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A Pilot Study of the Impact of Metaphylactic Treatment at Processing on Lung Lesions at Slaughter

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Summary

The utility of metaphylactic antibiotic/anti-inflammatory treatment in prevention of cattle lung lesions was examined. Sixty-nine, single source, ranch direct, fall weaned steers were allocated to treatment or no treatment groups at feedlot arrival in February, 1999. Treatment consisted of single subcutaneous administration of Nufloor™ (florfenicol, Schering-Plough Animal Health) at 18 mg/lb bodyweight and Banamine™ (flunixin meglumine, Schering-Plough Animal Health) at 1 mg/lb bodyweight. All steers were weighed, vaccinated with a modified live IBR/PI₃ vaccine, implanted, and identified by ear tag. Cattle were fed for maximum gain on a corn-based diet. At harvest, after 133 days on feed, lungs were observed for lesions indicative of previous pneumonia and scored using an established system. Hot carcass weight, quality grade, and yield grade was collected on each carcass. Results indicate that while lung lesions were prevalent (43.3% of cattle affected), treatment had no effect on the prevalence of lung lesions at slaughter. In addition, lung lesions were not associated with feedlot average daily gain or quality grade. This small study suggests that prevalence of lung lesions in low risk cattle will not be affected by administration of metaphylactic treatment with Nufloor/Banamine at processing.

Introduction

Bovine respiratory disease continues to be an important disease problem in feedlot cattle (1). The incidence of clinical respiratory disease is variable, and is marginally decreased by certain management practices, including appropriate vaccination and stress reduction programs near weaning and transport (2). Many cattle may have lung lesions at slaughter, even though they have no history of clinical illness (3).

In some, but not all studies, these lesions have been linked to decreased cattle performance and decreased quality grade (3,4,5).

Since the incidence of clinical respiratory disease, and presumably the inciting event that initiates lung lesion formation, occurs in the early feeding period, procedures that are known to limit clinical respiratory disease in the early feeding period may also limit the formation of lung lesions. This study was initiated to investigate the impact of antibiotic administration at arrival on the prevalence of lung lesions observed at harvest.

Materials and Methods:

A pen (69 head) of single source Angus steers placed in a commercial feedlot (Haverhals Feedlot Inc, Hudson, SD) was used for this study. The cattle were spring born (late April-May 1998) calves from heifer dams, and originated from a ranch in south central South Dakota. Cattle had been managed at the ranch of origin as a single group since weaning (August 25, 1998) and had been programmed to gain about 2 lbs/hd/d in the weaning-feedlot arrival period. Cattle were transported directly from the ranch to the feedlot, arriving at noon on February 12, 1999. At 4:00 PM, cattle were administered a modified live IBR/PI₃ vaccine, implanted (Synovex-S), ear tagged with a unique ID number, and weighed. The experimental treatment, which consisted of a single subcutaneous injection of Nufloor™ (florfenicol, Schering-Plough Animal Health) at a dose of 18 mg/lb and a single subcutaneous injection of Banamine™ (flunixin meglumine, Schering-Plough Animal Health) at 1 mg/lb, was administered to 34 steers. Cattle were assigned to either treatment or control groups sequentially as they came through the chute, with the first animal assigned by flip of a coin.

Cattle were placed in a single pen with no other animals and fed for maximum gain on a

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diet consisting of corn, corn gluten feed, liquid protein supplement, and ground hay. They were monitored daily and managed as customary in open pen midwest feedlots. Cattle were harvested on June 25, 1999 (133 days on feed) at IBP, Inc, Dakota City, Nebraska. Individual ear tag and slaughter tag numbers were collected as the cattle were processed. On the viscera table, lungs were observed for abnormalities (4). A third party contract individual was present to retrieve individual carcass data, including hot carcass weight, fat thickness, ribeye area, marbling score, and kidney-heart-pelvic fat.

The outcome of primary interest was the association between treatment and prevalence of lung lesions at slaughter. In addition, the association of lung lesion with average daily gain during feeding period (133 days) and quality grade were examined. ADG was computed as $((\text{hot carcass weight}/0.62) - \text{initial weight})/133$. Observed lung lesions were scored using a system previously described, but for analysis were simplified to a dichotomous outcome – presence or absence of lesions (6). Quality grades were considered nominal categorical variables. The individual was the experimental unit in a randomized design. Simple t-tests and chi-square tests were used to evaluate the data. All statistics were computed using SAS version 6.14. Statistical power calculations were made using a software program (PEPI – Computer Programs for Epidemiologists v 3.0).

Results

Average initial bodyweight was 750 lbs (± 57.9). One animal died in the feedlot after receiving repeated treatment for respiratory disease. That was the only health abnormality detected. Of the 69 original cattle, 68 were presented for harvest. Lungs were observed on 67 animals (1 missed observation at the viscera table) and carcass data was captured on 66 (2 carcasses missed). Estimated final live weight, using hot carcass weight and based on a 62% dressing percentage, was 1173 lbs (± 94.7 lb), producing an ADG of 3.16 lbs. Average 10th rib backfat was 0.57 inches (± 0.12 , range 0.32-0.84). All cattle graded low choice or better, with 17 (25%) grading prime.

Lung lesions were noted in 29 of 67 (43.3%) cattle observed. Lung lesion prevalence was not

associated with treatment, ADG, or quality grade in this group of cattle. ($p > 0.20$, Table 1).

Discussion

In this study, lungs were visually observed at commercial chain speed (325 head/hour) while other studies have removed lungs from the plant for intensive observation. However, visual observation at chain speed has resulted in good correlation with intensive examination (8).

This study observed lung lesions at slaughter in 43.3% of cattle. Other studies have documented lung lesion prevalence of 72%, 33%, 50%, and 33.6-76.5% of cattle examined, so the 43% found in this study is consistent with other studies (3,4,5,7). Factors such as season of birth (fall born calves have more lung lesions), feedlot pen effects, and weaning weight (increased weaning weight has been associated with more lung lesions) affect the prevalence of lung lesions (3).

Lung lesions have been associated with variable decreases in feedlot average daily gain of 0.046 - 0.167 lbs, and with decreased meat tenderness (3,4,5). This study failed to confirm these associations. This was a small pilot study with a low power to detect differences in ADG loss from lung lesions. Given the sample size, we would detect a 0.20 ADG difference between treatment and control in only 11-32% of the experiments. This underscores the importance of placing limited weight on this study alone, with respect to defining the relationship between lung lesions and ADG. The power to detect a treatment effect was slightly better. It was assumed that Nuflo/Banamine treatment might decrease lung lesion prevalence by 50%, so with a baseline lung lesion prevalence of 44% the power of this study was 48%. This is still rather low power, but is not abnormal for studies focusing on risk factors in disease.

It was disappointing that treatment did not tend to be associated with lung lesion reduction. It is not known when lung lesions occur, though it has been speculated that most lung lesions form early in the feeding period. If lesions were not initiated in the first 3 days following antibiotic administration, then antibiotic treatment at processing would not be expected to have a positive effect. Animals in this study were

considered "low risk" for respiratory disease, since they were ranch direct and backgrounded at the ranch of origin following weaning. Additionally, they comprised a small pen population and were not commingled with cattle from other sources. These attributes were different than previous studies and may have modulated lung lesion formation. It could be argued that lung lesions might occur as a sequel to respiratory disease but that pen and/or feedlot

conditions may modify the severity of the lesions.

Work investigating the association of lung lesions with feedlot performance and vaccination programs at the ranch of origin is continuing. The long-term objectives are to characterize the lifetime significance of lung lesions and describe the risk factors for their occurrence.

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Table 1 – Summary of Associations with Lung Lesions

Treatment Group	Lung Lesions at Slaughter	
	Absent N (%) ^a	Present N (%) ^a
Control	15 (22.4%)	18 (26.9%)
Treated	14 (20.9%)	20 (29.9%)
Quality Grade		
Prime	9 (13.6%)	8 (12.1%)
Choice 0/+	23 (34.9%)	18 (27.3%)
Choice-	5 (7.6%)	3 (4.6%)
ADG	3.14, SD=0.58	3.21, SD=0.49

^aTotal percentage of the 67 head (66 for quality grade and ADG data)