FORAGE AND PROTEIN PRODUCTION PER HECTARE USING DIFFERENT SPECIES FOR INTERSEEDING

J. A. Josifovich and J. O. Scheneiter
Estación Experimental Agropecuaria Pergamino
INTA. C.C. 31. 2700-Pergamino. Argentina

ABSTRACTS
The objective was to test the efficiency of different species for interseeding in relation to forage and crude protein production. Avalability of forage and crude protein were evaluated every spring, after 60 days rest. The design was a split-split plot: in an Argiudol soil legumes were the whole plot, grasses subplot and fertilizer sub-subplot. Dry matter accumulation did not show any difference in relation to treatments in three of four springs. Crude protein showed differences in three of four springs, being interseeding better than control. Interseeding of old pastures resulted in a good practice to keep the balance legume-grass, as a way to lengthen the period of utilization.

KEYWORDS
Interseeding, legumes, grasses, forage production, protein production

INTRODUCTION
In the last twenty years, several techniques in relation with pasture seeding or reseeding without plowing were developed as a result of the energy crisis and better consciousness of soil conservation. Besides, the producer's attitude in relation to these problems had changed also in Europe (Scott Russell, Cannell and Gross, 1975) and in USA (Barhart and Wedin, 1981). The aim of these techniques is to use machinery with less soil movement, less labor and time (Gates, Jones, Moller and Hicks, 1981). Several implements were developed for minimum tillage, according to soils, topography, climate and vegetation to be interseeded (Baker, Badger and McDonald, 1979). Different implements for interseeding (Josifovich, 1993) were tested in the northern part of Buenos Aires province, Argentina, in the best area of the pampas. The objective of the trial was to test the efficiency of different species for interseeding in relation to forage and crude protein production.

MATERIALS AND METHODS
The trial was located in an Argiudol soil in Pergamino, Argentina, (33,56 S 60,33 W). The pasture to be interseeded was alfalfa (Medicago sativa L.), fescue (Festuca arundinacea Schreb., brome (Bromus unioloides HBK.) and white clover (Trifolium repens L.), six years old, heavily grazed. The species interseeded and the seeding rates were alfalfa 4 kg/ha, red clover 1 kg/ha white clover 1 kg/ha, hardingrass 2 kg/ha, fescue 3 kg/ha, and orchardgrass 1.5 kg/ha. After a heavy grazing in early fall, the soil was labored with a heavy duty stubble coulter 2.5 by 2.5 cm square, 0.45 m apart, followed by a spring coulter 0.15 m apart. The planting was done in May, and the first grazing was in October. Half of combination of legumes and grasses were fertilized with calcium superphosphate at 100 kg/ha (initial level of P was 8 ppm.). The design was a split-split plot in which legumes were the whole plot, grasses the subplot and fertilizer the sub-subplot. Once a year during four years, plots were evaluated in October, after 60 days of rest in a rotational grazing system. Five square meter samples were taken from each treatment, cutting by hand. Dry matter was evaluated by drying the forage 48 hours at 60°C. Crude protein (Kjeldahl method) was determined for each sample. The data were analyzed by ANOVA procedure, using SAS system. When significant differences were found, means were compared by Tukey Test.

RESULTS
Dry matter production in each spring showed no differences due to different legumes or grasses or interaction of both. These results are different from those of Avendaño and Ovalles (1989) who stated that differences can be expected according to species. Only differences were observed in relation with fertilization treatments as they are showed in Table 1. These data agree with those of Avendaño and Ovalles (1989) according to phosphorus fertilization and forage yield. Crude protein yields did not show differences in relation to legumes and legume-grass interaction. Only in the first spring did hardingrass show more protein (P- 0,04) than fescue and orchardgrass. For simplicity, only the means for fertilization in relation to the non fertilized ones are shown (Table 2). If we accept, as Mallarino and Wedin (1990) and McBratney (1981) did, that legume proportion and forage production decrease in old pastures, interseeding with legumes and grasses can help maintain high productions with higher quality in our area.

REFERENCES
Avendaño, J. and Ovalle, C. 1989. Systémes d'amélioration de la strate herbacée par sursemis dans les espinales de la zone mediterranée subhumide du Chili. Proc. 16th. Int. Grass. Cong., Nice, France, p. 569-570.

Baker, C. J., Badger, E. M. and McDonald, J. H. 1979. Developments with seed drill coulters for direct drilling I. Trash handling properties of coulters. New Zealand J. of Exper Agri. **7**: 175-184.

Barnhart, S. K. and Wedin, W. F. 1981. Reduce tillage pasture renovation in the subhumid temperate region of the USA. Proc. 14th. Int. Grass. Cong. p. 545-547.

Gates, C. T., Jones, D. B.; Moller, W. J. and Hicks, J. S. 1981. The interaction of nutrients and tillage methods on wheat and weed development. Aust. J. Agric. Res. **32**:227-41.

Josifovich, J. A. 1993. Efficiency of different implements for pasture interseeding. Proc. 17Th. Int. Grass Cong., Hamilton, New Zealand, p. 862-863.

Mallarino, A. P. and Wedin, W. F. 1990. Effect of species and proportion of legume on herbage yield and nitrogen concentration of legume-grass mixture. Grass and Forage Sci. **45**: 393-402.

McBratney, J. M. 1981. Productivity of red clover grown alone and with companion grasses over a 4 year period. Grass and Forage Sci. **36**: 267-279.

Scott Russell, R., Cannell, R. Q. and Goss, M. J. 1975. Effects of direct drilling on soil conditions and root growth. Outlook in Agriculture **8**: 227-232.

Table 1
Dry matter accumulation in each spring, with and without fertilization (four years data) (DM/kg/ha).

	Springs			
	1st.	2nd.	3rd.	4th
Interseeded				
Fertilized	2444 a	2582 a	2651 a	4016 a
Interseeded				
not Fertilized	2364 a	2680 a	2512 b	4022 a
	NS	NS	0,05	NS
	CV: 14,53%	CV: 15,0%	CV: 9,55%	CV: 5,47%
	SEM: 67,2%	SEM: 93,02	SEM: 58,12	SEM: 51,8

Means followed by the same letter are not different.

Table 2
Crude protein yield (kg/ha) Four year data

	Springs			
	1st.	2nd.	3rd.	4th
Interseeded				
Fertilized	260 a	268 a	276 a	413
Interseeded				
not Fertilized	222 b	257 a	244 b	382
	P-0,0004	NS	P-0,0006	P-0,0025
	CV: 13,58%	CV: 16,15%	CV: 11,21%	CV: 7,89%
	SEM: 7,71	SEM: 10,0	SEM: 6,88	SEM: 7,43

Means followed by the same letter are not different.