

# Research Summaries 4

Moderators: Fred Lehman, Dan Grooms

## Investigation of Bovine Respiratory Disease Pathogens using Immunohistochemistry Testing on Selected Samples

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### Introduction

During the fall of 2004, fall-placed feedlot calves that were diagnosed on gross postmortem examination with bovine respiratory disease (BRD) as the predominant cause of death were pathologically examined in detail using laboratory support to determine the microbiological agents involved in fatal BRD, and to determine if specific microbiological agents were associated with different pathological presentations of fatal BRD.

### Materials and Methods

Animals diagnosed with BRD lesions using gross pathological examination were selected for sampling using a defined protocol that included several feedlots, a specified target population, specific pathological findings and a defined time interval from feedlot arrival to death. Animals during the first 60 days of the feeding period dying with peracute, acute, subacute and chronic BRD, as well as control animals with no BRD, were selected for inclusion in the study. The target was to collect samples from 25 animals with BRD of each duration and 25 control animals for a total of 125 animals. The amount of lung involvement was assessed using digital imaging techniques, and the pathological processes were characterized using gross postmortem observations and histopathology. Immunohistochemistry (IHC) was performed on three samples of lung taken from above, at, and below the line of demarcation between normal and abnormal tissue. Each section was analyzed using IHC to detect the presence of *M. haemolytica* (MH), *M. bovis* (MB), *H. somni* (HS), bovine viral diarrhea virus (BVDV), infectious bovine rhinotracheitis virus (IBRV), bovine respiratory syncytial virus (BRSV) and parainfluenza-3 virus (PI3V).

### Results

Samples were collected from a total of 89 animals at 17 feedlots, representing 13 peracute, 24 acute, 25 subacute, 18 chronic and nine control samples. The histopathologic findings were categorized into one of ten categories, with fibrino-necrotizing pneumonia (54, 83, 72 and 28% of peracute, acute, subacute, and chronic cases, respectively), supportive bronchopneumonia (62, 33, 36 and 39% of peracute, acute, subacute, and chronic cases, respectively), and "mycoplasma-like" necrosis (31, 25, 44 and 78% of peracute, acute, subacute, and chronic cases, respectively) being the three most commonly described lung lesions in each animal. In terms of IHC findings from lung tissues at the animal level, MH and MB were the most commonly identified pathogens, with positive IHC rates for MH of 85, 100, 92 and 28% in the peracute, acute, subacute, and chronic cases, respectively, and positive IHC rates for MB of 54, 46, 68 and 94% in the peracute, acute, subacute, and chronic cases, respectively. Pathogens such as BVDV and HS were found less commonly, with positive IHC rates for BVDV of 8, 38, 40 and 17% in the peracute, acute, subacute, and chronic cases, respectively, and positive IHC rates for HS of 15, 0, 4 and 39% in the peracute, acute, subacute, and chronic cases, respectively. The other pathogens studied in the project were identified in less than 10% of cases. Among the controls, one animal tested positive for BRSV on IHC. Several significant ( $P < 0.05$ ) associations were identified in the initial analyses. Ninety-six percent (24/25) of samples positive on IHC for BVDV were also positive for MH and 81% (13/16) of samples positive on IHC for HS were also positive for MB. Conversely, none of the 16 samples positive on IHC for HS were positive for either MH or BVDV. In addition, there was no significant association ( $P \geq 0.05$ ) be-

tween MH and MB as detected by IHC. There were strong positive ( $P < 0.05$ ) associations between IHC staining for MH and the occurrence of fibrino-necrotizing pneumonia, and IHC staining for MB and the occurrence of “mycoplasma-like” necrosis.

### Significance

The preliminary results of this study demonstrate that several etiologic agents are involved in fatal BRD

of feedlot cattle, with MH (peracute, acute, and subacute cases) and MB (chronic cases) identified in the vast majority of fatal BRD cases. In addition, preliminary results of this study identify some interesting associations between etiologic agents that warrant further investigation. More detailed/complex analyses and inclusion of IHC data for other agents such as *P. multocida* and *A. pyogenes* may improve interpretation of the preliminary results.

## Effects of NPCoat Intranasal™ on Health and Productivity of Beef Cattle

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### Introduction

Bovine respiratory disease (BRD) continues to plague the beef cattle industry. Despite the introduction of new antibiotics and vaccines, the incidence of BRD has continued to rise. Although appropriate preconditioning can greatly lower the incidence of BRD, most cattle are not preconditioned and the stresses of weaning, commingling, transportation and acclimation can easily cause treatment rates exceeding 50% or more. NPCoat Intranasal™ is a medical device based on antibodies processed from hen's eggs that provides a protective shield against viral, bacterial and mycoplasmal proliferation when sprayed into the nasopharyngeal cavity of cattle. This report details the effects of the application of NPCoat Intranasal™ on the incidence of morbidity and mortality related to BRD in southeastern calves shipped to a Colorado feedlot during January and February, 2005.

### Materials and Methods

Between January 17 and February 17, 2005, 465 southeastern mixed bulls and steers weighing approximately 500 lb (227 kg) were received at a northern Colorado feedlot. At processing, cattle were randomized and divided into two groups. In addition to usual processing, group B received 1.5 ml/nostril of NPCoat Intranasal™<sup>a</sup> on days one and seven. Group A received

an equal volume of placebo on the same schedule. Investigators, monitors and feedlot personnel were blinded to treatment identity. Number of head pulled/treated, number of head re-treated, total number of medical treatments, medical treatment costs, medical treatment rate percentage, medical re-treatment rate percentage, average number of treatments per head, respiratory removals, respiratory deaths, pen feed consumption and pen average daily gain were measured for the duration of the study.

### Results and Discussion

The final data summary for this study is as follows:

Summary data through 56 days			
	A-placebo	B-NPCoat	A vs. B
No. head started	233	232	
No. head treated	148	135	8.5% higher
No. head retreated	93	74	20.1% higher
Total no. medical treatments	311	265	14.8% higher
Respiratory chronics	13	10	23.1% higher
Respiratory deaths	29	20	30.5% higher
Total deaths	31	20	37.5% higher