EVALUATION OF REPRODUCTIVE PERFORMANCE OF POLWARTH CROSSES

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INTRODUCTION

Uruguay is going through important changes in the productive system of the sheep sector. Production of lamb meat is finding its way towards consolidation as a productive alternative, complementing and in many cases obtaining more relevance than wool, which was for many decades the principal product of our traditional sheep farms. Because of this, the use of non traditional breeds in order to increase productive and reproductive performance is a technological alternative that could increase the efficiency of national sheep systems.

Given that heritabilities of reproductive traits are in general low, it would require a number of years to obtain a relevant increment in the reproductive performances (Turner, 1969). By crossbreeding with highly prolific breeds it is possible to obtain in a relative fast time descendants that are more prolific than what could be obtained with less prolific breeds (Fogarty, 1984 cited by Fernández Abella, 1987).

MATERIALS AND METHODS

The experiment was conducted in Uruguay at the Sheep Experimental Units of INIA in two locations, La Estanzuela and Las Brujas, during the period between March 1998 and November 2004. The initial flock consisted in Polwarth ewes from La Estanzuela. These ewes were inseminated with semen from the following breeds: Il de France (IF), East Friesian (EF), Texel (T) and Polwarth or Ideal (I), all of these being white wool breeds. The female lambs produced in this phase were in turn bred at 18 months of age, which started the reproductive evaluation period. Breedings were done by pen breeding with Suffolk and Hampshire Down rams.

Data consisted in 748 records of ewe present during the breeding period and their respective lambing periods.

Fertility: The statistical model used for the fertility analysis (lambing ewes/ served ewes) was the following:

1) $Y = \mu + B + C + BxC + A + \varepsilon$

Where:

Y = fertility (%),

μ = Overall mean,

B = Biotype (IF x I, EF x I, I x I, T x I),

C = Ewe category (adult or hogget),

A = Year (2000-2003), and

$\boldsymbol{\varepsilon}$ = Residual.

Twinning rate: The statistical models used for the analysis of twinning rate (% of twins) were the following:

1) $Y = \mu + B + C + BxC + A + \varepsilon$

2) $Y = \mu + B + C + BxC + A + LW + \varepsilon$

Where:
Y = litter size (% twins),
μ = Overall average,
B = Biotype (IF x I, EF x I, I x I, T x I),
C = Ewe category (adult or hogget),
A = Year (2000-2003),
LW = Live weight at start of breeding Kg. (covariable), and
$\boldsymbol{\varepsilon}$ = Residual.

Given that both traits analyzed can only take two possible values (single or twin lambing) (pregnant or not pregnant), they present a binomial distribution and consequently PROC GENMOD of SAS was used for the analysis (SAS, 1993).

RESULTS AND DISCUSSION

Fertility: In Table 1 it can be observed that IFxI and EFxI ewes presented significantly higher values of fertility than the pure I ewes and the TxI crosses. Though no significant differences (Table 2) were observed for percentage of ewes lambed between the three types of crossbreeds, the cross with EF presented the highest values for this variable. In this experiment, no significant differences were found (p=0.9440) between fertility of the ewe hoggets (2 teeth) and adult animals in any of the evaluated biotypes (interaction NS), which seems to be different from research done in Corriedale (Ganzábal, 2003), in which differences in fertility were observed between ewes and hoggets of first lambing, even in those analysis in which live weight was considered constant.

Table 1: Effect of biotype and ewe category on Fertility

	Biotype					
Category	**IF x I**	**I x I**	**EF x I**	**T x I**	**Average**	
Hoggets	93	85	94	87	90^{a}	p=0.9440
Adults	92	88	94	94	92^{a}	
Average	93^{a}	86^{b}	94^{a}	90^{ab}		

a, b: rows with no common superscripts differ (p<0.01)

Table 2: Level of significance for fertility analysis

Compared variable Biotypes		Significance level (p)
IF x I	**EF x I**	NS
IF x I	**I x I**	0.0299
IF x I	**T x I**	NS
EF x I	**I x I**	0.0141
EF x I	**T x I**	NS
I x I	**T x I**	NS
Year		NS
Interactions		NS

NS: not significant ($p>0.01$)

Twinning rate: In Table 3 it can be observed that EFxI presented in the average over the 4 years evaluated a significantly higher percentage of ewes that had twins than the rest of the biotypes present in this study (Table 4), including the pure breed, Polwarth, both for adult and hoggets. These differences persisted even when the model used included the covariable live weight. This could indicate that in the case of the EFxI ewes the superiority in reproductive performance is not only due to a higher live weight than those presented by the other biotypes at the moment of breeding, but can be attributed to genetical differences. It is important to mention that having been raised under the same nutritional and sanitation management (same forage assignment), observed differences in live weight are due to genetical differences.

Table 3: Effect of biotype and category on twinning rate (% of twins).

	Biotype					
Category	**IF x I**	**I x I**	**EF x I**	**T x I**	**Average**	
Hoggets	12	8.7	24	5	12.4	p = 0.0052
Adults	23	13	36	13	21.3	
Average	17.5^{b}	10.9^{bc}	30^{a}	9^{c}		

a, b, c: rows with no common superscripts differ ($p<0.01$)

Significant differences were found in the percentage of animals that lambed twins between adults and 2-thoot hoggets ($p=0.0052$), but these differences disappeared when the data were analyzed at a constant weight ($p=0.1350$, Model 2). This concurs with what was observed in studies done with Corriedale (Ganzábal, 2003). This suggests that the better reproductive performance of adults could be associated in a greater part to the live weight at the breeding (48.3 vs. 45.4 Kg. for adults and hoggets respectively).

Table 4. Level of significance for twinning rate

Variable Biotypes		Level of significance Model 1	Level of significance Model 2
IF x I	**EF x I**	0.0080	0.0065
IF x I	**I x I**	NS	NS
IF x I	**T x I**	NS	NS
EF x I	**I x I**	0.0001	0.0162
EF x I	**T x I**	0.0003	0.0012
I x I	**T x I**	NS	NS
Category		0.0052	NS
Years		NS	NS
Interactions		NS	NS

NS: not significant (p>0.01)

CONCLUSION

The crossbreed biotype with the breed East Friesian (EFxI) was the group that presented the best reproductive performance in fertility and in litter size, of the evaluated biotypes. This superiority is maintained even when the analysis is done at a constant live weight.

REFERENCES

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