

Effect of OmniGen-AF on Immune Markers and Neutrophil Function in Lactating Dairy Cows

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Introduction

The immune system of the lactating dairy cow is significantly compromised at the time of calving and for several weeks thereafter. Animals in early lactation are frequently exposed to additional stress factors that result in immunosuppression, such as metabolic disease, metritis, environmental conditions, cow comfort, overcrowding, etc. Good transition cow management involves minimizing stress factors in order to improve immunity. In previous studies, the feeding of a proprietary ingredient blend, OmniGen AF (Prince-Agri Products) has been observed to increase the expression of markers of innate immunity and neutrophil function. This study was conducted in order to determine if OmniGen AF could augment the production of the immune markers L-Selectin (CD62L) and Interleukin 8 Receptor (IL8R), as well as improve neutrophil function by enhancing the *in vitro* phagocytosis of *Streptococcus uberis*.

Materials and Methods

Twenty multiparous and ten primiparous lactating Holstein cows were paired by days-in-milk, parity and milk production and randomly assigned to one of two treatments (control-fed: 56g/h/d placebo or OmniGen-AF-fed: 56g/h/d). Cows within groups averaged 63 DIM, 2.6 lactations and 81 lb of milk at trial start. All cows were fed their respective diet supplement for 61 days. Blood samples were collected on day of treatment assignment (day 0), at feeding mid-point (day 33), at feeding period end (day 61) and at 36 days post-treatment (day 97). All samples were assayed for the markers of immunity, CD62L and IL8R. In addition, neutrophils harvested from blood samples collected on days 61 and 97 were subjected to *S. uberis* (bovine isolate) in a 30:1 ratio (*S. uberis*: neutrophil) and assessed for phagocytoses via ELISA.

Results

CD62L and IL-8R levels were significantly different ($P<0.01$) at day 61. At trial start, CD62L values were

similar between the groups, however at day 61 the OmniGen-AF-fed cows had CD62L levels 2.5 greater than the controls ($P<0.01$). At 36 days post-treatment the levels of CD62L were not different and were similar to those recorded at trial start (day 0). IL-8R values were similar on days 0, 33 and 97, but differed ($P<0.01$) on day 61 and were 4.7 fold greater than the controls. Neutrophils harvested from OmniGen-AF supplemented cows exhibited a greater ability for phagocytoses against *S. uberis* at day 61 ($P<0.01$). No differences in neutrophils killing ability for *S. uberis* was observed between groups at day 97, which was 36 days post-OmniGen-AF feeding.

Significance

Blood levels of CD62L and IL-8R, indicators of innate immune function, were observed to be greater in cows fed OmniGen-AF and showed a gradual increase throughout the 61 day feeding period. The data parallel similar findings reported by Oregon State University researchers, who observed significant changes in these markers over a 28 day feeding period in sheep. Likewise, the rapid decline in CD62L following OmniGen-AF withdrawal from the diet was similar to that observed in previous sheep and dairy cow studies, illustrating the need for continuous diet supplementation. Neutrophils harvested from cows supplemented with OmniGen-AF demonstrated a greater ability to phagocytize *S. uberis* than neutrophils collected from control cows. Milk production between treatment cows during the experiment feeding period was not different between the groups, however, OmniGen-AF cows produced an average of 611 lb more milk per head than controls during this period of time. This difference persisted through the 36 day post-treatment period ($P<0.008$). The results of this study show that it is possible to stimulate specific immune markers as well as enhance neutrophil function by feeding OmniGen-AF. It also shows that the oral route of administration of immune modulators can be effective in ruminants.