

Perception of lameness management, education, and effects on animal welfare of feedlot cattle by consulting nutritionists, veterinarians, and feedlot managers

S.P. Terrell¹, DVM, MS; D.U. Thomson², PhD, DVM; C.D. Reinhardt³, BS, MS, PhD; M.D. Apley², DVM, PhD; C.K. Larson⁴; K.R. Stackhouse-Lawson⁵

¹Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan KS 66506

²Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University, Manhattan, KS 66506

³Department of Animal Sciences and Industry, Kansas State University, Manhattan, KS 66506

⁴Zinpro Corporation, Eden Prairie, MN 55344

⁵National Cattlemen's Beef Association, 9110 East Nichols Avenue Suite 300, Centennial, CO 80112

Corresponding author: Dr. D.U. Thomson, e-mail: dthomson@vet.k-state.edu

Abstract

Consulting nutritionists (n=37), consulting veterinarians (n=47), and feedlot managers (n=63) from the United States and Canada participated in a feedlot cattle lameness survey. The majority of participants either manage or consult open-air, dirt-floor feedyard facilities (98.4%). Participants were directed to an online survey to answer questions pertaining to the incidence, management, perception, and economics of feedlot lameness. The median response of estimated lameness incidence in the feedyard was 2%, with a mode of 1% and a mean of 3.8%. Of survey participants, 81% estimated the contribution of lameness to total feedyard mortality as less than 10%. Similarly, 64% of participants estimated the contribution of lameness to the overall chronic and realizer loss in the feedyard to be less 10%. Forty-one percent of participants believed that 50% or more of cattle suffering from lameness require treatment. Participants indicated that footrot (42% of participants), injury (35% of participants), and toe abscesses (10% of participants) were the most common causes of lameness. The major contributing factors associated with non-infectious causes of lameness, such as upper limb injuries, toe abscesses or ulcers, and lacerations include cattle handling before and after arrival, pen surface and condition, and cattle temperament. Important contributing factors for infectious causes of lameness, such as footrot, were identified as pen surface and condition, cattle handling prior to arrival, and weather. Lameness was considered an animal welfare concern by 58% of participants. This survey provides insight into the perception of lameness and potential management factors which contribute to

lameness through the perspective of multiple participants in feedlot cattle production systems.

Key words: animal health, animal welfare, beef cattle, feedlot, lameness

Résumé

Des consultants en nutrition (n=37), des consultants vétérinaires (n=47) et des gestionnaires de parc d'engraissement (n=63) provenant des États-Unis et du Canada ont participé à un questionnaire sur la boiterie des bovins en parc d'engraissement. La plupart des répondants sont soit des gestionnaires ou des consultants pour des parcs d'engraissement à l'air libre et sur la terre battue (98.4%). Les répondants participèrent à un questionnaire en ligne concernant l'incidence, la gestion, la perception et les retombées économiques de la boiterie en parc d'engraissement. La médiane de l'incidence estimée de la boiterie en parc d'engraissement était de 2% avec un mode de 1% et une moyenne de 3.8%. Parmi les répondants, 81% estimèrent que la contribution de la boiterie à la mortalité totale dans les parcs était de moins de 10%. De façon similaire, 64% estimèrent que la contribution de la boiterie aux pertes chroniques et actuelles du parc était de moins de 10%. Quarante et un pourcent des participants croyaient que 50% ou plus des bovins atteints de boiterie nécessitent un traitement. Les répondants indiquèrent que le piétin (42%), les blessures (35%) et les abcès ou ulcères (10%) étaient les causes les plus communes de boiterie. Les facteurs principaux associés aux causes non-infectieuses de boiterie, telles que les blessures aux membres supérieurs,

les abcès ou ulcères, et ceux associés aux lacérations incluent la manipulation des bovins avant et après leur arrivée, la condition et le type de surface de l'enclos et le tempérament de l'animal. Les facteurs importants associés aux causes infectieuses de boiterie, telles que le piétin, incluent la condition et le type de surface de l'enclos, la manipulation des bovins avant et après leur arrivée et la météo. La boiterie était considérée comme un sujet d'inquiétude pour le bien-être animal par 58% des répondants. Basé sur la perspective de multiple participants impliqués dans les systèmes de production des bovins en parc d'engraissement, ce questionnaire a permis de donner une idée de la perception de la boiterie et des facteurs de gestion qui contribuent potentiellement à la boiterie.

Introduction

Bovine respiratory disease is identified as the most costly disease in the feedlot industry, and thus it is widely researched.⁷ Conversely, lameness in feedlot cattle is not as well-researched, although lameness has been reported to account for 16% of all feedlot health problems.⁴ Feedlot health costs associated with lameness include treatment cost, death loss, and loss due to chronic animals or realizer sale.⁴ Costs associated with lost performance may have the most impact. Research has shown that lameness, specifically footrot, decreases performance in feedlot cattle.⁹ Tibbets et al reported a decrease of 0.11 lb (0.049 kg) in average daily gain in steers diagnosed with footrot in the finishing phase (121 days on feed until harvest), and an average of 14.3 additional days on feed for affected animals.

Lameness has animal welfare implications. Other animal protein production systems, such as the dairy industry, have identified lameness as having a major impact on animal welfare.⁵ The potential impact of lameness on cattle comfort and overall welfare, along with health and performance, drives the need to better understand the diseases causing lameness.

A study to understand the beef feedlot industry members' perceptions of lameness and its effects on health and welfare within the industry has not been conducted. A survey of feedlot industry professionals, including consulting veterinarians, consulting nutritionists, and feedyard managers was completed to identify management causes of lameness, common treatment practices, diagnostic philosophies, and to pinpoint areas of focus for future research and education.

Materials and Methods

Survey Participants

Feedlot managers (YM), consulting veterinarians (CV), and consulting nutritionists (CN) were contacted

for participation in this study based on their individual participation in professional organizations. A total of 63 YM, 47 CV, and 37 CN participated in the survey. Consulting veterinarians were contacted through the Academy of Veterinary Consultants' and American Association of Bovine Practitioners' respective email listserves. Through email, veterinarians were invited to participate and were provided an html link to access the survey online. Feedlot managers and CN were identified through industry mailing lists, and contacted individually by mail, asked to participate, and provided a URL to access the survey online. Approval was granted by the Kansas State University Institutional Review Board (#5971) to conduct the survey.

Data Collection

Data were collected using a web-based survey system through Kansas State University.^a Participants were provided a URL to the survey location via email and written letter. All participants completed the survey through the URL provided.

Survey Questions

The survey consisted of 24 questions covering general information (n=3), feedlot health and lameness (n=5); diagnosis, treatment, and causes of feedlot lameness (n=6); factors contributing to lameness (n=2); education and recommendations (n=6); and the economics of feedlot lameness (n=2).

Data Analysis

Data collected via the web-based survey system were downloaded into Excel[®] for data summarization and statistical analysis. Answers given as ranges, i.e. 10 to 15%, were reported as a calculated average for summary statistics and analysis. The mean, mode, median, and number of responses from the survey were calculated using Microsoft Excel.

Results and Discussion

General Information

A total of 147 feedlot industry members participated in the survey. Of these participants, 63 were feedlot managers (YM), 47 were consulting veterinarians (CV), and 37 were consulting nutritionists (CN). Eleven percent of participating YM managed feedlots with a 1-time capacity of 0 to 4,999 cattle, 36.5% of YM managed feedlots with a 1-time capacity of 5,000 to 20,000 cattle, and 52.4% of YM managed feedlots with a 1-time capacity greater than 20,000 cattle (Figure 1). Of the participating YM, 62 (98.4%) manage primarily open-air, dirt-floor type facilities, while 1 (1.6%) YM operates a feedlot with confinement barns with slatted floors. A total of 40 (85.1%) CV consult primarily

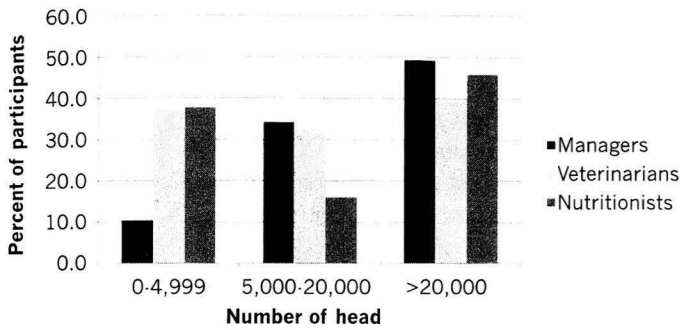


Figure 1. Percentage of 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012 by cattle head count of the yards they manage or predominantly consult.

with feedlots having open-air, dirt-floor facilities, and 7 (14.9%) CV consult primarily with operations feeding cattle in confinement barns with slatted floors. A total of 33 (89.2%) CN consult primarily open-air, dirt-floor facilities, 1 (2.7%) CN consults primarily with operations feeding cattle in confinement barns with slatted floors, and 3 (8.1%) CN consult primarily with clients who feed in confinement barns with deep bedding.

Feedlot Health and Lameness

Participants were asked a series of questions about their perceptions of feedlot health, and specifically about the impact of lameness on overall health. Participants were asked what percent of feedlot cattle they thought suffered from lameness. The median estimated lameness incidence from all participants was 2.0%. When separated by professional group, the median estimated lameness incidence was 2.0% by YM, 3.0% by CV, and 3.0% by CN (Figure 2). The participants were then asked what percentage of cattle suffering from lameness required treatment, with response ranges of 0 to 10%, 11 to 25%, 26 to 50%, or above 50% (Figure 3). A total of 24 (16.3%) participants responded 0 to 10%, 27 (18.4%) participants responded 11 to 25%, 35 (23.8%) participants responded 26 to 50%, and 59 (40.1%) participants responded that greater than 50% of cattle suffering lameness require treatment. Two (1.4%) of the participants responded they did not know what percentage of cattle required treatment.

Participants were asked to report the average death loss for all causes in their feedlot or in the feedlots they consult. The median response when estimating average death loss for all participants was 1.25%. When separated into professional fields, YM had a median response of 1.0% while both CV and CN had a median response of 1.5% (Figure 4).

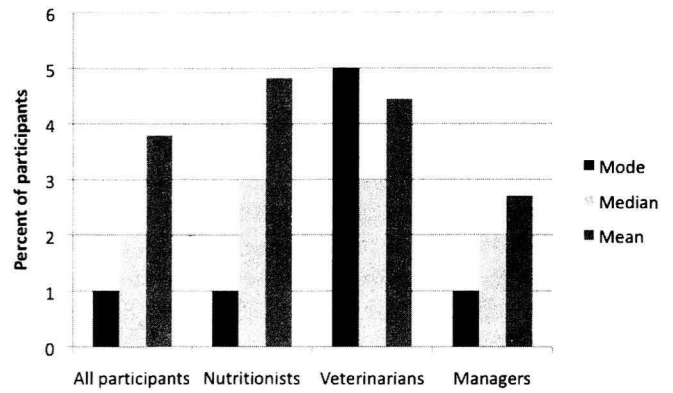


Figure 2. Percentage of beef cattle housed in feedlots that experience lameness as estimated by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012 reported as mean, median, and mode of responses.

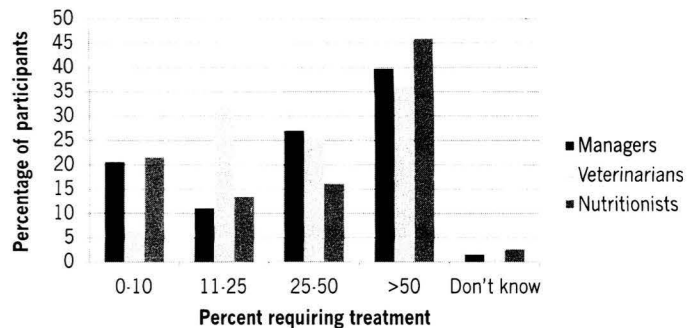


Figure 3. Percentage of beef cattle housed in feedlots experiencing lameness that require treatment as estimated by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

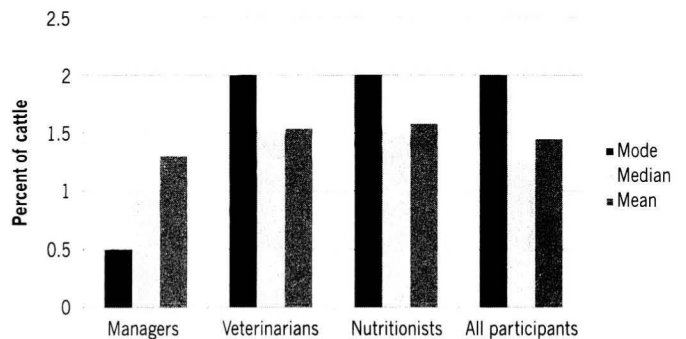


Figure 4. Percentage of mortality of beef cattle housed in feedlots as estimated by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012 reported as mean, median, and mode of responses.

Participants responded as to what percentage range of chronic (or realizer) and mortality losses in the feedlots they manage or consult is due to each of 4 categories: bovine respiratory disease, digestive disorders, lameness, or other causes (Figures 5 and 6). The majority (81.0%) estimated that 0-9% of feedlot mortality was associated with lameness, while 36.7% of respondents estimated 0-9% of feedlot chronic and realizer loss were associated with lameness. Another 38% of respondents estimated chronic realizer loss associated with lameness to be 10 to 29%.

Diagnosis and Causes of Feedlot Lameness

Standards of practice within the feedlot industry for the diagnosis of lameness, both within the pen or at the chute, are not well defined. A series of questions were asked to better understand the tools utilized at feedlots to diagnose lameness, along with perceptions of which lesions are most commonly diagnosed within the feedlot.

Participants were asked what criteria were used to identify a lame animal that subsequently required treatment for its injury or disease at the pen level (Table 1). A total of 60 (40.8%) participants responded that all cattle found lame in the home pen required further diagnosis and potential treatment. Forty (27.2%) participants responded that cattle with lameness along with depression, and apparent significant pain, needed to have further diagnostic and treatment follow-up. Twenty-seven (18.4%) participants responded that cattle with lameness along with decreased performance were removed from their home pen for further evaluation and potential treatment. Twenty (13.6%) participants responded that no set protocol was utilized.

Participants identified the diagnosis that most commonly caused lameness in feedlot cattle, the second most common cause, and the third most common cause (Figure 7). Among all respondents, 62 (42.2%) selected footrot as the most common diagnosis, 52 (35.4%) selected injury, 14 (9.5%) selected toe abscesses or ulcers, 11 (7.5%) selected laminitis, 6 (4.1%) selected sole bruises/ulcers, 1 (0.7%) selected hairy heel wart (digital dermatitis), and 1 (0.7%) listed other causes.

To better understand how cattle were diagnosed with different causes of lameness, participants were asked what tools were utilized at the chute to help determine the cause. Participants were allowed to select all answers that applied to the yard or yards they manage or consult. Sixty-five (44.2%) participants responded that palpation of the foot, joints, and upper leg for swell-

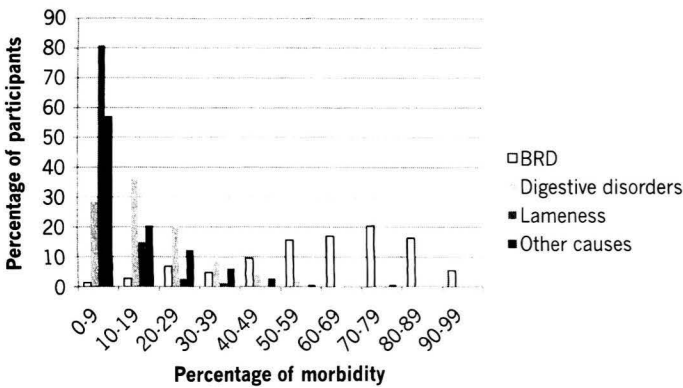


Figure 5. Percentage of mortality in feedlot cattle attributed to bovine respiratory disease, digestive disorders, lameness, and other causes by participants as estimated by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

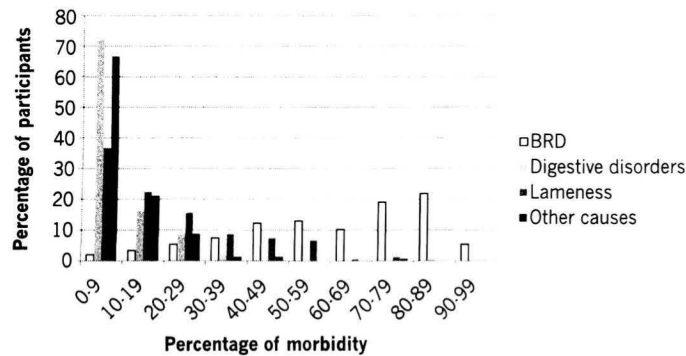


Figure 6. Percentage of feedlot chronic/railer loss attributed to bovine respiratory disease, digestive disorders, lameness, and other causes as estimated by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

Table 1. Pen-level diagnosis criteria utilized in feedlots to identify lameness morbidity and subsequent treatment by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

Pen-level lameness diagnosis criteria	% of respondents
Any sign of lameness	40.8%
Lameness along with depression, apparent significant pain	27.2%
Lameness along with a decrease in performance	18.4%
No set protocol	13.6%

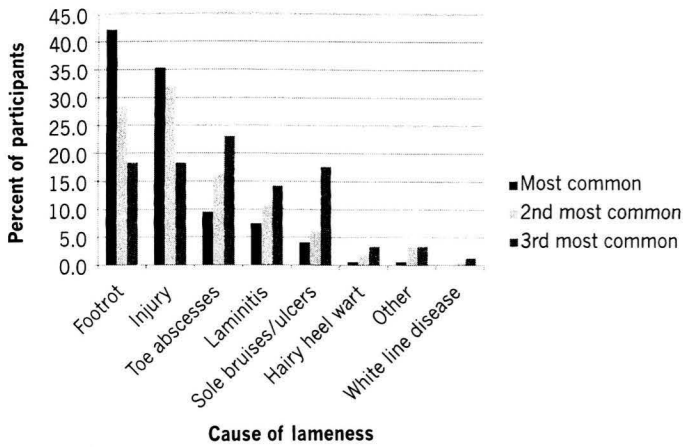


Figure 7. The 3 most common causes of lameness in feedlot cattle as identified by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

ing and heat was utilized for lameness diagnosis. A total of 85 (57.8%) participants responded that picking up the foot to view the bottom of the foot was used for diagnosing lameness in the chute. Another 28 (17.2%) participants responded that picking up the foot and using a hoof tester was utilized for diagnosis. Finally, 130 (88.4%) participants indicated visualization of the foot, joints, and upper leg for swelling was utilized to diagnose the cause of lameness at the chute, including 56 (88.9%) YM, 41 (87.2%) CV, and 33 (89.2%) CN.

Similarly, participants were asked what treatments were implemented in the feedlot or feedlots they manage or consult. One hundred forty-two (96.6%) participants responded injectable antibiotics were utilized as a treatment. Conversely, only 70 (42.9%) participants responded that corrective trimming, opening of abscesses, or removing of sole ulcers or bruises were implemented as a treatment. Topical treatments (listed as antimicrobials, copper sulfate, or others) were implemented in the feedlots managed or served by 57 (35.0%) participants.

Contributing Factors

To gain a better understanding of factors that can potentially be managed to improve control of cattle lameness in the feedlot industry, participants were asked to identify the 4 most important contributing factors for either infectious or non-infectious causes of lameness. The most common contributing factors for infectious causes of lameness in feedlot cattle identified by all survey participants (Table 2) were, in order of importance, pen conditions (125 responses, 85.0%); pen surface (83 responses, 56.5%); weather patterns (67

Table 2. Most common contributing factors for the development of lameness in beef cattle housed in feedlots identified by 63 feedlot managers, 47 consulting nutritionists, and 37 consulting veterinarians surveyed during 2012 (% of respondents, respondents allowed to select up to 4).

Factors	Infectious causes (%)	Non-infectious causes (%)
Pen conditions	85.0	57.8
Pen surface	56.5	41.5
Weather patterns	45.6	19.7
Cattle handling before arrival	34.7	63.9
Cattle handling after arrival	28.6	67.3
Nutrition	27.9	25.2
Cattle temperament	23.8	65.3
Cattle type (i.e. high risk, low risk)	15.6	11.6
Insufficient pre-conditioning nutrition program	12.9	8.8
Breed	9.5	8.2
Cattle age	4.8	6.8

responses, 45.6%); and cattle handling before arrival (51 responses, 34.7%). The remaining contributing factors were cattle handling after arrival (42 responses, 28.6%); nutrition (41 responses, 27.9%); cattle temperament (35 responses, 23.8%); cattle type (23 responses, 15.6%); insufficient pre-conditioning nutrition program (19 responses, 12.9%); breed (14 responses, 9.5%); and cattle age (7 responses, 4.8%).

The 4 most common contributing factors for non-infectious causes of lameness in feedlot cattle identified by all survey respondents (Table 2) were cattle handling after arrival (99 responses, 67.3%); cattle temperament (96 responses, 65.3%); cattle handling before arrival (94 responses, 63.9%); and pen conditions (85 responses, 57.8%). The remaining contributing factors were pen surface (61 responses, 41.5%); nutrition (37 responses, 25.2%); weather patterns (29 responses, 19.7%); cattle type (17 responses, 11.6%); insufficient pre-conditioning nutrition program (13 responses, 8.8%); breed (12 responses, 8.2%); and cattle age (10 responses, 6.8%).

Education and Recommendations

Participants were asked to identify sources of information for prevention of lameness (Figure 8). Sixty-one (96.8%) YM received information about lameness prevention from a veterinarian; 45 (71.4%) from

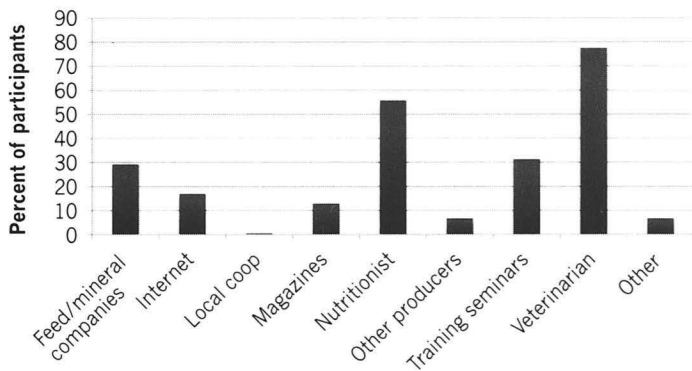


Figure 8. Sources of information utilized by feedlot managers to make decisions on lameness management of beef cattle identified by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012. Respondents were allowed to select more than 1 response.

a nutritionist; 13 (20.6%) from training seminars; 11 (17.5%) from feed or mineral companies; 9 (14.3%) from magazines; 7 (11.1%) from the internet; and 5 (7.9%) from other producers. A total of 17 (36.2%) CV received information about lameness prevention from nutritionists; 16 (34.0%) from training seminars; 10 (21.3%) from feed or mineral companies; 8 (17.0%) from the internet; 8 (17.0%) from magazines; and 1 (2.1%) from the local feed store. Twenty-two (59.5%) CN received lameness prevention information from feed or mineral companies; 17 (45.9%) from training seminars; 17 (45.9%) from a veterinarian; 10 (27.0%) from the internet; and 2 (5.4%) from magazines.

Impressions about lameness, its impact, and animal welfare implications were varied. A larger percentage of CV (93.6%) felt more work needed to be done to improve the understanding of lameness, compared to 70.3% of CN and 81.0% of YM. Similarly, 95.7% of CV considered lameness to be a welfare concern or a growing welfare concern, compared to 73.0% of CN and 66.7% of YM (Figure 9).

Participants were asked what tools would most likely help them better manage feedlot lameness in cattle (Figure 10). Twenty-eight (44.4%) YM, 10 (21.3%) CV, and 12 (32.4%) CN identified new therapies as a tool that would most help them manage lameness in the feedlot. Assistance with employee training was selected by 20 (31.8%) YM, 14 (29.8%) CV, and 9 (24.3%) CN. Eight (12.7%) YM, 14 (27.7%) CV, and 9 (24.3%) CN believed assistance with facility design would most likely help them manage lameness. Only 2 (3.2%) YM, 5 (10.6%) CV, and 3 (8.1%) CN believed improved nutrition would be of the most help to manage lameness. Finally, 5 (7.9%)

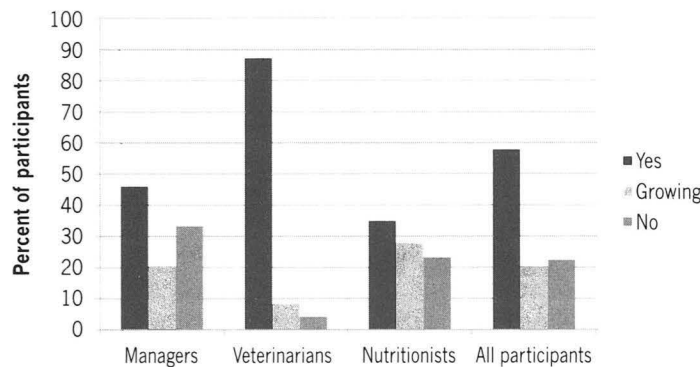


Figure 9. Perceptions of feedlot cattle lameness as an animal welfare concern by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

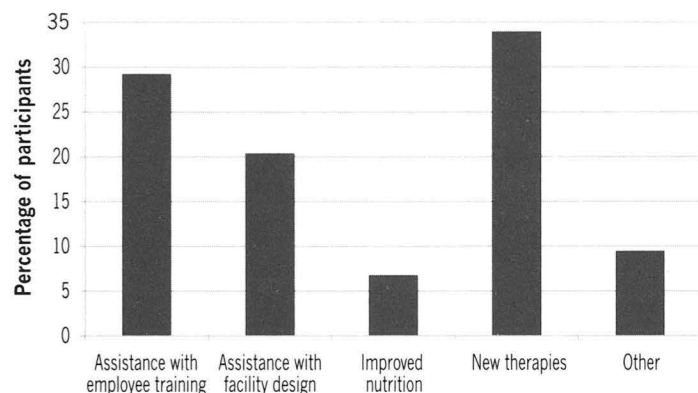


Figure 10. Tools that would be most helpful for better management of lameness in the feedlot identified by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

YM, 5 (10.6%) CV, and 4 (10.8%) CN listed other tools as most helpful in improving lameness management. Other suggestions included improving facilities and developing vaccination programs for prevention.

Economics

Economic costs associated with feedlot lameness are not well defined. Survey participants were asked to estimate the economic losses associated with lameness in the feedlot for affected cattle that go untreated and for lame cattle that are treated (Figure 11). Two (13.6%) participants estimated no economic losses, 27 (18.4%) participants estimated \$1 to \$50, 27 (18.4%) participants estimated \$51 to \$100, 32 (21.8%) participants estimated \$101 to \$200, and 31 (21.1%) participants estimated greater than \$200. A total of 28 (19.0%) participants

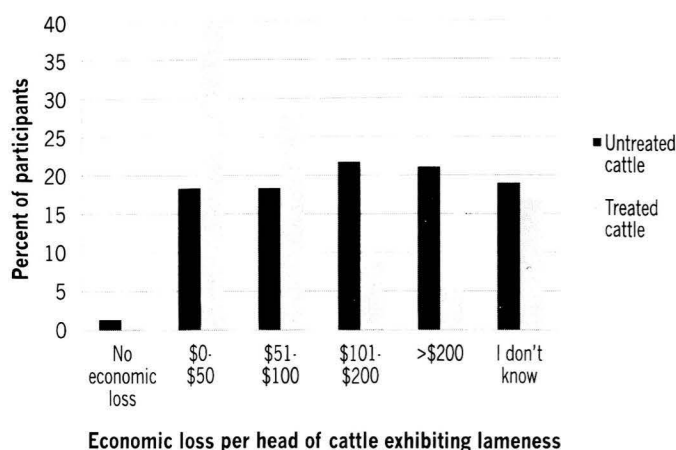


Figure 11. Economic loss per head of cattle that exhibit lameness in the feedyard and go untreated, and of cattle treated as estimated by 63 feedlot managers, 37 consulting nutritionists, and 47 consulting veterinarians surveyed during 2012.

responded that they did not know the economic cost of untreated lameness.

Participants similarly estimated the economic loss per animal that is treated for lameness. One (0.7%) participant responded that there was no economic loss, 59 (40.1%) responded \$1 to \$50, 41 (27.9%) responded \$51 to \$100, 13 (8.8%) responded \$101 to \$200, and 8 (5.4%) responded greater than \$200. Twenty-five participants responded they did not know the economic loss associated with animals treated for lameness (Figure 11).

Discussion

Understanding the perceived impact of lameness within the feedlot industry can lay groundwork for further investigation of the influence of lameness on health and welfare outcomes in the beef cattle industry. Previously, lameness prevalence was underestimated in the dairy industry. Dairy farmers in the United Kingdom estimated a mean lameness prevalence of 5.73%, while clinical lameness (animals classified as lame or severely lame) was documented to be 22.11% on 53 dairy farms.¹¹ Moreover, beef cows and beef bulls sold at livestock auction markets in the western United States had some degree of lameness, 15.1 and 15.4%, respectively.^{1,2}

Available data for lameness in feedlots typically report incidence rates during the feeding period, as opposed to prevalence rates reported in most dairy studies. In this survey, the mean estimate for the lameness incidence rate was 3.8% and the median estimate was 2%. A 7-year analysis in a single feedlot in Nebraska

showed a footrot incidence of 6.46% for calves fed an average of 262 days.⁹ Consequently, cattle diagnosed with footrot were on feed an average of 5 days longer and had a decrease in average daily gain of 0.044 lb (0.02 kg). In a similar review of over 1.8 million cattle, 13.1% of cattle experienced health problems in the feeding period, with 16% of the health problems associated with lameness,⁴ or approximately a 2.1% lameness incidence over the entire feeding period.

Animal welfare is a relevant issue, both for consumers and within the animal protein production industries. When animal industries were ranked by need of substantial welfare-related changes, veterinary school faculty members in the US ranked beef cattle below dairy, swine, meat birds, and layers (in most need), but above sheep (in least need).⁵ However, over 70% of the faculty members believed at least minor changes in animal welfare were required in the beef production system. Of participants in our survey, 78% considered lameness to be a concern or growing concern for animal welfare in the feedlot industry. Therefore, reducing lameness in feedlots could be an opportunity to make positive changes to improve the beef production system.

To improve lameness-related issues in feedlot, it is necessary to target specific causes of lameness and contributing factors. Footrot, injury, and toe abscesses are considered the most common causes of lameness.^{6,10} The major contributing factors associated with lameness identified in this survey include cattle handling before and after arrival, pen surface and condition, cattle temperament, and weather. Some strategies to prevent lameness have been identified, but improvement is necessary.^{8,10} Targeting important contributing factors, along with further research to identify means of prevention, diagnosis, and treatment of lameness, are important steps for more efficient beef production and improved animal welfare.

Conclusions

This survey provides a background of views currently held by feedlot managers, veterinarians, and nutritionists regarding the impact of lameness on industry economics, animal health, and animal welfare. The impact of lameness on cattle comfort and overall welfare are driving factors in need of further research. It is essential that the beef industry continue working toward a better understanding of the effects of lameness within feedlots.

Endnotes

^aAxio Online, K-State Survey Services, Manhattan, KS

^bExcel®, Microsoft, Redmond, WA

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