The response of an animal to a crop is the result of an interaction between the plant, the animal, agronomic practices, and the environment. Some of the factors influencing plant composition and animal response are presented schematically in Fig. 1, which illustrates the complexity of the factors involved and the many interactions possible between soil, plant, animal, and environment.

A sure way to increase the use of N fertilizer in forage production would be to prove that forage yields can be increased without adversely affecting the plant or the animal. In a review of numerous experiments on the effects of N fertilizers on yields of forage, Ward (1959) cited many experiments where yields of grasses were increased, and some where there was little or no response. In some experiments with mixed forages, N fertilization depressed yields of legumes, and in others there was little or no effect. He concluded that the response of forage crops to fertilization varied with soil type, relative levels of fertility within soil types, ratios of available nutrients, crops, and climatic conditions.

Reluctance of livestock producers to use N fertilizers on forages can be ascribed largely to a lack of information concerning the economics of N fertilization and to unsubstantiated reports of adverse effects of N fertilization on quality of forage and on health of animals. Reported unfavorable effects include a general decline in health of animals, an increase in metabolic disturbances, decreased intake of forage, lowered production, and reproductive difficulties.

Agronomic research attempts to establish simple correlations between chemical components, morphological changes, and yield. However, these correlations may vary with factors such as year, time of harvest, and temperature (Raymond, 1969). In view of our general lack of knowledge of the reason an animal accepts or rejects a specific feed, a similar problem exists in attempting to correlate factors such as chemical components, physical form, smell, and taste with acceptability of a forage to an animal.