

Diaphyseal Femoral Fractures in Cattle: 24 Cases

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Introduction

Diaphyseal femoral fractures in cattle often are regarded as unsuitable for treatment. In the past 15 years, several surgical techniques have been described. The age, weight, fracture configuration, intended production use and economic value of the individual influence treatment options. Open reduction and internal fixation may be the treatment of choice in young, light-weight cattle. Medical treatment (stall rest and anti-inflammatory drugs) may be an option for older cattle with selected fractures. We hypothesized that diaphyseal fractures in cattle can be successfully managed with proper case selection. The objectives of this study were to evaluate different surgical techniques, to evaluate the risk factors associated with the surgical repair and to evaluate the medical approaches in cases of femoral fractures.

Materials and Methods

Medical records (1994-2004) with a diagnosis of diaphyseal femoral fracture were reviewed for this study. The variables evaluated were history, physical examination findings, radiographic findings, surgery or medical management, complications and outcome. Chi square analysis was used to detect significance between variables ($P < 0.05$).

Results

Medical records for 24 cases were reviewed for this study. Of those records, 15 fractures were repaired surgically, five were managed medically and four animals were euthanized upon admission. Cattle having surgery included 10 beef calves and five dairy calves, 10 males and five females with an average age of 3.5 days. Eleven fractures were associated with dystocia. Nine animals were down since birth and six were non-weight bearing on the affected leg at presentation. All the fractures were comminuted, oblique, closed and severely displaced. Six fractures were distal diaphyseal, eight were mid-diaphyseal and one fracture affected the proximal diaphysis of the femur. The mid-diaphyseal fractures had a significantly better outcome compared with the other locations. Surgical technique was chosen based on evaluation of radiographs and according to the surgeon's pref-

erence. The types of fixation chosen included three cases with intramedullary (IM) stack pinning, eight cases of IM stack pinning combined with an external fixator, two cases with interlocking nails, one case with external fixator alone and one case with rush pins. No statistically significant differences were found between surgical technique and long-term survival. Post-operative films revealed adequate alignment in all cases. Mean time of hospitalization was 12 days (range, three to 41). Ten cases were discharged from the hospital, and five lived at least one year after the surgery. All survivors had no noticeable lameness two to four months after surgery. Post-operative complications were seroma formation ($n=5$) and implant failure ($n=8$). In five cases of implant failure, a second surgery was necessary to stabilize the fracture site. Two types of implant failure occurred: migration of the IM pins and loss of the external fixator. These complications did not significantly affect the outcome. Pneumonia was associated with a higher mortality rate.

The nine remaining animals were divided in two subcategories: neonates and older animals. The first group was composed of three animals (two female, one male). Their mean age and weight were 16 days and 103 lb (47 kg), respectively. Their fracture configuration was similar to the one described previously with the exception of one case that had minimal displacement of the fragments. Two were treated conservatively (stall rest), and one was euthanized on presentation because of the chronicity of the condition. One completed the medical treatment and had no signs of lameness at follow-up.

The six remaining animals included five dairy cows and one beef cow, five females and one male, and had a mean age of three years and weighed a mean of 1100 lb (500 kg). Fractures had variable degrees of comminution. Markedly less displacement was found in the older cattle. Two cows were still alive one year after diagnosis (one remained clinically lame after treatment), three were euthanized upon presentation because of their poor clinical condition and one was euthanized on the farm two weeks after diagnosis. All cattle that survived medical treatment were ambulatory at initial examination. The degree of lameness varied between non-weight bearing to toe-touching. Medical treatments included stall rest (range, two to six months) and non-steroidal anti-inflammatory drugs.

Significance

Based on the results of this study, mid-diaphyseal fractures had a better prognosis for surgical correction compared with distal or proximal fractures. Less displacement of the fragments were found in older animals,

and may allow medical management of selected cattle. In conclusion, the best surgical fixation of comminuted femoral fracture has not yet been found. Continued research is needed to optimize fracture stabilization in young cattle without interfering with the growth of the femur.

Calf Respiratory Disease and Pen Microenvironments in Naturally Ventilated Calf Barns in Winter

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Introduction

Dairy operators have constructed naturally ventilated barns with individual pens to house calves from birth to weaning. These barns vary in terms of construction materials, stocking density, pen enclosures, bedding, and operation of sidewall openings and ridges. Endemic calf pneumonia is common in these barns, particularly through the winter months. We investigated the use of airborne bacteria counts to characterize naturally ventilated calf barns and pens, and examined the relationship between airborne bacterial counts, various pen factors, and calf respiratory health.

Materials and Methods

Thirteen calf barns that met selection criteria were recruited and visited during the winter months of January through March 2004. A minimum of 12 pre-weaned calves were randomly selected in each barn and scored for the presence of respiratory disease. Respiratory disease scores were based upon body temperature, cough, nasal discharge, ocular discharge, and ear position. Using the Air IDEAL™ impaction microbial sampler, air samples from each of the subject calf pens and from at least five alley sites within each barn were exposed to sheep blood (BAP) and eosin methylene blue (EMB) agar plates. Total colony-forming units on each media were counted and concentrations of bacteria per cubic meter were calculated. Temperature and relative humidity was recorded in each calf pen, the barn alley, and outside the barn. Stall bedding type, dry matter, and a calf nesting score were recorded. Barn and pen

construction, dimensions, and calf numbers were recorded. Exterior wind speed and direction, with dimensions of ridge, eave, and curtain openings were used to estimate building ventilation rates. Data were recorded in Excel and analyzed using SAS (SAS, 1999). Pen bacterial counts were compared with alley bacterial counts in PROC FREQ, using Mantel-Haenszel statistics based upon rank scores. PROC MIXED was used to develop models, using a backwards elimination process and with farm as a random effect, for the fixed effects which were significant ($P < 0.05$) for alley bacterial count, pen bacterial count, and prevalence of respiratory disease.

Results

Pen air bacterial counts were significantly different from alley air bacterial counts on both BAP and EMB ($p < 0.001$). Significant factors ($p < 0.05$) associated with reduced alley air BAP counts were increased ventilation changes per hour, reduced stocking density as measured by volume per kg of calf, reduced pen air BAP counts, and barn type with conventional barns having lower alley air bacterial counts than greenhouse barns. Significant factors associated with reduced pen air BAP counts were increasing number of open planes of the calf stall, decreasing pen temperature, and bedding type (straw vs. wood) with lower counts associated with wood-particle bedding. Factors associated with reduced prevalence of calves with respiratory disease were reduced pen air bacterial counts on BAP, presence of a solid barrier between each calf pen, and increasing "nesting" score, reflecting an ability to nest into the bedding.