SEMIARID GRASSLAND AND WINTER CEREALS FOR LAMB PRODUCTION IN NORTHEAST PATAGONIA, ARGENTINA

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Abstract

In northeastern Patagonia where grain crops often led to harvest failure, low yields and a high drought risk, a lamb production system was established. On a 10 years old agriculture wheat cropping was interrupted in 1996, allowing re-vegetation through exclusion of grazing. Natural grassland recovered, prevailing the species *Stipa tenuis, Piptochaetium napostaense, Stipa ambigua*. Part of the plot was sown to wheat grass (*Thinopyrum ponticum*). In 1999, to improve sheep feeding, oat (*Avena sativa*) and barley (*Hordeum vulgare*) were sown for grazing during winter-spring season. In this system Corriedale sheep, Texel x australian Merino (TEMA) and Ile de France x australian Merino (ILMA) crosses were tested. Fertility, prolificacy, lamb mortality and weaning were evaluated. No differences among genotypes (α=0.05) were found. Weaned lamb weight per ewe was significantly higher in cross ewes ($p<0.0035$), while production efficiency showed no significant differences among genotypes (α=0.05), because of the higher body live weight of the crosses ($p<0.0001$). Yields of 16.4; 19.4 and 20.2kg lamb hectare^{-1} for Corriedale, TEMA and ILMA respectively were calculated, which represent an increase of 18 and 23 %. These differences could become economically significant in the production system under study.

Key words: agrosystems, grassland, wheat grass, winter oat and barley, sheep, cross breeding, Patagonia.

Introduction

Northeastern Argentine Patagonia, which belongs to the Phytogeographical "Monte" Province (Cabrera, 1976), shows native vegetation in a layer with few isolates tree individuals of *Prosopis caldenia* and unrestricted shrubs layer of *Geofrea decorticans, Larrea divaricata, Chuquiraga erinacea, Condalia microphylla, Schinus fasciculatus* and *Lycium chilensis*. The lowest layer contains forbs and grasses (*Stipa tenuis, S. ambigua, S. clarazii, Poa lanuginosa* and *Piptochaetium napostaense)*.

An inappropiate use of native grasslands due to overgrazing and to deforestation for grain cropping, causes severe wind erosion, losses of soil and reduction of the profitable potential. This kind of agriculture is signed by very low grain yields and a high risk of drought.

Replacement of continuous agriculture by pastoral or agro-pastoral systems allows a more appropiate utilization of the available resources. Lamb production represents a more secure and sustainable alternative to grain cropping, even if it is less profitable (Iglesias et al, 1998). The theory behind this survey is that the Corriedale breed, the most common in this part of Patagonia (Irazoqui, 1980), establishes a biological constraint to lamb meat production in a system based on natural grassland and winter cereals.

Materials and Methods

In the Experimental Farm of Patagones, (40°39'S; 62°54'W, Patagones, Buenos Aires Province), with an average rainfall of 331 mm (Giorgetti et al., 1997), a lamb meat production system was implemented in a plot that was devoted during 10 years (1985-1995) to agriculture. Wheat cropping was interrupted in 1996, thus allowing revegetation with native species. Presently *Stipa tenuis, Piptochaetium napostaense, Stipa ambigua* and in a lower proportion of *Stipa clarazii and Poa lanuginosa* predominate. A part of the plot were sown to wheat grass (*Thinopyrum ponticum*). In 1999, oat (*Avena sativa*) and barley (*Hordeum vulgare*) were sown for grazing, as a supplementary feeding for the sheep during winter-spring season. The forage production was estimated using the equation proposed by Giorgetti et al. (1997).

In order to ascertain the lamb production, perfomances of Corriedale, Texel x australian Merino (TEMA) and Ile de France x australian Merino (ILMA) were evaluated. Ewes of this three genotypes (6 and 8 teeth) grazed together between March 1999 and February 2000, excluding the mating period (May-June). The following productivity components were evaluated: fertility (lambing ewes x mating ewes $^{-1}$ x 100), prolificacy (lambs born x lambing ewes-^{1}x 100) and lamb mortality (dead lambs x lambs born $^{-1}$ x 100). Weaning rate (weaned lambs x mated ewes $^{-1}$ x 100) and weaned lamb weight per ewe was calculated as the weigh of lamb/s per ewe $^{-1}$. Production efficiency was estimated as weight of lamb/s x weight of the ewe $^{-1}$ x 100. Body liveweigth were calculated as the mean of three weighings.

Fertility and mortality were analyzed by means of χ^2 method; prolificacy was compared by means of the Linear General Model. In order to analyze body liveweight of ewes, a linear model with breed and birth factors, and its respective interaction was used. Lambs weaning weigth and production efficiency were analyzed by means of a linear model with breed and lambs weaning weigth factors as covariables.

Meat production per hectare was estimated based on an energy concentration of pasture resources of 1.9 Mcal ME/kg DM (Geenty and Sykes, 1983), considering the different energy requirements of ewes and their production levels.

Results and Discussion

In the implemented sheep production system, 80% of the surface is occupied by perennial grasses which protect the soil from wind erosion and supply 60% of feeding resources (Table 1). Natural grassland recovered after a three years period of grazing exclusion, wheat grass, which occupied 28% of the surface with perennial grasses, supplied 38% of perennial feeding resources. Winter cereals for grazing (20% of plot) provided 40% of the feeding stuff.

The higher production of wheat grass pasture allowed a higher concentration of animals during autumn-winter season and the resting of the natural grassland, encouraging tillering of native grasses. The grazing of winter cereals was strategic, allowing the high requirements of ewes to be covered in the last third of pregnancy and during lactation.

No significant differences among genetic groups were founded (α=0.05) for: fertility, prolificacy and weaning. Weight differences were determined among ewe genotypes ($p<0.0001$). The type of birth effect, as well as interaction were not significant (α=0.05). Tukey's test showed that crossbreeds form a homogeneous group, different from Corriedale (Table 2).

For the weaned lamb weigth per ewe, the original means are indicated without correcting them for the covariable, since lamb age at weaning was similar among genotypes. As to the breed factor, the means for weaned lamb weight per ewe differed significantly ($p< 0.0035$). ILMA and TEMA constitute a homogeneous group, different from Corriedale, as shown by Tukey's test.

Table 2 presents the original means for efficiency, without correction for the covariable, since age of lambs at weaning was similar among genotypes. F-test for breed factor showed no differences among mean values (α=0.05).

Individual production, measured as weaned lamb weight per ewe, of cross ewes was higher than Corriedale. However, when results were obtained as proportion between lamb weight and ewe weight, a more accurate indicator to the maintenance and production requirements of the flock, the higher body weight of the crosses eliminated this advantage. Performances of 16.4: 19.4 and 20.2 kg lamb per hectare $^{-1}$ for Corriedale, ILMA and TEMA, respectively, stating increases of 18% and 23% over Corriedale.

In arid environments, implementing lamb production system with crossbred ewes has great economics importance. Besides, with a considerable surface of perennial pastures, this systems are more sustainable than grain cropping.

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Table 1 - Specifications of forage resources in a sheep-production system.

Resources	Area (ha)	Forage production (kg DM ha^{-1})	Utilization Period* (month)	Grazing Station (days)
Native Grassland	56	560	J-A[99]/D-J-F[00]	125
Wheat grass	22	950	M-A-M-J[99]	120
Barley and Oat	20	1800	A-S-O-N-D[99]	120
Total	98			365

*Per year

Table 2 - Variables of Corriedale, TEMA and ILMA effectiveness.

Variables	Corriedale	TEMA	ILMA
Fertility (%)	88.6[a]	94.4[a]	95.8[a]
Prolificacy (%)	132.3[a]	152.9[a]	156.5[a]
Lamb mortality (%)	12.2[a]	15.4[a]	8.3[a]
Sheep weight (kg)	51.2[a]	61.3[b]	63.1[b]
Weaned lamb weight (kg)	35.0[a]	43.7[a]	45.9[b]
Efficiency (%)	68.5[a]	72.3[a]	74.8[a]

Means without common superscripts differs ($p<0.05$)