December 1993

Antibody Levels in Beef Calves (Birth through Weaning) Following *Clostridium perfringens* Type C Toxoid and/or Antitoxin Administration

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Proceedings, The Range Beef Cow Symposium XIII
December 6, 7, & 8, 1993, Cheyenne, WY

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INTRODUCTION

According to National Cattlemen's Association data, there are approximately 35 million beef cows and 10 million dairy cows in the United States. Combining pre-calving, pre-weaning, yearling, breeding bulls and replacement heifer vaccination opportunities to utilize Clostridial immunization programs, it is estimated that well in excess of 100 million doses of various Clostridial containing products are used each year. Knowing which products stimulate satisfactory antibody levels and their duration of response is an essential part of making informed recommendations to producers for controlling disease. Presently, non-industry, controlled field studies assessing Clostridial products are not available.

Specifically, Clostridium perfringens Type C is a common cause of neonatal calf diarrhea. Although histopathological diagnoses of this disease are made, these cases are frequently difficult to confirm. They are often referred to as sudden/unknown death in calves. From 18 veterinary diagnostic laboratories across the United States contributing to the USDA:APHIS:VS DxMONITOR (summer, 1992), 237 suspected cases of Clostridium perfringens Types C were tested during the period January 1, 1992 to March 31, 1992, but only 22 cases were confirmed. As such, Veterinary Clinicians must rely on gross necropsy results and frequently make recommendations with limited confirmatory information. Anecdotal information from several veterinary clinicians suggests that the incidence of these non-confirmed diagnoses diminished greatly with the use of Clostridium perfringens C&D products prophylactically.

Various opinions abound as to whether the best response to controlling Clostridium perfringens Type C or sudden death in young beef calves is achieved with the use of toxoid, antitoxin, or both, and whether an acceptable response is achieved by administration at birth, two-weeks, or at two-months-of-age. Lack of definitive information regarding optimum protection afforded by the use of these products and their timing leads to possible ineffective use. This, therefore, results in increased cost of the production by both product purchase and labor, and possible increased tissue damage as observed by several Beef Quality Assurance Programs using 7-way Clostridial products.

EXPERIMENTAL DESIGN

Approximately 240 beef calves born unassisted to first-calf heifers, located at two different ranch sites, (synchronized at breeding and due to calve within 3 days of each other) were divided into four groups. After each calf nursed colostrum naturally, it received either an appropriate dosage of 7-way Clostridial toxoid subcutaneously using the "tented" technique in the cervical region; 10 cc of Clostridial antitoxin in the same manner; both injections; or 10 cc of saline as a control. All dams were boostered with Clostridium perfringens Types C&D toxoid or Scourgard 3-K-C and C&D toxoid 2-4 weeks prior to the due date. Calves were born within 7-10 days of each other. Calves born to dams boostered pre-calving with C&D toxoid and randomly assigned to the toxoid treatment group at birth were given 7-way toxoid (post-colostrally). Calves born to dams boostered pre-calving with Scourgard 3-K-C and C&D toxoid and randomly assigned to the toxoid treatment group at birth were given C&D toxoid at birth (post-colostrally). All calves in all groups were boostered at branding (80-90 days-of-age) with 7-way Clostridial toxoid.

Blood samples were taken (pre-injection) within 48 hours of birth; at branding; and at weaning (6-7 months). Assays using ELISA techniques were performed to determine the antibody response levels for each treatment group.

RESULTS

Clostridium perfringens Type C antibody levels in beef calves born to dams boostered pre-calving with C&D toxoid were not different at either of the sampling periods. Antibody levels in calves administered 7-way toxoid, 10 cc C&D antitoxin, 7-way toxoid and 10 cc antitoxin, or saline at birth did not differ ($p>0.05$) when measured at branding or weaning. The initial antibody levels at birth, post-colostrally, were similar for all treatment groups prior to the treatment administration. The administration of 7-way toxoid at branding did not result in differing levels at weaning. (Figure 1)

Clostridium perfringens Type C antibody levels in beef calves born to dams boostered pre-calving with Scourgard 3-K-C and C&D toxoid were not different at branding. Antibody levels in calves administered C&D toxoid, 10 cc C&D antitoxin, C&D toxoid and 10 cc antitoxin, or saline at birth did not differ ($p>0.01$) when measured at branding. Antibody levels in calves receiving C&D toxoid and the calves receiving C&D antitoxin did differ at the weaning period ($p<0.01$). The initial antibody levels at birth, post-colostrally, were similar for all treatment groups prior to the treatment administration. (Figure 2)

CONCLUSIONS

1. Administering C&D toxoid, 10 cc C&D antitoxin, both, or saline at birth to beef calves did not alter Clostridium perfringens Type C antibody levels as measured at branding and/or weaning.

2. Pre-calving vaccinations in first-calf beef heifers result in different Clostridium perfringens Type C antibody levels at birth (post-colostrally).

Figure 1

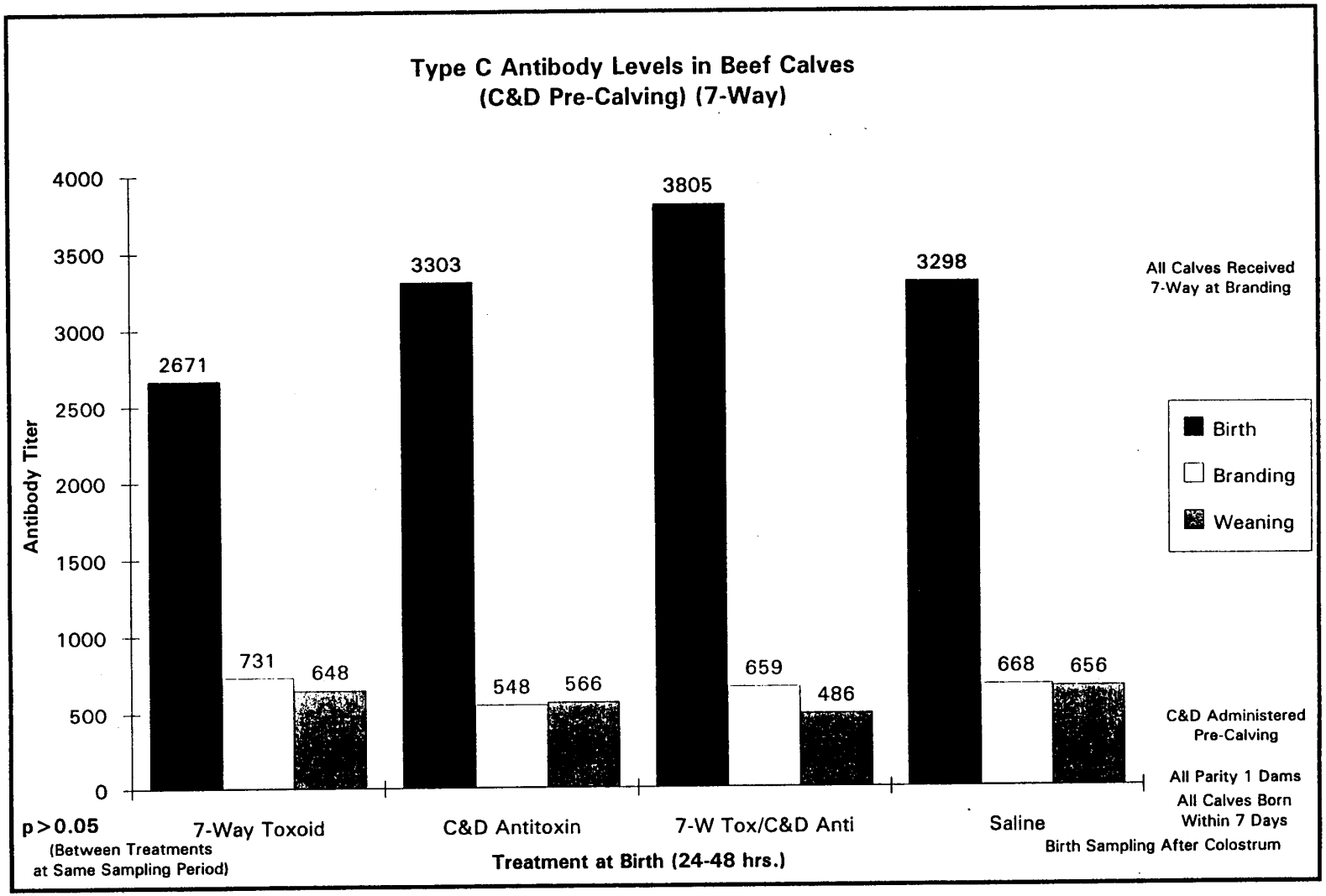
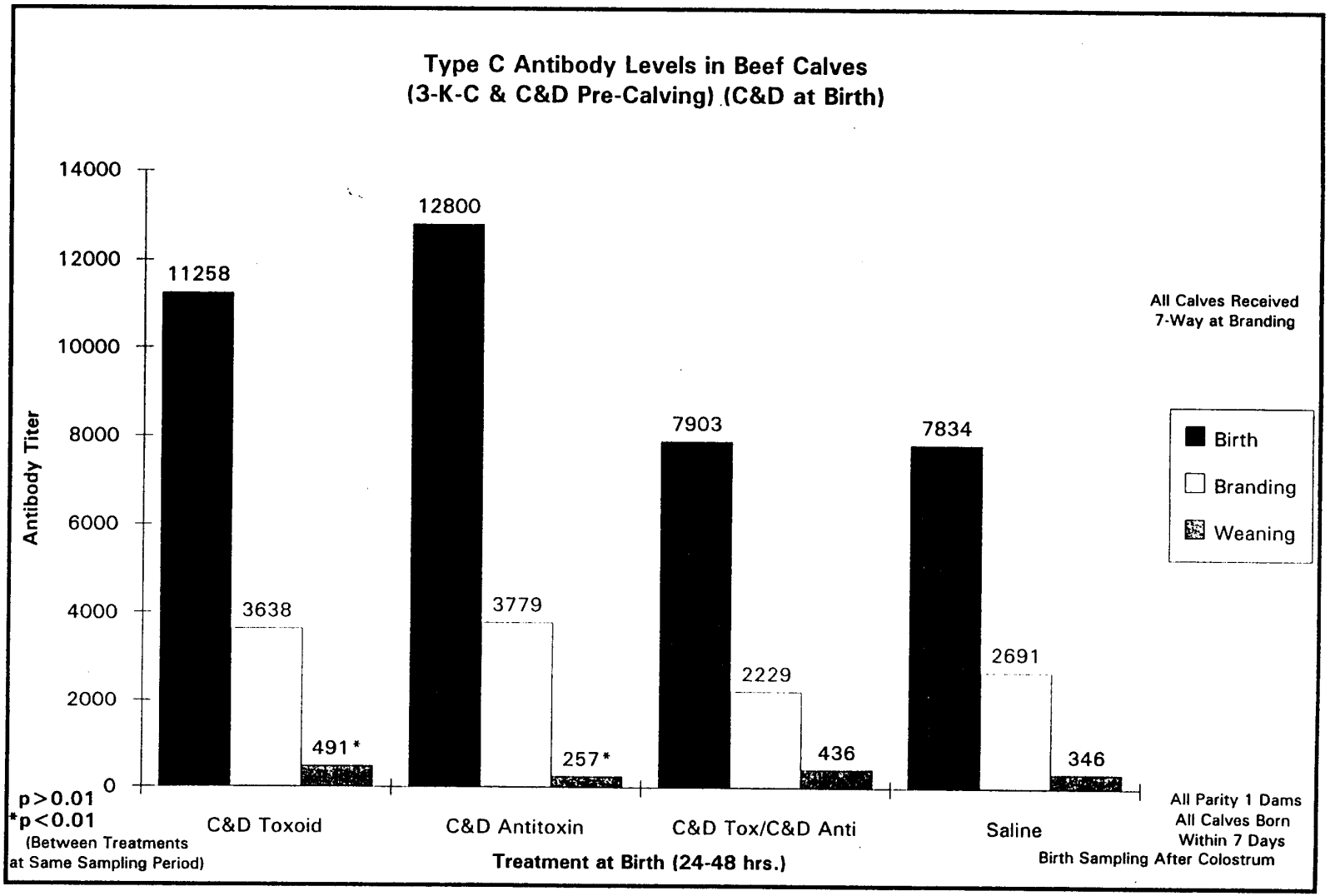

Type C Antibody Levels in Beef Calves
(C&D Pre-Calving) (7-Way)
Antibody Titer
4000
3500
3000
2500
2000
1500
1000
500
0
2671
731
648
3303
548
566
3805
659
486
3298
668
656
7-Way Toxoid
C&D Antitoxin
7-W Tox/C&D Anti
Saline
Treatment at Birth (24-48 hrs.)
p>0.05
(Between Treatments
at Same Sampling Period)
All Calves Received
7-Way at Branding
Birth
Branding
Weaning
C&D Administered
Pre-Calving
All Parity 1 Dams
All Calves Born
Within 7 Days
Birth Sampling After Colostrum

Figure 2


Type C Antibody Levels in Beef Calves
(3-K-C & C&D Pre-Calving) (C&D at Birth)
Antibody Titer
14000
12000
10000
8000
6000
4000
2000
0
11258
3638
491*
12800
3779
257*
7903
2229
436
7834
2691
346
All Calves Received
7-Way at Branding
Birth
Branding
Weaning
p>0.01
*p<0.01
(Between Treatments
at Same Sampling Period)
C&D Toxoid
C&D Antitoxin
C&D Tox/C&D Anti
Saline
Treatment at Birth (24-48 hrs.)
All Parity 1 Dams
All Calves Born
Within 7 Days
Birth Sampling After Colostrum