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Floristic and chemical composition of an organic, natural pasture used for fattening lambs in the region of Sidi Bouzid, Tunisia

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Abstract. The present work aimed to determine the botanical composition of a natural pasture in the region of Sidi Bouzid and to study its effect on performances of Barbarine lambs. The floristic composition showed that the plant communities of the natural pasture are characterized by the dominance of annual species (63.2%). Results obtained indicated that the floristic composition revealed the presence of 19 species. The natural pasture composed by *Cynodon dactylon* (62.3%), *Sisymbrium irio* (20.7%), *Anagallis arvensis* (5%), *Medicago ciliaris* (3.3%) and other species. The botanical composition was represented by grasses (62.4%), cruciferous (21.3%), legumes (3.6%), compositae (2.4%) and other family (10.1%).The chemical composition of the pasture showed a crude protein and fiber content of 10.7% and 25.5% respectively. Lambs grazing under this pasture had a low average daily gain (65.2 g/day) and a fat depth of 2.26 mm. These results indicated that this pasture is characterized by limited energy supply and it should be regenerated in order to assure a sustainable productivity of this production system.

Keywords. Sheep breeding – Natural pasture – Annual species.

Composition floristique et chimique d'un parcours naturel certifié biologique, utilisé pour l'engraissement des agneaux dans la région de Sidi Bouzid, Tunisie

Résumé. *Ce travail a pour objectif de déterminer la composition floristique d'un parcours naturel dans la région de Sidi Bouzid et d'étudier l'effet de son utilisation sur les performances zootechniques des agneaux de race barbarine. La composition du parcours est caractérisée par la dominance des espèces annuelles (63,2%). Les résultats obtenus indiquent que l'étude de la composition floristique du parcours naturel a montré la présence de 19 espèces pastorales. Le parcours est formé essentiellement de* Cyndon dactylon *(62,3%),* Sisymbrium irio *(20,7%).* Anagalis arvensis *(5%),* Medicago ciliaris *(3,3%) et autres espèces. Ces espèces appartiennent aux familles des graminées (62,4%), des crucifères (21,3%), des légumineuses (3,6%), des composées (2,4%) et d'autres familles (10.1%). La composition chimique montre que le parcours naturel présente une teneur en protéines brutes de 10,7% et en cellulose brute de 25,5%. Les agneaux ont montré un GMQ faible (60.5 g/jour) et une épaisseur du gras faible (2,26 mm). Ces résultats indiquent que ces parcours naturels doivent être régénérer afin d'assurer une productivité durable des systèmes de production.*

Mots-clés. *Élevage ovin – Parcours naturel – Espèces annuelles.*

I – Introduction

In Tunisia, sheep production was based mainly on extensive system based on pasture in the center and the south of the country. The contribution of pastoral resources was estimated at 80% of the diet of these animals (Ben Salem, 2011). At the beginning of the second half of the 20th century, the natural's pastures were characterized by a rich and diversified flora. During the last three decades, changes in agricultural practices and over grazing have caused their degradation. For these reasons, sheep feeding system had undergone profound changes. It is moving from extensive pastoral livestock transhumance to intensive farming mainly based on feeding concentrate

diets (Kayouli, 2006; Ben Salem, 2011). In organic system, the access to pasture is inevitable for lamb fattening system. The aim of this study was to determine the floristic composition of an organic natural pasture used for fattening Barbarine lambs in the region of Sidi Bouzid and to evaluate the effect of this pasture on growth performances.

II – Materials and methods

The composition of the vegetal species of 4 ha natural pasture in the farm "El Attizez", Sidi Bouzid (Tunisia) was studied. This pasture was used for fattening 27 weaned Barbarine lambs (11 females and 16 males) of an average weight of 24.1 ± 5.4 kg and 8 month-old, according to the organic system. In addition, lambs received 200 g of organic oat hay and 400 g of concentrate (63.7% organic barley, 18.2% organic broad bean, 13.6% faba bean, 4.5% mineral vitamin supplement). During the grazing period, we determined the herbaceous biomass and specific richness of the pasture using the quadrat method described by Floret (1988). The herbaceous biomass was estimated by the determination of the herb quantity present in the quadrat which was cut and weighted. The floristic composition of the natural pasture was determined using the linear analysis (line intercept) described by Daget and Poissonet (1971). Plant covers (RV), specific contribution (SCi) and specific index (ISi) of each species are determined. The pastoral value (PV) of pasture was calculated by the equation given by Floret (1988):

The animals were weighed to calculate the average daily gain (ADG). Herbage daily intake of lambs was estimated by the use of enclosure. The vegetal biomass in enclosure was determinate by harvesting and weighing the herb biomass before and after lambs grazing. Feed conversion rate (FCR) was calculated. Chemical composition of natural pasture was determinate according to the method of AOAC (1995). Six male lambs were slaughtered at the average weight of 38 kg. Fasting body weights (FW), and cold carcass weights were determined to calculate commercial dressing (CCW*100/FW). Subcutaneous fat depth was measured according to Fisher and De Boer (1994).

III – Results and discussion

1. Floristic and chemical composition

The biomass per hectare averaged 1066.5 kg DM/ha. Natural herbaceous plant cover represented 57.7%. As for the floristic composition, plant communities of the natural pasture were characterized by the dominance of annual species (63.2% *vs* 36.8% for perennial species).

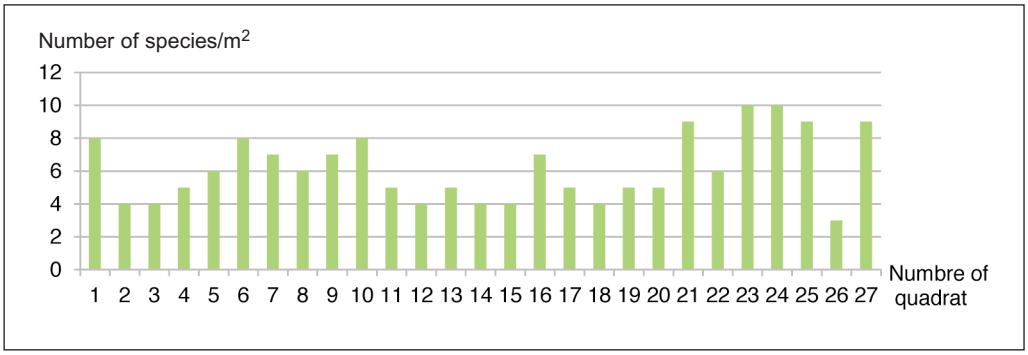

Fig. 1. Evolution of specific richness of species in natural pasture in the region of Sidi Bouzid.

The analysis of Fig.1 showed that species richness varied from 3 to 10 species/m^2 with an average of 6.2 species/m^2.The high coefficient of variation (CV = 33.6%) in the specific richness can be caused by lamb selection during grazing.

Table 1. Characteristics of floristic composition of natural pasture in the region of Sidi Bouzid

Species	Frequency	Specific contribution (%)	Specific index†	CS * IS
Cynodon Dactylon	719	62.3	4	250.1
Lolium rigidum	2	0.17	5	0.9
Sisymbrium irio	239	20.7	3	62.3
Eruca vesicaria	8	0.69	4	2.3
Medicago ciliaris	38	3.3	5	16.5
Astragalus hamosus	4	0.34	3	1
Launeae nudicaulis	16	1.38	4	5.6
Launeae resedifolia	5	0.43	4	1.7
Onopordon nervosum	5	0.43	2	0.9
Carduus pycnocephalus	1	0.08	2	0.2
Centaurea dimorpha	1	0.08	2	0.2
Anagallis arvensis	57	5	0	0
Convalvulus arvensis	23	2	4	8
Chenopodium murale	18	1.55	2	3.1
Malva parviflora	7	0.60	3	1.8
Polygonum aviculare	5	0.43	4	1.7
Glaucium flavum	1	0.08	2	0.2
Adonis oestivalis	5	0.43	0	0
Reseda alba	1	0.08	1	0.1
Total	**1155**	**100**	**–**	**357.13**

† 0: without value; 1: mediocre; 2: average; 3: good; 4: very high; 5: excellent; SC: Specific contribution; IS: Specific index.

Results in Table 1 indicated that the natural pasture was composed of herbaceous cover. The floristic composition revealed the presence of 19 species: *Cynodon dactylon* (62.3%), *Sisymbrium irio* (20.7%), *Anagallis arvensis* (5%), *Medicago ciliaris* (3.3%), *Convalvulus arvensis* (2%) and other species. *Cynodon dactylon* and *Sisymbrium irio* were the most dominating species, representing more than 80% of the total herb in term of frequency and vegetal biomass. The pasture was composed of grasses (62.4%), cruciferous (21.3%), legumes (3.6%), compositae (2.4%), and other family (10.1%). This result can be explained by the drought that characterized the 2010-2011 year. Few species (*Cyndon dactylon and Sisymbarium irio*) can be really adapted to drought.

The pastoral value was 41.19%. This value indicated that this pasture is classified average. This result was explained by a smaller specific contribution of the legumes family. In fact, legumes species are characterised by a better nutritional quality and are more palatable by animals. In addition, the dominance of *Cyndon dactylon* which is an invasive species resulted in the limitation of other herb species growth. In fact, Cervasio et *al*. (2009) reported that the expansion of invasive species in pasture reduced especially the pastoral value of species characterised by the best nutritional quality.

Chemical composition of natural pasture indicated high dry matter (45.97%) and ash (12.19%) values. The crude protein content was 10.69% and this result can be explained by the low contribution of the legumes family (3.6%) in the floristic composition of this pasture. In addition, this pasture had low fiber content (26.62%).

2. Growth performances and carcass characteristics

Lambs grazing in this natural pasture had a low weight gain of 6.24 kg during 103 day of feeding period. ADG was 60.5 g / day It was lower than the potential of Barbarine breed (Djemali *et al.*, 1994). FCR was high (17.22 kg DM/kg gain) and could be associated to the low energy content of the natural pasture and the low supply of concentrate. At an average fasting weight of 36.9 kg, commercial dressing was of 46.72%. These results agreed with those reported by Majdoub-Mathlouthi *et al*. (2013) for Barbarine lambs receiving low energy level. The subcutaneous fat thickness (2.26 mm) was acceptable and indicated lower carcass fatness (Diaz *et al*., 2002).

IV – Conclusions

Preliminary results of the qualitative and quantitative characterisation of this natural pasture in the region of Sidi Bouzid indicated a lower specific richness and the dominance of two species: *Cynodon dactylon* and *Sisymbrium irio*. In addition, the botanical flora of the studied pasture is characterized by greater percent of annual species. Then, and despite concentrate supplementation, grazing lambs had moderate performances. It may be associated to a limited energy supplementation. For these reasons and in order to maintain the organic system based on pasture, it seems very imperative to find other organic feeding resources and to recover these pastures in order to increase the pasture production in the critical period.

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