

# Posters

## Characterization of cell mediated immune responses in stressed and unstressed beef calves

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### Introduction

Bovine respiratory disease (BRD) is the most common cause of morbidity and mortality in North American beef cattle. One part of the cattle industry that is particularly affected by BRD is the stocker cattle segment. It is common for stocker calves to be vaccinated against the most common disease causing agents at arrival to stocker facilities. Unfortunately, stocker calves experience numerous stressors that could impact the efficacy of vaccination and it has been established that stress can suppress immune function in cattle. The objectives of this study were to characterize the cell-mediated immune responses multiple source, highly commingled calves of unknown health history and compare the responses of these calves to those of calves that were single source, of a known health history, and weaned for 60 days.

### Materials and Methods

Peripheral blood mononuclear cells (PBMCs) and neutrophils (PMNs) were isolated from blood collected via the jugular vein of each calf. PBMCs were stimulated with Concanavalin A, BVDV-1, BVDV-2, BHV-1, *M. haemolytica*, and *P. multocida* and evaluated for clonal proliferation and secretion of IFN- $\gamma$ , TNF- $\alpha$ , IL-1 $\beta$ , IL-6, IL-8, and IL-17 into cell culture supernatants. The native functional capacities of PMNs were evaluated in response to incubation with heat-killed *E. coli* and *S. aureus*. Complete blood counts (CBC) and

serum biochemical profiles were also performed for each animal at time of sample collection.

### Results

Compared to STR calves, UNS calves had significantly greater lymphocyte proliferative responses following stimulation with viral and bacterial antigens ( $P < 0.05$ ). In addition, PMNs isolated from UNS calves had a greater ability to phagocytose *E. coli* and *S. aureus* when compared to STR calves. Furthermore, CBC and serum biochemical results from STR calves suggested the presence of stress and dehydration. Also, serum non-esterified fatty acids (NEFA) were significantly higher in STR calves ( $P < 0.01$ ), while serum  $\beta$ -hydroxybutyrate (BHB) was significantly lower in STR calves ( $P < 0.01$ ).

### Significance

These data suggest that immunologic and physiologic differences exist between STR and UNS calves. While the underlying mechanisms for these differences are not clear, it is possible that combinations of energy imbalances, stress-induced immunosuppression, and general immune naiveté, may predispose STR calves to an increased risk of morbidity and mortality due to bovine respiratory disease.