



# RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY



## Do Water Quality and Trace minerals affect cattle immune systems?

Project Title:

Effects of Exposure to Oil Field Emissions on Immune System Health in Beef Cattle

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Several cattle producers ranching in the vicinity of oil and gas fields have claimed that oil and gas activity has had a negative impact on their cattle's health and reproductive ability. Both oil and gas activity and cattle production are often concentrated in the same rural areas and it was therefore determined that an investigation into this claim and to quantify any negative health impacts on cattle was warranted.

This project was carried out in conjunction with a larger study, funded through other sources that focused on the impact of air-borne emissions. The larger study did not have the resources to also examine whether or not cattle were being exposed to oil industry contaminants via drinking water. Since it has been speculated that oil and gas activity may impact trace mineral availability to cattle through feed or water, there was also a need to measure the effect that trace minerals have on the immune function of cattle.

### **WATER QUALITY**

Water samples were collected from the principle sources used to water cattle (all wells) on 27 different farms located throughout the oil patch in Alberta and Saskatchewan. Water samples were analyzed for a number of organic and inorganic compounds. The results indicated that there was no detectable presence of contaminants associated with industrial processes (including oil and gas production) or agricultural practices in any of the study herds.

### **TRACE MINERALS AND IMMUNE FUNCTION**

Blood samples were then taken from 20 to 25 yearling replacement heifers on each farm. The blood samples were analyzed for both trace mineral and vitamin E and A concentrations. Plasma copper concentration was marginal or deficient in 37 per cent of samples, vitamin E was marginal or deficient in 33 per cent, and vitamin A was marginal in 23 per cent of samples. The most notable finding was whole blood selenium, which was marginal or deficient in 69 per cent of animals.

The strength of the cattle's immune systems was measured by sampling blood before and after the administration of a rabies vaccine. The number of B and T cells (white blood cells that create antibodies to fight infections) were measured, as was the amount of antibody produced in response to the vaccine.

Since no industrial contaminants were found in the well water samples, no association could be made between water contamination and immune function.

Some associations between immune functions and micronutrients in blood were found. Higher selenium appeared to boost immune function, while higher copper concentrations appeared to lower immune function. Higher Vitamin A and E concentrations also appeared to improve immune function.

This research helped advance the understanding of how optimal levels of trace minerals can help protect the health of cattle. It also helped eliminate groundwater contamination as a suspect in the investigation to determine the impact of oil and gas activity on the health of cattle.

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The Beef Cattle Research Council, a division of the Canadian Cattlemen's Association, sponsors research and technology development and adoption in support of the Canadian beef industry's vision to be recognized as a preferred supplier of healthy, high quality beef, cattle and genetics.

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