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INFLUENCE OF ANTHROPOGENIC FACTORS ON THE PRODUCTION MILK POTENTIAL OF GRASS STANDS

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Summary

The production and quality of dry matter of hay (association *Lolio-Cynosuretum typicum*) were observed in 1992-1996. The observation was carried out on the seminatural grass stand and on the grass stand with additional sowing of grass and clover enriched by artificial fertilizer. The capacity of dry matter consumption of milk cows was used for evaluation of quality of production milk potential. The production milk potential of feeding ration was calculated on the basis of energy and nitrogenous substances.Higher values of production milk potential PDI on the perennial grass stands (figure1) with the maximum 21.27 l.head.day^{-1} resulted from the comparison of observed grass stands. The evaluated index of the renewed grass stands was lower than the values obtained on the perennial grass stands (in the first usage by 1.40 l, in the second one by 1.94 l and in the third one by 1.16 l.head.day^{-1}).When evaluating the production milk potential NEL (figure 1), we found out that the perennial grass stands produced 11.64-12.28 l of milk per head/ day and the renewed grass stands produced 10.82-13.87 l of milk per head.day^{-1}. The production milk potential was limited by energy value of dry matter of hay. If we want to change the surplus of nitrogenous substances in a feeding ration into the real production of milk, we have to subsidize a daily feeding ration of milk cows using the suitable amount of energy.

Key words: natural grassland, floristic composition, production milk potential

Introduction

Coarse fodder from grass stands is the main source of nutrition of milk cows in marginal areas of Slovakia. The suitable production of dry matter is also required together with dry matter's high quality (Holúbek 2000).
The notion of quality is represented by a number of characteristics which influence the ability of fodder plants to satisfy specific requirements of animals and determine the suitability of fodder plants for feeding .The quality plays an important role in determination of production milk potential of grass stands measured in units of animal production (milk, meat and wool). The wide range of interactions between grass stands and animals has a great influence on quality. The quality of forage crop and fodder plant should be observed together (Míka 1992).

Material and methods

The experimental observation was carried out on the seminatural grass stands of the agricultural enterprise Nitrianske Pravno (Strážovské vrchy, geographical unit Malá Magura- Chvojnica locality) in the years 1992-1996.
Our experiment was based on the block method (two blocks were used in the experiment). The first block consisted of the original perennial grass stand which was identified, on the basis of its botanical structure, as the association *Lolio-Cynosuretum cristati* R.Tx. 1937.The second block comprised of the renewed grass stand which was radically renewed by ploughing in autumn 1991. In spring 1992, the ploughing was followed by the sowing of clover – grass mixture : *Lolium multiflorum* hybrid „Felina" 12 kg.ha^{-1}, *Lolium perenne* variety „Metropol" 8 kg.ha^{-1}, *Dactylis glomerata* variety „Nela" 4 kg.ha^{-1}, *Trifolium pratense* variety „Sigord" 3 kg.ha^{-1}, *Trifolium repens* variety „Huia" 2 kg.ha^{-1}.The same variants of mineral nutrition and methods of nitrogen division of individual cuttings were used for both blocks. At the same time, the identical forms of artificial fertilizer were also used .
The grass stands were used in their late pasture ripeness. The yield of the grass stand of individual parcels (1.2x10 m) was determined at harvest. The sample with its weight 0.5kg was used to determine the dry matter. Then the calculation of dry matter production in t.ha^{-1} followed.
The Research Institute of Agriculture in Nyon participated in determination of agronomical value of dry matter of hay.
The capacity of dry matter consumption of milk cows was calculated to help us evaluate the quality of grass stands (Petrikovič 1994) Then the production milk potential was calculated on the basis of energy and nitrogenous substances (Sommer et al. 1994). The milk cow with the live weight of 600 kg and with the milk production of 10kg FCM milk per head/day was used for the calculation of dry matter consumption from the grass stand.
The production milk potential of the grass stand on the basis of NEL and PDI was calculated according to the following relationship:

$$PMP_{NEL} = \frac{\text{MJ NEL on milk production}}{\text{MJ NEL on 1 kg FCM}} \text{ (kg.head.day}^{-1}\text{)}$$

$$PMP_{PDI} = \frac{\text{PDI on milk production}}{\text{PDI on l kg FCM}} \text{(kg.head.day}^{-1}\text{)}$$

Results and discusion

The evaluation of production milk potential calculated from the energy value of fodder plants

The concentration of energy (energy content in a unit of dry matter of fodder plant) is the most important feature of quality of fodder plant and it is also closely linked with the consumption of fodder plants by animals as well as with the fodder plant's production effect. The average values indicate that the values of production milk potential NEL on the perennial grass stand were very similar in the first utilization, in the second one and also in the third one . The values of the renewed grass stand rose from the first utilization (10.82 l.head.day^{-1}) to the third utilization (13.87 l.head.day^{-1}). It is interesting that the highest value of production milk potential NEL (perennial grass stand 12.39 l.head.day^{-1}; renewed grass stand 12.49 l.head.day^{-1})was determined on the non-fertilized areas of both grass stands in the period of five years. According to the above mentioned facts, we were able to determine the following results : the non-fertilized grass stands accumulated more energy and the production milk potential NEL of non-fertilized areas was higher than the production milk potential NEL of fertilized grass stands.
The application of nitrogenous fertilizer did not influence the values of production milk potential NEL substantially. We were able to observe the opposite tendency represented by higher values of production milk potential NEL on non-fertilized grass stands. The nitrogenous fertilization lowered the content of netto energy in dry matter.

Table 1 The production milk potential of daily feeding ration consisting of grass stand and calculating on the basis of production milk potential PDI and NEL (l of milk .head.day^{-1})

Years 1992-1996	Variants	Perennial grass stand				Renewed grass stand			
		Utilization				Utilization			
		I.	II.	III.	x	I.	II.	III.	X
production milk potential NEL	1	12.42	12.29	12.46	12.39	11.70	11.86	13.93	12.49
	2	12.11	11.29	11.64	11.68	11.00	11.32	13.76	12.03
	3	12.13	11.07	12.07	11.76	11.27	12.09	13.89	12.42
	4	11.80	11.93	12.97	12.23	9.32	11.60	13.91	11.61
	x	12.12	11.64	12.28	12.02	10.82	11.72	13.87	12.14
production milk potential PDI	1	20.16	18.18	21.30	19.88	20.18	16.85	20.79	19.27
	2	20.20	16.99	21.96	19.72	20.04	16.89	21.43	19.45
	3	20.20	18.51	20.74	19.82	18.70	15.89	19.28	17.96
	4	23.25	22.75	21.08	22.36	19.32	19.03	18.94	19.10
	x	20.96	19.11	21.27	20.44	19.56	17.17	20.11	18.95

variant 1 – non-fertilized locality; variant 2 – 30 P + 60 kg K.ha^{-1}; variant 3 – PK + 90 N.ha^{-1}; variant 4 – PK + 180 N kg.ha^{-1}

The evaluation of the production milk potential calculated on the basis of real digestion of nitrogenous substances (the production milk potential PDI)
According to Ščehovič (1994), nitrogenous substances belong to a group of main qualitative features of fodder plants from grass stands. In the new systems of evaluation of nitrogenous substances, the digestion and metabolism of nitrogen can be interpreted together with the identification and quantification of losses of nitrogen which are caused by the inappropriate consumption of nitrogen (Sommer, Čerešňáková 1995). We used the acquired knowledge for calculation of production milk potential PDI. It can be derived from figure 1 that the perennial grass stands in average values had higher values of production milk potential PDI (20.44 l per head.day^{-1}) than the renewed grass stands (18.95 l per head.day^{-1}) . The difference between the grass stands was 1.49 l.
The value of production milk potential PDI ,on perennial grass stand in the first utilization, in the second one and also in the third one, was higher than the production milk potential PDI on renewed grass stand (figure 1). The nitrogenous fertilization on perennial grass stand caused the higher value of production milk potential PDI (the nitrogen dose 180 kg.ha^{-1} proved to be significant). There were no significant differences of values of production milk potential PDI among the variants of fertilized by nitrogen, variants fertilized by PK fertilizer and non-fertilized areas.
The influence of the highest dose of nitrogen on production milk potential PDI on the renewed grass stand was not unequivocal. This phenomenon can be explained by the influence of mineralization of organic matter after the radical

renewal of grass stand by ploughing. The ploughing caused the reduction of the effects of nitrogenous fertilization of individual variants because of the released nitrogen. The effect of mineralization was evident especially in drier years (1993 and 1995) when the renewed grass stand developed mainly into the first and third utilization when values of temperature prevailed over the values of precipitation (Slamka 1998).

The statistical evaluation of results of production milk potential PDI confirmed statistically important differences in the years of utilization of the given grass stands. Fertilization did not have a statistically significant impact on the production milk potential PDI.

If we compare production milk potentials calculated according to the concentration of netto energy of lactation and according to the content of digestible nitrogenous substances in the dry matter of grass stands, we can find out that the values of production milk potential PDI are higher than the values of production milk potential NEL on the both grass stands.

The value of average production milk potential NEL on the perennial grass stand is 12.02 l per head.day^{-1} and the value of the production milk potential NEL on the renewed grass stand is 12.13 l per head.day^{-1}. The average value of production milk potential PDI is higher than the production milk potential NEL (19.11-21.27 l per head.day^{-1} on the perennial grass stand and 17.17-20.11 l per head.day^{-1} on the renewed grass stand).

In conclusion, we can say that it is possible to achieve the milk production which corresponds to the values of production milk potential NEL on the given grass stands because the energy value of dry matter of grass stands is considered to be a limiting factor of milk production. It can be explained by the fact that there is a surplus of nitrogenous substances in the dry matter of fodder plant from grass stands. The milk production can be influenced negatively because the surplus of nitrogenous substances must be excreted from the organism of animal and this process is connected with the losses of energy.

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