Exploring the relationship between the polymorphism of the melatonin receptor gene and the variability of sheep seasonality

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Introduction

Previous works made on Ile de France and Merino d'Arles have proposed association between sheep seasonality of reproduction and a mutation at position 612 in Exon 2 of the melatonin Receptor gene (MT1). Moreover different degree of polymorphism at this locus has been found in alleles associated with high and low seasonality.

Objective

To explore in Latxa dairy sheep breed **-** the relationship between sexual seasonality and polymorphism of the MT1 gene and - the degree of polymorphism at this locus.

Methodology

✏ **1. Estimation of genetic parameters and breeding values of spontaneous ovulatory activity in spring (SOA)**

- ☑ It was assessed using level of progesterone in blood of 411 adult ewes bled repeatedly during 1999 an 2001.
- ☑ A linear animal model was used

✏ **2. Creation of five half-sisters families from heterozygous males for MT1 gene.**

- ☑ Genotyping sire daughters for the 612 position of MT gene
- ☑ Measuring of breeding season features (start, length, end) through progesterone level

✏ **3. Sequencing the area of the MT1 gene Exon 2 around position 612 for Latxa ewes differing at this position**

- ☑ Comparison of sequences associated with different genotypes at position 612 (12 ewes -/- ; 64 ewes +/+)

Results

✏ **1. There is a genetic variation of SOA suitable to be exploited but, heritability estimate is low (0,10 ±0,09)**

✏ **2. No relationship were found between start, length or end of breeding season for the different alleles at position 612. Moreover, no significant differences were found according the inherited allele**

✏ **3. Sequence pattern found in Latxa breed is similar to that already published for other breeds**

- ☑ Total linkage disequilibrium between the silent mutation at position 612 and a non conservative mutation at position 706
- ☑ Unique sequence for all animals with allele - at position 612 : there is no polymorphism from 643 to 1093
- ☑ Large polymorphism associated with allele + at position 612

	GENOTYPE	543	555	606	612	706	783	801	891	1093
ALL BREEDS	-/-	T	G	C	A	A	G	G	T	C
MERINO	+/+	G	G	T	G	G	G	G	C	C
		T	A	T	G	G	G	G	C	C
		T	A	T	G	G	G	G	C	T
		G	G	T	G	G	G	G	C	C
		G	G	T	G	G	G	A	C	C
		T	A	T	G	G	A	A	T	C
		T	A	T	G	G	A	G	T	C
LATXA	+/+	T	G	T	G	G	G	G	C	T
		T	G	C	G	G	G	G	T	C
		G	G	T	G	G	G	G	C	C
		G	G	C	G	G	G	G	C	C
		G	G	T	G	G	A	A	T	C
		G	G	T	G	G	G	A	C	C
		G	G	T	G	G	A	A	C	C

Conclusion

In contrast to other breeds, the association between MT1 genotype and sexual seasonality was not found in Latxa breed, but the particular sequence pattern at this locus is similar to that of other breeds.
This locus might be important in the regulation of out of season reproduction.