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A NOTE ON AN INVESTIGATION OF MORTALITY IN FEEDLOT  
CATTLE\*

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ONE OF THE risks in commercial feedlot operations, particularly in western Canada, is loss of cattle due to fatal diseases. A feedlot, by the nature of its operation, favors the spread of infectious diseases. Forced feeding and high protein diets pose additional risks to the health of the animals. So-called "sudden death" has been one of the commonest diagnoses made in cattle feedlots of western Canada. At one time, most of these sudden deaths were thought to be caused by *Clostridium perfringens* enterotoxemia. When careful laboratory examinations have failed to incriminate *Cl. perfringens* in the majority of such cases referred for laboratory confirmation (2), a systematic investigation of feedlot cattle mortality was conducted.

METHODS

The investigation was carried out during a period of eight months (October 1963, to June 1964). Four commercial feedlots, and veterinary practitioners in the vicinity of Lethbridge, Alberta co-operated in this study. The feedlots had an average of 2,300, 200, 300, and 600 head of cattle, respectively, in continuous operations. Their management practices were judged as better than average. Veterinary services

from local practitioners were available to all. Vaccinations against Shipping Fever and clostridial infections were practised periodically, but not routinely.

Whenever an animal in a feedlot died the carcass was transported to the Institute<sup>1</sup> as soon as possible (usually within an hour after notice of death). A detailed case history was obtained.

A thorough necropsy was conducted on each carcass. Tissues or organs showing lesions or suspected abnormalities were collected for bacteriological and histological examination. Intestinal contents were cultured anaerobically for the detection and typing of *Cl. perfringens* by a method described previously (2). Filtrates were made from the intestinal contents and checked for toxicity by the intravenous injection of mice (1).

RESULTS

In a period of eight months, 67 deaths occurred. The pathological conditions found in these carcasses are tabulated in Table I. During this period of feedlot operation 5707 animals were shipped for slaughter. The percentage of losses thus amounted to 1.2% of the turnover, or 0.7% of the total animal population of 9100, including cattle still in the feedlots at the end of the study.

Of the 67 losses, 58.2% had demonstrated signs of illness; whereas in 41.8% no prior signs were detected by the attendants

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TABLE I  
 DIAGNOSES MADE ON DEAD FEEDLOT CATTLE DURING AN EIGHT-MONTH PERIOD  
 (OCTOBER, 1963 TO JUNE, 1964)

Condition	No.	%	Clinical signs noted		Vacc.* (No.)	Days on feed	
			Yes	No		Min.	Max.
Pneumonia, various	13	19.4	8	5	5	14	120
Pneumonia, ( <i>P. hemolytica</i> )	6	8.9	3	3	2	3	14
Liver necrosis (or abscess)	6	8.9	5	1	3	4	150
Traumatic reticulitis	4	6.0	3	1	1	14	130
Peritonitis, ( <i>C. pyogenes</i> )	4	6.0	3	1	2	20	120
Bloat	7	10.4	6	1	2	7	115
Nephritis	2	3.0	2	—	2	11	150
Pulmonary emphysema	2	3.0	2	—	2	120	150
No diagnosis	5	7.5	1	4	2	9	90
Decomposed (no diagnosis)	6	8.9	—	6	2	10	200
Hemorrhagic colitis	2	3.0	1	1	1	90	100
Blackleg, ( <i>C. chauvei</i> )	1	1.5	—	1	1		102
Malignant edema, ( <i>C. septicum</i> )	1	1.5	1	—	1		30
Abomasitis	1	1.5	1	—	—		70
Abomasal impaction	1	1.5	—	1	1		9
Choke	1	1.5	—	1	—		30
Intestinal torsion	1	1.5	—	1	1		120
Polioencephalomalacia	1	1.5	1	—	—		10
Plant poisoning	1	1.5	1	—	—		34
Post-surgical infection	1	1.5	1	—	1		40
Drowning	1	1.5	—	1	—		40
TOTAL	67	100	39	28	29		
			(58.2%)(41.8%)				

\*Vaccinated against Shipping Fever and Clostridial infections with various commercial preparations.

and they were consequently termed as "sudden death". Various forms of pneumonia were the most numerous (19.4%) pathological findings. These were either purulent or chronic forms, commonly associated with *Pasteurella multocida* and *Corynebacterium pyogenes*. In five of these animals prior clinical signs were not noticed by the attendant. Pneumonia associated with *Pasteurella hemolytica* was of an acute type in which lung cultures yielded the organism in pure culture.

No obvious relationship between the various pathological conditions and the length of confinement in feedlot was evident, except in pneumonia due to *P. hemolytica*. In the latter, all deaths occurred within 14 days after an animal was placed in a feedlot. Similarly, no clear connection was found between the bacterial pneumonia and the vaccination status of the animals.

Interesting, perhaps were the excessively decomposed carcasses. Excessive delays in transporting the dead animals or high environmental temperatures were not en-

countered in these cases, yet the rate of tissue autolysis was rapid and almost always associated with excessive gas formation. Cultures and conventional stained impression smears made from the tissues of such carcasses revealed only minimal proliferation of bacteria, mostly non-pathogenic *Bacillus spp.* and atoxic *Cl. perfringens*. On a few occasions, examination of gassy muscle and subcutaneous tissue failed to show the presence of any bacteria in stained smears or on cultures, although fluorescent antibody staining techniques were not employed.

*Cl. perfringens* strains isolated from the intestine of the carcasses examined proved to be either Type A or strains which were insufficiently toxigenic for typing by the toxin neutralization test in mice. The intestinal filtrates from four animals were toxic for mice when injected in volumes of 0.4 ml. per mouse; however, this toxicity was not neutralized by type specific *Cl. perfringens* antisera. No toxic effects were present in filtrates injected in amounts of 0.2 ml. or less.

## DISCUSSION

It appears that the overall incidence of fatal disease in cattle feedlots is relatively high as compared with that in other types of animal husbandry such as range and dairy. Although this study was limited to four feedlots in one small geographical area it may be speculated that an approximately similar disease incidence has been found in other feedlots in the prairie provinces. These deaths represented sporadic losses in normal feedlot operation and did not include possible outbreaks of devastating transmissible diseases. The variety of the conditions found in this study seems to give a general impression of what disease incidence may be expected in a normal feedlot operation.

This investigation also illustrated that the popular term, "sudden death" is misleading. Some of the cases of pneumonia and liver degeneration that were listed as sudden deaths demonstrated pathological lesions of a chronic nature. Such animals must have shown some clinical signs of disease, but these were not detected by the attendants.

The six carcasses which showed rapid and excessive autolysis and gas formation in the tissues may have had some connection with metabolic disorders associated with uncontrolled feeding practices. Feedlot operators commonly call such a condition an "over-eating" disease and it is usually characterized by death without clinical signs. Another five carcasses, on which laboratory diagnosis could not be made, may possibly fit into this questionable category.

The fact that *Cl. perfringens* other than Type A, or preformed toxins of this organism, were not found in the intestinal contents of the dead animals confirms previous findings that *Cl. perfringens* enterotoxemia is not a problem in the feedlot deaths in this area (2, 3).

## SUMMARY

Deaths in four feedlots in continuous normal operation, with a total capacity of 3,400 head of cattle and a turnover of 5,700 animals, were studied over a period of eight months. The losses due to death amounted to 1.2% of the turnover.

A variety of pathological conditions were found. The most common conditions were

pneumonia, bloat, and liver degeneration or abscesses. *Pasteurella spp.* and *Corynebacterium pyogenes* were most commonly isolated on cultures. Eleven deaths out of 67 (16.4%) remained undiagnosed by the laboratory methods employed; it is suggested that some of these may represent metabolic disorders associated with feeding practices.

No evidence of *Clostridium perfringens* enterotoxemia was found.

## RÉSUMÉ

Durant huit mois, les auteurs ont étudié les causes de mortalités survenues dans quatre parcs d'alimentation fonctionnant normalement et de façon continue, d'une capacité totale de 3,400 têtes de bétail et d'un potentiel de renouvellement de 5,700 bêtes. Les portes s'élevèrent à 1.2% du potentiel de renouvellement.

Parmi les nombreuses conditions pathologiques identifiées, la pneumonie, la météorisation, la dégénérescence du foie et les abcès hépatiques s'avèrent les affections les plus fréquentes. Au moyen de cultures, on isola surtout des *Pasteurella spp.* et du *Corynebacterium pyogenes*. Sur 67 cas de mortalité, onze (16.4%) ne purent être diagnostiqués par les méthodes de laboratoire utilisées; on est d'opinion que certains d'entr'eux pouvaient constituer des troubles métaboliques dûs à une alimentation inadéquate.

Rien ne permit d'impliquer de l'entérotoxémie à *Clostridium perfringens*.

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