Evaluating Production, Herd Health and Immune Competency when Diets for Dry and Early Lactation Dairy Cows were Supplemented with OmniGen-AF®

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INTRODUCTION
Recent studies have documented changes in neutrophil function in both cattle and sheep fed diets supplemented with Omni-Gen-AF (1,2). Neutrophil function has been shown to influence disease incidence (and milk production) in dairy cattle. In the summer of 2006 a study was conducted on a large commercial dairy to measure differences in milk production and health parameters when OmniGen-AF was included in the diets of dairy cattle beginning at dry-off and through 30 days in milk.

DAIRY FACILITIES
Two side by side dairies located in the eastern corn belt were utilized in the field study. Lactating dairy cows from each dairy were housed, fed and managed similarly. Beginning at dry-off cows from each dairy were brought to one location and fed the same far-off and close-up ration. Once animals calved they were returned to the dairy of origin. Lactating cows were fed a one-group TMR (49% forage; 29% NDF, 18.0% CP and 44.0% NFC) once daily consisting primarily of corn silage (34% of DM), alfalfa hay (8% of DM), whole cottonseed (3.5% of DM), ground shelled corn and protein supplement.

EXPERIMENTAL DESIGN AND DATA COLLECTION
At dry-off (60 days from calving) all cows from one dairy were assigned to the control diet and all cows from the second dairy were assigned to the OmniGen-AF supplemented diet. Diets were fed throughout the entire dry period and through 30 days in milk. Therefore, cows that received the control diet as dry cows also received the control diet as lactating cows. Similarly, dry cows that received the supplemental OmniGen-AF also received supplemental OmniGen-AF during the first 30 days of lactation. OmniGen-AF was supplemented at the level of 56 grams per cow per day during both the dry and lactation period.

Milk yield and herd health data were collected on all experimental animals (Control, n=250; OmniGen-AF, n=262) using Dairy Comp 305 records. A subset of cows (32 from each group), were randomly selected for evaluation of immune competency. Blood was collected and analysis of neutrophil L-selectin was performed as an indicator of immune competence.

RESULTS
L-Selectin Levels
L-selectin is a neutrophil adhesion protein responsible for extra-vasation of the neutrophil from blood to tissue. This protein is measured as an indicator of immune status of animals. A higher level of L-selectin is indicative of a stronger immune system. Many factors have been shown to affect L-selectin levels in ruminants, including calving stress, administration of dexamethasone and feeding moldy feed ingredients contaminated with Aspergillus fumigatus (1,2,3).

Levels of L-selectin at dry-off (prior to OmniGen-AF supplementation) and 1 day post-calving were not different between control and treatment groups. However, by 30 days in milk levels of L-selectin in OmniGen-AF fed cows were different than levels of control cows (Figure 1). The L-selectin observations of this study are similar to those of another study conducted in Utah which also showed...
that levels of L-selectin in OmniGen-AF fed cows did not differentiate until 30 or more days into lactation. It was noted that L-selectin levels of cows fed OmniGen-AF during the dry period changed more quickly and to a greater extent than those of the control fed cows. Burton and Erskine have documented that levels of neutrophil L-selectin are decreased in cows during the peri-parturient period. It has been observed that the normal physiological changes that occur in and around calving may temporarily decrease neutrophil L-selectin expression, and that normal L-selectin levels may change more quickly in animals fed OmniGen-AF.

**FIGURE 1**
Differences in L-selectin levels between groups

![L-selectin mRNA expression level](image)

Milk Yield Data
Test-day milk yield and predicted 305 day milk yield is summarized in Table 1. First-test milk yield was not different between the 2 groups. However, by second test day, milk cows that had received the supplemental OmniGen-AF had milk yields that were different from the control cows. When total milk yield was summarized and predicted 305 day milk yield was computed, cows that had received OmniGen-AF had different milk yields as compared to the control cows. This difference was approximately 2,000 lbs for the lactation. Chapman et al., 2005 demonstrated a difference in milk persistency in cows supplemented with OmniGen-AF.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Milk Yield Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Control</td>
</tr>
<tr>
<td>No. cows in milk</td>
<td>250.0</td>
</tr>
<tr>
<td>1st test day milk</td>
<td>75.2</td>
</tr>
<tr>
<td>2nd test day milk</td>
<td>90.3</td>
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<tr>
<td>Total milk</td>
<td>17,129</td>
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<tr>
<td>Predicted 305 day milk</td>
<td>23,802</td>
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</table>

Culling Data
Total number of dead and culls did not differ between the two groups; however, when expressed individually, total number of culls and total number of dead animals were different between the control and OmniGen-AF fed groups (Figure 2 and Table 3).

**FIGURE 2**
Differences in culling levels by group

![Number of Culls and Dead Cows](image)

**TABLE 2**
Culls & Dead Cow Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>OmniGen-AF</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cull cows</td>
<td>59</td>
<td>84</td>
<td>25</td>
</tr>
<tr>
<td>Dead cows</td>
<td>47</td>
<td>24</td>
<td>-23</td>
</tr>
</tbody>
</table>
**Mastitis Data**

Mastitis prevalence in the herd was low (6.4% in control and 3.8% in OmniGen-AF group). However, differences between the groups were observed (Figure 3). More animals in the control group were culled due to mastitis. The average days in milk when cows were culled for mastitis on a voluntary basis for the control and OmniGen-AF fed groups were 38.0 and 59.5, respectively. The average days in milk when cows were culled on an involuntary basis for the control and OmniGen-AF fed groups were 25.5 and 42.3, respectively. Cows fed OmniGen-AF remained in the herd longer.

**FIGURE 3**

Differences in culling by group due to mastitis

More cows in the control group experienced mastitis earlier in lactation than cows fed OmniGen-AF (Figure 4). Most of the cases of mastitis in the OmniGen-AF fed group did not occur until after the feeding of OmniGen-AF ceased. These mastitis cases began approximately 28 days after the removal of OmniGen-AF from the diet.

**Herd Health Data**

There was a difference between the two treatment groups for most of the documented health disorders. In particular, the incidence of mastitis and metritis between the two groups was different (Figure 5).

**FIGURE 5**

Differences in herd events by group

**SUMMARY**

The observations in this study indicated a correlation between changes in the level of an immune marker at the molecular level and disease incidence in dairy cattle in a commercial setting.
REFERENCES


