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in

Etienne M. (ed.).
Dynamics and sustainability of Mediterranean pastoral systems

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 39

1999
pages 75-78

Chemical composition and *in vitro* digestibility of herbaceous autochthonous plants in a semi-arid region of Spain

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SUMMARY - Chemical composition and *in vitro* dry matter digestibility of herbaceous plants were estimated in four seasons and four localities in a semiarid region of Spain. The plants were: *Dactylis glomerata, Plantago albicans, Brachypodium retusum, Stipa sp., Lygeum spartum.* The results showed significant differences between species and seasons for all parameters studied.

Key words: *Dactylis glomerata, Plantago albicans, Brachypodium retusum, Stipa sp., Lygeum spartum,* seasons.

RESUME *- "La composition chimique et la digestibilité* in vitro *des plantes fourragères d'une région semi-aride de l'Espagne". La composition chimique et la digestibilité* in vitro *de plantes fourragères de la région semi-aride de l'Espagne, ont été estimées dans quatre localités et quatre saisons de l'année. Les plantes étudiées ont été :* Dactylis glomerata, Plantago albicans, Brachypodium retusum, Stipa *sp.,* Lygeum spartum. *Les résultats ont montré des différences significatives entre les espèces et entre les saisons de l'année pour tous les paramètres étudiés.*

Mots-clés *:* Dactylis glomerata, Plantago albicans, Brachypodium retusum, Stipa *sp.,* Lygeum spartum, *saisons.*

Introduction

The herbaceous species found in the pastures of Spanish arid and semiarid areas are not usual. They are usually found only in places where the brushwood has been removed and where the soil fertility has been increased by the livestock activity. These species show a seasonal growth, mainly due to the long dry periods (Robles and Boza, 1993).

On the other hand, due to the scarcity of pastures, these semiarid areas have usually been overgrazed and the best species have been removed by the effect of the high selection made by the sheep (Correal *et al.*, 1992).

The areas in Aragón included in this study present long dry periods as well as a great variability between years which influences the vegetative activity of the plants available as forage. The Monegros region in Aragón (Spain) presents salty soils which determine, in an important way, the existing vegetation (Ochoa, 1982). In order to use it as a forage resource it is necessary to know its feeding value all through the year and record the feeding requirements which it can cover as well as the most suitable way of exploitation.

This work studies the chemical composition and *in vitro* digestibility of herbaceous plants with forage potential during the whole year.

Material and methods

An inventory of the existing vegetation in the area of Monegros, Aragón (Spain), was made. From the results of this inventory, and from the data obtained from a pool made to the farmers of the area, the dominant species with a higher forage interest were selected. They are the following ones: *Dactylis glomerata, Plantago albicans, Brachypodium retusum, Stipa sp., Lygeum spartum.*

Samples of the plants were collected. Four locations were sampled as representative of the area characteristics, and samples of the above mentioned species were taken in the four seasons of the year.

Samples were analysed for dry matter (DM), ash and crude protein (CP) by conventional methods (AOAC, 1990). Neutral detergent fibre (NDF), acid detergent fibre (ADF) and lignin (ADL) were analysed by the method of Goering & Van Soest (1970). *In vitro* dry matter digestibility (IVDMD) was analysed according to the technique of Tilley and Terry (1963).

Data were analysed by analysis of variance and the comparison of means was made by Duncan's test using the SAS package (1987).

Results and discussion

Table 1 shows the chemical composition of different plants in spring, summer, autumn and winter. Results indicate that there are not significant effects between those locations where the samples were taken (Table 2).

Table 1. Chemical composition (%DM), *in vitro* dry matter digestibility (IVDMD) of herbaceous plants in spring, summer, autumn and winter

Herbaceous	Season	DM	ASH	CP	NDF	ADF	ADL	IVDMD
Dactylis Glomerata	1	53.43	8.71	10.59	65.01	35.63	4.69	57.38
	2							
	3	29.03	13.59	17.65	59.67	33.27	4.95	57.65
	4	35.53	13.54	16.05	54.25	28.80	5.16	66.80
Plantago Albicans	1	43.43	13.12	12.78	46.83	34.37	10.87	54.94
	2							
	3	19.43	18.35	20.24	43.21	29.44	9.06	61.56
	4	36.23	15.08	15.86	40.92	26.01	11.72	62.13
Brachypodium Retusum	1	65.87	8.55	6.68	76.40	41.56	7.65	32.22
	2	69.53	7.53	5.47	75.82	41.29	7.71	27.45
	3	66.60	10.82	8.40	72.49	40.01	8.84	29.00
	4	68.77	9.17	9.69	72.84	35.18	10.56	28.19
Stipa sp.	1	67.60	5.74	6.81	78.92	43.95	6.22	35.53
	2	87.65	4.53	5.63	78.77	45.85	6.83	34.93
	3	62.43	6.71	8.10	77.65	43.96	8.16	38.79
	4	69.15	7.74	9.63	74.74	37.45	8.48	38.94
Lygeum Spartum	1	70.15	5.66	5.60	80.99	51.80	7.36	26.08
	2	83.98	5.27	5.42	79.23	49.88	6.32	27.29
	3	54.60	5.98	6.12	79.38	50.63	6.78	30.08
	4	68.68	6.73	7.46	77.49	46.64	8.48	28.11

1: Spring; 2: Summer, 3: Autumn, 4: Winter

The chemical composition and IVDMD of each species were significantly different. *Dactylis glomerata* and *Plantago albicans* presented higher nutritive value than the rest of species.

We have found very low values of IVDMD in *Brachypodium retusum*, *Stipa sp.* and *Lygeum spartum* which are not enough to cover the energetic maintenance requirements of the animals. These data do not agree with the results obtained by Moreno *et al.* (1981). They found values of 71.5% for the digestibility of *Ligeum spartum* using the Van Soest summative equation (Van Soest, 1967) as a method

to measure the nutritive value. The differences between both methods may be the cause of the differences obtained in both studies.

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Table 2. Significance of the effects of species, season and place on the different parameters

	MO	CP	NDF	ADF	ADL	DSS *in vitro*
Species	***	***	***	***	***	***
	$2^{a}1^{b}3^{c}4^{d}5^{d}$	$2^{a}1^{b}3^{c}4^{c}5^{d}$	$5^{a}4^{a}3^{b}1^{c}2^{d}$	$5^{a}4^{b}3^{b}1^{c}2^{c}$	$2^{a}3^{b}4^{bc}5^{cd}1^{d}$	$1^{a}2^{a}4^{b}3^{c}5^{c}$
Season	***	***	***	***	*	*
	$3^{a}4^{a}1^{b}2^{c}$	$3^{a}4^{a}1^{b}2^{c}$	$2^{a}1^{b}3^{c}4^{d}$	$2^{a}1^{b}3^{b}4^{c}$	$4^{a}1^{ab}3^{b}2^{b}$	$4^{a}3^{a}1^{a}2^{b}$
Place	n. s.	***	n. s.	n. s.	n. s.	n. s.
		$1^{a}3^{a}2^{b}4^{b}$				
Species* place	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
Species* season	n. s.	***	n. s.	n. s.	n. s.	n. s.
Season* place	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.

1 = *Dactylis glomerata*, 2 = *Plantago albicans*, 3 = *Brachypodium retusum*, 4 = Stipa sp., 5 = *Lygeum spartum*.
1 = Vedado, 2 = Sariñena, 3 = Peñalba, 4 = Monegrillo
1 = Spring; 2 = Summer, 3 = Autumn, 4 = Winter
*P<0.05; **P<0.01; ***<P<0.001; a≠b≠c≠d<0.05