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Trial of inactivated bluetongue vaccine in Bharat-Merino sheep

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Abstract

A field trial of binary ethylenimine (BEI) inactivated saponified bluetongue virus-1 (BTV-1) vaccine was carried out in Bharat-Merino sheep at Central sheep and Wool Research Institute, Avikanagar. Vaccine elicited good group-specific and type specific antibody response, which persisted up to 7 months post vaccination. Haematological values remained within the safe range after vaccination. Animals were protected from virulent virus challenge by absence of clinical reaction and post challenge viraemia. However, a moderate to high inflammatory response at the site of inoculation warranted some modification in the vaccine/vaccination.

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Key words

Bluetongue, inactivated *vaccine*, BEI, saponin.

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Introduction

Bluetongue is a non-contagious, arthropod-borne viral disease of domestic and wild animals. The disease is categorized as list 'A' by OIE and is endemic in India. Since the first report of disease in sheep and goats in Maharashtra (**Sapre, 1964**), several outbreaks are reported regularly from many states of the country particularly the southern region, causing enormous losses to sheep breeders due to not only high mortality and morbidity but also to restriction on export of animals and their products to BT free countries/regions. Present work was carried out to develop an inactivated bluetongue vaccine for the control of disease.

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Materials and Methods

Bluetongue virus type 1 (BTV-1), procured from Dept of Veterinary Biotechnology, HAU, Hisar, was grown in bulk in Vero cells, inactivated with binary ethyleneimine and adjuvanted with saponin. Vaccine was tested for sterility and safety. Bharat-Merino sheep raised at Central sheep and Wool Research Institute, Avikanagar were vaccinated and clinical symptoms including rise in body temperature, haematological parameters and immune response were recorded at different intervals. Protective immune response was tested by challenge experiment.

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Results and Discussion

Inactivated vaccine was developed by inactivating BTV-1 ($10^{7.33}$ $TCID_{50}$ per ml), with BEI and adjuvanting with saponin as reported earlier (Ramakrishnan *et al.*, 2005). Vaccine was found safe and potent in nondescript sheep at in house level. Stott *et al.* (**1979**) used the same inactivant with Freund's adjuvant to get protective immune response in sheep. Twenty Bharat-Merino sheep (raised at Central sheep and Wool Research Institute, Avikanagar) were inoculated subcutaneously with 2 ml dose of vaccine, out of which, ten sheep were boostered at 21 days post vaccination. Two groups of four sheep each were inoculated with PBS and saponin as controls. Vaccine elicited mild to severe inflammatory reaction at the inoculation site, lameness and dullness for 3 days after vaccination. Rise in body temperature (103.4 to 105.8°F) was observed on second day post vaccination and persisted for three days. Hemoglobin and packed cell volume values remained within normal range. Mean differential leucocytes count increased (76.63%) in vaccinated animals 8 days post vaccination and decreased thereafter to become normal at 16 days (68.32%). Vaccine elicited good group specific antibody response (O.D. values between 0.13 to 0.45 vs 1.0 for negative control in competitive ELISA). Significantly high type specific antibody response (virus neutralizing antibody titre - 1:64 to 1:256) was observed in vaccinated animals after 21 days of primary vaccination and increased further (1:512 to 1:1024) after 14 days of booster vaccination in most of the animals. Titres continued to remain up to 1:256 till 82 days of observation period after booster vaccination. Similar antibody response was observed in sheep vaccinated with BEI inactivated BTV-18 (**Tembhurne, 2000**). No detectable antibody was present in control animals. Immunized sheep were protected for a period of seven months upon challenge with virulent virus. There was reduction in post challenge viraemia as have been observed by Stott *et al.*(**1979**) also in their experiment. However, a moderate to high inflammatory response at the site of inoculation warranted some modification in the vaccine/vaccination.

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