Session 34

manuel.espejo@juntaextremadura.net

INFLUENCE OF THE PLUVIOMETRY IN THE PASTURE PRODUCTION IN ”DEHESA” EXTENSIVE SYSTEM

Espejo Díaz M., Espejo Gutiérrez de Tena A. M., González López F., Prieto Macías P.M. and Paredes Galán J.

Centro de Investigación Agraria ”La Orden” . 06187 Guadajira (Badajoz- Spain)

INTRODUCTION

The Dehesa is an ecosystem consisting of pasture with trees whose primary use is livestock. It covers more than 2 million hectares of south-western of Iberian Peninsula. (Servicio Forestal, Caza y Pesca, 2002).
The climate is Mediterranean. Rainfall is the main factor influencing the production of the grass there is great variability between seasons and between years.
To quantify this effect we have studied the relationship between both parameters.

MATERIAL AND METHODS

Pasture production data was collected during 4 years (2004-2007) on 48 pilot farms (Espejo et al., 2006) of project Montado / Dehesa SP4.E127/03 II INTERREG IIIA developed in Extremadura and Alentejo and co financed by the European Union (Espejo et al., 2008).

The dry matter production data (kg DM / ha) are the result of the harvest in two or three times depending on the development of pasture, in four grazed exclusion cages by farm, as described by Carter (1962),

We have also taken into account the different areas of Dehesa in Extremadura (Figure 1) on the basis of their agricultural characteristics (topography, soils, vegetation, uses) (Figure 2).

The precipitation data come from the State Agency of Meteorology. Correlations were performed with SPSS ® software.

Figure 1. Map of different areas of Dehesa in Extremadura

Figure 2. Landscapes of different areas of Dehesa in Extremadura

RESULTS AND DISCUSSION

The pasture average production is 2347 kg DM / ha, which agrees with data obtained previously by Olea et al. (1988). There are high variations between years, between types of pasture and between areas.

Annual energy production is 3505 Mcal EM / ha. This production is equivalent to 2026 in maintenance rations for sheep / ha, taking into account a value of 0.55 as the average coefficient of digestibility of pasture in Dehesa, according to the methodology described by Martín et al. (1986).

Table 1 shows the correlations between grass production in kg DM / ha, and rainfall at certain times of the year.

Table 1. Correlations between grass production and rainfall

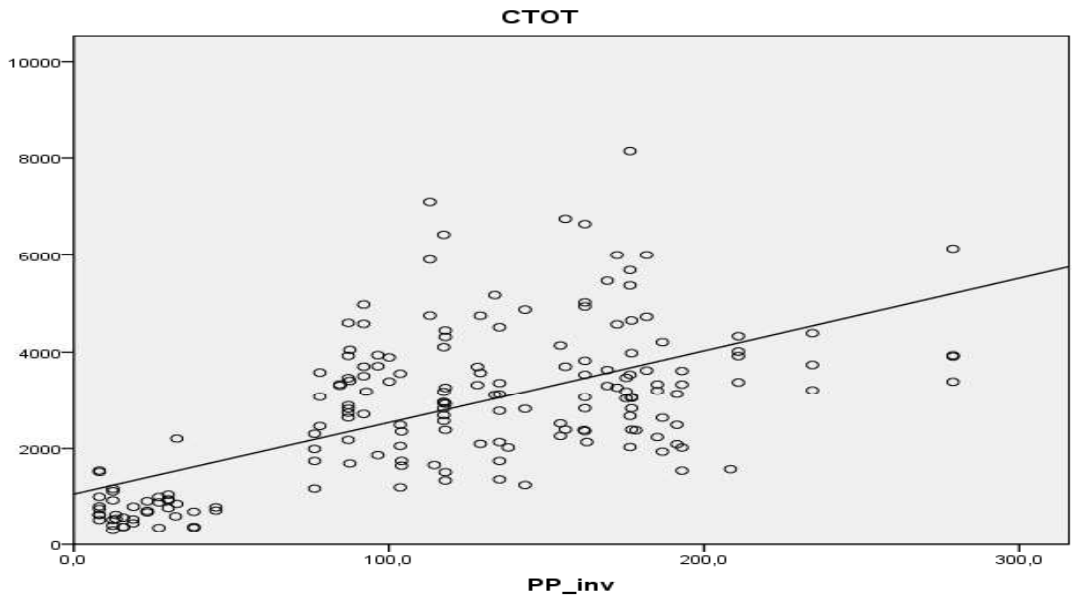
		PRODUCTION (Kg DM/ha)				
HARVEST		JANUARY	MARCH	JAN+MAR	JUNE	TOTAL
RAIN	N=	41	131	181	181	181
AUTUMN		- 0,132 NS	0,178 *	0,469 **	0,041 NS	0,355 **
WINTER			0,189 *	0,460 **	0,428 **	0,618 ***
SPRING					0,234 **	0,343 **
TOTAL ANNUAL						0,551 **
AUTUMN+WINTER			0,211 *	0,528 **	0,214 **	0,538 **
AUTUMN+SPRING					0,109 NS	0,429 **
WINTER+SPRING					0,390 **	0,566 **
MARCH					0,479 **	0,055 NS
SEPTEMBER		-0,06 NS	0,228 **	0,588 **	0,042 NS	0,477 **

The statistical study shows a highly significant correlation between the total rainfall and total production of DM: R = 0.551, **=P<0,01, but Winter rain is better indicator of the expected total production (R = 0.618 **), being the regression equation (Figure 3):

$$CTOT = 1053 + 14{,}87\ PPWIN$$

From which: CTOT= Total annual production of DM / ha
PPWIN = Winter Precipitation (December + January + February)

Figura 3. Regression line



The dry matter of better rainfall years quadrupled the values of very dry years in which we had to supplement the livestock most of the year. Only in 25% of the cases studied the pasture autumn production was apparent.

Autumn rainfall presents a significant correlation with pasture production of autumn and winter (R = 0.469 **). Rainfall for the months of March, April and May influenced the production of spring (R = 0.234 **).

September precipitation is the best indicator of the production in autumn and winter (R = 0.581 **) and March rainfall for the spring production (R = 0.479 **).

A regression analysis step by step of production with total monthly precipitation shows that the first three components of the model are precipitation in February, January and September, being the regression equation:

CTOT= 1057,67 + 27,19 PPENE + 12,95 PPFEB + 21, 58 PPSEP

Where: CTOT = Total annual production of DM / ha
PPENE = Rainfall in January
PPFEB = Rainfall in February
PPSEP = Rainfall in September

With the rain in these three months is what is achieved with a better fit (R = 0.667 **)

Knowing these three precipitation data, by using this equation can have an estimate of the production of a farm pasture, which allows estimates of requirements for food procurement for livestock, without having to resort to the determination in situ of the available grass which is more accurate but is a method that requires further work.

CONCLUSIONS

- Winter rainfall is a good indicator of the expected total production.
- September precipitation is the best indicator of the production in autumn and winter, and March rainfall for the spring production.
- The best fit of the total annual production of DM / ha is achieved by taking into account the rainfall in September, January and February.

REFERENCIAS BIBLIOGRAFICAS

- Carter, J. M. 1962. *Pasture Range Research Techniques*. *Comstock Publishing Associates. Ithaca, New York, 90-101*
- Espejo, M., Espejo, A., Matos, C., Pereira, P. 2006. Elección de Fincas Piloto para el desarrollo del proyecto INTERREG IIIA DEHESA MONTADO SP4.E13, En *Gestión ambiental y económica del ecosistema Dehesa en la Península Ibérica: 249-258*
- Espejo Díaz M., Martín Bellido M., Espejo Gutiérrez De Tena A. and Matos C. 2008.
- Development of an information system for the environmental and economic management of the dehesa/montado ecosystem in Extremadura and Alentejo.*Options Méditarranéennes.Serie A, 2008. Num 78, 91-96.*
- Olea, L.; Verdasco, P.; Paredes, J., 1988. Necesidades de pastos (cantidad y calidad) para el ganado ovino en sistemas extensivos y condiciones semiáridas- mediterráneas. *Actas XXVI Reunión anual de la SEEP. Vol. I, 383-402.*
- Martín Bellido, M.; Espejo Díaz, M.; Plaza Gonzalo, J.; López Carrión, M., 1986. Metodología para la determinación de la carga ganadera de pastos extensivos. *(Monografía INIA nº 57). Ed. Instituto Nacional de Investigaciones Agrarias. Madrid. 37 pp.*
- Servicio Forestal, Caza y Pesca., 2002. Plan Forestal de Extremadura, 2002. *Junta de Extremadura. Consejería de Agricultura y Medio Ambiente.*