

The Prevalence of Bovine Virus Diarrhea and Bovine Respiratory Syncytial Virus in Mexico

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Introduction

Significant research has been conducted which establishes the prevalence of BVD in Mexico¹⁻³. While this work demonstrates the widespread exposure, BVD disease is still a reportable disease, and is categorized as an enzootic disease by the Mexican Animal Health Authorities⁴. BRSV has long been considered a worldwide disease of cattle. A prior report⁵ and this comparison study indicate that the disease has long been present in Mexico, and is in fact widespread throughout the country. In spite of this work, BRSV is still considered an exotic disease in Mexico⁴⁻⁶.

In the summer of 1989, the veterinary staff of the Tizayuca dairy herd began to experience problems with the herd's calves. The herd consists of approximately 25,000 cattle, and was experiencing an unusually high rate of calf mortality. SmithKline Beecham Technical Services was contacted and provided technical assistance for the herd investigation. The affected calves averaged approximately three months of age, and demonstrated symptoms of high fever, diarrhea, and oral ulcers. Most of the affected calves recovered, while others would develop typical mucosal disease and then die. Necropsies revealed ulcers in the esophagus and digestive tract. A tentative diagnosis of BVD was made, and arrangements to obtain blood samples and permits for testing were begun. Blood samples were collected two months after the initial investigation, and were sent to the National Animal Disease Center in Ames, Iowa for analysis.

At approximately the same time that the Tizayuca dairy herd was being tested, several practitioners in Southern Texas reported respiratory diseases and other problems with Mexican calves being imported into Texas for either grazing or feeding operations. Blood samples were taken from several calves within one hour of their crossing the border, and were analyzed by Colorado State University's Diagnostic Laboratory. The serology reports suggested natural exposure to both BRSV and BVD.

Materials and Methods

In the Tizayuca dairy herd, whole blood samples (15 cc) were collected from ten adult cows and ten calves. Of the ten calves, five had been sick and recovered. The other

five were sick at the time of testing. All blood samples were cleared through the USDA for import into the United States, and then transported to the National Animal Disease Center (NADC) in Ames, Iowa for testing. The NADC ran virus isolation and serum neutralization titers for BVD, and indirect hemagglutination titers for BRSV.

In addition to the Tizayuca dairy herd, similar tests were conducted using blood samples collected from feeder calves entering Texas from the southwestern coastal areas of Mexico. The serology was run at the Diagnostic Laboratory of Colorado State University in Fort Collins, Colorado.

The feeder calves were separated into three groups. The first group, Group W-1, consisted of five calves that were new arrival, high-stress calves which had received a multivalent modified live and killed respiratory virus vaccine^A on the day of shipment to Texas. Group W-1 calves were sampled within one hour (within 24 hours of vaccination) of their arrival at the feed yard. The second group, Group W-2, also consisted of five calves which had received the same vaccine on the day of shipment, and had been in the yard twelve days prior to sample collection. The third group, Group S, consisted of three calves which had not received prior vaccination, and had been in the United States for ten days before blood samples were drawn.

Results

Tizayuca Dairy Herd

All of the cattle had antibodies against BRSV, using an indirect hemagglutination test, and most of the cattle had antibodies against BVD, using a viral neutralization test. Virus was not isolated from any of the sera. The titers for BRSV were extremely high, with one animal having a level higher than the control positive sample for BRSV. BVD titers ranged from negative to greater than 1:256. All adult cattle were sero-positive for the BVD virus. The serology results of the Tizayuca dairy herd are shown in Tables 1, 2 and 3.

^A*CattleMaster™ 4+L5, SmithKline Beecham Animal Health, Exton, Pa

TABLE 1 Adult Cows - Tizayuca Dairy Herd

Sample Number	BVD Serum Neutralizing Titer	BVD Virus Isolation Result	BRSV Titer
2653	1:32	-	512
2665	1:128	-	1024
2608	1:16	-	256
2645	>1:256	-	2048
2637	1:8	-	128
2669	>1:256	-	2048
2609	1:128	-	256
2624	>1:256	-	2048
2652	>1:256	-	2048
2650	1:16	-	256

BRSV Control Titer - 2048

TABLE 2 Tizayuca Dairy Calves Recovered From Clinical Signs

Sample Number	BVD Serum Neutralizing Titer	BVD Virus Isolation Result	BRSV Titer
1615	>1:256	-	128
1259	<1:2	-	>4096
1163	1:4	-	128
1117	<1:2	-	64
0997	<1:2	-	2048

BRSV Control Titer - 2048

TABLE 3 Tizayuca Dairy Calves With Clinical Signs

Sample Number	BVD Serum Neutralizing Titer	BVD Virus Isolation Result	BRSV Titer
1147	1:8	-	32
1455	1:16	-	128
1119	<1:2	-	64
1672	1:8	-	64
S/N	1:32	-	64

BRSV Control Titer - 2048

Incoming Mexican Feeder Calves

Four of thirteen (31%) of the calves sampled were sero-positive for BVD disease. Two animals in the new arrival group (W-1-3 and W-1-4) had significant BVD titers (Table 4). Animals W-2-2 and W-2-4 also had significant titers to BVD disease. All other cattle were sero-negative to BVD disease on serum neutralization testing at a dilution of 1:8.

Five of eight (60%) of the calves were sero-active to BRSV. The five calves in Group W-2 were not included in this percentage since titers shown could have been due to the administration of the modified live BRSV vaccine twelve days previously.

The serology results of the three groups of incoming Mexican feeder calves are shown in Table 4.

TABLE 4 Mexican Feeder Calves Entering Texas

Sample Number	Serology	
	BVD Titer	BRSV Titer
*W-1-1	<1:8	<1:2
*W-1-2	<1:8	1:16
*W-1-3	1:16	1:8
*W-1-4	1:512	1:8
*W-1-5	<1:8	<1:2
**W-2-1	<1:8	1:8
**W-2-2	1:128	1:8
**W-2-3	<1:8	1:32
**W-2-4	1:128	1:16
**W-2-5	<1:8	1:16
***S-1	<1:8	>1:256
***S-3	<1:8	1:8
***S-5	<1:8	<1:2

* Received vaccine^A prior to arrival
In yard 1 hour prior to sample collection

** Received vaccine^A on day of shipment
In yard 12 days prior to sample collection

*** No prior vaccine given
In yard 10 days prior to sample collection

^ACattleMaster™ 4+L5, SmithKline Beecham Animal Health, Exton, PA

Discussion

Significant research has been conducted in Mexico on the widespread incidence of BVD disease in dairy and beef cattle. Results of the serological survey conducted by Suzan¹ showed positive BVD disease antibodies of 63%-71% in 903 samples of serum collected from cattle in nineteen different Mexican States. Two earlier studies performed by Correa^{2,3} using 47 serum samples collected from two states in Mexico showed that 75% and 70% of the sera collected were found positive to BVD disease. Similar results were also obtained by Tenorio⁶, finding 69% positive BVD antibodies in serum samples collected from nineteen Mexican states. The results of these studies are consistent, but are slightly lower than the percentages of BVD disease found in the Tizayuca dairy herd. The extremely high rate of BVD exposure in the Tizayuca adult dairy cattle is most likely due to a constant shed of BVD virus by persistently infected cattle. This would explain the clinical picture seen in the calves. It should be noted that the negative virus isolation results in sick calves could be attributed to a short delay of the blood samples clearing United States Customs procedures, during which time the virus may not have survived. In view of the fact that no vaccines for BVD or BRSV are given in Tizayuca, Mexico, high exposure to these two disease pathogens exists in the herd. Currently, the Tizayuca dairy herd continues to experience significant

sickness and problems associated with the uncontrolled presence of BVD and BRSV.

Correa⁵ has also conducted a study of BRSV in Mexico, testing 12 serum samples by serum neutralization from 11 Holstein cows and one calf from the State Puebla, State of Mexico, and Mexico City. The samples were found to have titers ranging from 1:16 to 1:64.

All groups tested from the Tizayuca dairy herd had extremely high titers to BRSV, suggesting heavy exposure. The difference between the levels of titers between the dairy cattle and feeder cattle may be attributed to the variations of testing procedures in the different laboratories that were used.

The sero-activity reported for BVD disease in the feeder steers is indicative of exposure prior to arrival in the United States. The sero-activity in Group W-1 would not result from the use of the killed virus vaccine on the day they were shipped across the border. Research on use of killed BVD disease vaccines indicates that little or no titer development is seen within eighteen days following administration of the initial dose. Therefore, the 1:128 titers for animals numbers W-2-2 and W-2-4 represent exposure prior to arrival in the United States.

Exposure to BRSV is evidenced in the titers of Group W-1. These calves were sampled within one hour of arrival in the United States and had been vaccinated with a modified live BRSV product the day of shipment. The fact that three of five (60%) calves were sero-active on arrival in the U.S. indicates that exposure to BRSV occurred in Mexico. If the calves were not exposed prior to the time the modified live BRSV vaccine was administered, it is unlikely that sero-activity would be present at the time of sampling.

The high prevalence of antibody to BRSV and BVD strongly indicates that the presence of these two disease pathogens is widespread throughout Mexico. A clear association between the prevalence of these viruses and clinical disease was established for the animals in this study. This indicates that effective vaccines against these diseases need to be made available to Mexican cattle producers and that sound vaccination programs need to be implemented.

Summary

Two studies were performed to determine the prevalence of Bovine Virus Diarrhea (BVD) and Bovine Respiratory Syncytial Virus (BRSV) based on the serological evidence of serum neutralizing titers. Cattle from a large dairy farm in Tizayuca, State of Mexico, Mexico, and feeder cattle entering Texas from the southwestern coastal

areas of Mexico were studied. The serological results of the dairy farm cattle showed 100% were exposed to BRSV, and 100% were exposed to BVD. Similar exposures were detected in the herd's calves, with the serology showing 100% exposure to BRSV and 60% to BVD at 1:2 dilution or greater. Exposures were detected in the feeder calves entering Texas, showing 60% exposure to BRSV and 31% exposure to BVD at 1:8 dilution or greater.

Resumen

Se ejecutaron dos estudios para determinar la prevalencia del virus de Diarrea Viral Bovina (DVB) y el Virus Respiratorio Sincicial Bovino (VRSB) basados en la evidencia serológica de títulos seroneutralizantes.

Se estudiaron dos grupos de ganado, uno de vacas lecheras en Tizayuca, Edo. de México, México y otro de ganado de carne introducido a Texas procedente de la región costera suroeste de México. Los resultados serológicos en el ganado lechero mostraron un 100% de exposición al VRSV y al Virus de DVB. Una exposición similar se detectó en becerros de este hato, con los resultados serológicos indicando un 100% de exposición al VRSB y un 60% de exposición a DVB a la dilución 1:2 o mayor. Se determinó la exposición a estos dos virus en el ganado de carne a su entrada a Texas, mostrando un 60% de exposición al VRSB y un 31% de exposición al virus de DBV a la dilución 1:8 o mayor.

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