Synovial Fluid Analysis in Cattle: 52 Cases

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Introduction

Bovine lameness causes significant monetary losses to the industry. The majority of lameness often originates from disorders of the digits and diagnosis, management, and prevention programs for digit disorders on a herd basis are well established. In contrast, non-digital lameness originating from joint diseases has a lower prevalence. However, joint diseases cause significant losses in productivity, often lead to premature culling with loss of genetic material and increase cost for replacement. One study recorded 22 days of lameness in 63 non-digital lameness cases. Infectious arthritis presents a diagnostic and therapeutic challenge to the practitioner and clinician. This may be caused in part by vague clinical signs in the early stages of the disease or by inconsequent treatment due to economic concerns. It is generally accepted that early diagnosis and aggressive treatment of infectious arthritis are essential to successful management and full return to function. Inadequate treatment lowers the prognosis and may also preclude the application of various treatment modalities previously described in other species. While infectious arthritis has received a lot of attention in other species, reports on diagnosis and management of this disorder in cattle are sparse. In other species, synovial fluid analysis is an integral part in the diagnosis of various forms of joint diseases and clinical guidelines for the differentiation of infectious and non-infectious arthritis are well established. In cattle there are only few reports on synovial fluid analysis and these are frequently based on small sample sizes. The purpose of this study is to describe the changes of the synovial fluid constituents in cattle with various forms of arthritis and to establish guidelines for clinical differentiation of infectious and non-infectious arthritis in cattle based on changes in the cellular components and protein concentration of synovial fluid.

Materials and Methods

Medical records of cattle presented for lameness to the veterinary teaching hospitals of The Ohio State University, Kansas State University, and University of Montreal between January 1, 1984 and December 31, 1996 were reviewed. Case records with complete physical examination, lameness examination, synovial fluid analysis, and clinical diagnosis were included in this study. Case records were stratified as septic and non-septic arthritis for statistical comparison. Cases identified as non-septic arthritis were further classified as traumatic arthritis, degenerative joint disease, developmental orthopedic disease, idiopathic arthritis and arthritis secondary to regional infection. Signalment parameters for age at presentation and sex and breed were recorded. Synovial fluid data were analyzed for total protein, absolute values of total nucleated cell count, and absolute values and proportions of polymorphonuclear cells, mononuclear cells, and specific gravity. Signalment data were analyzed using descriptive statistics. Synovial fluid data were analyzed using one-way ANOVA. Significance for all tests was set at $p<0.05$ and are expressed as mean ± standard error.

Results

Fifty-two records met the inclusion criteria for the study. Cattle with a clinical diagnosis of septic arthritis were younger (17 ± 16.2 months) than animals diagnosed with non-septic arthritis (32 ± 32.1 months) ($p < .05$). Temperature was higher for cattle having septic arthritis (39.4 ± 1.3°C) than for non-septic arthritis (38.7 ± 1.1°C) ($p = 0.007$). Parameters for pulse, respiratory rate, and gender were not different. Synovial fluid total protein content was higher for septic arthritis (5.54±1.15g/dl) than for non-septic arthritis (4.06±1.8g/dl) ($p= 0.001$). Total leukocyte counts for septic arthritis were significantly higher than for non-septic arthritis ($p= 0.001$). Polymorphonuclear cell counts were higher for septic arthritis than for non-septic arthritis ($p= 0.002$). Polymorphonuclear cell proportion was greater for septic arthritis than for non-septic arthritis ($p=0.004$). Mononuclear cell counts were higher for septic arthritis than for non-septic arthritis ($p=0.028$). However, mononuclear cell proportion was lower for septic arthritis than for non-septic arthritis ($p= 0.04$).