

IMMUNE RESPONSES OF SHEEP POX IN VACCINATED SHEEP EVALUATED BY CHALLENGE AT DIFFERENT INTERVALS

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Abstract

The 3 LRS 2013 modified Romanian strain of sheep pox virus vaccine which was produced on lamb kidney cell cultures in Saudi Arabia Kingdom had been evaluated for its potency, safety and duration of immunity in vaccinated Nagdi (local breed) sheep by giving them fixed challenge doses at different intervals post-vaccination.

The vaccinated sheep were protected for at least 15 months as it was indicated by the high level of neutralizing antibodies in their sera to sheep pox virus which was confirmed by challenge test.

INTRODUCTION

Sheep and goat pox are contagious viral skin diseases of goats and sheep. They are clinically similar and may cause severe losses, especially in susceptible breeds and young animals. The diseases are characterized by fever and in severe generalized form of the disease, lesions are found in the respiratory tract, digestive system, and visceral organs. The diseases are well known to exist in Saudi Arabia Kingdom for ages. Hence, a modified living viral vaccine has been used to control such diseases which caused great economic losses in the animal production.

In our study, we evaluated the safety, potency and the duration of immunity gained by vaccination of susceptible sheep by the locally produced modified attenuat-

ed sheep pox viral vaccine, by detectiong the neutralizing antibodies. As well , challenge by the virulent sheep pox virus at different intervals post-vaccination was attempted.

MATERIALS AND METHODS

Experimental Animals:

Twenty - four , 6-7-month old Nagdi susceptible sheep were used. Animals were clinically examined daily for 10 days. They were divided into 5 groups each of 4, and 2 animals wer left as normal non-vaccinated control.

Virus and Vaccine:

The vaccine used was the 3 LRS 2013 Romanian strain of sheep pox virus which was propagated on primary lamb kidney cell cultures. Two sheep from each group received 0.5 ml of the reconstituted vaccine containing 100 tissue culture infective dose (TCID₅₀) intradermally. The vaccine was prepared by SAVVI (Saudi, Arabia, Veterinary Vaccine Institute).

The virus used in challenging those sheep was Bertville virulent sheep pox strain, and was titrated in lamb kidney cell cultures , and used in titre of 10^{5.5} TCID₅₀.

Vaccination and Challenge:

Two animals of each group were vaccinated with the reconstituted sheep pox virus vaccine, each one received 0.5 ml of the vaccine intradermally in the inner side of the thigh. The other 2 sheep from each group were used as positive controls for the challenge test. Challenge was carried out by inoculation of sheep with 0.25 ml of the virulent virus in each inner side of the thigh with the dose of 10^{4.5} TCID₅₀ for each sheep. Challenge test was carried out at different times after vaccination, starting from the 21st day , 6 months , 9 months , 12 months and lastly after 15 months , in groups of sheep 1-5 respectively.

Two sheep were left vaccinated non-challenged as in contact noraml control. Body temperature as well as clinical symptoms were obvserved daily to the end of the experimental time. Serum samples were collectd weekly after vaccination to the time of challenge, and sera were collected after challenge for virus neutralization test.

Virus Neutralization test (VNT):

VNT was carried out using the vaccine strain of sheep pox virus at 100 TCID₅₀ against equal volume of the 2 fold diluted tested sera. The tissue culture used here is primary lamb kidney cell cultures. There was peak on the 7th day post-infection. Titers of sera were calculated according to the method of Reed and Muench (1938), reciprocal to the end point dilution that gave 50% protection of the cells to the 100 TCID₅₀ of virus.

RESULTS AND DISCUSSION

It is clear in Fig 1, 2, 3, 4, and 5 resembling the five groups of vaccinated sheep with the locally produced sheep pox vaccine neutralizing antibodies started to rise as early as the 7th day post - vaccination and became constant as late as the 15th month post-vaccination which was the last period of challenge test in group 5.

Antibodies to sheep pox virus boosted sharply shortly after giving challenge dose, in vaccinated as well as in non - vaccinated animals. No significant rise in antibodies in control sheep until the day of challenge was noticed.

No lesions were detected or thermal reactions in vaccinated sheep after giving the vaccine, and proved to be protected against challenge up to the 15th month post - vaccination.

Sheep pox virus infection in sheep and goats causes great economic losses among our live- stock. Vaccination is very important in endemic areas to control its spreading.

Several strains of vaccination are used as vaccine in Egypt. However, Sabban (1957) developed a strain of virus used in vaccine after adaptation into chick embryos. Studies on sheep, tissue culture vaccine were carried out by several authors as Penkova *et al.* (1974) and Ramyer (1965) who obtained results in the development of satisfactory vaccine.

In our investigation, the level of neutralizing antibodies as demonstrated in Fig. 1, 2, 3, 4, and 5 indicated a good degree of protection for 15 months after vaccination, as well as no reports have been received dealing with sheep vaccination by using our locally produced sheep pox vaccine.

No thermal or any other reactions were observed in the vaccinated sheep giving a dose of virulent sheep pox virus, but it boosted the antibody response to its maximum peak. Our results go hand in hand with those of Ramyer and Baharsefat (1969), and Ramyer and Heseum (1970) on their studies on the tissue culture sheep pox vaccine.

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Antibodies to sheep pox virus boosted sharply shortly after giving challenge dose in vaccinated as well as in non-vaccinated animals. No significant rise in antibodies in control sheep until the day of challenge was noticed.

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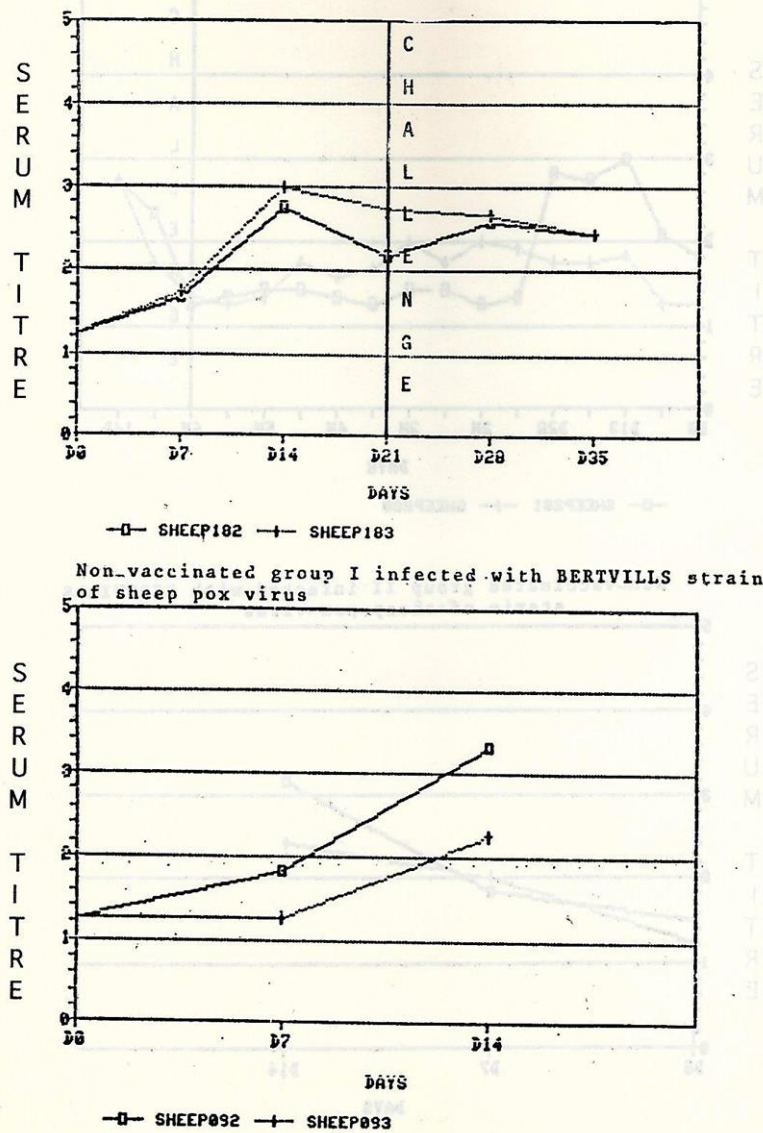


Fig. 1. Neutralizing antibodies in previously vaccinated group I challenge with BERTVILLS strain of sheep pox virus.

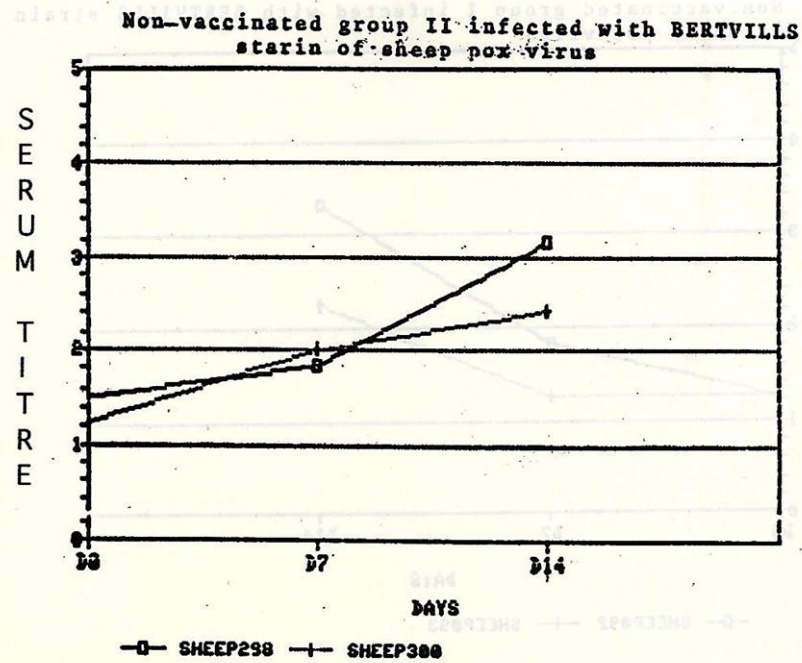
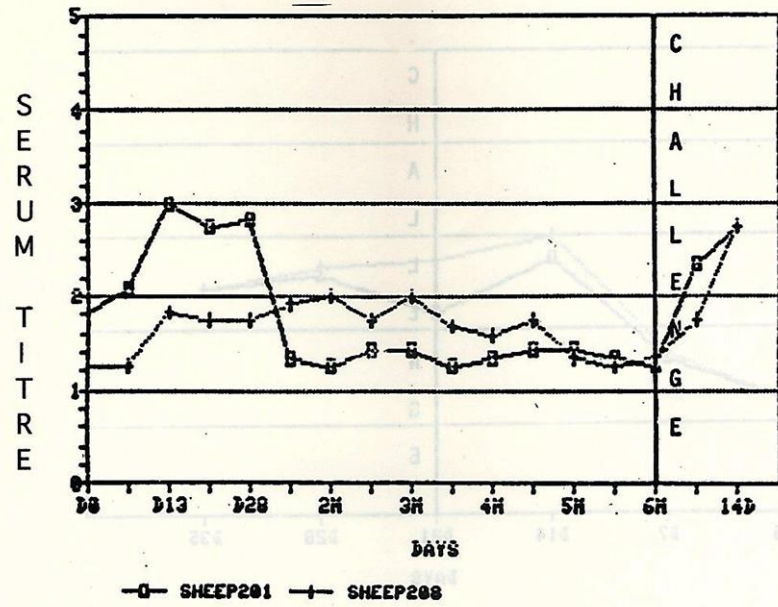
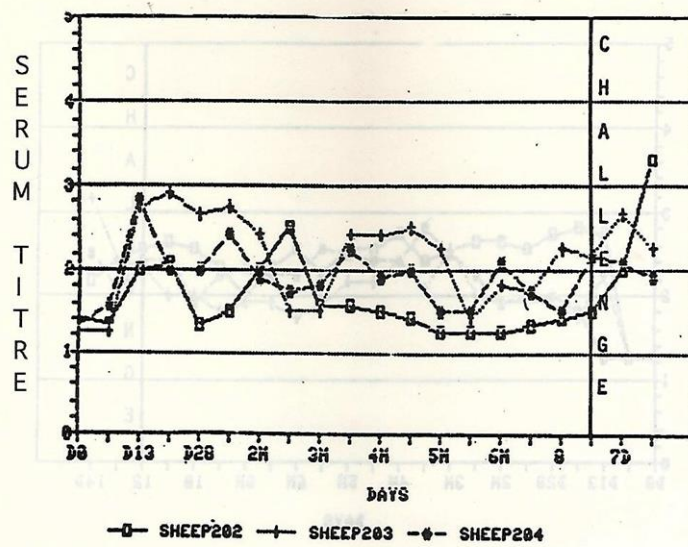


Fig. 2. Previously vaccinated group II challenge with BERTVILLS strain of sheep pox virus.



Non-vaccinated group III infected with BERTVILLS strain of sheep pox virus.

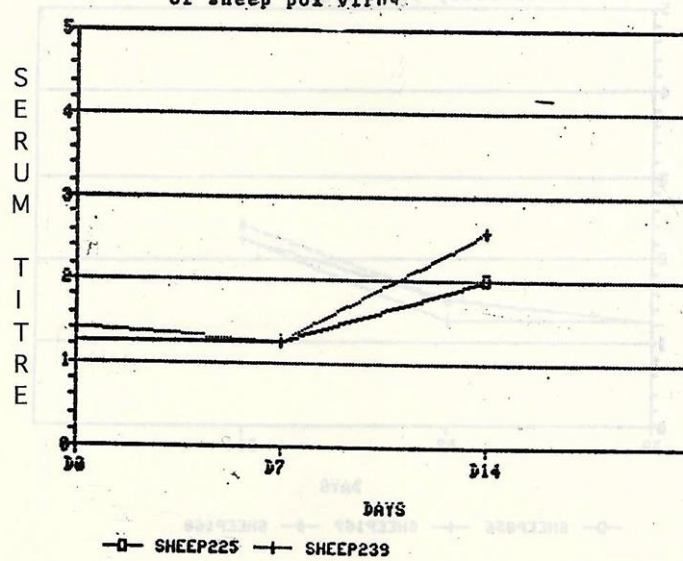
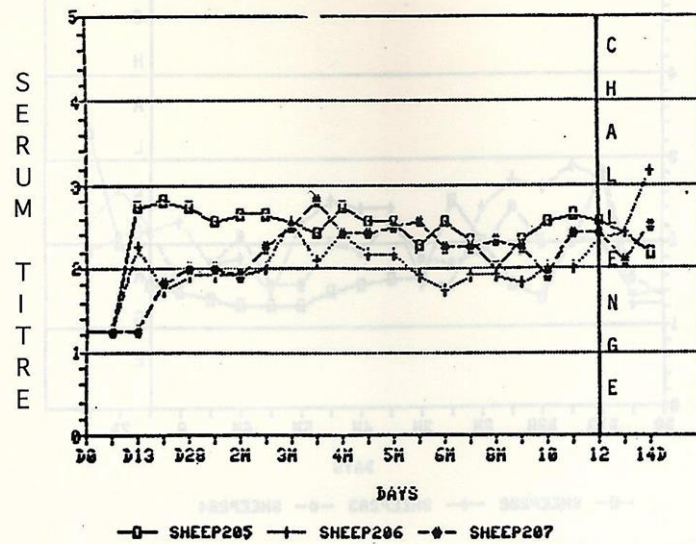


Fig. 3. Previously vaccinated group III challenge with BERTVILLS strain of sheep pox virus.



Non-vaccinated group IV infected with BERTVILLS strain of sheep pox virus

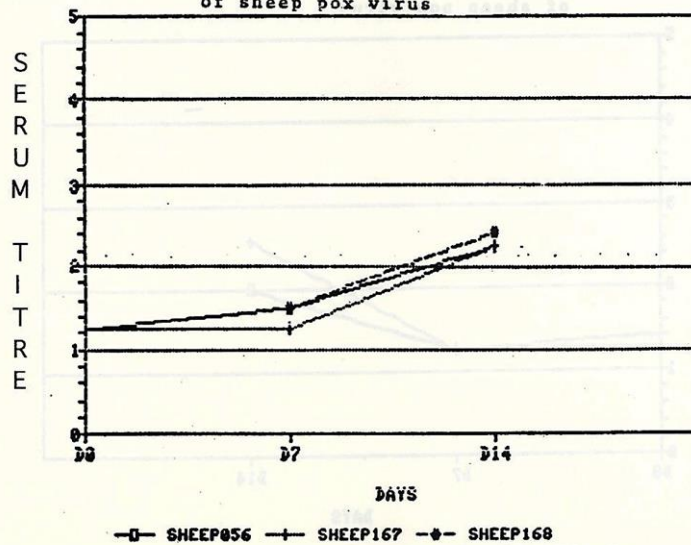


Fig. 4. Previously vaccinated group IV challenge with BERTVILLS strain of sheep pox virus.

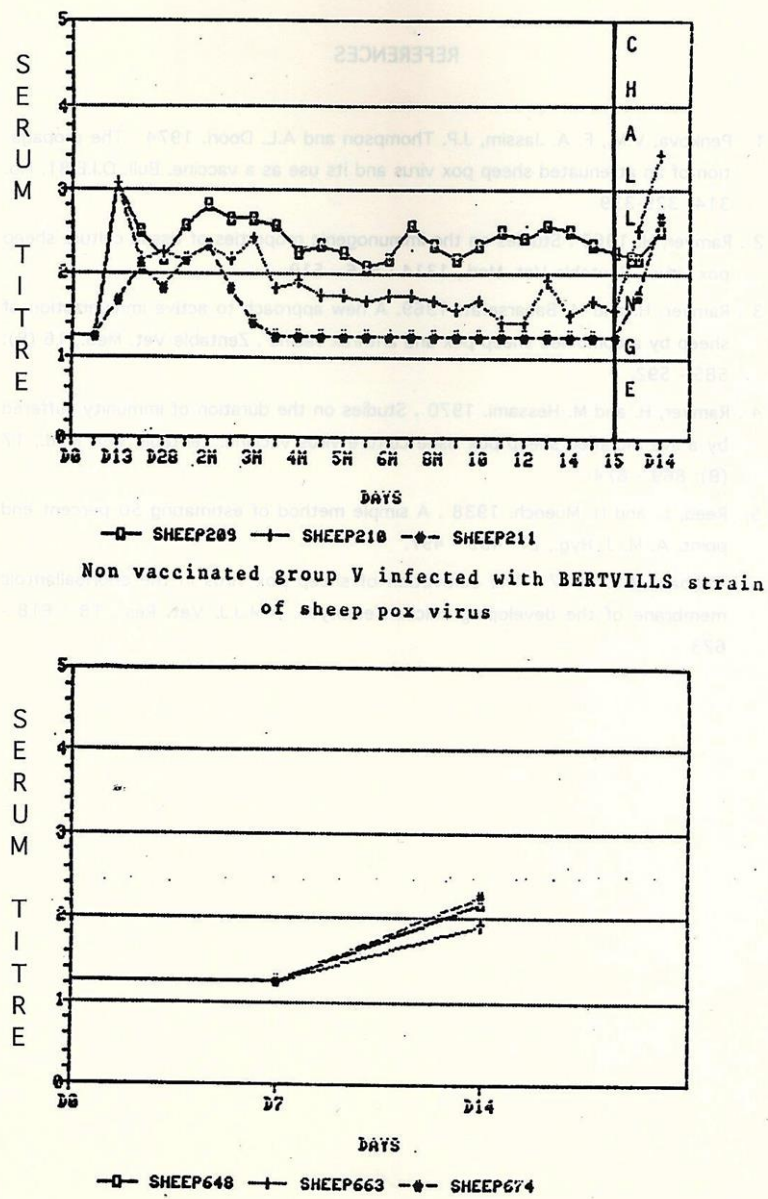


Fig. 5. Previously vaccinated group V challenge with BERTVILLS strain of sheep pox virus.

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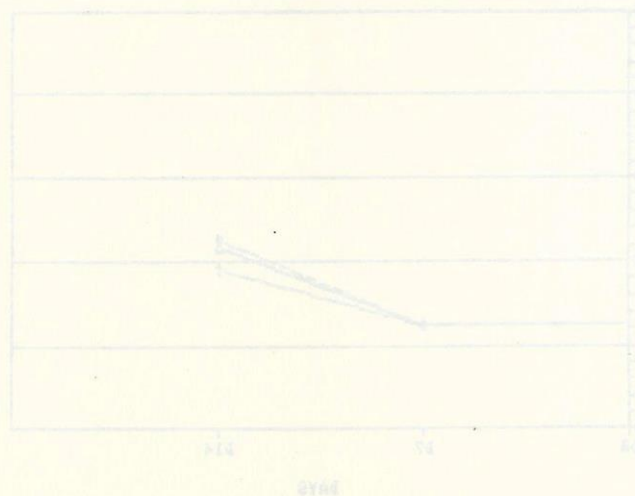


Fig. 2. Immunity of sheep pox virus (V) challenge with BERTVILL.2 strain of sheep pox virus.

الاستجابة المناعية للقاح مرض الجدري في الأغنام لاختبار التحدي علي فترات مختلفة

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استخدم في هذا البحث لقاح جدري الأغنام العترة الروماني رقم ٣ ل ر س ٢٠١٢ - وتم تمريرها علي خلايا كلية الحملان الصغيرة في المملكة العربية السعودية ، ثم تم تقدير قوته المناعية ودرجة نقاوته ودرجة الأمان ومدى فاعليته في الخراف النجدي (المحلية) وذلك بإعطائها جرعة تحدي ثابتة علي فترات مختلفة .

لوحظ أن الأغنام المحقونة قد أعطت فترة حماية طويلة امتدت حتي ١٥ شهراً بدليل ارتفاع مستوى الأجسام المناعية المتعادلة في مصل هذه الخراف وتم تأكيدها باختبار التحدي.