Comparative Efficacy Studies: Tilmicosin vs Long-Acting Oxytetracycline or Ceftiofur for Treatment of Bovine Respiratory Disease in Newly Received Calves

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Six comparative efficacy studies were conducted to evaluate tilmicosin (TIL) and either long-acting oxytetracycline (LAO) (3 studies) or ceftiofur (CFT) (3 studies) for treatment of bovine respiratory disease (BRD) in newly received salebarn or ranch calves. Two studies were conducted in each of the following locations: Colorado, Idaho and Oklahoma. Calves at each location were processed according to standard trial site procedures. Within each trial, morbid animals were identified and randomly assigned to the respective treatment groups (TIL vs LAO or TIL vs CFT). Morbid animals were identified as exhibiting clinical signs of BRD and a minimal rectal temperature of 104.0 F. All antibiotics were administered at label dosages. Following assignment to treatment, animals were housed in 10 to 20 head dedicated treatment pens for the remainder of the respective study. A total of 1109 calves were treated for BRD in the 6 studies (range, 121 to 200 BRD cases/site). Average initial body weight at the 6 locations was 513 lb (range, 412 to 627 lb). All cattle within a location were fed conventional starter and growing rations. Observations included rectal temperature and clinical impression score (CIS) on days 0 and 3, and body weight on days 0 and 28. Body weight was determined on day 100 in 3 studies. Treatment response (success or failure) was determined by evaluating each animal for improvement of the day 0 CIS, and rectal temperature at 72 hours post initial therapy. BRD therapy outcome was categorized as: treatment success (animal requiring only the initial experimental treatment therapy), treatment failure (animal requiring a second antibiotic regime within or at 72 hours post initial therapy), repull (animal requiring a second antibiotic regime at or after 96 hours post initial therapy), chronic (animal not responding to multiple antibiotic regimes) and mortality. All studies were conducted under a similar protocol. Three studies lasted 28 days and 3 studies lasted 100 days. Data within each study were analyzed using analysis of variance techniques. Treatment success favored (P<.05) TIL in 2 of the 3 TIL vs LAO studies and in 2 of the 3 TIL vs CFT studies. Treatment success rates for the 3 TIL vs LAO studies were: 95 vs 72%, 43 vs 14% and 85 vs 75%, respectively, and for the 3 TIL vs CFT studies were: 73 vs 56%, 87 vs 79% and 93 vs 86%, respectively. Treatment failure favored (P<.05) TIL in 1 of the 3 TIL vs LAO studies and in 1 of the 3 TIL vs CFT studies. Treatment failure rates for the 3 TIL vs LAO studies were: 0 vs 3%, 50 vs 75% and 15 vs 25%, respectively, and for the 3 TIL vs CFT studies were: 24 vs 42%, 1 vs 4% and 5 vs 5%, respectively. Repull rate favored (P<.05) TIL in 1 of the 3 TIL vs LAO studies and in 1 of the 3 TIL vs CFT studies. Repull rates for the 3 TIL vs LAO studies were: 5 vs 25%, 6 vs 11% and 5 vs 4%, respectively, and for the 3 TIL vs CFT studies were: 5 vs 10%, 12 vs 18% and 2 vs 9%, respectively. The number of cattle classified as chronic was not different in any of the 6 studies. Mortality was not different in the TIL vs LAO studies and favored (P<.05) TIL in 1 of the 3 TIL vs CFT studies. Mortality rates for the 3 TIL vs LAO studies were: 0 vs 0%, 0 vs 1% and 0 vs 0%, respectively, and for the 3 TIL vs CFT studies were: 2 vs 10%, 1 vs 1% and 0 vs 0%, respectively. Feed performance is a reflection of therapeutic response in morbid cattle, (Bateman, K. G., *et al*, *Can Vet J,* 31:689-696, 1990). In our studies, day 28 average daily gain favored (P<.05) TIL in 2 of the 3 TIL vs LAO studies and in all 3 of the TIL vs CFT studies. Day 28 average daily gain (lb) for the 3 TIL vs LAO studies was: 2.69 vs 2.41, 1.71 vs 1.50 and 3.63 vs 3.79, respectively, and for the 3 TIL vs CFT studies was: 0.63 vs -0.03, 0.64 vs 0.28 and 2.68 vs 2.23, respectively. Day 100 average daily gain (lb) in 2 TIL vs LAO studies was: 3.10 vs 2.96 and 3.58 vs 3.59, respectively, and in 1 TIL vs CFT study was 3.02 vs 2.92, respectively. The combined results of these 6 studies confirm that tilmicosin is an effective antibiotic therapy for treating bovine respiratory disease.

Evaluation of Herd Serum Antibody Titers
(A vital tool in formulating an effective herd vaccination program)

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The presence of antibodies in an animal at vaccination will impair the immune response elicited by a vaccine. Cattle that have not developed an acquired immune response (either by vaccination or natural infection) **are**

susceptible to impairment at much lower levels of passively acquired antibody than cattle with acquired immunity. Even this latter group can have a depressed immune response to an antigen when sufficient levels of antibody are present. The level of antibody that will impair the immune response will vary depending on the specific antigen e.g. BHV-1 has a lower antibody threshold as compared to BVDV. The composition of a vaccine also has a direct impact on its vulnerability to antibody. Vaccines containing a small antigenic mass require replication in the host to produce a satisfactory immune response. These vaccines are highly vulnerable to the presence of antibody since the live vaccine viruses will be neutralized before they can replicate. In contrast, vaccines containing certain adjuvants, e.g., Freund's Incomplete, can form a barrier between the vaccine antigen and antibody that retards the formation of antibody antigen complexes.

This information is fundamental for evaluating a herd vaccination program and can be applied in two important ways:

1) **Evaluating the effectiveness of an existing vaccination program.**

   This involves a comparison of paired serum samples from the herd collected on the day of vaccination and on selected day(s) following vaccination. The subsequent data would indicate both the efficacy and cost-efficiency of a given vaccination program.

2) **Assessing antibody titers within a herd at different stages.**

   A single sampling of herd serum from cows at various stages of reproduction (as well as calves) will indicate which types of vaccines should be used at selected stages.

"Standardized" assessment of antibody titers is becoming a reality at most diagnostic laboratories. These tests are highly reliable and relatively inexpensive. These assessments of antibody levels can be indicative of the scope of the immune response. For example, a minor rise in antibody titer following vaccination implies that the vaccine poorly stimulated other components of the immune system, e.g. cell-mediated immunity. Recent studies point to this conclusion *despite hopes to the contrary.*

Poster supported by Grand Laboratories, Inc., Larchwood, Iowa.

Autogenous Vaccines in the Prevention and Control of Mastitis (Herd Specific and Antibiotic Free Solutions)

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Even though vaccine manufacturers are making great advances in vaccines every year, many long-known mastitis-causing enemies of the dairy industry still cause great problems for veterinarians and producers alike. Mastitis is probably one of the most frustrating diseases to treat especially with new strain variations emerging year to year. The other issue that is compounding this situation is the curbing of antibiotics use because of stricter milk quality assurance programs. A lot of practices are doing well with the use of herd-specific and disease-specific autogenous vaccines which are economical, easy to use, and effective. We as veterinarians are the 1st step in prophylaxis with these vaccines, by sending an isolate or milk sample to the diagnostic lab for identification. Working with a federally approved laboratory, the isolates are used to produce vaccines, employing methods that preserve antigenic integrity. Then in order to maximize its immunogenic potential, they are adjuvanted plus safety and sterility tested before we get it back to use on the farms of origin. More of the smaller dairies in our region are looking for ways to stay competitive with the larger integrated dairies, especially in the face of situations such as high somatic cell counts caused by mastitis, quality assurance and the restrictive use of antibiotics are going to demand the industry looks somewhere for answers. Autogenous vaccines may be one of those answers.