

**EFFECT OF SURFACE-APPLIED DAIRY SLURRY TO ALFALFA, GRASSES
AND ALFALFA-GRASS MIXTURES ON FORAGE YIELD AND QUALITY,
SOIL NITROGEN, AND STAND PERSISTENCE**

D. H. Min, L. R. Vough, and T. Chekol
Natural Resource Sciences & Landscape Architecture

Introduction: Applying manure to alfalfa or alfalfa-grass mixtures may not seem to be efficient from an nitrogen (N) use perspective, but may actually be the best management alternative from an environmental perspective. Manure applications to alfalfa or alfalfa-grass mixtures may actually result in less potential environmental harm than application to corn and small grains. Alfalfa and alfalfa-grass mixtures can consume large quantities of manure nutrients since legumes take up soil N in preference to fixing N from the air when free N is available in the soil.

Objectives: 1) Evaluate effects of dairy slurry application rates and times on yield, quality and stand persistence of alfalfa (AL), orchardgrass (OR), tall fescue (TF), reed canarygrass (RC), AL-OR and AL-RC. 2) Evaluate the effectiveness of these species for utilizing N and P from various application rates.

Treatments: AL, OR, TF and AL-OR were managed in a 5-cut and OR, RC, AL-OR and AL-RC in a 4-cut system. Nine fertility treatments were initiated after 1st cutting in 1995 -- 7 slurry rate/timing treatments, an inorganic fertilizer treatment and unfertilized control.

Results: Generally, yields from dairy slurry application were comparable to the inorganic fertilizer treatment for all species in both 4-and 5-cutting management systems. Applying dairy slurry at the highest rate in split-applications was not detrimental to herbage yields under either cutting management system. Herbage yields of AL and AL-OR were similar regardless of N rates in the 5-cutting management system. Crude protein content of grasses was similar to AL and AL-OR across all slurry rates and comparable to the inorganic fertilizer treatment. N rates did not affect ADF and NDF contents in either cutting management system. Alfalfa-grass mixtures had significantly lower NDF content than grasses in the 4-cutting management system. In the 5-cutting management system, alfalfa and alfalfa-orchardgrass had significantly lower NDF content than orchardgrass and tall fescue alone.

Soil $\text{NO}_3\text{-N}$ levels at 0-12 and 12-24 inches in the 4-cut system were significantly higher for RC than OR, AL-OR and AL-RC in December 1996 from application of 1413 lb total slurry N/acre in 1996. At the 1800 lb N rate, $\text{NO}_3\text{-N}$ was again significantly higher for RC at 0-12 inches and for RC and OR at 12-24 inches than for AL-OR and AL-RC. For AL-OR and AL-RC, there were no significant differences in $\text{NO}_3\text{-N}$ at either depth between the control, 500 lb N from NH_4NO_3 and 706 lb N from slurry. There were no significant differences in soil $\text{NO}_3\text{-N}$ levels among species in the 5-cut system. At 0-12 inches soil N was significantly higher than the control for all species at all slurry treatments except TF at 747 lb N. Soil N for the 747 lb N from slurry was generally not significantly different between the control, 500 lb N and 747 lb total N from slurry. Stand ratings in April 1997 indicated no detrimental effects on stands after two years of slurry applications. Thus alfalfa and alfalfa-grass mixtures appear to be as effective as orchardgrass and tall fescue in utilizing N from manure and more effective than reed canarygrass.