Effects of Feeding OmniGen-AF® Beginning 60 Days Prior to Dry-Off on Mastitis Prevalence and Somatic Cell Counts in a Herd Experiencing Major Health Issues

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ABSTRACT

Twenty-two Holstein cows were used in a trial to determine if feeding OmniGen-AF® to late lactation cows in a herd experiencing major health issues could be a practical management tool for maintaining normal immune system function prior to and during the early dry period, a time of increased susceptibility to mastitis. Treated cows (n = 11) consumed a ration that contained *OmniGen-AF* [9 g/100 kg of body weight/day (d)] beginning 60 d prior to dry-off, during the dry period and through 30 d in milk (DIM). Control cows did not receive *OmniGen-AF* 60 d prior to dry-off, but did receive the same ration during the dry period through 30 DIM. Body weights, body condition scores (BCS), mastitis prevalence, new intramammary infection (IMI) rates and SCC were measured throughout the trial. At calving, adverse health event data were recorded and milk production was obtained monthly via DHIA testing. No differences were observed between treatments for body weight or BCS throughout the 150-d trial. Adverse health events at calving showed no differences between treatments except for % hyperketonemia, which was lower among treated cows (63.6% vs. 100%). The prevalence of mastitis from calving through 30 DIM for treated cows (6.1%) was lower than controls (11.05%); likewise, the new IMI rate during this time for treated cows (0.61%) was lower than controls (5.81%) The SCC from calving through 30 DIM for treated cows (215,000/ml) was lower than controls (493,000/ml). Average production/d at the first DHIA test (~33 DIM) showed that treated cows produced more milk (39.9 kg) than controls (35.34 kg). Feeding *OmniGen-AF* 60 d prior to dry-off reduced hyperketonemia and mastitis, lowered SCC and numerically increased milk yield in a herd experiencing major health issues.

INTRODUCTION

The early dry period of the dairy cow is a time of physiological stress, suppression of the immune system, and heightened susceptibility to mastitis, resulting in elevated SCC at calving and lowered milk production (Burton and Erskine, 2003). The development of a management tool designed to help maintain normal immune function prior to and during this time of stress would promote udder health and increase resistance to mastitis, leading to improved milk yield and quality at calving. Providing micronutrients such as selenium and vitamin E that promote the immune response, contributes to reducing the level of mastitis and lowering SCC during early lactation (Erskine, 1993). Likewise, daily feeding of a nutritional product designed to support healthy immune function in dairy cattle (OmniGen-AF®; Phibro Animal Health Corporation, Teaneck, NJ) during the dry period demonstrated a positive role in supporting mammary gland immune function during the periparturient period (Nace et al., 2014). Thus, it is believed that feeding *OmniGen-AF* may enhance resistance to mastitis during times of transition.

The objective of this trial was to determine if feeding *OmniGen-AF* for 60 days (d) prior to dry-off, during the dry period, and through 30 days in milk (DIM) helps supports immune function and therefore results in less mastitis, lower SCC and greater milk yield at calving compared with only feeding *OmniGen-AF* during the dry period through 30 DIM.

MATERIALS AND METHODS

At the time the trial was initiated, the University of Georgia Teaching Dairy Herd was experiencing major health issues, which were related to herd management and challenging weather conditions. As a consequence, cow and heifer breeding attempts were not effective, and heifers were older (30 – 36 months) and heavier than preferred when delivering their first calf. Additionally, several cows were overweight at dry-off, overfed during dry period and calved with elevated body condition scores (BCS). Added to these issues was an on-going drought, resulting in a shortage of home-grown forage, and the subsequent purchase of poor quality forage, leading to nutritional stress. As a result of these stressors, the following health issues surfaced at calving: hyperketonemia, displaced abomasum, metritis, retained placenta, udder edema, clinical mastitis and increased mortality. Consequently, the herd experienced lower daily milk yield, lower fat test, lower milk urea nitrogen test and an elevated bulk tank SCC. Thus, the herd began to feed *OmniGen-AF* to determine if this nutritional product could help support the immune system of cows, prevent production declines during stress and minimize the metabolic health issues and mastitis level at the time of calving.

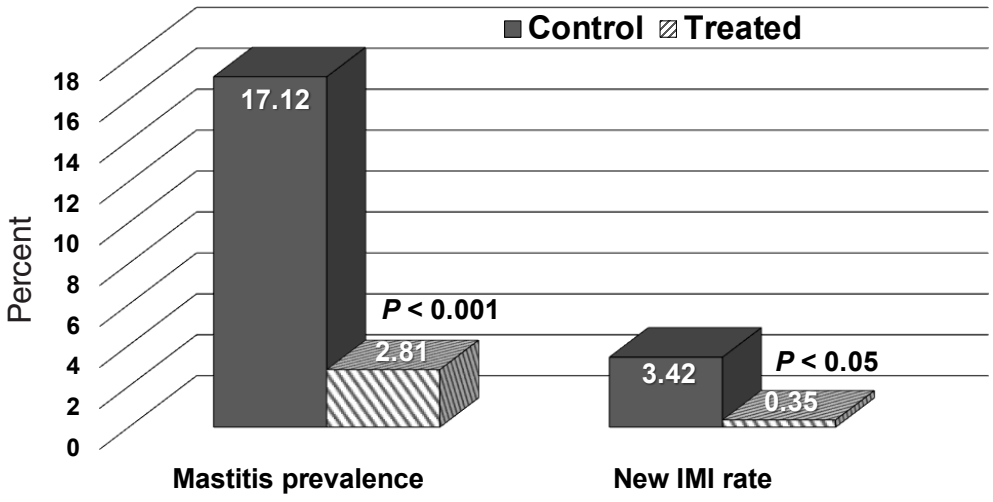
Twenty-two Holstein cows were assigned to Treated (n = 11) or Control (n = 11) groups for a 150-d feeding trial. Treatment groups were balanced by parity, previous lactation milk production, SCC and mammary gland infection status. Treated cows consumed a ration that contained *OmniGen-AF* at 9 g/100 kg of body weight/d starting 60 d prior to dry-off and continued on this ration during the dry period through 30 DIM (d 150). Control cows received the same ration starting at dry-off (d 60), which continued through 30 DIM. Body weights and BCS were measured throughout the trial. Bacteriology and SCC were examined on each quarter at 60 d prior to dry-off (d 0), 30 d prior to dry-off (d 30), at dry-off (d 60), at calving (d 120) and at 3, 10, 20 and 30 DIM. Mastitis prevalence was reported as the percentage of quarters with an IMI at each sampling. A new IMI was reported as a new infection in a previously uninfected quarter. At calving, adverse health event data (displaced abomasum, metritis, hyperketonemia, retained placenta and clinical mastitis) were recorded on individual animals, and milk production was monitored monthly via DHIA testing. Urine samples from all fresh cows were tested for the presence of ketone bodies using the Siemens Multistix® 10SG; tests indicating > 15 mg/dl of ketones were considered positive.

RESULTS

Body weights decreased among cows in control and treated groups from 60 d prior to dry-off (mean 706 kg) through 30 DIM (mean 637 kg), but no differences were observed between groups. Likewise, BCS decreased among cows in both groups from 60 d prior to dry-off (mean 3.6) through 30 DIM (2.7), but no differences were observed between groups.

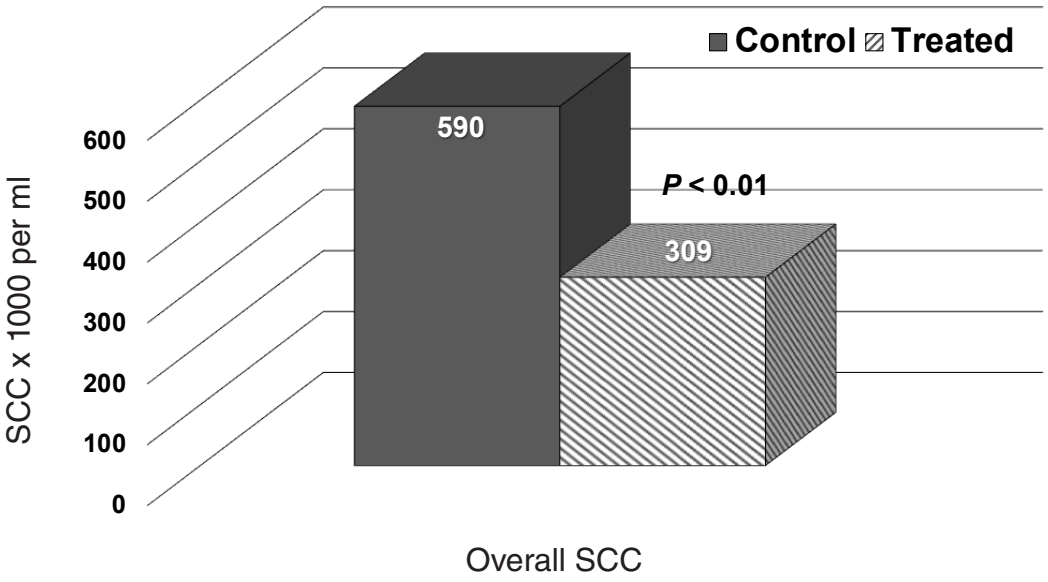
An examination of adverse health events at calving showed no differences between groups except for the percentage of cows with hyperketonemia, which was lower ($P < 0.05$) among treated cows (63.6%) vs. control cows (100%). The overall prevalence of mastitis during the 150-d trial from 60 d prior to dry-off through 30 DIM for treated cows (2.81%) was lower ($P < 0.001$) than controls (17.12%; Figure 1); likewise, the overall new quarter IMI rate for treated cows (0.35%) was lower ($P < 0.05$) than controls during this period (3.42%; Figure 1).

Figure 1. Overall mastitis prevalence and new intramammary infection (IMI) rate across the 150-d trial.



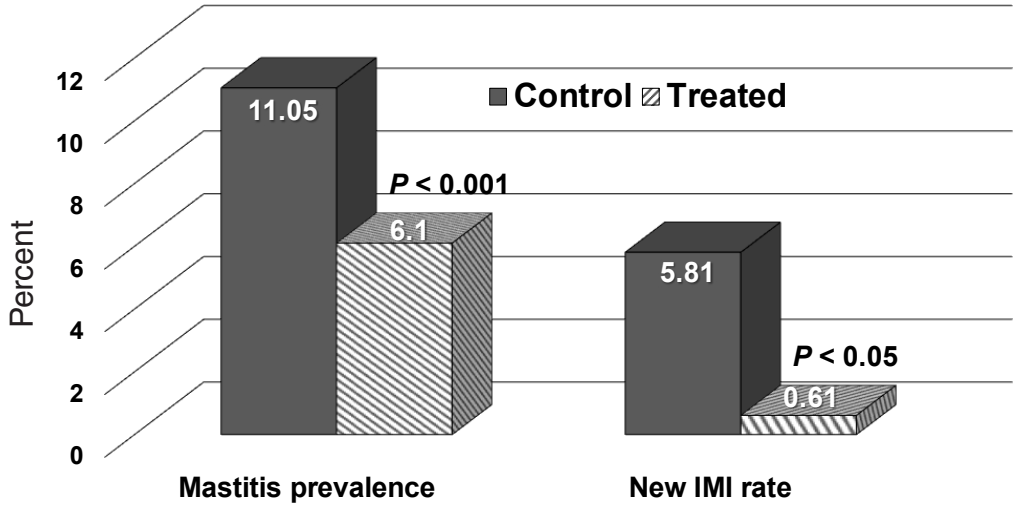
The average SCC from 60 d prior to dry-off through 30 DIM for treated cows (309,000/ml) was lower ($P < 0.01$) than controls (590,000/ml; Figure 2).

Figure 2. Overall SCCx1000 per ml across the 150-d trial.



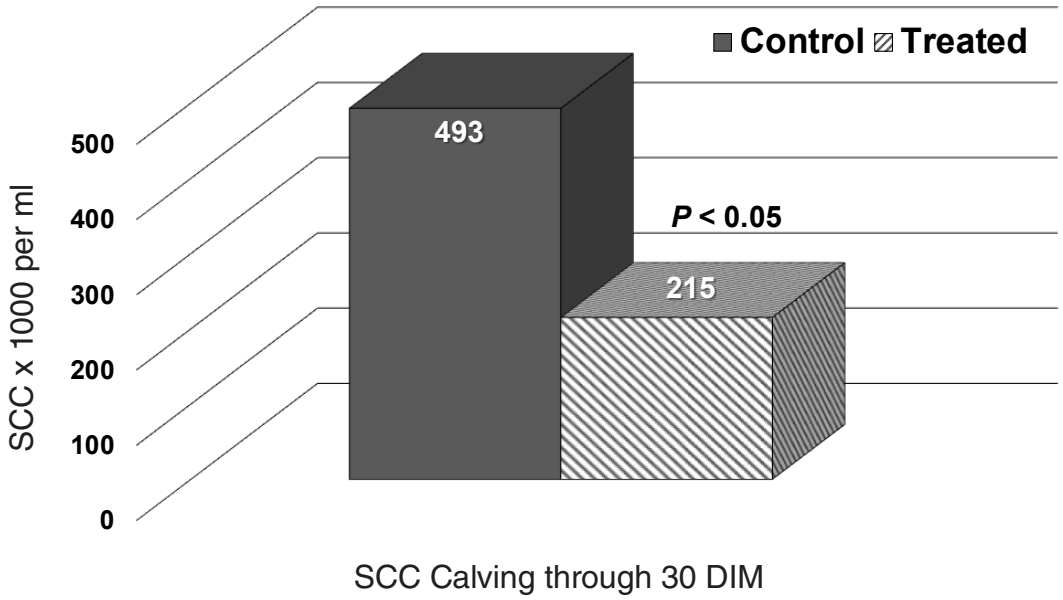
The prevalence of mastitis from calving through 30 DIM for treated cows (6.1%) was lower ($P < 0.001$) than controls (11.05%; Figure 3); likewise, the new quarter infection rate during this time for treated cows (0.61%) was lower ($P < 0.05$) than controls (5.81%; Figure 3).

Figure 3. Mastitis prevalence and new intramammary infection (IMI) rate from calving through 30 DIM.



The SCC from calving through 30 DIM for treated cows (215,000/ml) was 56% lower ($P < 0.05$) than controls (493,000/ml; Figure 4).

Figure 4. SCCx1000 per ml for control and treated cows from calving through 30 DIM.



A breakdown of the four post-calving SCC values (Table 1) demonstrated that at each sampling time, SCC were numerically lower in treated cows but were not significantly different from controls due to insufficient numbers of quarters available at each sampling time.

Table 1. SCC x1000 per ml for individual samplings on d 3, 10, 20 and 30 post-calving.

Post-calving day	SCC Control	SCC Treated	*P* value
3	482	304	0.363
10	380	202	0.265
20	571	309	0.337
30	544	139	0.118

Average production/d at the first DHIA test (~33 DIM) showed that treated cows produced more milk (39.9 kg) than controls (35.34 kg) but the difference was not statistically significant. No differences in production between groups were observed at the second and third DHIA tests.

DISCUSSION

Results of this study demonstrate that feeding *OmniGen-AF* during the final 60 d of lactation, during the dry period and through 30 DIM helps support normal immune function during the stage of the lactation cycle when the innate immune system is typically immunosuppressed and cows are most susceptible to mastitis (Smith et al., 1985). Compared with control cows fed *OmniGen-AF* only during the dry period through 30 DIM, treated cows fed *OmniGen-AF* for 60 d prior to dry-off, during the dry period and through 30 DIM exhibited less hyperketonemia and mastitis, lower SCC and numerically greater milk yield at first test. These results support and extend previous findings with *OmniGen-AF* (Bascom et al., 2016; Nace et al., 2014; Ryman et al., 2013) and the continued study of feeding nutritional products to improve mammary gland health, particularly in herds experiencing health issues.

REFERENCES

Bascom, S.S., J.D. Chapman, L.O. Ely, G.A. Holub, J.P. Jarrett, J.S. Lanier, D.J. Kirk, D.E. Nuzback, A.D. Rowson, and T.J. Wistuba. 2016. Health, milk yield and milk quality records evaluated in 787 dairy herds before and during OmniGen-AF® supplementation to dry and lactating cows. J. Dairy Sci. 99(E-Suppl. 1):649.

Burton, J.L., Erskine, R.J., 2003. Immunity and mastitis. Some new ideas for an old disease. Vet. Clin. N. Am. Food Animal Pract. 19:1-45.

Erskine, R.J., 1993. Nutrition and mastitis. Vet. Clin. N. Am. Food Animal Pract. 9:551-560.

Nace, E.L., S.C. Nickerson, F.M. Kautz, S. Breidling, D. Wochele, L.O. Ely, and D.J. Hurley. 2014. Modulation of innate immune function and phenotype inbred dairy heifers during the periparturient period induced by feeding an immunostimulant for 60 days prior to delivery. Vet. Immunol. Immunopathol. 161:240-250.

Paape, M.J., K. Shafer-Weaver, A.V. Capuco, K. Van Oostveldt, and C. Burvenich. 2000. Immune surveillance of mammary tissue by phagocytic cells. Adv. Exp. Med. Biol. 480:259-277.

Ryman, V.E., S.C. Nickerson, F.M. Kautz, D.J. Hurley, L.O. Ely, Y.Q. Wang, and N.E. Forsberg. 2013. Effect of dietary supplementation on the antimicrobial activity of blood leukocytes isolated from Holstein heifers. Res. Vet. Sci. 95:969-974.

Smith, K.L., D.A. Todhunter, and P.S. Schoenberger. 1985. Environmental mastitis: Cause, prevalence, prevention. J. Dairy Sci. 68:1531-1553.

Smith, K.L., D.A. Todhunter, and P.S. Schoenberger. 1985. Environmental pathogens and intramammary infection during the dry period. J. Dairy Sci. 68:402-417.