PUBLICATIONS
1993

FIELD DAY REPORT - 1993

Texas A&M University Agricultural Research and Extension Center at Overton

Texas Agricultural Experiment Station
Texas Agricultural Extension Service

Overton, Texas

May 28, 1993

Research Center Technical Report 93-1

SERUM IMMUNOGLOBULINS AND THEIR ABSORPTION BY NEWBORN BEEF CALVES

R. C. Vann, J. W. Holloway, G. E. Carstens and R. D. Randel

Background. Calf survival is a concern of cow/ calf producers. The calf is born with negligible levels of immune protection. The neonate must absorb colostral Ig to build up an adequate immune protection, which in turn provides resistance against disease organisms. Often neonatal calf mortality is associated with failure of passive transfer, as reflected by low serum Ig concentrations. Several classes of immunoglobulins (Ig) exist, however, IgG, IgG_1, IgG_2, IgM and IgA are the primary classes of Ig that are found in cattle.

The objectives of this study were to 1) determine factors affecting absorption efficiency of Ig by newborn beef calves and 2) evaluate Ig serum concentrations and absorption efficiency in relation to calf sickness. Twenty Brahman (B) and twenty Angus (A) cows were bred to B and A sires to produce ten calves of each of the following breed types: AxA, AxB, BxB and BxA. After calving, the calves were left with the dam for 30 to 45 minutes or until they attempted to stand and suckle. At this time, the cow and calf were separated and the calf was placed in a temperature-controlled room. Blood samples were collected from the calf prior to suckling and at 6, 12, 24 and 48 h after calving. Serum was harvested and frozen at -20C until analyzed for Ig using sRID assay techniques. Each calf was fed pooled colostrum at 14 cc/lb birthweight after presuckling and 6 h blood samples were collected. In addition, an *E. coli* preventive packet was given with the first pooled colostrum feeding. At 6 h, after birth the calf was placed in a wooden box and allowed interaction with the dam, however, the calf could not suckle the dam. At 12 h after birth the calf was fed its dam's colostrum and returned to the dam's side.

Research Findings. Angus cows had heavier ($P<.05$) calves then B cows (80.5 ± 3.1 vs 71.7 ± 2.9 lb, respectively). Bull calves tended ($P<.08$) to be heavier than heifer calves (80.1 ± 3.3 vs 72.2 ± 2.6 lb, respectively).

Serum concentrations of total Ig, IgG, IgG_1, IgG_2, IgM and IgA in calves were not affected ($P>.10$) by sex of calf, breed of dam, breed of sire or the interaction between any of these traits. However, crossbred (AxB and BxA) calves had higher serum total Ig concentrations compared to purebred (AxA and BxB) calves.

Efficiency of Ig absorption by the calf at 6 and 12 h was not affected ($P>.10$) by sex of calf, breed of sire or dam, or any interaction between any of these traits. Overall efficiency of absorption was similar for all breed combinations and averaged 22.0 ± 3.3 % at 6 h and 19.2 ± 1.9

% at 12 h for total Ig absorption of that available to the calf.

Healthier calves (calves sick less than 10 days with *E. coli*) had higher (P<.05) serum Ig concentrations compared to the less healthy calves (calves sick greater than 10 days with *E. coli*). The two breeds of cows (B and A) were managed differently, however, calves with higher serum Ig concentrations tended to be more resistant to disease challenge than calves with lower serum Ig concentrations.

Application. Crossbred calves had higher serum total Ig concentrations. It has been suggested that hybrid vigor may influence the calf's ability to absorb immunoglobulins. The crossbred calf usually tries to suckle the dam more quickly thus receiving Ig in a more timely fashion. Perhaps this is one reason why crossbred calves tend to perform more efficiently than purebred calves. Serum Ig concentrations in calves increase from negligible quantities at birth and usually reach a peak around 24 to 48 hours after birth. Calves with higher serum Ig concentrations tended to be more resistant to disease challenge compared to calves with lower serum Ig concentrations. Calves with higher serum Ig concentrations at 24 and 48 h tended to be sick for shorter periods of time compared to calves with lower serum Ig concentrations. Thus, it is of primary importance that each calf receives adequate colostrum as soon after birth as possible.