

Survival of Commercial Dairy Cows after Digit Amputation or Arthrodesis Surgery

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Introduction

Common digit diseases, such as sole ulcers, sole abscesses, foot rot and white line disease may become complicated by extensive corium and laminae tissue necrosis, leading to deep sepsis of the digit. Septic arthritis of the distal interphalangeal (DIP) joint constitutes 3 to 10% of all hoof conditions. Deep infection of the digit causes severe lameness and, in herds with high incidence of lameness, economic losses from this condition may be significant. Digit amputation is the standard treatment for deep sepsis of the bovine foot in the field. It is reported that cows that had digit amputation were retained in the herd for an average of 13 months, while cows that had arthrodesis surgery were retained for an average of 18 months. However, there were no control cows in those studies with which to compare the survival time. The objective of this study was to evaluate the effect of digit amputation and arthrodesis surgery on survival.

Materials and Methods

Dairy cows with deep sepsis of the digit were treated surgically by digit amputation or arthrodesis surgery. Each cow that had digit surgery performed was matched with one or two herd mates that served as controls. Control cows for both arthrodesis and digit amputation were matched as closely as possible for days-in-milk (DIM), lactation number, and being alive and lactating at time of treatment of the case. If more than two suitable control cows were identified, the first two cows on the list generated by Dairy Comp 305 were selected, and if only one suitable cow was identified, only one cow was used as a control. DIM was used to generate the list, and if no cows matched perfectly, the cow in the same lactation with the closest DIM was chosen.

Cows were not randomly assigned to surgical procedures for this study. Before January 2004, arthrodesis surgeries were not performed routinely, and almost all cows that had deep sepsis of the foot had digit amputation performed. Beginning August 2004, the surgeon treated every cow with deep sepsis of the foot with arthrodesis surgery.

A retrospective case-control study design was utilized. Separate analyses were performed for each surgical procedure. For cows with surgery, survival time was defined as the interval from the date of surgery until

the cow was sold or died. For control cows, survival time was defined as the interval from the date of surgery for the matched case until the cow was sold or died. Cows still in the herd at the end of data collection were coded as censored observations. The survival of cows with surgery was compared to survival of matched controls using Cox's proportional hazards model (SAS 9.1 Cary, North Carolina). Two separate models were used for arthrodesis and amputation. The models were stratified on matched group. Kaplan-Meier survival functions were plotted using Statistix (Analytical Software, Tallahassee, FL).

Results

Digit Amputation: There were 49 cows in the digit amputation (AMP) group, and 68 matched controls (MC-AMP) in the analysis. Survival time was censored at DIM on the end of data collection for eight cows (16%) in the AMP group and 35 cows (53%) in the MC-AMP group because they were still alive at the end of data collection. The mean DIM at censoring was 479 days and the median was 484 days. Cows with amputation had a higher rate of leaving the herd due to culling or death than controls (hazard ratio = 5.5, $P < 0.001$). The Kaplan-Meier estimate for median survival time for cows with amputation was 68 days, compared with 585 days for control cows.

Arthrodesis: Seventeen cows in the arthrodesis (ARTHRO) group and 20 matched controls (MC-ARTHRO) were included in the analysis. Survival time was censored at DIM on the end of data collection for 13 cows (76%) in the ARTHRO group and 13 cows (65%) in the MC-ARTHRO group. The mean DIM at censoring was 269 days and the median was 286 days. There was no effect of arthrodesis surgery on survival ($P = 0.16$). In fact, cows with arthrodesis tended to remain in the herd longer than matched controls.

Significance

Deep sepsis of the digit can result in significant economic losses for the farmer. Although not compared simultaneously, our results suggest that arthrodesis surgery was superior to digit amputation and should be considered for the treatment of deep sepsis of the bovine foot.