calves with lung inflammation associated with mycoplasma bronchopneumonia. Receiver operative characteristic (ROC) curves was constructed to describe the performance of amino acid profiles in calves with mycoplasma bronchopneumonia. These data may be useful diagnostically and prognostically in calves with bronchopneumonia.

Materials and Methods

Eighteen calves admitted to the Veterinary Teaching Hospital demonstrating clinical signs compatible with bronchopneumonia. After physical examination and diagnostic imaging confirmed the cause of their signs, a bronchoalveolar lavage was performed and a *M. bovis*-specific PCR assay demonstrated positive responses in all 18 ill calves. **Sixteen calves owned by Rakuno Gakuen University that were *Mycoplasma*-free and had no abnormal clinical signs were used as controls.** Single blood samples were collected by jugular venipuncture from all calves on arrival the hospital. Free amino acid concentrations in serum were determined using automated amino acid analysis system (The Shimadzu Prominence LC-20AD amino acid analysis system, Shimadzu, Kyoto, Japan). We calculated the essential amino acid (EAA), non-essential amino acid (NEAA), TAA (EAA + NEAA), BCAA (Val + Ilu + Leu), AAA (Tyr + Phe), BCAA/AAA, and SPR, respectively. For non-normally distributed data, the Kruskal-Wallis test was employed for comparison among groups. The ROC curves were used to characterize the sensitivity and specificity of a parameter associated with a poor prognosis (euthanized or died). The significance level was set at $p<0.05$.

Results

The average concentrations of serine, alanine, valine, leucine, phenylalanine, and ornithine were significantly lower in the calves with bronchopneumonia than those of normal animals ($p<0.001$). In contrast, calves with mycoplasma bronchopneumonia were found to have large amounts of phosphoserine ($p<0.001$), o-phosphoethanolamine ($p<0.01$), citrulline ($p<0.01$), cysteine ($p<0.001$), tyrosine ($p<0.001$), carnosine ($p<0.01$) and OH-lysine ($p<0.01$) compared to those without respiratory disease. There were no significant differences in the levels of the remaining 16 amino acids or NH4. The calves with mycoplasma were characterized by significantly lower TAA, total EAA, BCAA/AAA, and BTR, and were significantly higher in SPR. The proposed diagnostic cutoffs for BCAA/AAA, BTR and SPR in serum based on ROC analysis in detecting catabolic states associated with mycoplasma bronchopneumonia were set at < 1.75, < 2.86, and >0.85, respectively.

Significance

This study demonstrated that BRD inflammation resulted in increased serum tyrosine, 1 component of serum AAA. This increase was also associated with decreases in serum BCAAs. The serum amino acid profiles described in this study demonstrated significantly lower BCAA/AAA and BTR in calves with bronchopneumonia than in normal calves. In addition, the BTR (AUC=0.892) was similar to BCAA/AAA (AUC=0.882). These ratios characterize the metabolic state of the animal with chronic bronchopneumonia. The observed sensitivity and specificity of the ROC analysis of serum amino acid profiles indicated that these profiles may be useful in managing clinical mycoplasma bronchopneumonia cases. Future studies need to focus on dissecting those changes associated with inflammation, anorexia, and those specific to mycoplasma bronchopneumonia.

Real-time detection of bovine viral diarrhea virus using detection dogs: a proof of concept study

T.C. Angle, *PhD*[1]; **T. Passler**, *DVM, PhD*[2]; **L.P. Waggoner**, *PhD*[2]; **T.D. Fischer**, *BS*[2] ; **B. Rogers**, *BS*[2]; **P. Galik**, *MS*[3]
[1]*Canine Performance Sciences Program, Auburn University, AL 36849*
[2]*Department of Clinical Sciences and Pathobiology, Auburn University, AL 36849*
[3]*Animal Health Research, Auburn University, AL 36849*

Introduction

Viral infections are ubiquitous in humans, animals, and plants. Real-time methods to identify viral infections are limited and no rapidly deployable detection technology exists. Previous research identified that tissues produce unique volatile organic compounds (VOC) and demonstrated that VOC concentrations change during pathologic states including infection, neoplasia, or metabolic disease. Patterns of VOC expression may be pathogen-specific and may be associated with an odor that could be used for disease detection.

Materials and Methods

We investigated the ability of 2 trained dogs to detect cell cultures infected with bovine viral diarrhea virus (BVDV) and to discriminate BVDV-infected cell cultures from uninfected cell cultures and from cell cultures infected with bovine herpesvirus 1 and bovine parainfluenza virus 3. Dogs were trained to recognize cell cultures infected with 2 different biotypes of BVDV propagated in MDBK cells using 1 of 3 culture media. For detection trials, 1 target and 7 distractors (or 8 distractors for blank trials) were placed in petri dishes and presented by a blinded dog handler on a scent wheel.

Results

Detection of BVDV- infected cell cultures by Dog 1 had a diagnostic sensitivity of 0.850 (95% CI: 0.701, 0.942), which was lower than Dog 2 (0.967, 95% CI: 0.837, 0.994). Both dogs exhibited very high diagnostic specificity (0.981, 95% CI: 0.960, 0.993) and (0.993, 95% CI: 0.975, 0.999), respectively.

Significance

These findings suggest that BVDV infection results in expression of unique VOC patterns in cultured cells. Trained detector dogs represent a plausible real-time mobile pathogen sensing technology for viral pathogens.

Effect of injectable castration regimen administered at branding on gain performance, testosterone production, and testicle atrophy in beef bull calves

J. G. Powell, *DVM, PhD*[1]; **P. A. Beck**, *PhD*[2]; **E. B. Kegley**, *PhD*[1]; **J. K. Apple**, *PhD*[1]; **D. R. Cox**, *DVM*[3]
[1]*Department of Animal Science, University of Arkansas, Fayetteville, AR 72701*
[2]*Southwest Research and Extension Center, University of Arkansas, Hope, AR 71801*
[3]*Cowboy Animal Health, LLC, Plano, TX 75023*

Introduction

The USDA estimates 15 million castration procedures are performed annually on bull calves in the United States. Currently, no commercially available injectable sterilization methods exist for beef cattle in the US. Some zinc solutions have been utilized in other in other species, such as companion animals, as an injectable sterilization method. The objective of the current study was to evaluate the effect of a zinc solution as an injectable castration method when administered at 3 dosages to beef bull calves at branding. The effect of the injectable castration method on weight gain, testosterone production, and testicle atrophy was measured.

Materials and Methods

Crossbred beef bull calves (n=31; BW=252 ± 58 lb) were allocated to treatments by bodyweight and birthdate. Twenty-seven bull calves were allocated to 3 injectable castration treatments (n=9 calves/injectable castration treatment) with technicians on-site being blinded to treatments. Treatments were arranged to reflect 3 levels of dosages of the zinc solution (Calivex, Cowboy Animal Health, LLC, Plano, TX). Two bull calves were castrated using knife techniques (negative control) and 2 bull calves were left intact (positive control) until the termination of the study at weaning. Bulls were gathered from pastures, separated from dams, and weighed with no further shrink prior to processing on d 0 and on 28-day intervals until they were weaned from dams on d 122. Blood samples and scrotal measurements were obtained on d 0, 28, 56, 83, and 122. Serum was analyzed for testosterone concentrations. Bodyweight and performance were analyzed using the general linear measures procedure of SAS. Serum testosterone concentrations and thicknesses of the right testicle and scrotum were analyzed using repeated measures analyses. Contrasts were used to compare intact vs castrated, injection vs knife, and linear and quadratic effects for Calviex dosage.

Results

There were no effects (P≥0.64) of castration or castration method on bodyweight or pre-weaning average daily gain. Over the course of the experiment, mean average daily