

The Induction of a T Helper 1 Immune Response with an Inactivated Viral Vaccine

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Introduction

Bovine viral diarrhea virus (BVDV) is a major pathogen of cattle causing severe respiratory and reproductive disease. BVDV vaccines remain an important part of the control strategy. Inactivated vaccines have been often characterized as evoking only a humoral antibody response with little opportunity for memory. It has been well established that a good cell mediated response and memory requires a T helper 1 (TH1) response. In this study we measure the T helper 1 response in cattle vaccinated with Virashield.

Materials and Methods

Twenty 5-6 month old calves seronegative BVDV type 1 and BVDV type 2 and negative for BVDV *in vitro* interferon-gamma production were used in the study. The animals were randomly sorted into two treatment groups. Group 1 was sham vaccinated with sterile water and Group 2 was vaccinated with Virashield 6 on day 0 and revaccinated on day 28. Blood was collected for BVDV Type 1 and Type 2 SN testing, as well as flow cytometry and *in vitro* interferon (INF)-gamma production on days 0, 7, 14, 21, 28, 31, 35, 38, 42, 49 and 56.

Results

Serological response to type 1 and 2 BVDV were detected at 14 days post vaccination. The responses increased dramatically following re-boosting at 28 day, increasing by more than 10 fold. Stimulating peripheral blood mononuclear cells from the vaccinated animals with Tifton, Georgia cytopathic (TGAC) BVDV *in vitro* increased IFN-gamma at day 14 and was significantly increased ($P < 0.05$) at day 35 (7 days post re-vaccination).

Significance

These studies indicate that an inactivated vaccine can generate a BVDV TH1 memory response. The stimulation of this response is characterized by the production of INF-gamma. This response is the keystone to the acquired cellular immune response. High activation of the TH1 response will result in longer duration in vaccine specific immunity.