Pasture Cows Nutrition in Submounteens Condition in Sumava Region

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Abstract
Quality of meadow and grazing herbage was evaluated. Dry matter, crude protein, ash, fat and fibers were analyzed. Herbage sampling was realized on three pastures of cattle with higher altitudes. Grass and herbage are the most natural and optimal feedstuff for cattle in fresh and as silage feed. Grazing management should notably regulate the pasture composition, i.e. support dominance of soft stoloniserous strains of grasses and decrease occurrence of weed and less value strain of gramineous grasses. The impact of grazing on milk performance and health of dairy cows was surveyed on sub-mountain farms. The higher milk, fat and protein yields were found in grazing season in comparison with winter confinement period.

Keywords: grazing herbage, herbs, meadow, milk quality, pasture

1. Introduction

Grazing by cattle is a traditional grassland management practiced in the sub-mountain area of the Czech Republic. The choice of the most convenient breed of cattle and pasture management is a prerequisite of sustainable multifunctional farming. In Central Europe the seminat ural grasslands form up to one third of agricultural land [1]. The seasonal pasture (May–October) or harvest for hey and grass silage are the predominant grassland utilizations there. Minimal sward restoration activities as regards resewing or artificial fertilization use to be applied in pastures in the Czech Republic. Such farming can be viewed as environment-friendly supporting the sward patchiness and habitat, flora and fauna diversity.

The vegetation of the pastures consisted mostly of *Lolio-Cynosurenion* suballiance. The potential natural vegetation was identified as *Luzulo albida–Quercetum petraeae* and *Abieti-Quercetum*. These species are typical of sub-mountain regions of the Czech Republic and are suited to the grazing management of pastures dominated by *Lolio-Cynosurenion* [2]. There was an average of 17 plant species recorded in the scans. Diversity of plant species in the different over sea level many authors are observed [2, 3]. However, more than a 50% reduction of cattle numbers in the Czech Republic during last two decades has made the management of permanent grasslands difficult. Although there has been an increased interest in beef breeds, the dairy breeds of Holstein and Czech Pied with good beef and dairy performance have been largely used for grazing in the Czech Republic. In 2006, the total population of dairy cows of 424 000 comprised mostly of Holstein and Czech Pied breeds in nearly equal proportions, while the total population of beef cattle included 140 000 cows [4]. The choice of the most convenient breed of cattle and pasture management is a prerequisite of

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ecologically and economically sustainable multifunctional farming.

The extensive utilization of grasslands is further underlined by decline of cattle numbers in last two decades to recent 58 cows per 100 hectares of permanent grasslands [4].

The aim of this study was to survey impact of grazing on milk performance and health of cows on three dairy farms differed by their frequency of access to pasture during vegetation season (farm 1-all day long, farm 2-half a day, farm 3-none).

2. Materials and methods

Surveys of sward vegetation were carried out in 2010 on a farm located in f the Šumava Mountains at an altitude of 550-650 m above sea level. The seasonal rotational grazing of Holstein and Czech Pied cattle has been practiced for 30 years, primarily for milk production. The average rain fall through grazing season (May to November) was 424 mm, average temperature in this season was 8,7 1°C. The grazing season was 181 day, grazing area has 171 ha (part of this area was for cut for silage utilized). The grazing season in 2006 started on the 12th May and lasted until the end of October (les of November as part day was used). The herd consisted of 50 Holstein (yield of milk kg/cow/year was 6468) and 62 Czech Pied (yield of milk kg/cow/year was 5613) cows which grazed in 4 cycles on a total area of 132 ha and were milked twice per day. The comparison with the average years milk production in Czech republic was by H 82% and by C 94%. The biggest distance of fence is 2 km. A proportion of the farm was harvested for grass silage in late May and grazing on the pastures prepared for silage was delayed until late June. During the grazing season pasture herbage accounted for 60-80% of the feed ration. Cows were offered an additional grain concentrate with mineral supplements during milking. The vegetation of the pastures was examined using standard phytocenological methods based on scanning. Two transects with five fixed stands each at 30 m intervals were used for long term monitoring of two pastures that were managed either by grazing from early May to late October ("grazed") Scans of 16 m^2 areas were sampled at each stand. The plant species composition and the total vegetation cover in the two pastures were surveyed. Herbage from a 10 m^2 area was collected from the grazed in July 2006 and September 2006 and analyzed for fibers content. The content of acid detergent fibre (ADF) and neutral detergent fibre (NDF) in the dry matter was determined using an *in vitro* method (Van Soest and Wine, 1967). Other feed analyze method by the Feed law 2001was used. The evaluate trends in milk production in the grazing and housing seasons was measured after [2].

The significance of the best suited model was evaluated by analysis of variance. The significance of the "season" variable coefficient c was evaluated by the Wald's test and served as an estimate of the difference in seasonal milk productivity. For the milk fat, milk protein and milk somatic cell content analysis, 7,933 records of milk performance controls from 2000 to 2006 were used. Data from May and October, when the feed ration is changing, were not used. The t-test (Statistica 6.0) was applied to evaluate the differences between seasons. The data on the character of veterinary treatments were gathered on farms from 2005 to 2007. The number of veterinary treatments were summarized according to the farm and the season of year (winter season: November–April; summer season: May–October). The frequency of treatments per 100 cows and the mean values of two summer and two winter seasons (two years of observations) were calculated. The categories of health problems connected with udder, metabolisms, reproduction or legs were distinguished and the analysis of variance with two factors (farm, season) was used in each category separately.

3. Results and discussion

Modeling the regression relationships which included days in milk as explanatory variable revealed the individual milk yields on average by 1.58 kg and 1.02 kg per day higher in grazing season compared with housing season on farm 1 and 2, respectively (Table 2). This was accompanied by enhancement of fat (farm 1, 2) and protein yields (farm 1) during grazing season (Table 3). Similar positive effect of pasture on milk performance parameters was observed in Holstein cows also by other authors [5, 6].

Table 1. Characterization of the farms in 2005, the breeds in herd, average milk production per standard lactation and the length of daily access to pasture during in summer season

Farm	Cows in herd	Breed	Milk per lactation (kg)	Comparison with national average of the breed	Daily access to pasture in summer season
1	116	C	5613 (C)	94% (C)	day+night
		H	6463 (H)	82% (H)	
2	144	C	4724 (C)	79% (C)	day
3	351	H	7350 (H)	91% (H)	none

C–Czech Pied; H–Holstein

The number was somatic cell counts (SCC), the indicator of udder infection problems and general health status of cows, did not differ between seasons on farm 1 but it increased in grazing season on farm 2. Longer distance of pastures from stalls on farm 2 could act as a stress factor for cows and enhance the SCC [7]. The results from farm 1 show that the access to pasture does not necessarily increase SCC, which is in agreement with findings of [8].

Table 2. Parameters of the regression model characterized by relation y=a+bx+cz

Regression coefficients	a	b	c
Farm 1	27.61 ***	-0.049 ***	1.58 ***
Farm 2	24.50 ***	-0.054 ***	1.02 *

y–milk yield (kg cow^{-1} day^{-1}), x–days in milk, z–season variable with two levels (0–winter, 1-summer)
Statistical significance of regression coefficients a, b, c: P<0.05*, P<0.001***

Table 3. The mean values of individual daily milk fat, protein yields and somatic cell counts recorded in milk performance control in winter (W) or summer (S) season in 2000–2006

Farm, breed	Season	Milk yield (g day^{-1})*	Protein yield (g day^{-1})*	n*
1 C	W	744	580	1676
	S	830 a	682 a	1122
1 H	W	853	635	1326
	S	907 a	728 a	849
2 C	W	665	546	3785
	S	680 a	541	2582

C: Czech Pied, H: Holstein, SCC: somatic cell count, a: significant difference (P<0.05)
n: number of records

The TMR contains mainly high-energy ingredients while the structural fiber is on its minimum limit for cow rumen well functioning. This was probably the main reason of the higher disease incidence on farm 3. In the tables 4, 5, 6 the results of feed rations the results of one farm are present. The feed ratio in winter and summer seasons in table 4 is present. In table 5 the chosen nutrients and milk components are shoved. In the table 6 the average of daily milk yield, content of some milk components in each moth are shoved.

Table 4. Feed rations for cows 20010

Feedstuff	Winter period	Summer period
hay	ad libitum	ad libitum
Raps pressing	1 kg/head	-
Concentrate	5 kg/head	3.5 kg/head
Mineral mixture	100 g/head	100 g/head
Pasture	-	ad libitum
Grass clover silage	ad libitum	-

Table 5. Average pasture nutrients in pasture milk daily yield protein and fat

	pasture				milk		
month	NL (%)	CF (%)	ADF (%)	NDF (%)	(kg/head/day)	Fat (%)	Protein (%)
V.	18.39	18.72	26.82	42.90	22.10	3.78	3.34
VI.	11.12	25.69	32.52	56.54	23.40	3.73	3.25
VII.	14.91	28.54	29.08	47.97	23.00	3.75	3.21
VIII.	17.64	24.43	30.12	53.51	21.60	3.81	3.25
IX.	13.97	20.51	31.48	51.10	22.10	3.82	3.32

Table 6. Average milk daily yield, content of feat, protein, lactose in milk

month	kg/head/day	Fat (%)	Protein (%)	Lactose (%)
1	21.50	4.03	3.18	4.90
2	19.40	4.22	3.25	4.88
3	20.80	3.97	3.19	4.80
4	20.80	3.92	3.12	4.92
5	22.10	3.78	3.34	4.74
6	23.40	3.73	3.25	4.82
7	23.00	3.75	3.21	4.81
8	21.60	3.81	3.25	4.75
9	22.10	3.82	3.32	4.69
10	17.20	4.42	3.24	4.78
11	21.20	4.08	3.14	4.76
12	21.00	4.13	3.19	4.85

Table 7. Amino acids content after acid hydrolyze in cow milk, and casein ($mg.kg^{-1}$ in 100% dry matter)

	Milk				Casein			
Amino acids	1	2	3	4	1	2	3	4
Asp	25.4	75.21	74.52	76	75.21	74.52	76	68.82
Thr	12.83	31.38	30.85	29.63	31.38	30.85	29.63	27.19
Ser	21.4	60.76	59.7	58.67	60.76	59.7	58.67	57.26
Glu	33.18	100.31	99.45	97.31	100.31	99.45	97.31	96.25
Pro	18.2	56.2	57.19	57.2	56.2	57.19	57.2	57.43
Gly	9.26	27.42	25.81	26.32	27.42	25.81	26.32	25.94
Ala	11.32	31.65	29.99	33.89	31.65	29.99	33.89	30.25
Val	22.7	66.71	64.82	67.18	66.71	64.82	67.18	66.93
Met	9.25	26.74	28.4	27.36	26.74	28.4	27.36	27.4
Ile	18.25	50.82	51.63	52.6	50.82	51.63	52.6	51.72
Leu	29.5	98.42	96.52	97.99	98.42	96.52	97.99	96.43
Tyr	12.63	53.3	54	56.02	53.3	54	56.02	55.17
Phe	17.3	49.9	50.63	49.88	49.9	50.63	49.88	50.05
His	8.16	27.41	28.06	29.05	27.41	28.06	29.05	28.89
Lys	28.93	72.87	71.95	74.82	72.87	71.95	74.82	72.06
Arg	12.7	29.92	30.71	31.06	29.92	30.71	31.06	32.7

Sample No. 1: red spotted cattle
Sample No. 2: odds of red spotted cattle
Sample No. 3: black spotted cattle
Sample No. 4: odds of black spotted cattle

The average amino acid content in whole milk and some product as casein depend these results on breeds of cows. It is necessary to continued of observations of nutrients influence from pasture on milk protein and amino acids content.
The results of grazing influence on milk and beef cattle with the results of many authors as for example [9-11] corresponded. For the better understanding of grazing management, evaluation of pasture nutrients, yield, quality of animal products is necessary the many experiments and the new method of analyses validate. The results from 2006 year from 2 farms are depending on farm management. This results with the paper from [12, 10] and others corresponded
Although the metabolic diseases connected with function of the rumen (indigestion, ketosis, metabolic acidosis, hypocalcaemia) were not so remarkably higher in comparison with pasturage farms (contrary the other disease categories), their chronic incidence influences strongly the functioning of the organism, namely the immunity (udder infections), contractility of uterus and motor functions of vegetative muscle organs. In this aspect, the natural source of food in form of herbage has a positive effect on metabolic functioning of the cows [12-14].

4. Conclusions

We suggest that evaluation of pasture nutrients, yield can give valuable information that can improve the grazing management. Grazing influenced not statistically significant a low nutrient content in grass with herbs gave a lower cut production, especially in terms of cutting, grazing management and lower part of fertilization N. The content of average richness species of grasses, trefoils and other plants are present. In the lower altitude on farm R increasing of trefoils especial white clover is increased. This shoved high utilization of pasture and good management. Higher stands of pasture depend on altitude had tendency to lower dry matter content. The grazing positively influenced the milk production and milk fat and protein yields by Czech Pied and Holstein cattle. The aim of this study was to evaluate the milk composition of Czech Pied and Holstein cows during 6-months grazing period in comparison to winter silage-based breeding on three sub-mountain farms. The individual 24-hours milk yields and concentrations of fat, protein and somatic cell counts (SCC) were measured monthly in a total of 671 Czech Pied and 114 Holstein cows during 6-years period. Cows belonged to two Czech Pied herds, offered 7-hours (Farm 1, F1) or 20-hours (Farm 2, F2) daily grazing allowance, and to a mixed Czech Pied and Holstein herd (Farm 3, F3) offered 20-hours pasture access. The data of each herd were evaluated separately allowing to the season (grazing, housing) and the breed

Acknowledgements

This experiment is based on the project NAZV QH92252 and GAJU 2013.

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