IMMUNE RESPONSE OF VEAL CALVES TO BVDV VACCINATED WITH PNEUMOVAC PLUS VACCINE IN EGYPT

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Abstract

Forty veal calves were used in the study; thirty calves were vaccinated and 10 rest were used as control. The vaccine dose was by two injections I/M 2 weeks apart.

Eighteen of the vaccinated calves developed BVD serum neutralizing (SN) antibodies at 21 or 28 days, where 6 of them responded in low non-protective titre that was lost quickly at 1.5 - 2 months post-vaccination (PV). The rest 12 calves developed a protective SN titre that lasted for 4 months or less PV (40 %).

Twelve vaccinated calves did not respond for vaccination and no SN BVD antibodies were detected. Bovine virus diarrhoea virus infection and isolation were recorded in 5 non-vaccinated calves; 3 of them did not develop BVD antibodies. Also, BVD virus infection was recorded in vaccinated calves, but in 3 of those which lost their protection BVD titre.

BVD immune suppression was detected in vaccinated calves which did not respond to vaccination (60 %, comprising 12 calves that did not respond and 6 responded weakly to BVD vaccination).

Also, the study proved immune tolerance to BVD in 3 non-vaccinated calves which got BVD infection without development of any SN BVD antibodies.

The study declared that the vaccine is satisfactory to protect immune competent veal calves from BVD infection. Also, the study proved immune tolerance of calves to BVD, a problem necessitating study to control.

INTRODUCTION

Bovine viral diarrhoea-mucosal disease disease (BVD-MD) is a multisystemic viral disease of cattle with widely disparated clinical manifestations (Paton *et al.*, 1989). The disease was described by Baker (1982) as an acute disease of cattle characterized by pyrexia, leukopenia and bloody diarrhoea, mouth lesions, lameness, respiratory illness, poor weight gains and death .

Bovine virus diarrhoea was isolated for the first time in Egypt from sick and dead calves at Tahrir province and Sakha farms (Hafez 1973 and Baz 1975).

The studies proved the wide distribution of BVD-MD in Egypt (El-Dobeigy 1975) and El-Dobeigy *et al.*, 1983). These facts emphasized the need for the use of some type of vaccine for its control.

The present investigation aimed to study the efficacy of BVD constituent of pneumovac plus vaccine veal calves under field conditions.

MATERIALS AND METHODS

Animals :

Forty buffalo calves of about 2-3 months of age and free from respiratory disorders were chosen from 23 July farm at El-Marg station belonging to General Company of Meat and Milk Production.

Vaccine :

Inactivated pneumovac plus polyvalent combined tissue culture imported vaccine B.No. 3317/40/2 was used.

Media :

Eagle's minimal essential medium (MEM) was obtained from the Egyptian Organization of Biological Products and Vaccines, Giza, Egypt.

Cell cultures :

The primary culture from the primary calf kidney cell was prepared as de-

scribed by Plowright and Ferris (1959).

Bovine anti BVD monospecific hyperimmune serum was obtained from Ames Iowa Laboratories, USA.

Vaccination of buffalo calves :

All experimental calves were kept under observation for 10 days before vaccination, where general clinical examination was carried out. Thirty calves were vaccinated each with pneumovac plus vaccine by two injections 2 weeks apart according to Morzoria *et al.* (1979). Sera were collected from each calf every 3 days after the first vaccination, then, every week after the booster dose for 2 weeks, then, every month up to 6 months. The other 10 calves were not vaccinated and kept as control, where sera were collected following the protocol adopted for the vaccinated calves.

Serum neutralization test was used for the measurement of specific BVD - MD serum neutralizing antibodies in vaccinated calves according to Robson *et al.* (1980).

Ten nasal swabs, three rectal swabs and ten buffy coats were collected from calves showing nasal discharge; rectal swabs from calves showing diarrhoea and buffy coats were collected from calves showing rise in temperature. These samples were prepared according to the method described by Selvokeumar *et al.* (1982). The obtained isolates were identified by serum neutralization test using reference specific hyperimmune serum supplied from Ames Iowa Laboratories, USA.

RESULTS

The results of SN developed antibody titres for BVD virus are represented in Table 1 for vaccinated and control calves during 6 months experimental period. Only, 12 calves developed immunizing BVD SN antibody titre (more than 11) at 1 month PV. Titre remained till 4 months PV or decreased till non-immunizing titre. BVD infection was recorded in calf No. 5810 at one month PV. BVD antibodies were decreased to a non-immunizing level at 2 months PV indicating virus nutralization.

Other 18 calves responded weakly with a non-immunizing SN antibody titre (1:6) or did not respond at all. Virus infection was detected in 4 calves which did not respond to vaccination as virus was isolated from diseased calves and no BVD SN

antibodies were detected.

In the 10 non-vaccinated control veal calves (Table 2), no SN antibodies were detected in 5 calves during experimental period. Other 5 calves got infection, 3 of them did not develop immunizing BVD antibodies, and virus was isolated; the other 2 rest got BVD antibodies in a high immunizing titre (More than 1 : 8).

DISCUSSION

Twelve out of the 30 vaccinated calves (40 %) developed an immunizing BVD titre at 1 month (10 calves) and 1.5 months (2 calves). Booster vaccination elevated titre from (1/6 to 1/11) up to 1/11-1/22. This significant response resembles that of Kolar *et al.* (1972). However, it differs from the results obtained by Motzoria *et al.* (1979) who found no significance in response after pneumovac vaccination in newly born calves, and attributed this to the presence of maternal antibodies that blocked the effect of vaccination. In our case, there were no maternal antibodies and , so, there was a significant rise after booster injection. The titre remained in 9 calves for 4 months or decreased, and that could be for normal decay or field infection. The other 3 calves lost their BVD SN titre at 2 months PV. One calf 5810 got infection at one month PV. From Table 1, it could be observed that the titre decreased and reached a non-immunizing level at 2 months PV (1:6).

The rest 18 calves that did not respond to vaccination (12 did not respond at all and 6 responded weakly) are suspected immune tolerant for BVD virus. This failure of strong response was previously recorded by Peter *et al.* (1967), Malmquist (1968), Baz (1975 and 1982) and Burki and Germann (1984). Four of the not responded calves had BVD infection with virus isolation and no SN antibodies were detected; a serious condition for BVD that animal will carry BVD virus and disseminate it in all susceptible animals arround. Two of the not responded calves for BVD vaccination had a BVD SN high titre at 5 or 6 months PV that could indicate that the calves were in the incubation stage of BVD complex at the time of vaccination, and a neutralization of antibodies occurred.

In control calves, 5 calves got infection with BVD virus, two calves got high antibodies response, and no response in the rest 3, and virus was isolated indicating immune tolerance for BVD in these 3 calves.

Table 1. Results of serum neutralization test in vaccinated calves .

Serial Numer	Animal Numer*	BVD - MD neutralizing antibodies post vaccination (interval period)									Remarks
		0 day	21 day	28 day	1.5 month	2 month	3 month	4 month	5 month	6 month	
1	5631	-	6	11	22	22	11	6	-	-	
2	5633	-	-	-	-	-	-	-	-	-	V.from BC
3	5634	-	-	-	-	-	-	-	-	-	
4	5635	-	6	11	22	11	11	6	-	-	
5	5636	-	6	-	-	-	-	-	-	-	
6	5637	-	6	-	-	-	-	-	-	-	
7	5640	-	6	-	-	-	-	-	-	-	
8	5641	-	6	6	11	11	11	11	-	-	
9	5643	-	-	6	11	11	11	11	-	-	
10	5644	-	6	-	-	-	-	-	-	-	
11	5645	-	-	11	22	22	22	22	-	-	
12	5646	-	-	-	-	-	-	-	-	-	
13	5647	-	-	11	11	11	11	11	-	-	
14	5648	-	6	11	22	22	22	11	-	-	
15	5650	-	-	-	-	-	-	-	-	-	
16	5801	-	-	-	-	-	-	-	-	-	
17	5802	-	-	22	11	-	-	-	45	22	Infection
18	5803	-	-	-	-	-	-	-	-	-	
19	5804	-	-	6	6	-	-	-	-	-	
20	5805	-	-	-	-	-	-	-	-	-	
21	5806	-	-	-	-	-	-	-	-	-	
22	5808	-	-	-	-	-	-	-	-	-	
23	5809	-	11	22	22	-	-	-	-	-	
24	5810	-	11	22	11	6	-	-	-	-	
25	5811	-	-	-	-	-	-	-	-	-	V.from NS
26	5815	-	6	6	6	-	-	-	-	-	
27	5817	-	6	22	22	11	11	6	-	-	V.from BC
28	5819	-	11	11	11	11	11	11	-	-	
29	5820	-	-	-	-	-	-	-	-	45	infection
30	5824	-	-	-	-	-	-	-	-	-	

* : Vaccinated calves.
V. = Virus.
NS = Nasal Swab.
BC = Buffy Coat

In conclusion, the pneumonic plus vaccine induced an immune protective response in non-BVD immune paralysed or affected calves that lasted for 4 months PV if animals are not subjected to field infection. Immune suppression due to BVD virus is extensive in this farm necessitating an urgent study for the problem in Egypt to control BVD.

Table 2 . Results of serum neutralization test in control calves .

Serial Numer	Animal Numer*	BVD - MD neutralizing antibodies post vaccination (interval period)									Remarks
		0 day	21 day	28 day	1.5 month	2 month	3 month	4 month	5 month	6 month	
1	5639	-	-	-	-	-	-	6	-	-	
2	5807	-	-	-	-	-	-	-	-	-	V.from BC
3	5818	-	-	-	-	-	-	-	-	-	
4	5649	-	-	-	-	-	-	6	-	-	
5	5813	-	-	-	-	-	-	-	-	-	
6	5632	-	22	22	-	-	-	-	-	-	Infection
7	5638	-	-	-	-	-	-	6	-	-	V.from NS
8	5642	-	6	-	-	-	-	-	-	-	V.from BC
9	5812	-	-	6	-	-	-	-	-	-	Infection
10	5816	-	11	22	22	22	22	22	-	-	Infection

** : Control calves.
V. = virus.
NS = Nasal Swab.
BC = Buffy Coat.

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دراسة حقلية للاستجابة المناعية للعجول البتلو المحصنة بلقاح نيموفاك المتعدد لفيروس الميوكوزا فى مصر

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أستخدم بالدراسة عدد أربعون عجلا بتلو حصن منها عدد ثلاثون (٣٠) وترك الباقى (١٠) كضابط للتجربة بالحقل . وجرعة اللقاح من خلال حقنتين بالعضل بينهما أسبوعان.

وقد كوّن ثمانى عشر عجلا أجساما مناعية بالسيرم معادلة للفيروس عند ٢١ أو ٢٨ يوماً بعد التحصين، وحيث أن ستامنها استجابت أستجابة ضعيفة مناعيا بعيار غير واقى من المرض والذى نفد سريعا عند ١,٥ أو شهرين بعد التحصين . والإثنا عشر عجلا قد كونت أجساما مناعية معادلة للفيروس واقية من المرض والتى بقيت حتى ٤ شهور أو أقل بعد التحصين (٤٠٪).

هذا ولم يستجب نهائيا عدد ١٢ عجلا بتلو للتحصين ضد الميوكوزا ولم يمكن أيجاد أى عيار للأجسام المناعية بالسيرم المعادلة للفيروس . وقد تم إثبات العدوى مع عزل الفيروس فى عدد خمسة (٥) عجول غير محصنة ولكن ثلاثة منها لم تكونّ أجساما مناعية ضد الميكوزا وكما سجلت عدوى بفيروس الميكوزا فى عدد ثلاثة عجول محصنة فى العجول التى نفدت عيارها المناعى للميوكوزا.

وقد أكدت الدراسة تأثير مناعى بالعجول بفيروس الميكوزا بنسبة ٦٠٪ وهذه هى التى لم تستجب نهائيا للتحصين ضد الميوكوزا (١٢ عجلا) وأيضا التى استجابت أستجابة ضعيفة (عدد ٦ عجول). وكما أكدت الدراسة عدم وجود مناعة بالميكوزا فى العجول الضابطة غير المحصنة والتى أخذت عدوى بفيروس الميكوزا ولم تكون أجساما مناعية له.

والدراسة بذلك بينت كفاءة اللقاح المرضية لحماية العجول السليمة مناعيا للميوكوزا و بنيت وجوب دراسة التأثير المناعى بالميوكوزا للحيوانات ومواجهته بمصر.