

The influence of fertiliser application to strip-sown grasslands on herbage production and quality

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Keywords: grassland, fertiliser, strip-seeding

Introduction To increase the productivity of dairy cattle in the Czech Republic requires an improvement in herbage quality and an increase in the net energy of herbage. The decrease in cattle numbers by 50 % and the expansion of the grassland area both result in a surplus of feedstuffs of low quality. Introduction of strip-seeding of legumes and grasses into grasslands in interaction with fertilisation provides a possible solution to this problem.

Materials and methods Strip-seeding experiments (Kohoutek *et al.*, 2003) were established at a site at Jevicko, Czech Republic in a region that has a mild-warm, mild-humid climate (altitude 330 m, an average annual temperature of 7.5 °C and an annual rainfall of 629 mm). The soil type is a fluvisol. This study evaluates strip-sown grassland (PTP) compared to permanent grassland (TTP). Strip-seeding in 1991 (seeding machine SE 2-024), 1996, 2000 and 2003 (seeding machine for strip-seeding - prototype) was carried out with the same mixture and seed quantity (29 kg/ha). The mixture was of the following composition: *Festulolium* hybrid (*Lolium multiflorum* Lam. x *Festuca arundinacea* Schreb.), cv. Felina (12 kg/ha), Perennial ryegrass (*L. perenne* L.), cv. Sport (8 kg/ha), Cocksfoot (*Dactylis glomerata* L.), cv. Niva (4 kg/ha), Red clover (*Trifolium pratense* L.), cv. Kvarta (3 kg/ha) and White clover (*T. repens* L.), cv. Huia (2 kg/ha). The strip-sown alternative (PTP) treatments were as follows: (1) zero fertilization; (2) phosphorus (P) and potassium (K) at a rate of 30 kg/ha P as superphosphate and 60 kg/ha K as a potash salt, (3) as treatment (2) plus 90 kg N/ha and (4) as treatment (2) plus 180 kg N/ha. This paper describes dry matter (DM) production and corrected DM production of strip-sown legumes (corrected DM production = DM production x % projective dominance of botanic group / 100) from 1992 to 2004. Concentrations of crude protein and net energy (NEL) were estimated from 1997 to 2004.

Results Strip-seeding into grassland without fertiliser application and with P and K fertiliser (Table 1) had a significantly lower production of DM and had a higher proportion of strip-sown legumes than the alternative treatments that received N fertiliser, where nitrogen supported greater grass DM production and increased grass competitiveness over legumes. The concentration of crude protein and NEL in herbage was higher in the alternatives without N fertiliser application which make them suitable for dairy cow feeding.

Table 1 Dry matter (DM) production and corrected DM production of strip-sown legumes, and concentrations of crude protein and NEL in forage

Fertiliser treatments	DM production (t/ha)	Corrected DM production of strip- sown legumes (t/ha)	Concentration of crude protein (g/kg DM)	NEL concentration (MJ/kg DM)
N ₀ P ₀ K ₀	7.48	1.08	122.4	5.67
N ₀ P ₃₀ K ₆₀	7.48	1.47	125.4	5.61
N ₉₀ P ₃₀ K ₆₀	9.33	0.73	112.3	5.50
N ₁₈₀ P ₃₀ K ₆₀	10.8	0.52	118.7	5.51
LSD _{0.05}	1.35	-	-	-
LSD _{0.01}	1.60	-	-	-

Notes: LSD_{0.05} = least significant difference at $P < 0.05$; LSD_{0.01} = least significant difference at $P < 0.01$

Conclusion Strip seeding of legume-grass mixtures into grasslands without fertiliser application and with P and K fertiliser increased forage quality more than N-fertiliser application, which supported an increase in yield but decreased the proportion of strip-sown legumes in the herbage.

Acknowledgements The paper results from the support of research project MZe, NAZV, No. QF 3018.

Reference

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