



Gene Interactions Positively Affect Embryonic Survival in Dairy Cattle

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WARF: P090396US02

Inventors: Hasan Khatib

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a combination of genes that are associated with reproductive performance in cattle.

Overview

Reproductive performance in high-producing dairy cows is declining. The decrease in fertility and early embryonic survival rate is a serious problem worldwide, leading to increased dairy cow culling and economic loss. It likely is caused by several factors, including genetics.

Signal transducer and activator of transcription (STAT) proteins are transcription factors that play important roles in cytokine signaling pathways. Recent studies have shown that STAT proteins are involved in the fertilization process and early embryonic development.

A UW–Madison researcher previously identified single nucleotide polymorphisms (SNPs) that are associated with fertility and embryonic survival in dairy cattle, including a SNP in the *STAT5A* gene. Identification of more genes associated with reproduction traits is needed to facilitate genetic testing of cattle to enable quick and accurate evaluation of fertility and embryo survival rate.

The Invention

Using an *in vitro* fertilization system, the UW–Madison researcher now has identified two SNPs in the *STAT3* gene that are associated with reproduction. He discovered that the combination of the two *STAT3* SNPs, as well as the combination of a previously known *STAT1* SNP and one of the *STAT3* SNPs, are correlated with embryonic survival. The presence of both *STAT3* SNPs or one of the *STAT3* SNPs and the *STAT1* SNP showed a greater association with desirable reproduction traits than either *STAT3* SNP alone.

Applications

- Dairy cattle breeding to improve fertility and embryo survival

Key Benefits

- Provides additional genetic tools for use in selective cattle breeding to enhance fertility rate and embryonic development
- Enables selection decisions to be made earlier than in traditional breeding programs, thereby shortening the generation interval for cattle breeding
- DNA markers are easy to measure, unambiguous and co-dominant.

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For More Information About the Invention:

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Related Technologies

- [WARF reference number P06197US describes the first reported gene, STAT5, to affect embryo survival in mammals.](#)
- [WARF reference number P08266US describes a SNP in the FGF2 gene that is highly correlated with embryonic survival.](#)
- [WARF reference number P09013US02 describes a panel of SNPs from the interferon- \$\tau\$ pathway that is associated with fertility and embryo survival in cattle.](#)

Related Intellectual Property

- [View Divisional Patent in PDF format.](#)

Publications

- Khatib et al. 2009. Effects of Signal Transducer and Activator of Transcription (STAT) Genes STAT1 and STAT3 Genotypic Combinations on Fertilization and Embryonic Survival Rates in Holstein Cattle. J. Dairy Sci. 92, 6186-6191.
- Khatib H, Monson RL, Huang W, Khatib R, Schutzkus V, Khateeb V, Parrish JJ (2010) Validation of In-vitro Fertility Genes in a Holstein Bull Population. J. Dairy Sci. 93(5):22449

Tech Fields

- [Animals, Agriculture & Food : Animal biotech](#)

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