

Sickness, Mortality and the Buller Steer Syndrome in a Western Canadian Feedlot

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Abstract

A retrospective epidemiological study was undertaken of 78,445 male cattle that entered a 24,000-head feedlot in western Canada from 1991 to 1993 to determine if an association existed between sickness, mortality, and bullers.

Animal health records for bullers were collected and analysed to see if they were at greater risk of sickness and mortality than other steers, and to see if pens with a high prevalence of bullers also had a high prevalence of sickness and mortality.

The prevalence of bullers increased with increasing age of cattle on arrival at the feedlot ($R = 0.36$; $P < 0.001$). Sickness and mortality decreased with increasing age of cattle on arrival. However, sickness and mortality in bullers relative to other steers actually increased with increasing age on arrival suggesting an interaction existed between sickness and bullers. Bullers were significantly ($P < 0.05$) more likely to get sick and to die than other steers. In all cases, there was a strong temporal association between sickness and bullers, with sickness and bullers mostly occurring within the first 30 days of the feeding period.

On average, pens of cattle with a high prevalence of bullers did not have a correspondingly high prevalence of sickness or mortality. Sickness would appear to be an effect modifier of dominance behaviour and therefore bullers in feedlot steers. Bullers should always be checked for signs of sickness and treated accordingly. Further research is needed to investigate the effects of sickness on dominance behaviour in pens of feedlot cattle.

Introduction

The buller steer syndrome is a major behavioural problem in cattle confined in feedlots (1,2). Within a pen of cattle, one or a number of cattle persistently ride a particular individual or individuals within the group. The ridden animals are referred to as bullers.

In terms of its importance as a clinical entity in feedlots, the buller steer syndrome is consistently ranked along with acute undifferentiated bovine respiratory disease and footrot as one of the three most important disease syndromes that occur in beef feedlots in North America (1,2).

Current management of bullers in feedlots has been based on their rapid identification and removal from the feedlot pen to prevent injury and even death from riding-related injuries. This paper summarises the findings from a study conducted in a western Canadian feedlot over a 2-year period to determine whether bullers were at greater risk of sickness and mortality than other steers in the population. It is a summary of a paper previously published in the Australian Veterinary Journal (2).

Materials and Methods

Detailed records of health and performance were obtained for male cattle entering a 24,000-head feedlot at Strathmore, Alberta, Canada, from August 1991 to November 1993. Two cohorts of cattle born in 1991 and 1992 were followed through the feedlot. Cattle entered the feedlot annually as three distinct groups: 'fall steer calves', 'winter steer calves' and 'yearling steers'. Details of the feedlot management have been published previously (2).

Record keeping and analysis

All feedlot records were maintained on a computer database. Treatment data were entered by feedlot personnel into terminals located at all handling facilities. These data were collected and analysed at the end of the feeding period.

Case definitions

A 'buller' was a steer or intact bull that was removed from its pen and taken to the hospital facility because it was observed to have been persistently ridden by pen mates or had obvious signs of having been ridden

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by pen mates (rub marks and mud on flanks and ribs, and hair loss from the upper hind quarter and tail head). This study identified only cattle that were being ridden. It was not possible to identify and study the cattle doing the riding ('riders').

Cattle were defined as 'sick' if they met the case definition for acute undifferentiated bovine respiratory disease (undifferentiated fever); this being depression, gauntness and inappetance, with exhibited signs attributable only to the respiratory system. In addition to the above clinical signs, cattle also had to have a rectal temperature of $+ 40.3^{\circ}\text{C}$ before they were treated. Acute undifferentiated bovine respiratory disease was the most common clinical syndrome treated in this feedlot, with corresponding mortality due to various manifestations of bovine respiratory disease and haemophilosis.

Buller management

Buller management and the management of sick cattle in this feedlot has been previously described (1,2). All cattle that died or were euthanased were necropsied by attending feedlot veterinarians within 24 h of death. For the purposes of this study, deaths were arbitrarily categorised as those due to infectious causes (that is deaths where the cause was a contagion), injuries or other causes (2). Statistical procedures were used to determine if bullers were at greater risk of sickness and mortality (due to infectious causes, injuries or other causes) than other steers (2).

Epidemic curves were also generated to determine when bullers got sick relative to their being first diagnosed as a buller (1,2). Epidemic curves for sickness by days on feed for each of the three management groups were calculated for comparison with epidemic curves for bullers by days on feed.

Group (pen) analysis

Pearson correlation coefficients were calculated to determine if there was an association between the pen prevalence of sickness and mortality and the pen prevalence of bullers (2).

Results

The overall prevalence of sickness, mortality and bullers by management group is presented in Table 1. The general trend was for an increase in bullers and a corresponding decrease in sickness and mortality as the age of cattle on arrival at the feedlot increased. However, the risk of sickness and mortality in bullers relative to other steers actually increased with increasing age on arrival (Tables 2 and 3). Overall, bullers were two to nine times more likely to get sick and die than other steers, and, in most cases, this was statistically significant ($P < 0.05$).

Table 1. Prevalence of buller cases in the two cohorts of animals (born in the spring and summer of 1991 and 1992, respectively). Each cohort consisted of 3 separate intakes, 'fall steer calves' (FSC), 'winter steer calves' (WSC) and 'yearling steers' (YS).

| Management group | FSC | WSC | YS |
|-----------------------|---------------------|--------------------|----------------------------------|
| 1991 - 1992 | | | |
| Number of cattle | 19 170 (62 pens) | 2406 (9 pens) | 18 417 (64 pens) ^a |
| Number of bullers | 594 | n/a ^a | 455 ^a |
| Buller prevalence (%) | 3.1 (1-7.3) | n/a ^a | 2.5 (0-5.8) ^a |
| Sickness (%) | 31.3 (13.5-61.6) | n/a ^a | 4.7 (0.3-11.1) ^a |
| Mortality (%) | 2.5 (0.3-6.2) | n/a ^a | 0.6 (0-2) ^a |
| 1992 - 1993 | | | |
| Number of cattle | 19 257 (63 pens) | 4 507 (17 pens) | 17 094 (61 pens) |
| Number of bullers | 334 | 72 | 684 |
| Buller prevalence (%) | 1.7 (0-3.9) | 1.6 (0.3-4.2) | 4 (0-11.2) |
| Sickness (%) | 29 (13.2-59.5) | 6.4 (1.6-15.2) | 3.4 (0-12.3) |
| Mortality (%) | 2.1 (0.3-5) | 1 (0-2) | 0.7 (0-3.7) |

^a Individual treatment records for all the 1992 winter steer calves and the yearling steers that entered the feedlot from August to November, 1992 were deleted from the feedlot computer system before they could be retrieved for analysis. The range per pen is included in brackets after the figure where relevant.

The mortality risk for bullers and other steers was the same for all causes of mortality. Bullers were more likely to die from injuries than other steers; however, this was not statistically significant ($P > 0.05$) (Table 4). Relatively few bullers (7/93) died from injuries with the majority (67/93) of deaths being from infectious causes, especially manifestations of bovine respiratory disease or haemophilosis.

For bullers that were diagnosed as sick, the onset of sickness relative to being diagnosed as a buller is presented in Table 5. In all cases, there was a strong temporal association between sickness and bullers. Sickness and bullers both have 'days on feed' distributions, with most cases being diagnosed within three weeks of arrival at the feedlot (Figure 1).

There was a significant correlation at the pen level between arrival weight (and therefore age) of cattle on arrival at the feedlot and the prevalence of bullers ($R = 0.36$; $P < 0.001$). However, there was no correlation between bullers, sickness and mortality at the pen level.

Table 2. Association between diagnosis as a buller and sickness for ‘fall steer calves’ (FSC), ‘winter steer calves’ (WSC) and ‘yearling steers’ (YS).

| Management group | Sick | Buller | | Odds Ratio | 95%CI ^a | Adjusted 95%CI ^b |
|---------------------|------|--------|-------|------------|--------------------|-------------------------------|
| | | Yes | No | | | |
| Cattle born in 1991 | | | | | | |
| FSC | Yes | 301 | 6010 | 2.2 | 1.8,2.5 | 1, 4.9 (1.1,4.3) ^c |
| | No | 293 | 12566 | | | |
| YS | Yes | 111 | 865 | 6.4 | 5.1,8.0 | 3.3,12.4 |
| | No | 344 | 17097 | | | |
| Cattle born in 1992 | | | | | | |
| FSC | Yes | 144 | 5589 | 1.8 | 1.4,2.3 | 0.7,4.6 (0.8,4) ^c |
| | No | 190 | 13334 | | | |
| WSC | Yes | 21 | 288 | 5.9 | 3.4,10.3 | 1.2,29.9 |
| | No | 51 | 4147 | | | |
| YS | Yes | 174 | 581 | 9.3 | 7.6,11.3 | 4.1,21.3 |
| | No | 510 | 15829 | | | |

^a 95% confidence interval. The difference is significant if this does not include 1.

^b The 95% confidence interval was adjusted for clustering of both bullers and sickness at the pen level (2).

^c 90% Adjusted confidence interval.

Table 3. Association between diagnosis as a buller and mortality for ‘fall steer calves’ (FSC), ‘winter steer calves’ (WSC) and ‘yearling steers’ (YS).

| Management group | Dead | Buller | | Odds ratio | 95% CI ^a | Adjusted 95% CI ^b |
|---------------------|------|--------|-------|------------|---------------------|---------------------------------|
| | | Yes | No | | | |
| Cattle born in 1991 | | | | | | |
| FSC | Yes | 37 | 427 | 2.8 | 2, 4 | 1.5, 5.2 |
| | No | 557 | 18149 | | | |
| YS | Yes | 15 | 95 | 3.9 | 2.1, 6.8 | 0.9, 15.8 (1.2, 7) ^c |
| | No | 669 | 16315 | | | |
| Cattle born in 1992 | | | | | | |
| FSC | Yes | 24 | 365 | 3.9 | 2.5, 6.1 | 2.1, 7.4 |
| | No | 310 | 18558 | | | |
| WSC | Yes | 0 | 41 | - | - | - |
| | No | 72 | 4394 | | | |
| YS | Yes | 17 | 72 | 9.6 | 5.4, 16.9 | 4.3, 21.9 |
| | No | 438 | 17890 | | | |

^a 95% confidence interval. The difference is significant if this does not include 1.

^b The 95% confidence interval was adjusted for clustering of both bullers and mortality at the pen level(2).

^c 90% Adjusted confidence interval

Discussion

This study shows that bullers were at significantly greater risk of sickness and mortality (mostly due to

Table 4. Comparison of mortality by cause in bullers relative to non-bullers.

| Mortality | Buller | | Odds ratio ^a | 95% Confidence interval ^a |
|------------|--------|-----|-------------------------|--------------------------------------|
| | Yes | No | | |
| Infectious | 67 | 760 | 0.81 ^b | 0.49, 1.35 |
| Injuries | 7 | 30 | 2.63 ^b | 0.95, 6.34 |
| Other | 19 | 210 | 0.97 ^b | 0.55, 1.68 |

^a Exact 95% confidence interval. This is significant if it does not include 1.

^b The reference group in each case is the other two mortality groups (that is for infectious, the risk of mortality is relative to injuries and other mortality).

Table 5. Percentage of bullers diagnosed as ‘sick’ relative to the time they were diagnosed as a buller (‘Day 0’) for fall steer calves (FSC), winter steer calves (WSC) and yearling steers (YS).

| Time diagnosed as ‘sick’ | Management group | | |
|--------------------------|------------------|------|------|
| | FSC | WSC | YS |
| Before | 23.5 | 66.7 | 63.7 |
| ‘Day 0’ | 11.7 | 28.6 | 22.6 |
| After | 64.8 | 4.8 | 13.7 |

various pneumonias or haemophilosis) than other steers. The risk of mortality due to riding-related injuries in bullers was relatively low in this feedlot, presumably due to the early recognition of bullers and their removal from their designated feedlot pens.

A significant association existed at the individual animal level between sickness, mortality and bullers. The temporal association between diagnosis of sickness and bullers varied depending on the age of the cattle, but the association appeared strong. The majority of sickness and bullers occurred during the first 30 days of the feeding period. Sickness and mortality were most common among the youngest cattle and declined with increasing age. However, the association between sickness, mortality and bullers at the individual level was greatest among the oldest yearling steers. These older yearling steers had a low overall prevalence of sickness and mortality, but the highest prevalence of bullers (Table 1). This suggests an interaction existed at the individual level between disease and bullers. Significant evidence now existst that riding behaviour in cattle and therefore the identification of bullers is associated with dominance behaviour in newly mixed groups of cattle (1). Sickness would therefore appear to be an effect modifier of dominance behaviour and therefore bullers in pens of feedlot steers.

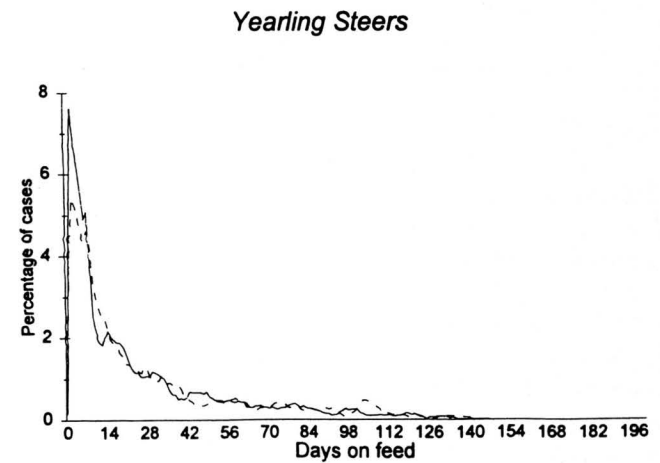
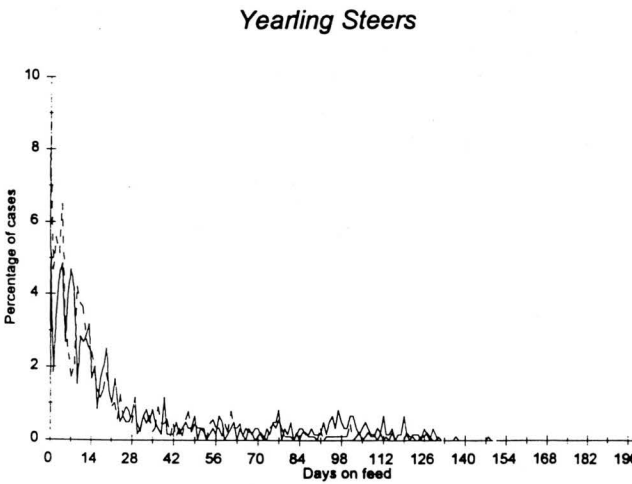
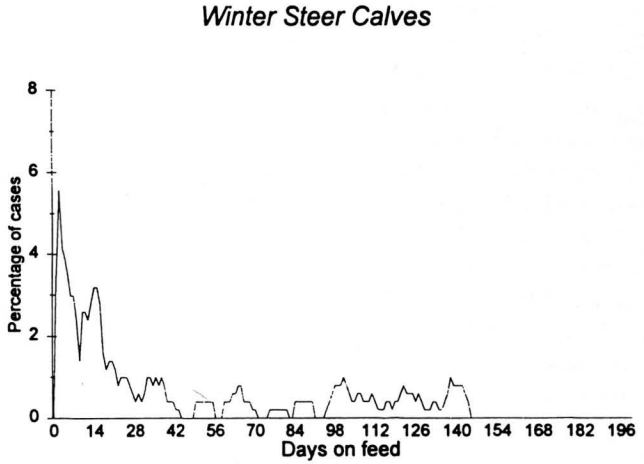
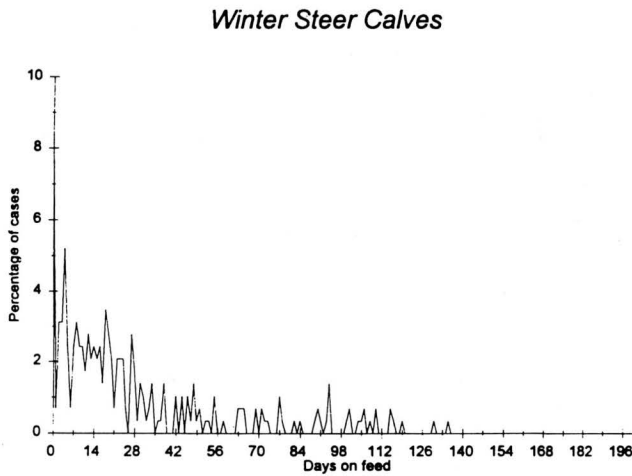
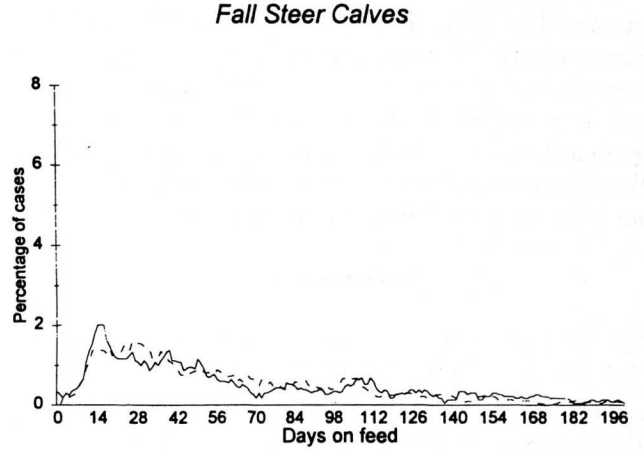
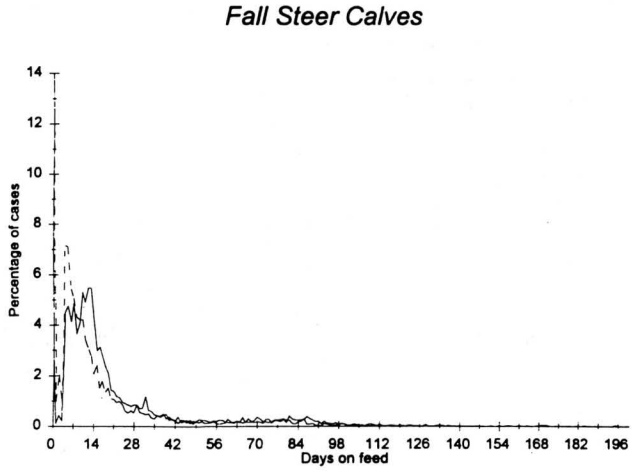


Figure 1. Epidemic curves for sickness (acute undifferentiated bovine respiratory disease) is on the left and bullers by days on feed on the right. The dotted line (---) denotes calves born in 1992 and the solid line (___) is for calves born in 1993 for fall steer calves, winter steer calves and yearling steers.

This study has implications for buller management. The high risk of sickness and mortality in bullers relative to other feedlot steers suggests that bullers should always be checked for signs of sickness in addition to their removal from their designated pen to prevent severe riding-related injuries. Treating bullers that are sick may improve the chance of settling them back into their designated feedlot pen.

References

1. Taylor LF, Booker CW, Jim GK, Guichon PT (1996). Epidemiological investigation of the buller steer syndrome (riding behaviour) in a western Canadian feedlot. *Aust Vet J*;75:45-51.
2. Taylor LF, Booker CW, Jim GK, Guichon PT (1997). Sickness, mortality and the buller steer syndrome in a western Canadian feedlot. *Aust Vet J*;75:732-736.

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INDICATIONS

EXCENEL Sterile Suspension is indicated for treatment of bovine respiratory disease (BRD, shipping fever, pneumonia) associated with *Pasteurella haemolytica*, *Pasteurella multocida* and *Haemophilus somnus*. EXCENEL Sterile Suspension is also indicated for treatment of acute bovine interdigital necrobacillosis (foot rot, pododermatitis) associated with *Fusobacterium necrophorum* and *Bacteroides melaninogenicus*.

CONTRAINDICATIONS

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Selection of dosage level (0.5 to 1.0 mg/lb) and regimen/duration (daily or every other day for BRD only) should be based on an assessment of the severity of disease, pathogen susceptibility and clinical response. **Shake well before using.**

WARNINGS

NOT FOR HUMAN USE.

KEEP OUT OF REACH OF CHILDREN.

Penicillins and cephalosporins can cause allergic reactions in sensitized individuals. Topical exposures to such antimicrobials, including ceftiofur, may elicit mild to severe allergic reactions in some individuals. Repeated or prolonged exposure may lead to sensitization. Avoid direct contact of the product with the skin, eyes, mouth, and clothing.

Persons with a known hypersensitivity to penicillin or cephalosporins should avoid exposure to this product.

In case of accidental eye exposure, flush with water for 15 minutes. In case of accidental skin exposure, wash with soap and water. Remove contaminated clothing. If allergic reaction occurs (e.g., skin rash, hives, difficult breathing), seek medical attention.

The material safety data sheet contains more detailed occupational safety information. To report adverse effects in users, to obtain more information or obtain a material safety data sheet, call 1-800-253-8600.

RESIDUE WARNINGS: Treated cattle must not be slaughtered for 48 hours (2 days) following last treatment because unsafe levels of drug remain at the injection sites. No milk discard time is required when this product is used according to label directions. Use of dosages in excess of those indicated or by unapproved routes of administration, such as intramammary, may result in illegal residues in edible tissues and/or in milk. A withdrawal period has not been established in pre-ruminating calves. Do not use in calves to be processed for veal.

PRECAUTIONS

Following intramuscular or subcutaneous administration in the neck, areas of discoloration at the site may persist beyond 11 days resulting in trim loss of edible tissues at slaughter. Following intramuscular administration in the rear leg, areas of discoloration at the injection site may persist beyond 28 days resulting in trim loss of edible tissues at slaughter.

STORAGE CONDITIONS

Store at controlled room temperature 20° to 25° C (68° to 77° F) [see USP]. Shake well before using. Protect from freezing.

HOW SUPPLIED

EXCENEL Sterile Suspension is available in the following package size:
100 mL vial

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