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NUTRIENT UTILIZATION AND MILK PRODUCTION RESPONSES
OF LACTATING COWS RECEIVING UNCONVENTIONAL
SILAGE-BASED DIETS

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DISSERTATION ABSTRACT

NUTRIENT UTILIZATION AND MILK PRODUCTION RESPONSES
OF LACTATING DAIRY COWS RECEIVING UNCONVENTIONAL
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Tropical corn (*Zea mays* L.), hybrid pearl millet [*Pennisetum glaucum* (L) R. BR.] and white lupin (*Lupinus albus* L.) are unconventional crops that fit into a double cropping system in the Southeastern United States. These crops were ensiled and compared with temperate corn (*Zea mays* L.) as a forage source for lactating dairy cows. Isocaloric and isonitrogenous dietary treatments based on silages of temperate corn with AgBag[®] (TCAgBag), Pioneer-1132[®] (TCP1132), or Pioneer-1174[®] (TCP1174) additive; or tropical corn (TrC), pearl millet (PM) or lupin (L) were fed to 54 Holsteins in a

lactation-digestion trial and to six ruminally- cannulated cows in an in situ study.

Tropical corn, pearl millet and lupin silage were inoculated with AgBag[®] additives. Dry matter intake for cows fed temperate corn diets (22.7 kg/d) was greater than those fed TrC (19.8 kg/d), PM (17.2 kg/d) or L (19.6 kg/d). Milk yield from cows fed temperate corn diets (30.8 kg/d) was greater than those from cows fed TrC (26.8 kg/d) or PM (26.3 kg/d) diets and tended to be greater ($P < .06$) than that from cows on L diet (28.5 kg/d). Milk protein and 3.5% fat corrected milk followed the milk yield pattern. Milk fat percentages were similar between temperate corn and unconventional silage diets whereas milk protein percentage for cows fed PM diet was lower than that for cows fed temperate corn diets. Ruminal pH and molar percentage of majors volatile fatty acids were similar between cows on temperate corn and unconventional silage diets except for propionate. Apparent digestibilities of organic matter, crude protein, dry matter (DM), acid detergent fiber (ADF) and neutral detergent fiber (NDF) were highest for L diet (81-88%), followed by TrC and PM diet (68-78%) and temperate corn diets (38-72%), respectively. In situ potentially digestible DM, ADF and NDF were greater for unconventional silage diets than for temperate corn silage diets. Degradation rate of DM and ADF for L diet was also higher than those for temperate corn silage diets. These results indicate that tropical corn, pearl millet and lupin can be ensiled and used in dairy rations, but milk production may be depressed with PM and TrC diets. For these silages, more readily available energy sources may be required in the diet in order to produce similar milk production to diets based on temperate corn silage. Moreover, stage of maturity could have a large influence on results.