THE EFFECT OF HARVEST DATE OF ALEXANDRIAN CLOVER GROWN AS A CATCH CROP ON THE QUALITATIVE PARAMETERS OF SILAGE

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ABSTRACT

The aim of the work was to assess the quality parameters of silage produced from alexandrian clover (*Trifolium alexandrinum* L.), grown as a catch crop, with respect to the growth phase of the stand. The silages were experimentally created using the VacSy system. Chemical analyses were performed on the silages and the digestibility of nutrients was determined using the in situ method. The content of nitrogenous substances gradually decreased from 210 to 160 g/kg dry matter with the aging of the stand. A tendency towards a slight increase in the NDF content was found in the deflowered stand. From the point of view of nutrient digestibility, there was also a decrease in both the dry matter digestibility and the NDF digestibility in the deflowered stand.

Keywords: clover, silage, yield, chemical composition, digestibility

INTRODUCTION

Alexandrian clover is (*Trifolium alexandrinum* L.) a valuable, high-yielding annual forage legume and well adapted to a wide range of environments for grazing and forage production (Singh *et al*., 1989; Yucel *et al*., 2018). Martiniello *et al.* (1996) found that it is a suitable companion crop for barley, annual ryegrass, triticale and oats. Alexandrian clover is an appropriate species for rhoughage production which yields 12–14 t/ha dry matter (Yucel *et al*., 2016). As a legume, Alexandrian clover can fix more than 200kg N/ha/year (Giambalvo *et al*., 2011). Additionally, unlike other legume species, Alexandrian clover does not cause bloat in ruminants (Simms *et al*., 1991) and therefore can be fed alone. However, the effect of including fresh Alexandrian clover, either singly or as part of a mixed forage sward, in the diet of dairy cows on metabolic processes, MY, and milk quality is poorly documented (Enriquez-Hidalgo *et al*., 2020). Enteric methane emissions of ruminants are reported to increase with increasing proportion of forage in the diet (Archimède et a., 2018). Also roughage and silage quality of alexandrian clover grown as catch crop in Czech republic conditions is not enough check.

The objective of this study was to evaluate the effect of growth phase of Alexandrian clover grown as catch crop, on chemical composition and digestibility of silages.

MATERIAL AND METHODS

Alexandrian clover was grown as a catch crop, after harvest of pea for silage production. Forage of clover was harvested at three growth phases (full flowering, end of flowering, faded), wilted for 24 hours, cut for 20 mm and ensiled. Forage was harvested from three places of growth where dry matter (DM) yield was detected. Experimental silages were made using VacSy system to vacuumed bags (3 bags per harvest place, three places per harvest; amount 600 g per bag). Silages were stored for 8 weeks and then opened and dried at 55 °C for 48 hours. Dried silages were ground through 2 mm sieve (samples for in situ method) and 1 mm sieve (samples for chemical composition). Silages were analysed for ash, crude protein (CP), ether extract (EE), crude fibre (CF), neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL). Ruminal digestibility of DM, OM and NDF was detected by in situ method using Holstein cows and incubation for 24 hours in bags with pore size 51 µm. Results were evaluated with GLM procedure of SAS where growth phase was used as fixed effect and repetition as random effect. Significance of differences were tested by Tukey´s post hoc test.

RESULTS AND DISCUSSION

Table 1 shows the dry matter yields of Alexandrian clover forage in individual stages of maturity, where up to a 3.5-fold increase is evident in the deflowered stand compared to the full flowering stand. In the youngest stand, the stand also failed to wilt to a sufficient level suitable for ensiling. The silage was at its optimum at the second harvest. The content of CP gradually decreased from 210 to 160 g/kg DM as the stand aged, however, compared to commonly grown clovers in the Czech Republic, this range is still relatively narrow. According to the available literature (Broderick *et al*., 2001; Vanhatalo *et al*., 2009) and our experience, for example, in the case of red clover, the range of CP content in silages ranges from 120 to 220 g/kg DM and in alfalfa silages from 110 to 250 g/kg DM. The relatively balanced contents of fiber and its fractions are interesting, where no differences were found among harvests for fiber and lignin, a tendency for a slight increase in the NDF content was found in the third harvest and there was a difference in the ADF content between the first and second harvest. The CF content of our silages corresponds to the data presented by Jabbar *et al.* (2022). There was no difference in the digestibility of dry matter, OH or NDF between the first and second harvest. There was a decrease of approximately five percent in the third harvest. Similar effect of later harvest on DOM was detected also by Vanhatalo *et al.* (2009) for red clover silages.

CONCLUSION

From our findings, we can recommend harvesting rather in the end of flowering growth of the alexandrian clover when grown as a catch crop, especially due to the low yield in very young growth and, conversely, the reduced quality in the growth that has completely faded.

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Tab. 1: Effect of growth phase on yield, chemical composition and ruminal digestibility of alexandrian clover silages

Growth phase	Full flowering	End of flowering	Faded	P
DM yield; t/ha	0.47[c]	1.23[b]	1.66a	<0.01
Chemical composition				
DM; g/kg	210[c]	323[a]	272b	<0.01
OM; g/kg DM	852[b]	885[a]	875a	<0.01
CP; g/kg DM	213[a]	195[b]	160c	<0.01
EE; g/kg DM	22.6[a]	17.2[b]	17.5b	<0.01
CF; g/kg DM	221	204	216	0.288
NDF; g/kg DM	350	344	366	0.073
ADF; g/kg DM	301[a]	261[b]	280ab	<0.01
ADL; g/kg DM	88.8	60.4	70.0	0.121
Ruminal digestibility				
DDM; %	76.2[a]	76.1[a]	71.9b	<0.01
DOM; %	73.4[a]	74.1[a]	69.5b	<0.01
DNDF; %	44.6[a]	43.3[a]	36.9b	<0.01

Means in the same row with different uppercase letters differed (P <0.05).

DM – dry matter; OM – organic matter; CP – crude protein; EE – ether extract; CF – crude fibre; NDF – neutral detergent fibre; ADF – acid detergent fibre; ADL – acid detergent lignin; DDM – digestibility of DM; DOM – digestibility of OM; DNDF – digestibility of NDF.

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