

**AGRICULTURAL RESEARCH FOUNDATION  
INTERIM REPORT  
FUNDING CYCLE 2017 – 2019**

**TITLE: Effect of Selenium-enriched hay fed to dairy cows during the dry period on the immunity of calves**

**RESEARCH LEADER: Massimo Bionaz**

**COOPERATORS: Gerd Bobe**

**EXECUTIVE SUMMARY: Calves just after birth have a very fragile adaptive immune system, making them extremely sensitive to diseases during the first month of life. Selenium is known to have a positive effect on the immune system. Selenium is an essential micromineral which is highly regulated by FDA. It is unlawful to supplement selenium more than 3 ppm in cattle, due to the toxic effect when fed in higher amount. However, this is true only in areas of US where Se level in the soil is adequate. Oregon soil contains extremely low level of Se making the forages grown in the state of OR deficient of Se. Selenium can improve the immune system of cows but can also improve the immune system of dairy calves by providing better immunoglobulins coming from the cows and higher amount of Se via colostrum. For the above reasons, we sought to assess if the immune system of calves can be improved in cows fed with Alfalfa enriched with Se.**

**OBJECTIVES:**

- 1) Determine the IgG quality of colostrum and the absorption of various IgG by the calves**
- 2) Measure the effect on gene expression in intestinal cells of the calves**
- 3) Measure the activity of immune cells in cows and calves**

**PROCEDURES: Calves from 16 cows (10 Jerseys and 6 Holsteins) from the OSU dairy center were used. Cows were fed ad libitum with corn silage and grass silage TMR. Half of the cows randomized by breed and time of calving were supplemented with 1 kg DM/100 kg BW of Alfalfa enriched with Se (3.25 mg/kg DM) and the rest was supplemented with the same amount of a control Alfalfa (0.34 mg Se/kg DM). Calves were fed with the colostrum of their mother and then received whole milk from the OSU dairy cows as typical of the farm (i.e, calves did not received any more treatment) plus they had ad libitum availability of starter. Calves were weighted at birth and then at 24 days of life to determine average daily gain. Calves were checked for health status during the first month post-birth. Feces were collected from the calves at 3, 14, and 24 day of life and immediately stored in liquid N. Blood was collected from the calves at 2 and 24 days of life to obtain serum and plasma, immunoglobulins level, and to assess the immune status by measuring total white blood cells count, leukocytes differential using antibodies associated with flow cytometer, and phagocytosis using a commercial kit associated with flow cytometer. Colostrum and blood were collected also to determine the Se level and the glutathione peroxidase activity.**

**SIGNIFICANT ACCOMPLISHMENTS TO DATE:** All the samples were collected from 12 calves (8 Jerseys all female and 6 Holsteins 3 females and 3 males) and 4 more calves still need to be born. From the samples we have performed total white blood cells count, phagocytosis, leukocytes differential, and measured the BW of the calves. From a preliminary statistical analysis, the calves born from cows receiving the Alfalfa enriched with Se had a higher phagocytosis compared to calves from control cows. No differences in the other measured parameters were detected. We are now in the process to complete the *in vivo* part of the experiment (i.e, the additional 4 calves) and measuring Se level in colostrum and blood. We plan to submit an abstract to the upcoming ADSA Meeting from the results of the above data plus the Se level in the blood. Thus we have almost completed the objective 3. We expect to have completed the *in vivo* part of the experiment by end of April to accomplish Objectives 1 and 3.

**ADDITIONAL FUNDING RECEIVED DURING PROJECT TERM:** we received funding from the Oregon Beef Council (\$10,000) to measure immune status of the cows enrolled in this experiment and from the USDA Hatch funding from the Experimental Station (\$26,800) to measure transcriptome of the liver and macrophages isolated from the milk from the cows enrolled in the present experiment. No additional funding were received to accomplish the work related to the calves.

**FUTURE FUNDING POSSIBILITIES:** Results from the present experiment maybe used to submit a proposal to the USDA NIFA AFRI foundational opportunity.