Antemortem Diagnosis of Bovine Respiratory Disease

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The bovine respiratory disease complex (BRDC) is the most common disease problem in feedlot cattle, accounting for 65-75% of feedlot morbidity and mortality. The annual cost of BRDC to the cattle industry has been estimated at $167.2 million to $232.4 million (Perino, 1992). BRDC is caused by a complex interaction of stresses and microorganisms on the host animal. In most outbreaks, it is not possible to diagnose with certainty which infectious agents are present by clinical examination alone. Diagnosis of infectious causes of BRDC has primarily been done on tissue samples obtained from postmortem examinations. This method has resulted in a low diagnosis rate for viral infections. In addition, antibiograms done on bacterial isolates from the lungs of treated dead cattle or chronically ill cattle are of questionable value since these samples were obtained from "treatment failures". We have adopted a new program combining nasal swabs and tracheal swabs to improve viral diagnosis rates and provide more meaningful sensitivity data on bacterial isolates. The goal of this program is to provide more timely and accurate information so informed decisions can be made on treatment, vaccination, and herd health programs when BRDC outbreaks occur.

Materials and Methods

Animals selected for sampling were in the acute stages of respiratory disease and had not had recent antibiotic treatment. A squeeze chute was used for restraint. Two sterile dacron swabs (American Scientific Products, McGaw Park, IL) were used to collect specimens of nasal exudate from the deep nasal cavity for virology tests. These swabs were immediately placed in viral swab transport medium (minimal essential media), labelled, and placed in a styrofoam cooler out of direct sunlight until they were delivered to the laboratory. A tracheal culture was obtained using an oral speculum and a 26" long commercial guarded tracheal swab and transport system (Accu-CulShure® Specimen Collection and Transport Instrument, Technology for Medicine, Inc., Pleasantville, NY). After the sample was collected, the swab was snapped apart at the black mark, placed in the shipping tube, labelled, and chilled.

The samples were received at the laboratory within 24 hours of collection. One nasal swab was inoculated onto cell cultures for virus isolation and identification attempts. The media was vortexed for two minutes and filtered through a 0.45 μm filter. Then 0.2 ml samples were added to bovine turbinate cells and bovine lung cells. Samples were incubated for up to two weeks at 37°C. Cell cultures were observed daily for cytopathic effects, and isolates were identified with specific fluorescent antibody conjugates. The second nasal swab was tested for bovine respiratory syncytial virus (BRSV) using a human respiratory syncytial virus (RSV) commercial ELISA test (Abbott Test Pack® RSV, Abbott Laboratories, North Chicago, IL). The media sample was vortexed for two minutes and was then handled as previously described (Rodgers, 1990). Results were obtained in less than 30 minutes.

The tracheal swab was inoculated onto sheep blood agar and incubated in a 5% CO_2 environment for 48 hours at 37°C. Significant isolates were identified and antibiograms obtained using minimum inhibitory concentration (MIC) testing (Sensititre® System, Radiometer, West Lake, OH).

Results and Discussion

Eight herds were sampled using the new protocol and significant pathogens were found in each herd. Significant bacterial pathogens were found in each herd (100%) and viral agents were identified in 50% of the herds (Table 1). Traditional virus isolation methods using tissue specimens from dead animals result in approximately a 20% rate of diagnosis. Our limited trial resulted in a 30% increase in diagnosis rates. A similar system of viral diagnosis has been used by another diagnostic laboratory resulting in a 50% increase in diag-

nostic rates (Mock, 1992). Mock (1992) and Rodgers (1990) both found the RSV ELISA test to be effective for BRSV diagnosis. This was important because the labile nature of BRSV makes it very difficult to isolate using cell culture methods. We did not diagnose any BRSV infections in this trial, but this may have been due to the limited number of herds tested. The guarded tracheal swab was used to obtain pretreatment bacterial isolates from the lower respiratory tract. The Accu-CulShure® swabs contain transport medium (Cary-Blair) to maintain bacterial viability during shipping to the laboratory. Bacterial isolates from the lungs of treated dead calves represent treatment failures and are not good indicators to use for antibiotic selection (Kee Jim, 1992). Nasal swabs have been used in the past to obtain bacterial isolates, but the isolates may not be representative of isolates from the lower respiratory tract (Allan, 1985). In addition, resident nasal bacteria may overgrow respiratory pathogens. Moreover, a recent study by Mechor, *et al.* (1988) demonstrated that sensitivity results obtained from pretreatment nasal swabs using the Kirby-Bauer technique do not correlate with subsequent clinical response obtained with various antimicrobials. MIC testing performed on the isolates serves as a guide for dosage determination for antibiotic treatment. The MIC results must be correlated with clinical response when selecting antibiotics for treatment.

Table 1. Results of antemortem BRD study.

Case	# Animals tested	Pathogens Isolated
1	3	Pasteurella multocida
2	7	Pasteurella haemolytica
3	2	Actinomyces pyogenes, Infectious bovine rhinotracheitis virus (IBR)
4	9	Haemophilus somnus, Pasteurella multocida
5	9	IBR, Pasteurella haemolytica, Haemophilus somnus, Actinomyces pyogenes, Pasteurella multocida
6	2	Pasteurella haemolytica
7	8	IBR, Pasteurella haemolytica
8	1	Bovine virus diarrhea virus, Haemophilus somnus

In conclusion, we believe this system can be used to improve antemortem diagnosis rates for BRD. We feel it is important to identify primary etiologic agents in pneumonia outbreaks so that effective vaccination programs can be developed, informed decision can be made on treatment programs, and new infections can be identified. By implementing this program, veterinarians and cattlemen can more quickly identify and effectively treat respiratory disease problems resulting in fewer sick days and less stress in groups of cattle. The nasal swab specimens are easy to obtain, and the system increases virus isolation rates over tissue submissions. The tracheal swab specimen can be obtained rapidly and is less stressful than a tracheal wash. The bacterial isolates obtained are more representative of acute pneumonia than isolates from nasal swabs and from treated cattle, and so the antibiograms obtained should be more useful for developing treatment programs.

Footnote

Accu-View® Mouth Gate and Speculum and Accu-CulShure® specimen collection and transport instrument by Medical Laboratory Automation, Inc., 270 Marble Ave., Pleasantville, NY 10570-2982; phone 800-431-1720.

S/P® Sterile Dacron® Tip Applicator Cat. No. A5005-1 by Baxter Diagnostics, Inc., Scientific Products Division, 1430 Waukegan Road, McGaw Park, IL 60085-6787; phone 800-964-5227.

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