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Viruses as a Cause of Neonatal Calf Losses

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Numerous disease agents are responsible for neonatal calf losses. Recent studies on neonatal calves with diarrhea have been reported in Nebraska (1,2,3,4,5) as being caused primarily by two viral agents. These are a reovirus-like agent and a coronavirus-like agent. Previous workers (6,7,8) have reported other viral agents as being significant in neonatal calf enteritis (scours). These agents are a virus which causes calf pneumonia-enteritis and strains of bovine viral diarrhea virus (B.V.D.).

Mebus and co-workers (1) produced neonatal calf diarrhea in experimental gnotobiotic and germfree calves, one to five days of age, with field fecal material and with bacteria-free filtrates prepared from feces of the above experimental diarrheic calves. The period of incubation, age of calf, clinical signs, and mortality were identical to those observed in diarrheic calves on many of the ranches and in dairy herds. The incubation period was 12-18 hours. The clinical signs, when calves were exposed to the reovirus-like agent, were characterized by depression, inappetance, and profuse watery, yellow feces. Most affected calves drooled saliva from the commissures of the lips. Fecal material from these calves, when examined by electron microscopy, contained reovirus-like virions with an approximate diameter of 65 nm (1,9). When fecal material or sections of the small intestine were stained by fluorescent antibody (FA) technique (1) immunofluorescent cells were observed. These cells in the feces were cast off epithelial cells. This procedure (10) is recommended for diagnosis and differentiation of

reovirus-like infections and/or coronavirus-like infections in calves.

Nebraska workers (4,11) reported that the incubation period in calves for coronavirus-like infection varied from 19-24 hours. Clinical signs observed were mild depression, dehydration, anorexia, and yellow diarrhea. They indicated that the major difference between reovirus-like and coronavirus-like infections was the continuation of diarrhea in the coronavirus-like infected calves. After several days of diarrhea, the feces had a curdled appearance, contained mucus, and dehydration was greater in coronavirus-like infected calves. Coronavirus-like infection in field outbreaks usually occurs in calves seven to 14 days of age or older; whereas reovirus-like infections are observed at one to seven days of age.

When sections from the small and the large intestine were stained by the FA technique with corona conjugate, epithelial cells were observed to fluoresce. When reovirus-like conjugate and B.V.D. conjugate were used on these same areas, negative results were obtained.

Limited experimental studies (12) in newborn calves exposed orally to an attenuated reovirus-like agent propagated in bovine kidney cells were protected when challenged 72 hours post-vaccination with homologous virulent virus. These findings led to the commercial production of a vaccine. In 1972, a field survey was made on a total of 64 beef herds. Eight thousand twenty-six calves and 35 dairy herds with 806 calves were vaccinated. The median calf morbidity rate before

vaccination in both groups when combined was 66%; morbidity in vaccinated calves dropped to 10%. The median calf mortality rate before vaccination was 10%; this dropped to 1% in vaccinated calves.

Favorable results have also been obtained with an attenuated coronavirus-like vaccine on an experimental basis.

A survey on diarrheic calves in Nebraska by White, et al., (13) reported that the reovirus-like agent was found widespread in Nebraska herds and in three other states; subsequently it has been found in 23 states, Canada, and Japan.

Lambert and Fernelius (14) reported that of 13 specific pathogen-free (SPF), colostrum-deprived calves exposed orally or intranasally at birth to B.V.D. virus, four had severe diarrhea and died with neonatal enteritis from 38 hours to 13 days postexposure. Isolations of B.V.D. virus were made from several of the organs of the calves at necropsy. All of the nine surviving calves had moderate to severe diarrhea frequently persisting for seven to ten days, and B.V.D. virus was isolated up to 103 days postexposure. These authors concluded that B.V.D. virus should not be overlooked as a primary cause of the neonatal calf enteritis complex.

The experimental reproduction of calf diarrhea (scours) simulating field outbreaks with reovirus-like and coronavirus-like agents in germfree, gnotobiotic, and normal-born calves leads us to believe that these two viruses are the principal agents associated with neonatal calf diarrhea.

Further support for the above statement is the finding of positive immunofluorescence in fecal samples and intestinal sections submitted from field cases of diarrhea in calves. The conjugates were prepared using these two agents as antigens.

The protection of newborn calves in the field by

vaccines prepared from these two viral agents gives additional support to the importance of these agents as being primary causative agents of neonatal calf diarrhea.

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**Published with the approval of the Director as Paper No. 3734, Journal Series, Nebraska Agricultural Experiment Station. Research reported was conducted under project Number 14-1.*