STØTTET AF

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Effects of regrowth periods in different grass clover mixtures

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Abstract

To evaluate the effect of different cutting schedules in different grass mixtures, 2 trials were established in 2017 in Denmark with 11 different grass mixtures with different proportions of the grass species; i) perennial ryegrass, ii) hybrid ryegrass, iii) Festulolium and iv) tall fescue and the clovers and legumes; v) white clover and vi) red clover. In 2018-2020 the plots were harvested 4 times with a weekly interval from 1st to 4th cut with a Haldrup harvester. The yield results show that all mixtures had similar daily growth rates for 1st and 2nd cut, while the daily growth rate of mixtures including red clover or tall fescue was higher, compared to mixtures with white clover or perennial ryegrass in 3rd or 4th cut. The decline of digestibility of organic matter was rather similar across mixtures for 1st cut,

The decline of digestibility of organic matter was rather similar across mixtures for 1st cut, while the decline was much lower in 3rd cut in mixtures containing only white clover compared to mixtures including red clover.

The content of crude protein increased by order of cut and the content and decline within the growing period of each cut was related to yield level and the daily growth rate, indicating a dilution of protein depending on yield level. The initial content was higher in mixtures including red clover

Our results indicate that the temperature during the growing period of each cut has a major impact on the daily decrease of organic matter digestibility, meaning the cutting interval needs to be shorter in warm periods and for mixtures containing red clover or tall fescue to achieve a digestibility of organic matter at appr. 80 percent.

Keywords: mixtures, regrowth period, digestibility

Introduction

Grass silage is a major source of protein and fibre in the diet for dairy cattle in Denmark. However, the digestibility of organic matter and fibre is limiting the amount of grass silage in the diet for high yielding dairy cattle. Previous studies by Johansen *et al.* (2017) and Egan *et al.* (2018) demonstrated a positive correlation between digestibility of organic matter in grass silage, the legume proportion, and the ECM (energy corrected milk) yield of lactating cows. The milk yield peaked when organic matter digestibility (DOM) reached 82 percent, but the marginal effect from 80 to 82 percent was rather small. Typically, we find a negative correlation between grass yield and digestibility of organic matter, so achieving the best combination of a high yield and digestibility requires the correct timing of cutting during the season.

Materials and methods

Two trials were established in 2017 in Denmark with 11 different grass mixtures with different proportions of the grass and legume species based on weight proportion in seed mixtures as shown in table 1. The seed rate of mixtures was adjusted according to seed weight to obtain same plant density. The soil type of the trial sites was predominantly sandy soils with 6 and 12 % clay and the trials were not irrigated. All mixtures were yearly fertilised with 270 kg N, 32 kg P, 268 kg K and 68 kg S ha⁻¹ applied descending from 1st to 4th cut.

Five plots per replicate with each mixture were subdivided into 3 subplots, so each plot was only used for one cut to avoid carry-over effects of previous cuts. In 2018-2020 the plots were harvested 4 times with a weekly interval from 1st to 4th cut with a Haldrup harvester. A

Promilleafgiftsfonden for landbrug



subsample of each plot was mixed from the 4 replicates and was dried at 60 degrees for 36 hours and subsequently milled at a Cyclotec mill with 1 mm sieve. Forage quality was determined by content of crude protein, sugars, neutral detergent fibres (NDF), digestibility of organic matter and the legume proportion using dry NIRS.

Results and discussion

The daily growth rate for 1st and 2nd cut was quite linear and similar for alle mixtures with an average daily growth rate of 150 kg dry matter ha⁻¹. The mixtures containing a high proportion of Festulolium had the highest yield, but also the lowest content of crude protein – probably due to a dilution effect of crude protein. DOM was highest for the mixture containing only perennial ryegrass and white clover and lowest for the mixtures with a high proportion of tall fescue. The decrease in DOM was highly correlated to the decrease in digestibility of NDF and content of sugar and protein. For 3rd and 4th cut, the mixtures containing only white clover as legume maintained a higher DOM than mixtures including red clover but also a lower yield and daily growth rate. Regardless of mixture composition, the decrease in DOM for each cut was to some extend correlated to the temperature during the growing period of each cut.

Conclusion

Our results indicate that the temperature during the growing period of each cut has a major impact on the daily decrease of organic matter digestibility, meaning the cutting interval needs to be shorter in warm periods and for mixtures containing red clover or tall fescue to achieve a digestibility of organic matter at appr. 80 percent.

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Mixture	Perennial	Hybrid	Festulolium	Tall Fescue	Meadow	White	Red
no.	ryegrass	ryegrass		(Festuca	fescue	clover	clover
	(lolium	(lolium		arundinacea)	(Festuca	(Trifolium	(Trifolium
	perenne)	hybridum)			pratensis)	repens)	pratense)
1	87					13	
2	52			30		9	9
3	57			30		13	
4	60	23				9	8
5	47	40				13	
6	42		25		15	9	9
7	37		45			7	11
8	37		50			13	
9	32		33			5	30
10	15			70		6	9
11	15			75		10	

Table 1. Seed composition (%) of 11 mixtures based on weight basis

Promilleafgiftsfonden for landbrug





Figure 1. Yield of metabolisable energy pr ha, digestibility of organic matter and content of crude protein for 6 selected mixtures for 1^{st} (a), 2^{nd} (b), 3^{rd} (c) and 4^{th} (d) cut. Values are means of 2019-2020