

# Vaccine linked to 'bleeding calf syndrome'

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Bleeding calf syndrome (bovine neonatal pancytopenia or BNP) affects new born calves resulting in low blood cell counts and depletion of the bone marrow. It first emerged in 2007 and a serious number of cases are reported each year. In affected calves, bone marrow cells which produce platelets are also destroyed. Consequently the calves' blood does not clot and they appear to bleed through undamaged skin. There is evidence that BNP is linked to the use of a particular vaccine against "Bovine viral diarrhea virus" (BVDV).

It has been suggested that antibodies in colostrum, the first milk the mother produces, are responsible for destroying the calf's blood cells. New research published in BioMed Central's journal [Veterinary Research](#), links BNP to anti-MHC class I antibodies. These antibodies are produced by the mother in response to contamination of vaccine against BVDV with proteins released by the production process. Veterinary Research, the top ranking veterinary journal, transferred to [BioMed Central](#) earlier this year and is now fully open access.

MHC I (Major Histocompatibility Complex class I) is found on the surface of all nucleated cells. These proteins present protein fragments from within the cell to [white blood cells](#). Cells bearing the body's own [protein fragments](#) are ignored, but fragments of virus or other foreign proteins serve as targets for T-lymphocytes. MHC I is variable and present as several gene copies. Each individual or animal, has its own set of MHC I molecules and recognition of foreign MCH I by the immune system is a major reason for the rejection of [organ transplants](#).

Prof Till Rümenapf from Justus-Liebig-Universität Giessen commented that, "Alloantibodies (antibodies generated by one individual of a species against another of the same species) are produced by the mother if she has different MHC I than the bovine cells used to grow the vaccine. These do not harm the mother. However if her calf has the same MHC I as the vaccine production cells, the antibodies in her colostrum will destroy the calf's cells, including those of the bone marrow. Destruction of megakaryocytes results in the calf being unable to produce platelets and consequently its blood cannot coagulate."

Prof Rümenapf continued, "BVDV is responsible for compromised fertility in dairy herds and has huge implications for farming and animal welfare. We found MHC I in the vaccine, and antibodies to these molecules in vaccinated cows. The presence of MHC I in this vaccine highlights the potential risks of growing vaccine in cells derived from the same species the vaccine is intended for. Other vaccines for BVDV, with different production methods and formulations, apparently do not cause these problems."

**More information:** Vaccine-induced antibodies linked to bovine neonatal pancytopenia (BNP) recognize cattle Major Histocompatibility Complex class I (MHC I) Fabian Deutschens, Benjamin Lamp, Christiane M Riedel, Eveline Wentz, Günter Lochnit, Klaus Doll, Heinz-Jürgen Thiel and Till Ruemenapf *Veterinary Research* (in press)

Provided by BioMed Central

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