Addition of Clover to Tall Fescue Pastures and Its Effects on Nitrogen Status of Animals, Forages and Soils
Heather Glennon1, Jean-Marie Luginbuhl1, Paul Mueller1, Julie Grossman2, Michelle Schroeder-Moreno1
Crop Science, North Carolina State University1; Soil Science, North Carolina State University2

Introduction

- Incorporating legumes into grass pastures as a low input nitrogen (N) source is not a new concept but one that is regaining popularity with producers who want to farm more sustainably.
- Through biological nitrogen fixation (BNF), legumes are able to take N from the atmosphere and convert it into “free” plant available N.
- Because legumes are higher in nitrogen content, they have been reported to increase individual animal rate of gain, but decrease stocking rate and gain/hectare due to lower forage yield.
- Ruminants excrete 75-90% of their intake nitrogen through feces and urine which subsequently can increase soil nitrogen and reduce BNF.
- Legumes have the potential to increase N cycling in pastures and decrease the need for N fertilization.
- There are few reported studies using goats grazing tall fescue-clover pastures in the southeastern United States.

Objectives

1. Measure the effects of nitrogen source on: Animal Performance
2. Measure the effects of grazing/excreta on: Biological nitrogen fixation, Soil nitrogen

Experimental Design

- Split-block design with four main nitrogen treatments.
- Grazed and mowed sub-plots.

Materials and Methods

ANIMALS
- Boer-cross and Kiko-cross meat goats
  - Spring 2012 & 2013: 3 does with twins/plot, 56 days
  - Fall 2012: 5 wethers/plot, 47 days

FORAGE
- Yield measurements taken before and after grazing/mowing using a falling plate meter
- Samples were hand-separated for botanical composition
- Determination of protein and fiber concentrations of fescue and clover
- 15N Natural Abundance technique used to calculate biological nitrogen fixation

SOIL
- 10-cm deep cores taken before and after grazing/mowing and weekly thereafter
  - “Wet” 1 M KCl nitrogen extraction was used to determine:
    - Ammonium nitrogen (NH4-N)
    - Nitrate nitrogen (NO3-N)

Results

ANIMALS
- Weighed, bled, fecal and urine sampled every 28 days
- Blood was analyzed for urea nitrogen
- Feces and urine were analyzed for nitrogen concentration

SOIL
- N additions
  - 0
  - 50
  - 100
  - 150
  - 200

Kid Gain/Hectare

Kid Gain/Hectare

References

- Moreau F.C., Ledgard S., McKee C., Silvers C. (2005) The effects of a single application of cow urine on annual N fixation under varying simulated grazing intensity, as measured by four 15N isotope techniques. Plant and Soil 264, 469-484