

# Could Anti-Müllerian Hormone be used as a Novel Fertility Trait in Dairy Cows?

M. Gobikrushanth<sup>1,3</sup>, D. C. Purfield<sup>3</sup>, M.G. Colazo<sup>2</sup>, S. T. Butler<sup>3</sup>,  
Z. Wang<sup>1</sup>, D.J. Ambrose<sup>1,2</sup>

<sup>1</sup>Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, Canada T6G 2P5; <sup>2</sup>Livestock Research and Extension Branch, Alberta Agriculture and Forestry, Edmonton, AB, Canada T6H 5T6; <sup>3</sup>Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland.  
E-mail: gobikrus@ualberta.ca; divakar.ambrose@gov.ab.ca

Exploring the use of circulating anti-Müllerian hormone (AMH) concentration as a potential fertility trait is of recent interest. We aimed to determine (1) factors associated with variation in serum AMH concentrations, (2) the relationship between serum AMH concentration and fertility (P/AI, pregnancy loss between 30 and 60 d post-AI [PLOSS] and pregnancy risk up to 250 d postpartum), (3) genomic heritability for serum AMH concentration and (4) single nucleotide polymorphisms (SNPs) associated with phenotypic variation in serum AMH concentration in dairy cows. Serum AMH concentration (pg/mL) were determined during the first week postpartum in 647 lactating Holstein cows from seven herds in Alberta. A subset of the cows was genotyped on the 26 K Bovine BeadChip, and subjected to genome wide association analysis to identify SNPs associated with variation in serum AMH concentrations. The overall mean ( $\pm$ SEM), median, minimum and maximum AMH concentrations were 191.1 $\pm$ 6.3, 151.7, 13.9 and 1,879.0 pg/mL, respectively. Concentrations of AMH were not associated with herd, pre-calving body condition, and postpartum week or season of sampling. The lactation number, however, had a quadratic relationship with serum AMH concentration. Categories of AMH (low [ $\leq$ 83.0 pg/ml], intermediate [ $\geq$ 83.0 to  $\leq$ 285.0 pg/ml] and high [ $\geq$ 285.0 pg/ml] had numerical improvements in fertility outcomes (P/AI: 34, 43 and 40%, respectively; PLOSS: 20, 12 and 8%, respectively), but the differences were not statistically significant. The genomic heritability was estimated to be 0.46 ( $\pm$ 0.31). A total of 647 SNPs across 12 chromosomes were associated with phenotypic variation in serum AMH concentrations. One candidate gene associated with AMH production (AMH gene on *Bos taurus* autosome [BTA] 7) and four candidate genes related to embryo development (SCAI and PPP6C genes on BTA 11 and FGF18 and EEF2K genes on BTA 20 and 25, respectively) were linked to some of the lead SNPs identified to be associated with phenotypic variation in serum AMH concentrations.

Take Home Message: There was some evidence that cows with high concentrations of serum AMH have better fertility outcomes than cows with low serum AMH in the establishment and maintenance of pregnancy; however, these findings warrant further investigation in a larger population of cows.