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Stubble management of *Medicago polymorpha* L. and pod consumption by grazing ewes during summer

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Summary - A research on pod, seed production and consumption of *Medicago polymorpha* L. grazed by sheep was carried out during summer 1998. Pod, seed production, stubble availability, chemical composition and their consumption by sheep were measured. Pod availability resulted 3.1 t ha⁻¹ whereas seed production was 1.4 t ha⁻¹. The crude protein content was 21% and 11% in pods and stubble, respectively. During the trial the ewe intake of mature pods on average was 1200 g DM head day⁻¹ corresponding to 540 g head day⁻¹ of seed. No effects were found on live weight and body condition score change. The high seed yield of burr medic assures a large seed bank and, in the meantime, its high quality represents an important feed resource for sheep grazing stubble during summer.

Key-words: *Medicago polymorpha* L., pod production, stubble, pod intake, grazing ewes

Résumé - Un essai a été mené pendant l'été 1998 concernant la production et la consommation des légumes et des semences de *Medicago polymorpha* L. pâturée par des brebis. La production de légumes et de semence, la disponibilité en chaumes ainsi que leur composition chimique et les quantités consommées par les brebis ont été mesurées. La disponibilité en légumes a été de 3.1 t MS ha⁻¹ tandis que la production de semence a été de 1.4 t ha⁻¹. Le contenu en protéine brute a été 21% et 11% respectivement dans les légumes et dans la semence. Pendant l'essai les brebis ont ingéré 1200 g tête jour⁻¹ de légumes, ce qui correspond à 540 g tête jour⁻¹ de semence. Le pâturage des chaumes n'a pas eu d'effets sur le poids vif et sur la note d'état corporel. La quantité très élevée de semence produite assure la constitution d'une importante réserve de semence et, au même temps, sa bonne qualité représente une importante source alimentaire pour les brebis au pâturage pendant l'été.

Mots-clés: *Medicago polymorpha* L., production de légumes, chaumes, ingestion de légumes, brebis, pâturage

Introduction

The annual self-regenerating legumes play an important role in Mediterranean environment because of their high seed yield and adaptation to grazing (Piano and Talamucci, 1996). In the last years some studies focused on the importance of self-regenerating species in Sardinian pasture (Sulas *et al.*, 1995). A critical aspect of the use of these swards is related to seed consumption by ewes during summer grazing that requires a livestock management to preserve the seed bank particularly for large seed species (Cocks, 1988; Thomson *et al.*, 1990; Russi *et al.*, 1992). *Medicago polymorpha* L. seems to be interesting in the Mediterranean grazing systems (Porqueddu *et al.*, 1996, Ligios *et al.*, 1997) where, with a good spring management, can assure above 1 t ha⁻¹ of seed (Lelievre and Porqueddu, 1994; Cocks, 1997) or 3 t ha⁻¹ of pods with high crude protein content (Sitzia and Fois, 1999). This high seed yield could allow a large seed bank and, in the meantime, because of its high quality represent an important feed resource for grazing sheep during summer (Chriyaa *et al.*, 1997). The aim of the trial was to assess the quality of a burr medic stubble and the consumption by Sarda ewes during summer grazing.

Materials and methods

The study area is located in NW Sardinia (40° N, Italy), on flat clay calcareous soil, with pH 7.5, low N and P₂O₅ and adequate K₂O contents. The climate of the area is Mediterranean with an average annual rainfall of 569 mm. One hectare paddock of *Medicago polymorpha* L. *vr.* Anglona was sown in November 1997 with a seeding rates of 40 kg ha⁻¹ and it was fertilised with 100 kg ha⁻¹ of P₂O₅. The paddock was grazed during late winter and part of spring by 24 dairy ewes and from 1/04/98 it was rested to assure the self-reseeding (for main details see Sitzia *et al.*, in this volume). In June the paddock was divided in three plots of 0.33 ha and each one was utilised by 24 ewes plus 1 ram. In order to adapt the ewes to graze the sward a three weeks pre-experimental period (24/06-15/07) was performed allowing the animals for 3 hours per day (18.00 - 21.00) to the stubble. From 15 of July to 4 of August (experimental period) the ewes grazed for one week in each plot for 13 hours per day (18.00 - 7.00). During the rest daylight time (11 hours) the ewes stayed on 2.5 ha paddock provided with a shadow shelter and water containers were available in all paddocks. Pod, stubble availability, refused (6 samples of 0.25 m² per plot) and their chemical composition (crude protein, CP; NDF, ADF, ADL; Goering and Van Soest, 1970) were measured. Pod consumption was calculated as the difference between pod offered and refused divided by the number of grazing sheep and the number of grazing days. Live weight (LW) and body condition score (BCS) (Russel *et al.*, 1969) were measured at the beginning of the pre-experimental and at the beginning and the end of experimental period. Statistical analysis was performed on plots pod and stubble availability, on LW and BCS by ANOVA.

Results and discussion

Annual precipitation recorded from October to June was 482 mm, 72% of the total rainfall concentrated in autumn-winter period. The pod production was 3.1 t ha⁻¹ and the corresponding seed production was 1.4 t ha⁻¹. Stubble availability was 8.1 t DM ha⁻¹. Table 1 summarises the pod availability and the refusal in each plot during the experimental period. No significant differences were found between plot on pod offered and between pod offered and refused after each grazing period.

Tab. 1 *Medicago polymorpha* L. pod offered, refused and pod intake during the trial in plots A, B and C (16/7/98-4/8/98).

	A	B	C
Pods availability (kg DM ha ⁻¹)	2380 a	2950 a	2980 a
Pods refusal (kg DM ha ⁻¹)	1860 a	2230 a	2310 a
Pod consumption (g DM ewe ⁻¹)	981	1358	1263
Grazing days	7	7	7
Surface (ha)	0.330	0.330	0.330

The pods were well consumed by ewes. The less pod consumption measured in plot A was probably due to the low pod availability in comparison to the B and C plot (P = 0.13). The seed consumption resulted on average 540 g head day⁻¹ as already found by Cocks (1988) in *Medicago spp* and by Pardini (1993) in *Trifolium spp.* sward. The seed consumption did not influence the seed bank living about 32000 seeds m². During the trial no differences were found on stubble availability (6.9 t DM ha⁻¹) and stubble refused (7.2 t DM ha⁻¹). The stubble decreased from the pre-experimental to the experimental period and it was probably due to

the loss of dry matter and of leaves by sheep trampling. The main features of pods and stubble offered during the trial are summarised in table 2. The pods on average showed higher CP than stubble whereas the NDF, ADF and ADL content resulted similar. The high CP value in the pods was in good agreement with our previous trial (Sitzia and Fois 1999). The burr medic stubble showed an interesting chemical composition compared to standing hay of Sardinian natural pasture mainly based on grasses (Lai *et al.*, 1973).

Tab. 2 Means and standard error (std. err.) of *Medicago polymorpha* L. pods and stubble quality in the samples collected during the trial.

	DM (%)	CP (% DM)	Ash (% DM)	NDF (% DM)	ADF (% DM)	ADL (% DM)
Pods	92.5	21.1	7.4	57.0	39.6	11.5
std. err.	0.51	0.42	0.25	0.83	0.53	0.15
Stubble	81.1	11.3	19.5	57.5	42.0	9.6
std.err.	4.23	0.18	1.03	0.83	0.71	0.22

No difference were found on LW and BCS however during the experimental period an increase in the live weight (+27 g ewe d⁻¹) was recorded (Fig.1 and Fig. 2). These results are very interesting in our condition where, usually, the ewes loss weight during summer, sometime with a negative consequences on the next productive season.

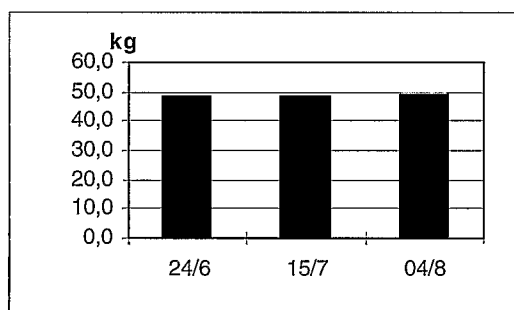


Fig. 1 LW change throughout the trial.

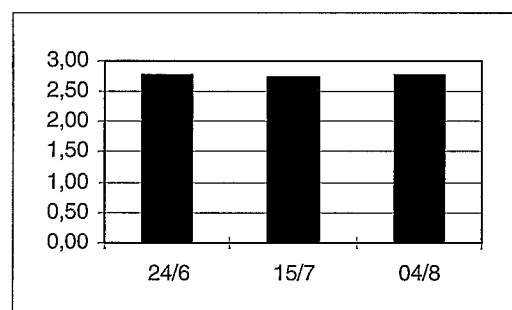


Fig. 2 BCS evolution during the trial.

Conclusions

The results of the trial show that in summer the burr medic can offer a quality pasture because of the high pod and stubble quality and availability. Nevertheless in our experimental condition with a quite low stocking rate and short grazing period the ewes, for their typical selection capacity, chose the burr medic pods and refused the stubble. However the ewes maintained their live weight and body condition in a period when, often, the animals have to be fed with hay and concentrate.

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