

Research Summaries I

“Beef and General”

Moderator - Don Hansen, DVM

Genetic -Based Infectious Disease Resistance As A New Health Management Strategy

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Cattle naturally resistant to *Brucella abortus* were bred and progeny from five generations of families were used to study the heritability of genes controlling this trait. Back-crossed calves were phenotyped by challenge with *B. abortus* and the results from genetic analyses indicated that at least two genes control this trait. Macrophages (M ϕ) from resistant cattle significantly restricted the *in vitro* growth rate of *Mycobacterium bovis*, *B. abortus* and *Salmonella dublin* which was correlated 83% with *in vivo* resistance. We have cloned the *bovine natural disease resistance associated macrophage protein (BovNramp1)* gene and found a significant association between natural resistance and a polymorphism in the 3' untranslated region. These findings indicate that the polymorphism could be effectively used to genetically select cattle resistant to brucellosis, and potentially salmonellosis, tuberculosis and paratuberculosis. Application of differential display reverse transcriptase PCR (DD RT-PCR) to M ϕ from resistant or susceptible cattle infected or un-infected

with *M. bovis* or *B. abortus* identified several differentially expressed mRNAs two of which were characterized for their potential role in controlling the intracellular growth rate. From infected resistant macrophages, a quantitatively expressed gene with homology to the human calcium dependent potassium channel gene was identified, and a new gene qualitatively expressed was sequenced. Quantitative mRNA expression of *MCP-1*, *TNF α* , *TNF α R*, *GM-CSF*, *TGF β 3*, *IFN γ* , *IL-1*, *IL-2*, *IL-2r*, *IL-3*, *IL-4*, *IL-6*, *IL-8*, *L-8r*, *IL-10*, *IL-12*, *Nramp*, *iNOS* and the two newly identified genes as compared to *GAPD* and *histone* profiled by reverse transcription-T7 RNA dependent amplification (RT-TRDA) from resistant or susceptible challenged and un-challenged M ϕ revealed unique patterns. Our results suggest that genetic control of macrophage bactericidal mechanisms plays a major role in the control of these zoonotic pathogens and may offer an additional approach to pre-harvest pathogen reduction through genetic selection or genetic engineering.

The Effect of Modified Live Bovine Viral Diarrhea Virus (BVDV) Vaccination During the Third Trimester of Pregnancy in Beef Cows

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Sixteen Brahman-Angus F1 cows (3 years old) were found to be negative for persistent BVDV infection by

virus isolation on Buffy coat samples between approximately 180-270 days of gestation. Two weeks later cows