

O005 Novel GDF9 polymorphism determining higher ovulation rate and litter size in sheep

**Carlos J Hoff de Souza¹, Alan S McNeilly²,
Magda Vieira Benavides³, Eduardo de Oliveira Melo⁴
and Jose C Ferrugem Moraes¹**

¹Embrapa Pecuaria Sul, Bage, Brazil ²University of Edinburgh, Edinburgh, United Kingdom ³Embrapa LabEx USA, Beltsville, U.S.A. ⁴Embrapa Cenargen, Brasilia, Brazil

Introduction:

Litter size in sheep is mainly determined by ovulation rate (OR). Several polymorphisms have been identified in oocyte specific growth factors such as growth and differentiation factor 9 (GDF9) that result in an increase in OR and prolificacy of sheep. This study aimed to evaluate the effect of a novel polymorphism in sheep GDF9.

Methods:

Screening the databank of the Brazilian Sheep Breeders Association (ARCO) for the phenotype of triplet delivery, we identified flocks of Ile de France ewes segregating a major gene. After re-sequencing of GDF9 a point mutation (C943T) was found, resulting in non-conservative change of an amino acid (Arg315Cys) in the cleavage site of the mature peptide. The allele was called Vacaria (FecG^v) after the city where the first flocks with this polymorphism were located. A group of half-sib ewe lambs was evaluated for OR by a series of laparoscopies during the first (8 months) and second (20 months) breeding seasons.

Results and Discussion:

Females carrying the Vacaria polymorphism had higher OR ($P < 0.001$), based on at least three laparoscopies per animal. The OR were 2.1 ± 0.1 and 1.2 ± 0.1 in mutants ($n=13$) and wild type ewes ($n=13$). The OR was also influenced by the age of the animals but that had no interaction with genotype, the ewe hoggets showed an increase in the ovulation rate in the second breeding season ($P < 0.001$) when the females had an OR of 2.1 ± 0.1 compared with 1.6 ± 0.1 in the first breeding season. In three flocks segregating this allele the litter size was higher in mutant sheep ($P < 0.001$), being 1.5 ± 0.1 in the 47 carriers compared with 1.3 ± 0.1 in wild-type 350 ewes. These are the first descriptions of the effect of this allele in sheep ovulation rate and litter size, additional studies are being conducted on reproductive behaviour of homozygous ewes.