

Preface

This anthology is a compilation of data collected during the 48 year period between 1957 and 2004 that scientists at the North Dakota State University Dickinson Research Extension Center conducted investigative research into the potential use of nitrogen fertilization treatments to improve native rangeland ecological conditions by returning the natural balance of the botanical species composition and by restoring the productivity of the total herbage biomass to the declining and deteriorating Northern Plains mixed grass prairie resulting from the unmanaged negative aspects of traditional grazing management practices. Five nitrogen fertilization treatment plot studies were conducted between 1957 and 1987. Plot studies I and II (1957, 1962-1963) were conducted by Dr. Warren C. Whitman. Plot studies III and IV (1964-1969, 1970-1978) were conducted by Dr. Harold Goetz and Dr. Warren C. Whitman with collaboration from Paul E. Nyren (1976-1978). Plot study V (1982-1987) was conducted by Dr. Harold Goetz and Dr. Llewellyn L. Manske. Two grazing trials on nitrogen fertilized native rangeland were conducted between 1972 and 1982. Grazing trial I (1972-1976) used yearling steers and was conducted by Dr. Warren C. Whitman and Dr. Harold Goetz. Grazing trial II (1978-1982) used cow-calf pairs and was conducted by Paul E. Nyren and Dr. Harold Goetz from 1978 to 1981 and by Dr. Llewellyn L. Manske and Dr. Harold Goetz from 1981 to 1982. A long-term plant species composition shift study was conducted by Dr. Llewellyn L. Manske from data collected during 1972 to 1988 and 1997 to 2004. This extensive nitrogen fertilization on native rangeland research program did not result in the development of a recommended cultural practice for management with nitrogen fertilization because of the excessively high cost of the additional herbage produced and the objectionable shift in plant species composition. Nevertheless, the results from this research program provided insightful understanding into the complexity of the nitrogen cycle and plant growth activity in native rangeland ecosystems and identified the reduction in plant water use efficiency and the problem of herbage production at below potential quantities on native rangelands managed by traditional grazing practices to be caused by the ecosystems deficiency of soil mineral nitrogen.