

AN OUTBREAK OF ABORTION IN A DAIRY HERD FOLLOWING INOCULATION WITH AN INTRAMUSCULAR INFECTIOUS BOVINE RHINOTRACHEITIS VIRUS VACCINE

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INTRODUCTION

Live virus vaccines administered intramuscularly have been widely used for the control and prevention of the various clinical entities caused by infectious bovine rhinotracheitis (IBR) virus in North America (3). It is known that these vaccines may cause abortion (6), therefore all licensed products include a warning that they should not be administered to pregnant animals. The incidence of abortion following vaccination has been reported as varying from zero to 25% with less than 10% occurring in most cases (7). This paper records clinical and laboratory findings in a herd of Holstein cattle in Eastern Ontario in which 30 pregnant animals were inoculated with a commercial intramuscular IBR vaccine, with the subsequent loss of 23 pregnancies.

CLINICAL HISTORY

Prior to vaccination, the herd contained 26 pregnant cows, six pregnant heifers, and six heifer calves under one year of age. All 32 adult females had conceived to artificial insemination between April 3 and August 18, 1971, 25 to the first and seven to the second insemination.

On November 2, 1970, the day after a four-year-old cow aborted at 212 days of gestation, 30 of the remaining 31 pregnant animals were inoculated intramuscularly with the recommended dose of a commercial modified live IBR virus (tissue culture origin) vaccine. The cow which had aborted (fetus not submitted), and one other which the owner planned to sell, were not inoculated.

Between November 23, 1970 and February 22, 1971, 18 of the vaccinated animals aborted, 17 aborting single fetuses and one aborting twins. On February 2, rectal examinations conducted on the 13 animals which had not aborted by that date, revealed that

five of these contained dead fetuses *in utero*. Intrauterine infusion with dilute Lugol's solution in these five cases on February 17 resulted in the expulsion of four of these fetuses within three days.

Seven of the vaccinated animals calved normally (Table I). With the exception of the first post-vaccination (PV) abortion and the single animal which failed to expel a fetus following infusion, the 20 single and both twin fetuses were obtained for laboratory examination. Paired blood samples were taken from twelve animals which aborted following vaccination, the first sample on, or within a few days of abortion, the second two to four weeks later. The two animals which were not vaccinated were bled on November 30, December 15, and January 13. A complete herd bleeding, including the young heifers, was carried out on February 17.

Two of the aborted cows were sold toward the end of December and another died two days after aborting, apparently of a clostridial toxemia. The two unvaccinated animals were purchased and transferred to an isolation unit at ADRI on February 25.

LABORATORY EXAMINATIONS

All aborted fetuses, except the six which had been dead *in utero* for some time, were examined grossly and portions of lung, liver, spleen, kidney, adrenal and thyroid glands submitted for histological examination (15 cases). Selected tissues were also submitted for bacteriological examination in six cases, for IBR fluorescent antibody examination in one case, and for virological examination in ten cases. All serum samples were tested for the presence of IBR virus antibodies by complement fixation (CF) and/or serum-virus neutralization (SVN) tests. Selected sera were tested for Brucellosis and Leptospirosis.

RESULTS

The sequence of calvings and abortions is summarized in Table I. All the abortions following vaccination occurred between 21 and

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TABLE I
 SEQUENTIAL OUTCOME OF 30 PREGNANCIES AND RESULTS OF 22 FETAL EXAMINATIONS
 IN ANIMALS VACCINATED NOVEMBER 2, 1970

Animal No.	Stage of Pregnancy at Vaccination (days)	Termination of Pregnancy		Fetal IBR Examinations	
		Days Post-vaccination	Condition ^a	Histological	Virus Isolation
1	193	21	A	Not submitted	
2	190	28	A	Pos	Neg
3	165	29	A	Pos	Neg
4	167	29	A	Pos	Neg
5	176	30	A	Pos	
6	182	33	A	Pos	
7	167	34	A	Pos	
8	145	36	A	Pos	Pos
9	188	38	A	Pos	
10	158	41	A	Neg	
11	181	45	A	Pos	Neg
12	148	46	A	Pos	Pos
13	199	54	A (twins)	Both Pos	Both Neg
14	180	61	M		
15	185	65	A	Pos	Neg
16	167	66	A	Pos	Neg
17	77	80	M		
18	183	100	C		
19	180	103	C		
20	177	103	C		
21	149	109	M ^b		
22	154	109	M ^b		
23	190	110	M ^b		
24	98	110	M ^b		
25	159	112	A	Pos	Pos
26	178	No Record	M ^b		
27	158	No Record	C		
28	157	No Record	C		
29	147	No Record	C		
30	146	No Record	C		

^aA = Aborted M = Fetus mummified or decomposed C = Live calf

^bIntrauterine infusion of 100 ml 5% Lugol's iodine on PV day 107.

112 days PV. No abortifacient pathogens were isolated from stomach contents or tissues of the six fetuses examined bacteriologically and all serological tests for brucellosis and leptospirosis were negative. Histological changes typical of IBR infection (2, 4) were observed in the tissues of all but one of the 15 fetuses examined. Although histological lesions were present in all ten fetuses from which tissues were also submitted for virus isolation, IBR virus was only recovered from three (Nos. 8, 12, 25). Specific IBR virus immunofluorescence was observed in the tissues of the only fetus submitted to this examination (No. 2). A significant increase in the level of IBR antibody was observed in CF tests conducted on paired serum samples from nine of the twelve cows tested following abortion. On February 17, three and one-half months after the date of vaccination, the six yearling heifers and the seven vaccinated cows which calved normally were serologically negative for SVN antibody. On the same day 12 of the 20 aborted cows still showed a SVN titre of 1:10 or greater.

The two unvaccinated purchased animals were inoculated on March 11, 1971 with the same commercial IBR vaccine as had been used in the field. At this time, they were 42 and 221 days pregnant respectively. The former was revaccinated on May 31 and October 29 and calved normally on November 4. The latter calved normally on May 2, was revaccinated on May 31, was rebred and conceived on August 23, was vaccinated again on February 21, 1972 and calved normally on June 2 of that year. These two females remained serologically negative for IBR antibodies while on the farm, but both developed titers following vaccination at the laboratory.

DISCUSSION

Consideration of the clinical history and the results of laboratory examinations led to the conclusion that the administration of IBR vaccine to the 30 pregnant animals was responsible for the death and/or abortion of 15 fetuses (from 14 cows) and, probably caused

the death and/or abortion of a further nine fetuses. This represents a total pregnancy loss of 76.7%. No spread of infection from vaccinated to unvaccinated animals was detected. The fact that the seven cows which calved normally and eight of the aborting cows, in addition to the eight unvaccinated animals, were serologically negative 107 days post-vaccination, was probably due to disappearance of circulating antibody by this time. However, it should be noted that one of the purchased cows did not develop detectable antibody until after its second inoculation.

It is recognized that IBR virus can cause fetal death and abortion at any stage of gestation, but most cases occur during the latter half of pregnancy (6). Although fetal mummification and advanced decomposition have been reported in natural IBR abortion (7), the 30.4% incidence in this case is unusually high. It is interesting to note that two of the individuals which aborted mummified fetuses weighing 98 and 700 gm, were only 77 and 98 days pregnant respectively at the time of vaccination. Apart from these two, all other 21 animals which lost fetuses were between 140 and 200 days pregnant on the date of vaccination and this period may be one during which the fetus is particularly susceptible when the virus is injected parenterally.

In an experimental study (8) on the prevention of IBR abortion by vaccination, 62.5% of the control animals aborted. These animals were inoculated either intramuscularly or intranasally with low passage tissue culture-propagated live virus at three to six months of gestation; all abortions occurred eight to 41 days postchallenge. Another report (5) records the loss of 20 of 119 pregnancies (16.8%) 13-107 days after IBR vaccination in animals 83-244 days pregnant.

This incident emphasizes the dangers associated with the use of such vaccines in herds containing pregnant females. The general consensus appears to be that, provided these products are used *as recommended*, the risks are minimal (1). Furthermore, the majority of animals vaccinated prior to breeding are protected against IBR abortion during their subsequent pregnancy (8). There is no proof that these vaccines are responsible for causing abortions in breeding herds where only non-pregnant animals are inoculated.

The advent of intranasal vaccination (9), which is claimed to be safe for use in pregnant females, may provide a solution to this problem. However, in view of the ubiquitous and persistent nature of herpesvirus infections and because of the findings recorded above, it is

suggested that care should be exercised in the selection of animals to be vaccinated with live IBR virus vaccines.

SUMMARY

Clinical and laboratory findings following an incident in which 30 stabled, pregnant dairy cows and heifers were inadvertently inoculated with an intramuscular live infectious bovine rhinotracheitis (IBR) virus vaccine are recorded. Twenty-three of these four to six months pregnancies terminated in abortion or fetal death between 21 and 112 days after vaccination. Seven of the aborted fetuses were unfit for laboratory examination because of decomposition or mummification and one was not submitted. The results of histological, virological and serological studies on the remainder confirmed that IBR virus was responsible for these fetal losses. No spread of infection to unvaccinated, serologically negative animals in the same barn was observed. The implications of these findings, in relation to the role of vaccination as a means of preventing abortions caused by IBR virus, are discussed.

RÉSUMÉ

L'auteur rapporte les résultats d'examen cliniques et d'épreuves de laboratoire concernant 30 vaches et taures gestantes en stabulation, auxquelles on avait administré par inadvertance une injection intra-musculaire de vaccin atténué contre la rhino-trachéite infectieuse bovine. Du 21^e au 112^e jour après cette vaccination, 23 gestations, qui évoluaient depuis quatre ou six mois, se terminèrent par un avortement ou la mort du fœtus. La putréfaction ou la momification rendirent sept de ces avortons impropres à des examens de laboratoire et on négligea d'en soumettre un autre. Les résultats d'études histologiques, virologiques et sérologiques relatives à 16 autres avortons confirmèrent le fait que ces avortements étaient attribuables au virus de la rhino-trachéite infectieuse bovine. L'infection ne se propagea pas aux sujets du troupeau non vaccinés et dépourvus d'anticorps décelables. L'auteur commente les implications de ses observations relativement au rôle de la vaccination comme moyen de prévention des avortements attribuables au virus de la rhino-trachéite infectieuse bovine.

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LETTER TO THE EDITOR

DEAR SIR:

Organized veterinary medicine took a step forward when it appointed both professional and lay personnel to the Board which directs the affairs of the CVMA Veterinary Research Trust Fund. The January issue of the Canadian Veterinary Journal records an interesting cross section of representatives from different walks of life. Among them, I was pleased to see included, the world renowned artist Alex Colville.

As Chairman of the O.V.C. Cultural Affairs Committee, I am proud to inform readers of

the C.V.J. that the O.V.C. Alumni Association and the Alma Mater Fund combined to present a 1954 Colville painting to the College. Its title is "Two Riveters" and it is one of the first paintings to show the artist's concern with the interaction between man and machine.

Colville's presence on the Research Trust Board should provide an objective view to the proceedings.

Yours truly,
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