

Research Summaries I & II:

Beef and General

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Botulism in Cattle: A Review of 31 Outbreaks, 1984-1997

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Case records of 31 herd outbreaks confirmed by the Pennsylvania Botulism Diagnostic Laboratory [PBDL] over the past 13 years (1984-1997) were reviewed. Only cases with positive isolation of the *Clostridia botulinum* toxin or culture of *Clostridia botulinum* spores capable of toxin production were included in our review.

Clinical signs of botulism in cattle include flaccid paresis that usually progresses from hind limb ataxia to recumbency, while the cow remains bright and alert. The most specific clinical signs of botulism in cattle are poor tongue and jaw tone. Normal cattle will resist having the tongue grasped and pulled from the side of the mouth and quickly retract the tongue once released even when the jaw is clamped shut by the examiner. Cattle with clinical signs of botulism typically have decreased jaw and tongue tone, allowing the tongue to be readily grasped and drawn out of the mouth and are very slow to retract the tongue back into the mouth. Even mildly affected cattle that remain ambulatory and show no other clinical signs will have decreased tongue tone that will remain detectable for weeks after intoxication.

Botulism outbreaks in cattle diagnosed by the PBDL included the diagnosis of the four types of clostridial toxins most commonly isolated from animal outbreaks in the United States, types A, B, C and D. Outbreaks were diagnosed in 11 states although most

outbreaks were from the Mid-Atlantic region. Type B, involved in the vast majority of cases, is the most common form of *Clostridium botulinum* found in the eastern United States in mammals, including humans. Pennsylvania, Maryland, Delaware and Ohio had multiple confirmed outbreaks and the states of Indiana, Massachusetts and Tennessee all had single confirmed outbreaks of *Clostridium botulinum* type B.

Type A botulism, diagnosed in an outbreak in Idaho, was associated with spoiled alfalfa silage stored in temporary plastic silos. Type C botulism, predominant in the western United States, was diagnosed in a California herd fed carrion-contaminated barley silage. The feeding of carrion-contaminated poultry waste, which has been cited frequently in the literature as a source of botulism in cattle, was associated with an outbreak of type C botulism in Arkansas and a type D outbreak in West Virginia.

Fermented forages (silages) were found to be the most frequent source of botulinum toxin in the outbreaks confirmed at the PBDL. Small grain silages (also referred to as cereal silages) such as rye, barley or oat silage were represented in disproportionately high numbers and were the source of toxin in more than half of all outbreaks. A variety of small grains are utilized for forages, including rye, barely, oats or combinations of these. Small grain silages are typically harvested in

small quantities that vary greatly from year to year and are usually planted to compensate for shortfalls in poor crop years. Cool wet spring weather often creates challenging harvest conditions, resulting in forages with highly variable dry matter and highly variable carbohydrate (sugar) levels, factors that may result in failure to undergo rapid complete fermentation and achieve proper pH (pH of 5.0 or lower is recommended).

To put into perspective the relative risk associated with small grain forages, Pennsylvania harvests about five million tons of corn silage from 390,000 acres and two million tons of alfalfa silage from similar acreage each year. The most frequently utilized small grain silage in Pennsylvania is rye, which is harvested as silage from about 5,000 acres to produce 40,000 tons of silage. This represents only about one half of one percent of total silage tonnage but was the source of toxin in well over half of all outbreaks. The other small grains are utilized in even smaller amounts yet were responsible for about two-thirds of the outbreaks.

The method of forage storage in these outbreaks was highly significant. Plastic-based storage methods present a very high risk and have almost entirely replaced any other method of storage associated with herd

outbreaks of botulism. Twelve cases involved silages stored in large round bales wrapped in plastic and an additional ten cases were associated with silages stored in plastic tubular temporary silos [like AgBags]. In Pennsylvania large round plastic wrapped "balage" has become increasingly popular with a diverse group of producers, including herds of all sizes on both dairy and beef farms. Two of the outbreaks involved silages stored in conventional upright silos and only one involved a bunk (trench) silo.

Botulism should be considered as a differential diagnosis for recumbent cattle, especially in outbreaks involving multiple non-periparturient cattle of any age. Isolated cases, however, are possible. Clinical signs of decreased tongue and jaw tone, along with inability to swallow after chewing, are characteristic of botulism. Herd outbreaks of botulism reported in the literature have been dominated by outbreaks of types C and D botulism associated with ingestion of carrion or carrion-contaminated feeds. Although infrequently reported in the literature, "forage poisoning" associated with type B botulism was found to be the predominant form of botulism diagnosed in cattle by the PBDL over the last decade.

For Your Library

Human - Livestock Interactions: The Stockperson and the Productivity and Welfare of Intensively Farmed Animals

by P. H. Hemsworth and G. J. Coleman

The effects of human-animal interactions on livestock appear to have been ignored or neglected until recently.

This book is aimed at those people who have an interest in human-animal interactions in agriculture, perhaps as trainers, managers of farms in which animals are intensively farmed, or students and academics seeking an introduction to the subject. The authors have attempted to make the book as self-contained as possible, by giving a brief account of the theories or principles underlying the research discussed.

The first half of this book contains a detailed review of our empirical knowledge of human-animal interactions together with the development of the theory underlying this empirical research. The second half leads into an examination of the opportunities to manipulate these interactions.

**Oxford University Press, 198 Madison Avenue,
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