Proteomic analysis of follicular fluid in carriers and non-carriers of the Trio allele for high ovulation rate in cattle

ABSTRACT

This study was conducted to characterise differences in follicular fluid proteins between carriers and non-carriers of a bovine allele for high ovulation rate. A total of four non-carrier and five carrier females were used in an initial study with four and six additional non-carriers and carriers respectively used in a validation study. Emergence of the follicular wave was synchronised and the ovaries containing the dominant follicle(s) were extracted by ovariectomy for follicular fluid collection. A hexapeptide ligand library was used to overcome the masking effect of high-abundance proteins and to increase detection of low-abundance proteins in tandem mass spectrometry. After correcting for multiple comparisons, only two proteins, glia-derived nexin precursor (SERPINE2) and inhibin β B chain precursor (INHBB), were significantly differentially expressed (false-discovery rate <0.05). In a replicate study of analogous design differential expression was confirmed ($P<0.05$). Joint analysis of results from the two studies indicated that three additional proteins were consistently differentially expressed between genotypes. For three of these five, previous studies have indicated that expression is increased by transforming growth factor-β-bone morphogenetic protein signalling; their reduction in follicular fluid from carrier animals is consistent with the ~9-fold overexpression of SMAD family member 6 (SMAD6) in carriers that is inhibitory to this pathway.

Keyword: Bovine; SMAD6; Follicle; SERPINE2; Inhibin