Symposium: Clinical Aspects of Bovine Viral Diseases

On May 17—18, 1979, the above Symposium was held at Towson Maryland and Co-Sponsored by the University of Pennsylvania School of Veterinary Medicine, the Pennsylvania State University Co-operative Extension Service and AABP District II; Conference Coordinator Dr. Robert H. Whitlock. Some of the papers presented at this Symposium are published herewith.

BVD and Bovine Viral Abortions

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General Considerations

At our present state of knowledge, virus diseases contribute only a small percentage to the whole enigma of bovine abortion. Research and increased capabilities of diagnostic laboratories are gradually providing information on the role of viruses as abortifacients. Diagnostic laboratories emphasize the role of infectious diseases in abortion when in fact the problem may be multifaceted. Isolation of a virus from an aborted fetus does not necessarily incriminate the virus as the primary etiological agent. The infection in the fetus may be too mild by itself to cause abortion. However, certain viruses such as the BVD virus may enhance the replication of other coexisting viruses.[1]

There appears to be a substantial barrier in the fetus to viruses from the external environment. In addition to Maternal immunity, which protects the fetus from natural infection, immunoglobulins start forming in the fetus at 90-120 days of age.[2] Prior to this time non-specific inhibitors may have a protective effect. Also, complement is formed within the first third of fetal life and its concentration increases steadily during the prenatal period. An early protective effect is provided by evidence that placental attachment (approx. 35 days) must occur before viruses can be transferred to the fetus.

Abortifacient Viruses

The following viruses have been incriminated as etiological agents in bovine abortion: Bovine Virus Diarrhea (BVD), Infectious Bovine Rhinotracheitis (IBR), Malignant Catarrhal Fever, other Herpes viruses, Bluetongue, Parainfluenza, Enteroviruses, Adenovirus and Parvovirus. The emphasis will be placed on the viruses of BVD and IBR since they are the ones most frequently isolated in our diagnostic laboratory.

Diagnostic Methods[3]

A systematic, detailed examination is necessary in order to increase the number and accuracy of diagnoses:

1. Herd history now and several months prior to abortion is often of great help. Circumstantial evidence may be the only information obtained to arrive at a diagnosis. Respiratory and/or enteric disease will often have occurred in the herd prior (sometimes 2-3 months) to the abortions. Other times, unexplained fevers, loss of appetites and drop in milk production may be the only signs noted. Vaccination history is important, especially the type of vaccine, route and date of administration, also, whether it was administered to pregnant animals or not.

2. Serology - serum samples should be collected from the aborting cows and also from a few individuals in close contact with them. Testing acute and convalescent sera is necessary because of the widespread presence of viral antibodies in our cattle population.

The serum neutralization test is used most frequently to measure maternal antibodies. However, this test relies on the

tissue culture system and takes a week to be completed. At our laboratory we are in the process of implementing the complement fixation test[4]-especially for BVD. This test can be conducted in a shorter period of time and the antibodies measured are more likely to be directly related to the abortion. Consequently, some serological information can be obtained even when a convalescent serum sample cannot be obtained.

Additional valuable information can be obtained when neonatal calves born near the time of the abortion problem are tested for viral antibodies. The blood sample must be taken prior to the ingestion of colostrum. The fetal immune system is capable after 90-120 days of age of responding to viral infections.

3. Examination of the entire fetus and placenta: Fetuses that we examine are often retained 1-2 days before expulsion, consequently they usually have undergone extensive autolysis.

Gross examination reveals extensive extravasation and lysis of red blood cells. This hemolyzed blood accumulates in the subcutaneous tissue, perirenal tissue and all body cavities.

Microscopic examination of formalized tissue, cut and stained with hematoxylin-eosin, may be helpful. In the case of IBR, foci of necrosis are found in several fetal organs-especially the liver. Reticuloendothelial hyperplasia may occur, especially in portal areas of the liver. The BVD virus causes a vasculitis that may be evident microscopically.

4. Virus isolation and FA tests:

Tissues are pooled, frozen and studied through the methods of virus isolation and immunofluorescence. We attempt to recover the BVD virus, although it is rarely isolated. The IBR virus can often be isolated from the placental cotyledon and also found with the FA test-especially in kidney tissue. Of all the viral abortions, IBR is most frequently and easily diagnosed. However, the BVD virus may also be important and widespread even though it is not diagnosed as often. The effect of the BVD virus depends upon the stage of gestation. During the first trimester the fetus often dies and is aborted without being noticed. Mummification also occurs during this time period. The fetuses that survive become carriers of the virus. Immunocompetence usually eliminates the virus. During the second trimester, especially between 100-180 days, BVD virus infection may result in neurological defects such as cerebellar hypoplasia and retinal deficits. Fetuses infected during the last 90 days usually recover and are not aborted.

BVD infection during the last 180 days usually results in a high level of antibody to the BVD virus at birth. However, occasionally some animals are born that are immunologically tolerant[5]. These individuals are viremic and may develop mucosal lesions. They often die from diarrhea or respiratory disease. The BVD-type lesions are found especially as linear ulcers in the esophagus.

In the future other viruses such as Parvovirus may take on added significance as causes of abortion and/or neonatal disease of cattle. However, for the present time the viruses of BVD and IBR remain the ones of most concern.

References

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Calf Coronavirus and Rotavirus infections: An Update

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Since the initial report of rotavirus causing diarrhea in human infants, the literature on rotavirus has become voluminous. Rotaviral infection has been recorded in many species: mouse, cattle, sheep, deer, pig, horse, monkey, prognhorn antelope, impala, Thomson's gazelle, addax, rabbit, cat and dog.

Rotavirus from different species, and in some cases different isolates from the same species, can be distinguished biochemically. The importance of cross species infection is not known. The U.S. calf rotavirus did not infect piglets, while the U.K. calf isolate caused diarrhea. The mouse rotavirus did not infect calves. Human infant rotavirus caused diarrhea in calves, but the severity of illness and amount of virus shed was less than that caused by infection with the U.S. calf rotavirus.

Several methods are now available for detecting antigen or antibody. Antigen, or virus in feces, can be detected by electronmicroscopy, fluorescent antibody techniques,