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Lactation response to soybean meal and rumen-protected methionine supplementation of corn silage-based diets[1]

H. Nursoy,* M. Gonzalez Ronquillo,† A. P. Faciola,‡ and G. A. Broderick§[2,3]
*Department of Animal Nutrition, Veterinary Faculty, Bingol University, Bingol, Turkey 12000
†Universidad Autonoma del Estado de Mexico, Facultad de Medicina Veterinaria y Zootecnia, Instituto Literario 100, Toluca, Mexico ‡Department of Animal Sciences, University of Florida, Gainesville 32611
§USDA-Agricultural Research Service, US Dairy Forage Research Center, 1925 Linden Drive, Madison, WI 53706

ABSTRACT

Corn silage, an important forage fed to dairy cows in the United States, is energy rich but protein poor. The objectives of this experiment were to investigate the effects on production of milk and milk components of feeding corn silage-based diets with 4 levels of dietary crude protein (CP) plus rumen-protected methionine (RPM). Thirty-six cows were blocked by days in milk into 9 squares and randomly assigned to 9 balanced 4 × 4 Latin squares with four 4-wk periods. All diets were formulated to contain, as a percent of dry matter (DM), 50% corn silage, 10% alfalfa silage, 4% soyhulls, 2.4% mineral-vitamin supplement, and 30% neutral detergent fiber. Supplemental RPM (Mepron, Evonik Corp., Kennesaw, GA) was added to all diets to main- tain a Lys:Met ratio of 3.1 in digested AA. Ground high-moisture corn was reduced and soybean meal (SBM) plus RPM increased to give diets containing, on average, 11% CP (28% corn, 31% starch, 6% SBM, 4 g of RPM/d), 13% CP (23% corn, 29% starch, 10% SBM, 8 g of RPM/d), 15% CP (19% corn, 26% starch, 15% SBM, 10 g of RPM/d), and 17% CP (14% corn, 24% starch, 19% SBM, 12 g of RPM/d). Data from the last 14 d of each period were analyzed using the mixed pro- cedures in SAS (SAS Institute Inc., Cary, NC). With the exception of milk fat and milk lactose content, we found no significant effects of diet on all production traits. We did note linear responses to dietary CP concentration for intake, production of milk and milk components, and MUN. Cows fed the 11% CP diet had reduced DM intake, lost weight, and yielded less milk and milk components. Mean separation indicated that only true protein yield was lower on 13% CP than on 17% dietary CP, but not different between 15 and 17% CP. This indicated no improvement in production of milk and milk components above 15% CP. Quadratic trends for yield of milk, energy-corrected milk, and true protein suggested that a dietary CP concentration greater than 15% may be necessary to maximize pro- duction or, alternately, that a plateau was reached and no further CP was required. Although diet influenced apparent digestibility of DM, organic matter, and neutral detergent fiber, digestibility did not increase linearly with dietary CP. However, we observed linear and quadratic effects of dietary CP on acid detergent fiber digestibility. As expected, we found a linear ef- fect of dietary CP on apparent N digestibility and on fecal and urinary N excretion, but no effect of diet on estimated true N digestibility. Ruminal concentrations of ammonia, total AA, peptides, and branched-chain volatile fatty acids also increased linearly with dietary CP. Quadratic responses indicated that 14.0 to 14.8% CP was necessary to optimize digestion and energy utilization. Overall results indicated that, when RPM was added to increase Lys:Met to 3.1, 15% CP was adequate for lactating dairy cows fed corn silage diets supplemented with SBM and secreting about 40 kg of milk/d; N excretion was lower than at 17% CP but with no reduction in yield of milk and milk components. Key words: corn silage, soybean meal, rumen- protected methionine, dietary crude protein.

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[2]Retired; present address: Broderick Nutrition & Research LLC, 221 Glen Hollow Road, Madison, WI 53705.
[3] Corresponding author: gbroderi@wisc.edu