise ($P < 0.01$) in the nitrogenous substances within the area C5 as opposed to other areas where the levels remained steady. Comparing the development before and during the pasture, we can see that the significant rise ($P < 0.5$) in nitrogenous substances did not occur until the second year of grazing (1998). This increase could be ascribed principally to the rejuvenation of the steppe vegetation that was accompanied in the second year of grazing by a sharply falling proportion of the over-mature vegetation in the sampled profile. In spite of that the nitrogenous levels even in the most intensive area C5 did not rise but to the levels common for the older (ZEMAN et al., 1995) or very low-quality pastures (ZEMAN et al., 1991). Nevertheless, the established levels approached or even exceeded the values listed by VENCL et al. (1991) in relation to a high-quality or even very high-quality pasture vegetation (7.0–16.0 $g.kg$ dry matter^{-1}). A similar tendency was observed in the development of the PDIN and PDIE levels. The PDI values established in the steppe were growing close to the levels stated by VENCL et al. (1991) in relation to the extensively utilized pasture vegetation.

As far as the proportion of fat in the steppe vegetation is concerned, no effect of the site on the fat levels was established (see Tab. II). A difference was found only in relation to the specific utilization of the steppe vegetation. The amount of fat measured in the steppe vegetation during the pasture was considerably ($P < 0.001$) higher than in the years before (VESELÝ, 2002a), which corresponds with the findings of MARTIN and SIEBOLD (1997). Their analysis of the dry matter in the meadow and pasture vegetation rich in clover and herbs with 2–3 utilizations established the proportion of fat at 3.9–4.8%, whereas the fat levels in the dry matter of the herbs with 1–2 utilizations ranged between 2.1 and 2.2%.

Due to a higher proportion of over-mature vegetation in the individual sampling areas the amount of fibre in the steppe dry matter was high and variable (VESELÝ, 2002a). Similarly high fibre levels were established during the first year of grazing. The grazed areas still contained a higher proportion of dried vegetation from the previous year. Consequently, the proportion of fibre in the dry matter was considerably higher than the values listed by ZEMAN et al. (1991, 1995) with reference to the pasture vegetation (20.0–27.5%). On the other hand, it was fairly close to the values established by VENCL et al. (1991) in the meadow and pasture vegetation towards the end of earing and during the blooming period (29.0–32.5%). The only effect of grazing that could be observed during the first year was the decreased variability of the fibre levels on the individual sites ($P < 0.05$).

A really significant fall in the amount of fibre ($P < 005$) compared to the period before grazing, could not be recorded until the second year, when the change was caused by a substantial reduction of the dried vegetation. The decreasing amount of fibre was particularly conspicuous on the most intensive sites (C5 and C10) that underwent the most intensive pasturing in 1998. The fibre levels on the extensive sites remained higher.

The proportion of ash in the dry matter of the steppe vegetation was affected both by the site conditions and its utilization. A noticeable increase ($P < 0.05$) was recorded on the most intensive sites (C5 and C10) and in the period, when the steppe vegetation was grazed. The pasturing had a noticeable impact on the amount of ash in the vegetation. The differences could be seen both between the ash levels before and during the pasture and between the ash levels measured in 1997 and 1998. The connection between the specific utilization and the proportion of ash in the dry matter corresponds with the findings presented by MARTIN and SIEBOLD (1997) who established 9.0–10.7% of ash in the dry matter of the meadow and pasture vegetation with 2–3 utilizations, whereas only 6.5–7.0% of ash in the dry matter of the vegetation with 1–2 utilizations. A comparison with the pasture vegetation of the Czech Republic (ZEMAN et al., 1995) indicates that the amount of ash in the steppe vegetation during the period before grazing was lower (VESELÝ, 2002a). Due to the increase to 8.74–10.19% over the period of grazing, the proportion of ash in the steppe vegetation became similar to the average ash levels in the Czech

I: *The original levels of the dry matter in the steppe vegetation and the proportion of the nitrogenous substances and PDI in the dry matter of the steppe vegetation*

Sampling area	Year							
	1997			1998			1997–1998	
Original dry matter levels (in %)								
C5	b[1)]	44.33 ± 2.33	a[2)]	a	30.86 ± 2.36	a	38.21 ± 2.64	ac
D8	a	48.07 ± 4.15	a	a	46.08 ± 2.71	b	46.78 ± 2.23	b
C10	ab	38.35 ± 2.86	a	a	33.41 ± 2.59	a	35.45 ± 1.96	a
C12	a	43.32 ± 3.76	a	a	45.37 ± 3.01	b	44.65 ± 2.31	bc
B17	a	41.86 ± 2.18	a	a	44.10 ± 2.83	b	43.32 ± 1.97	bc
Original levels of the nitrogenous substances in the dry matter (in %)								
C5	a	10.66 ± 0.50	a	b	19.35 ± 0.64	b	14.61 ± 1.42	a
D8	ab	10.94 ± 1.47	a	b	12.22 ± 0.77	a	11.77 ± 0.71	b
C10	a	10.48 ± 0.80	a	b	13.64 ± 0.71	a	12.34 ± 0.65	ab
C12	a	10.00 ± 0.31	a	a	11.64 ± 0.56	a	11.06 ± 0.42	b
B17	a	10.70 ± 0.53	a	b	13.64 ± 0.93	a	12.61 ± 0.70	ab
PDIN levels in the dry matter (in g/kg of the dry matter)								
C5	a	68.90 ± 3.24	a	b	124.98 ± 4.12	b	94.39 ± 9.16	a
D8	ab	70.71 ± 9.51	a	b	78.92 ± 4.94	a	76.05 ± 4.56	c
C10	a	67.69 ± 5.19	a	b	88.15 ± 4.59	a	79.72 ± 4.18	ab
C12	a	64.60 ± 2.00	a	a	75.18 ± 3.64	a	71.47 ± 2.69	bc
B17	a	69.14 ± 3.43	a	b	88.10 ± 6.02	a	81.46 ± 4.52	ac
PDIE levels in the dry matter (in g/kg of the dry matter)								
C5	a	81.84 ± 2.61	a	b	129.27 ± 2.67	b	103.40 ± 7.68	a
D8	ab	81.20 ± 6.61	a	b	91.61 ± 3.83	a	87.97 ± 3.48	bc
C10	a	80.25 ± 4.47	a	b	101.99 ± 4.05	a	93.04 ± 3.96	ac
C12	a	79.03 ± 1.87	a	a	89.41 ± 2.78	a	85.78 ± 2.20	bc
B17	a	82.71 ± 2.79	a	b	98.71 ± 4.61	a	93.10 ± 3.56	ac

The average values of the same order marked by different letters are conclusively different P < 0.05
1) comparison of the individual years
2) comparison of the sampling areas

pasture vegetation. The fact that the amount of ash varies markedly with site (P < 0.05) is to be put down to the variability of the steppe soil conditions.

The NFES levels in the step areas remained relatively steady both in terms of the site conditions and utilization. During the first year of pasturing (1997) the amount of NFES in the vegetation remained similarly steady, however, in the second year (1998) there was a major decrease on the site C5 compared to the sites C10 and C12 (P < 0.01). Both in the period before (VESELÝ, 2002a) and during the pasture the proportion of NFES in the dry matter ranged from 45.16–48.70%, which overlaps with the span listed by ZEMAN et al. (1991, 1995), BUCHGRABER et al. (1998) – (41.59–49.20%).

The amount of GE in the steppe dry matter (see Tab. III) remained steady (18.10–18.18 MJ) over both periods and as such agreed with the values presented by ZEMAN et al. (1995). The only exception to this development was the site C10 (17.96 MJ). So it appears that pasturing left the GE levels relatively unaffected (P>0.05).

The amount of ME was affected by the utilization but did not vary with the site conditions. During the period of pasturing there was a clear (P < 0.01) rise in the ME levels (VESELÝ, 2002a) The variability of the ME levels according to the site decreased and finally became quite insubstantial (P > 0.05). The amount of ME measured before pasturing (VESELÝ, 2002a) reached the levels that were according to the database created by ZEMAN et al. (1991; 1995) comparable to the levels established in the older and very low-quality pasture vegetation: 8.46 MJ and 8.32 MJ, respectively. The grazing, during which the vegetation was substantially rejuvenated, caused the amount of ME in the steppe vegetation to reach

II: *The proportion of the organic nutrients and ash in the dry matter of the steppe vegetation*

Sampling area	Year								
	1997			1998			1997–1998		
Fat levels in the dry matter (in %)									
C5	b[1)]	3.42 ± 0.14	a[2)]	c	4.74 ± 0.33	a	4.02 ± 0.26	a	
D8	b	3.50 ± 0.26	a	b	3.96 ± 0.21	a	3.80 ± 0.17	a	
C10	b	3.47 ± 0.23	a	c	4.43 ± 0.30	a	4.04 ± 0.23	a	
C12	a	3.70 ± 0.14	a	a	4.02 ± 0.24	a	3.90 ± 0.16	a	
B17	bd	3.80 ± 0.21	a	cd	4.12 ± 0.18	a	4.01 ± 0.14	a	
Fibre levels in the dry matter (in %)									
C5	b	30.18 ± 0.51	a	a	21.76 ± 0.72	a	26.36 ± 1.39	ac	
D8	ac	31.31 ± 0.33	a	d	27.88 ± 0.40	b	29.08 ± 0.47	bd	
C10	b	30.66 ± 0.70	a	a	24.49 ± 1.11	c	27.03 ± 1.03	ae	
C12	a	29.96 ± 0.59	a	a	27.67 ± 0.29	b	28.47 ± 0.37	bce	
B17	b	29.60 ± 0.53	a	a	26.95 ± 0.54	b	27.88 ± 0.48	acd	
Ash levels in the dry matter (in %)									
C5	a	9.08 ± 0.56	ab	b	10.78 ± 0.41	b	9.85 ± 0.43	ac	
D8	ab	8.82 ± 0.42	a	b	9.35 ± 0.25	a	9.16 ± 0.22	ab	
C10	b	10.10 ± 0.41	bc	b	10.25 ± 0.36	bc	10.19 ± 0.26	c	
C12	a	9.06 ± 0.42	ac	a	9.42 ± 0.22	ac	9.29 ± 0.20	ab	
B17	a	8.79 ± 0.57	a	a	8.72 ± 0.26	ac	8.74 ± 0.25	b	
NFES levels in the dry matter (in %)									
C5	ab	46.65 ± 1.18	a	a	43.37 ± 1.57	a	45.16 ± 1.04	a	
D8	a	45.42 ± 1.71	a	ab	46.60 ± 0.79	ac	46.19 ± 0.77	a	
C10	ac	45.28 ± 0.91	a	bc	47.18 ± 1.14	bc	46.40 ± 0.78	a	
C12	a	47.28 ± 0.97	a	a	47.25 ± 0.78	bc	47.26 ± 0.59	a	
B17	a	47.10 ± 1.29	a	a	46.58 ± 0.88	ac	46.76 ± 0.71	a	

The average values of the same order marked by different letters are conclusively different P < 0.05
1) comparison of the individual years
2) comparison of the sampling areas

the levels which ZEMAN et al. (1995) ascribe to very young or eared vegetation (9.38 MJ and 9.46 MJ, respectively) and which VENCL et al. (1991) found in very high-quality vegetation towards the end of the earing period and high-quality vegetation before earing (9.68 and 9.77 MJ, respectively).

The development of the LNE and FNE levels in relation to the site conditions and utilization was similar to the development of ME. The amount of LNE and FNE was affected by the utilization but did not vary with the site conditions. In the course of the pasture there was a marked increase (P < 0.01) in the LNE and FNE levels and a substantial decrease in the site variability. The stated differences were not conclusive with the exception of a considerably higher proportion of LNE and FNE established in the second year of grazing on the site C5 compared to D8 and C12 (P < 0.05). The proportion of LNE before grazing (VESELÝ, 2002a) did not reach the levels presented by ZEMAN et al. (1995) (5.50–6.12 MJ), but it remained roughly within the range given by VENCL et al. (1991) for a high-quality meadow and pasture vegetation (4.49–5.79 MJ). According to ZEMAN et al. (1995) the amount of LNE remained only at the level of the older vegetation (4.87 MJ). In the course of the pasture the LNE levels in the steppe vegetation corresponded with the values presented by ZEMAN et al. (1995). Nonetheless, they did not reach the energetic values stated by VENCL et al. (1991) with reference to the very high-quality meadow and pasture vegetation before and during the earing period (6.13–6.57 MJ LNE per 1 kg of the dry matter). A similar situation was observed in the development of the FNE levels.

III: *Energy levels in the dry matter of the steppe vegetation*

Sampling area	Year							
	1997			1998			1997–1998	
GE levels in the dry matter (in MJ GE/kg of the dry matter)								
C5	a[1)]	18.06 ± 0.09	ab[2)]	a	18.25 ± 0.08	ab	18.15 ± 0.06	cd
D8	a	18.13 ± 0.10	b	a	18.11 ± 0.05	a	18.12 ± 0.05	cd
C10	a	17.86 ± 0.08	ac	a	18.02 ± 0.05	a	17.95 ± 0.05	ab
C12	a	18.03 ± 0.08	bc	a	18.06 ± 0.03	a	18.05 ± 0.03	ac
B17	ab	18.12 ± 0.09	b	b	18.31 ± 0.04	b	18.24 ± 0.04	d
ME levels in the dry matter (in MJ BE/kg of the dry matter)								
C5	a	9.04 ± 0.18	a	b	10.64 ± 0.07	a	9.77 ± 0.27	a
D8	ac	8.79 ± 0.22	a	d	9.71 ± 0.13	a	9.39 ± 0.15	a
C10	a	8.65 ± 0.29	a	b	9.96 ± 0.20	a	9.42 ± 0.23	a
C12	a	9.03 ± 0.21	a	a	9.70 ± 0.09	a	9.47 ± 0.12	a
B17	ab	9.25 ± 0.19	a	b	10.07 ± 0.14	a	9.79 ± 0.14	a
LNE levels in the dry matter (in MJ LNE/kg of the dry matter)								
C5	a	5.28 ± 0.12	a	b	6.42 ± 0.05	b	5.80 ± 0.19	a
D8	ab	5.10 ± 0.15	a	c	5.75 ± 0.09	ac	5.52 ± 0.10	a
C10	a	5.01 ± 0.20	a	b	5.94 ± 0.14	bc	5.56 ± 0.16	a
C12	a	5.27 ± 0.14	a	a	5.74 ± 0.06	ac	5.58 ± 0.08	a
B17	a	5.42 ± 0.13	a	b	6.00 ± 0.10	ab	5.80 ± 0.10	a
FNE levels in the dry matter (in FNE BE/kg of the dry matter)								
C5	a	5.04 ± 0.15	a	b	6.46 ± 0.07	a	5.69 ± 0.24	a
D8	ac	4.81 ± 0.18	a	d	5.63 ± 0.11	bc	5.34 ± 0.13	a
C10	a	4.73 ± 0.24	a	b	5.88 ± 0.18	ac	5.41 ± 0.20	a
C12	a	5.03 ± 0.17	a	a	5.62 ± 0.8	bc	5.42 ± 0.10	a
B17	a	5.21 ± 0.16	a	b	5.92 ± 0.13	ac	5.67 ± 0.12	a

The average values of the same order marked by different letters are conclusively different P < 0.05
1) comparison of the individual years
2) comparison of sampling areas

SOUHRN

Vliv pastvy ovcí na obsah energie a organických živin ve stepních porostech Národní přírodní rezervace *Mohelenská hadcová step*

Cílem práce bylo posouzení vlivu pastvy ovcí na nutriční hodnotu porostů NPR Mohelenské hadcové stepi. Volná pastva s využitím elektrického ohradníku proběhla v letech 1997–1998. Ovce plemene žírné merino přepásaly plochu 4,25 a 6 ha při pastevním zatížení 6,8–9,4 ovcí na 1 ha v roce 1997 a 6,7–8,7 ovcí na 1 ha v roce 1998. Pro odběry stepních porostů bylo vybráno pět stanovišť tak, aby jejich fytocenologické složení bylo typické pro určitou část stepi. Porosty byly odebírány v průběhu vegetačního období ve čtrnáctidenních intervalech z plochy 3x1 m^2. V odebraných porostech bylo hodnoceno množství sušiny, vlákniny, dusíkatých látek, tuku, popela, bezdusíkatých látek výtažkových (BNLV), BE (brutto energie), ME (metabolizovatelné energie), NEL (netto energie laktace), NEV (netto energie výkrmu), PDIN a PDIE (PDI – skutečně stravitelných dusíkatých látek v tenkém střevě přežvýkavců). V průběhu pastvy došlo ke snížení obsahu sušiny v porostech, ale i tak byl její průměrný obsah vysoký (35,45–46,78 %). Vliv pastvy na obsah dusíkatých látek se projevil (P < 0,05) především v druhém roce pastvy (10,00–10,94 % oproti 11,64–19,35 % v sušině porostů). Ve srovnání s pastevními porosty však byl stále nižší. Obdobná situace byla zjištěna i u PDIN a PDIE (64,60–70,71 oproti 75,18–124,98 g/kg sušiny a 79,03–82,71 oproti 89,41–129,27 g/kg sušiny). U obsahu tuku

(3,80–4,02 %) nebyl zaznamenán vliv stanoviště (P < 0,05), ale způsobu využití. V důsledku pastvy došlo k jeho signifikantnímu zvýšení (P < 0,001). U obsahu vlákniny došlo v prvním roce pastvy jen ke snížení jeho stanovištní variability (29,60–31,31 %). Teprve v druhém roce pastvy došlo k jeho průkaznému (P < 0,05) snížení (21,76–27,88 %). Obsah popele v sušině porostů se v období pastvy pohyboval v rozmezí 8,74–10,19 % a byl ovlivněn stanovištními podmínkami i formou využití. Významně vyšší (P < 0,05) hodnoty byly zaznamenány na intenzivnějších přepásaných plochách. Obsah BNLV ve stepních porostech (45,16–47,26 %) byl ve vztahu ke stanovištním podmínkám i formě využití vyrovnaný. U obsahu energie se neprojevovala stanovištní variabilita. Obsah ME, NEL a NEV (9,39–9,79; 5,52–5,80 a 5,34–5,69 MJ v kg sušiny) byl ovlivněn formou využití. V průběhu pastvy došlo k snížení jeho stanovištní variability a k signifikantnímu zvýšení jeho obsahu v sušině porostů na úroveň udávanou u pastevních porostů.

pastva ovcí, chráněná území, nutriční hodnota

This study was supported by the Research plan No. MSM6215648905 “Biological and technological aspects of sustainability of controlled ecosystems and their adaptability to climate change“, which is financed by the Ministry of Education, Youth and Sports of the Czech Republic.

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