A dual-flow continuous, culture system was used to investigate the effect of inclusion of ALIMET® feed supplement, (HMTBa) and AGRADO® Plus feed ingredient in the diets on nutrient digestibility, bacterial protein synthesis and ruminal disappearance. Twelve fermenters were fed a basal diet two times a day that consisted of 52 percent grain mixture and 48 percent forage for nine days. In this experiment, 0.1 percent HMTBa plus 65 ppm AGRADO Plus were added to a diet that contained 1.9 percent fat (blend of corn, linseed and fish oils).

The addition of HMTBa and AGRADO Plus restored the microbial protein synthesis depression observed in diets with unprotected fat (UF).

Introduction

Unsaturated fats such as fish, linseed and corn oil negatively affect rumen fermentation. Antioxidants such as AGRADO Plus have been found to reduce oxidation of unsaturated fats and fat soluble vitamins when fed to growing cattle and dairy cows to improve animal performance. Antioxidants have been shown to increase milk production when fed to lactating dairy cows. It was hypothesized that in diets with highly unsaturated fat content, feeding an antioxidant such as AGRADO Plus in the presence of ALIMET would reduce the negative effect of unsaturated fat in the rumen.

Objective

The objective of this study was to evaluate the benefits of ALIMET plus an antioxidant such as AGRADO Plus on rumen fermentation when added to diets with high content of protected (PF), or unprotected, unsaturated fats.

Materials and Methods

A twelve-unit, dual, effluent, continuous culture system similar to the system of Hoover et al., (1989) was used in this experiment. The conditions of the continuous culture fermentations simulate rumen parameters of lactating cows and consisted of 12 percent/hour liquid and 4.17 percent solid dilution rates, 24-hour retention time, feed intake of 100 grams dry matter (DM)/day fed twice a day. Fermentation temperature was kept at 39°C and pH was recorded at 0.5 hour intervals. Each dietary treatment was fermented in triplicate nine-day fermentations, with effluent samples composted for analysis during the last three days for organic matter (OM), dry matter (DM), crude protein (CP), neutral detergent fiber, (NDF) acid detergent fiber (ADF) and non-structural carbohydrate (NSC) digestibility, rumen volatile fatty acids (VFA’s), non-ammonia, ammonia, bypass and microbial nitrogen. Microbial nitrogen efficiencies were expressed as microbial nitrogen produced over kilograms dry matter and organic matter digested. Ingredients were ground through a four millimeter mesh screen. Both treatments were added to the experimental diet at the expenses of corn meal. Protected or unprotected sources of unsaturated fat were added to a control diet at a rate of 1.8 percent in the presence and absence of 0.1 percent ALIMET + 65 ppm AGRADO Plus. The source of protected unsaturated fat was Energy II repro (Bioproducts, Inc.) and the source of unprotected, unsaturated fat consisted of a blend of 33 percent corn oil, 33 percent linseed oil and 33 percent fish oil.
Results and Discussion

Nutrient Digestibility:
No significant changes were observed in nutrient digestibility when protected or unprotected fat were fed, except for ADF digestibility which was significantly improved in the UF diets. Addition of ALIMET and AGRADO Plus significantly improved crude protein digestibility in the UF, but no effect was observed in the PF diets (Figure 1).

Microbial Synthesis and Nitrogen Partitioning:
Feeding UF reduced microbial nitrogen synthesis and efficiency resulting in higher ammonia and reduced non-ammonia nitrogen when compared to PF. The negative effect of UF on microbial nitrogen yield and efficiency was restored with the addition of ALIMET and AGRADO Plus to the diet (Figure 2). Addition of ALIMET and AGRADO Plus to PF did not change microbial protein synthesis.

Summary
The negative effect of feeding unprotected, unsaturated fat on microbial protein synthesis was reversed in the presence of ALIMET and AGRADO Plus.

References

* P<0.01