Clinical Reports:

Efficacy of Corticosteroids as Supportive Therapy for Bronchial Pnuemonia in Yearling Feedlot Cattle

B.M. Christie, *D.V.M.*
Box 1761
Hereford, Texas 79045
R. E. Pierson, *D.V.M.*, **P.M. Braddy,** *D.V.M.*, **D.E. Flack,** *D.V.M.*, **D.P. Horton,** *D.V.M., M.S.*, **R. Jensen,** *D.V.M.*, **E.A. Lee,** *R.S.*, **E.E. Remmenga,** *Ph.D.*, **K.G. Rutt,** *B.S.*,
College of Veterinary Medicine and Biomedical Sciences
Colorado State University,
Fort Collins, Colorado 80523

Respiratory diseases cause more fatalities to feedlot cattle than all other diseases combined (1). Conventional treatment for bacterial pneumonias usually consists of antibiotics and/or sulfonamides. Rationale for supportive therapy in the treatment of pneumonia lacks scientific basis and proof. One of the most controversial drugs for supportive therapy are corticosteroids. The purpose of this paper is to report on the efficacy of dexamethasone,[a] a potent synthetic anti-inflammatory corticosteroid when used with antibiotics and sulfonamides in Shipping Fever pneumonia of yearling feedlot cattle.

Material and Methods

Cattle: This study involved 2,184 yearling cattle diagnosed as clinical cases of bronchial pneumonia. A diagnosis of bronchial pneumonia was based on: 1) history of recent arrival in the feedlot, and 2) clinical signs which included febrile response, coughing, hyperpnea, dyspnea, nasal discharge, rales and referred bronchial sounds on auscultation of lungs, depression and anorexia. The 2,184 cattle were selected from a total cattle population of over 200,000 which had received vaccination for IBR-Lepto, dipped for ectoparasities and implanted with an anabolic hormone within 10 days of arrival in the feedlot.

Necropsies: Treated cattle which died during this trial were necropsied for confirmation of clinical diagnosis.

Trial Protocol: Pneumonic cattle were randomly placed into either one of two groups for treatment. Group II (control) cattle were treated with 5 mg/lb. of terramycin I.V., 250 mg. Pyrelamine[d] I.M. and 10 cc placebo (propylene glycol). Group I (principals) received the same treatment as the controls but dexamethazone at 20 mg/day was given in place of the placebo (Table 1).

Clinical Evaluation: Treated cattle were evaluated daily. Recovered animals were sent to convalescent pens first; later to their original pens. Sick cattle were continued on therapy as outlined in Table 1 until either a response occurred, treatment was discontinued due to chronicity or the animal died. On day 2 following initial treatment, lungs were auscultated and evaluated. Cattle showing signs of disease other than pneumonia were eliminated from the trial. A computerized record system was used to summarize and evaluate the results.[b] Periodic statistical analysis determined when to terminate the trial.

Laboratory Evaluation: Blood samples from 330 pneumonic cattle were collected on days 1 and 3 for determination of plasma protein: fibrinogen ratios (P-P:F). Plasma and serum proteins were measured with a refractometer.[c] Fibrinogen and PP:F were calculated from these measurements.

Results

Clinical Evaluation: Table 2 summarizes the clinical response to treatment in both control and principals. When dexamethasone was administered, the response to treatment was poorer, more relapses occurred, and more cattle died from pneumonia. Variation of response and relapses were statistically significant. ($P < 0.05$ and 0.01, respectively). No statistical difference was found in deaths between Groups I and II.

Laboratory Results: PP:F ratios decreased in both groups from day 1 to 3, defining an absolute increase in the fibrinogen concentration (Table 3). However, no statistically significant difference was present between the two groups.

Discussion

Dexamethasone-treated cattle had a poorer response during initial treatment and relapsed more frequently than controls. This is consistent with observations in human pneumonia where corticosteroids accelerate an afebrile response (2) and exacerbations of signs 24 hours or more after the last steroid treatment.

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[a] Azium, Schering Corporation, Bloomfield, New Jersey.
[b] Dr. E.E. Remmenga, Statistical Department, Colorado State University.
[c] T.S. Meter, American Optical Co., Buffalo, New York.
[d] Antihistamine

Table 1. Therapy Regime for Dexamethasone-Treated and Control Cattle

	Principals (Group I)	Control (Group II)
Day 1, 2 & 3: All Experimental Animals	Terramycin — IV — 5 mg/lb Pyrilamine — IM — 250 mg Dexamethasone — IV — 20 mg (10cc)	Terramycin — IV — 5 mg/lb Pyrilamine — IM — 250 mg Placebo (Propylene Glycol) IV (10cc)
	Evaluation	
Day 4, 5 & 6:	Non-responsive Animals Triple Sulfa Solution* — IV — 2 gr/lb initially; then 1 gr/lb, Tylosin — IV — 3 mg/lb	
	Re-evaluation	
Day 7, 8 & 9:	Non-responsive Animals Erythromycin — IM — 3 mg/lb	
	Re-evaluation	
Day 10+:	Non-responsive Animals Not Standardized	

*8% Sodium Sulfamethasine, 8% Sodium Sulfamerazine, 8% Sodium Sulfathiazole.

Table 2. Results of Treatment

	Group I Principals Treatment: Terramycin 5 mg/ lb + Pyrdamine 250 mg. Azium 20 mg	Group II Controls Treatment: Terramycin 5 mg/ lb., Pyrelamine 250 mg. 20 cc Placebo
Number treated	1113	1071
Number to respond	913 (82%)	916 (85.5%)
Death loss	77 (6.9%)	61 (5.7%)
Relapsed	265 (23.8%)	193 (18%)

Table 3. Effect of Dexamethasone on Fibrinogen Ratios of Pneumonic Feedlot Cattle.

	Group I Principals (322 hd.)	Group II Controls (338 hd.)
Mean Plasma Protein (gm%):		
Day 1	7.80	7.85
Day 3	7.73	7.74
change	-0.07	-0.11
Mean Fibrinogen (mg%):		
Day 1	700.8	658.0
Day 3	760.1	733.6
change	+59.3	+75.6
Mean PP:F Ratio:		
Day 1	10.13	10.93
Day 3	9.17	9.55
change	-0.96	-1.38

Normal fibrinogen and PP:F ratios have been reported (3,4,5). A PP:F ratio of 10:1 or less is indicative of a significant increase in the absolute concentration of plasma fibrinogen, while values of 15:1 or greater indicate no absolute increase in plasma fibrinogen (5). The normal plasma fibrinogen is reported to be 450-750 mg/100 ml(5). Mean plasma fibrinogen levels for sick cattle with pneumonia is reported to be 1300 mg%, with a range of 875-2300 mg%. The absolute plasma fibrinogen concentration, as measured by the PP:F ratio, increased from day 1 to day 3 in both groups. Response to anti-inflammatory agents are expected to give the opposite results. This may be a result of two processes: either the response to the inflammatory process is increasing in spite of administration of Azium in this time span

or the tissue destruction associated with daily processing and venapuncture, as well as intramuscular injections, was sufficient to cause a fibrinogen response. It has been shown that daily blood sampling alone does not alter plasma fibrinogen levels (6). Normal individual fibrinogen values vary widely (3).

Until this trial was conducted, the efficacy of corticosteroids in treating bronchial pneumonia in cattle was not known. Feedlot consultants and practitioners were undecided whether or not to use steroids as an adjunct to conventional antibiotic and/or sulfonamide therapy in bronchial pneumonia. From this study, the following observations and recommendations can be made.

1. Dexamethasone in the treatment of bronchial pneumonia of feedlot cattle results in:
   a. Increased number of relapses
   b. Fewer animals to respond to treatment
   c. Possibility of increased death loss
   d. Prolonged course of disease before death
2. Dexamethasone is contraindicated in the treatment of bronchial pneumonia.
3. Fibrinogen ratios are unaffected by 20 mg of dexamethasone.

Summary

Administration of dexamethasone (20 mg/hd/day for 3 days) as supportive therapy when combined with antibiotics and/or sulfonamides to yearling feedlot cattle with bronchial pneumonia resulted in poorer response, more relapses and a prolonged course of the disease. Even when combined with antibiotics and/or sulfonamides, dexamethasone should be considered contraindicated in this type of pneumonia.

References

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Oral Vaccine for Prevention of *E. Coli* Diarrhea in Calves

Samuel G. Walton, *D.V.M.*
Effingham, Illinois 62401

A problem evolved in a Holstein dairy herd where calves less than 12 hours old developed a profuse watery diarrhea. This diarrhea became increasingly difficult to control with good management and antibiotics. The last antibiotic used that was effective was chloramphenicol. This had to be given at the rate of 1 gram intravenously twice a day for the first two days of life. Necropsy and cultures done at the farm and the State Diagnostic Laboratory showed a severe *E. coli* enteritis. Because rotation of calf maternity and calf-raising buildings did not decrease the severity of the diarrhea, the owner asked if there was another way to control the diarrhea. It was explained that in swine with a similar problem excellent results had been obtained using Dr. Erwin Kohler's[1] procedure for an oral *E. coli* vaccine.

With the owner's permission, Dr. Kohler's procedure was basically followed. Rectal swabs were taken from a calf with acute watery diarrhea. These swabs were streaked on Tergitol 7 Agar and allowed to grow for 24 hours at 37°C. The colonies selected for vaccine production were the ones with smooth edges, yellow in color with no red, and very mucoid. No intestinal loop pathogenicity tests were done because my experience has been, in swine, the appearance of the colony on Tergitol 7 Agar is a good indication of pathogenicity. Once the colonies were selected, they were stored in Tryptose Agar slants and also cultured for identification on Bactassy Plates (R)[2] to insure the cultures were *E. coli.*

Next, a group of dry cows was vaccinated four to six weeks before their parturition date. The vaccine was made by removing some *E. coli* stored in the Tryptose Agar slants and growing the *E. coli* in Brain Heart Infusion Broth for 24 hours at 37°C. The broth is then added to whole cow's milk and incubated for another 24 hours at 37°C. The volume of broth used is 20 ml per gallon of milk. The milk volume is 12 ounces per cow to be vaccinated.

The results obtained in this herd were very good. Thirty-eight calves out of forty were raised after vaccination. Of the two calves not surviving, one calf was born dead, and the other was weak and died within 12 hours of birth with no diarrhea. The same procedure has since been used on two other farms with equal success. The biggest advantage of this system is that the pathogenic *E. coli* can be stored and fresh vaccine made at frequent intervals by a simple incubation procedure. Also, only one feeding of colostrum seems to be sufficient if it occurs within one hour of birth.

[1]Dr. Erwin Kohler, Dept. of Veterinary Science, Ohio Agricultural Research & Development Center, Wooster, Ohio 44691.
[2]Bactassay Plates - Pitman-Moore, Washington Crossing, New Jersey 08560.