Report for 2002WY7B: Drought prediction model development and dissemination in Wyoming

There are no reported publications resulting from this project.

Report Follows:

Problem and Research Objectives:

Timely, locally relevant, within year drought prediction tools for each major land resource area within Wyoming are not available. The few sites with existing data have not been developed or extent of their geographic relevance examined. The overall goal of this proposed research is to develop a timely, locally relevant, within year drought prediction tool for each major land resource area within Wyoming, focusing on the relationships of precipitation variables and annual forage production on rangeland by accomplishing the following objectives.

1. Cooperatively with CES and land management agencies, establish herbage yield and quality measurement sites representative of the predominant soils and precipitation pattern/amounts in major land resource areas in Wyoming and continue sampling the existing long-term forage production harvest site near Saratoga.

2. Locate and access existing annual forage production data from agency files within Wyoming.

3. Obtain and summarize relevant precipitation records for reporting stations nearest to vegetation sampling sites.

4. Analyze relationships of monthly and seasonal precipitation with annual peak standing crop forage yields and quality.

5. Provide cooperators with sampling and analysis tools for each to continue to strengthen predictive capabilities for their site.

6. Widely disseminate to the broad constituency of land managers and users in Wyoming, the most useful drought prediction methods resulting from this study.

Methodology:

Cooperating agencies will establish vegetation production sampling sites in different land resource areas in Wyoming near their weather site or existing weather recording stations. Existing sources of long term vegetation production/weather records will be sought, including those at Cheyenne from USDA-ARS-HPGRS. A 16 year record of productivity and weather data from a site near Saratoga will be continued.

Regression techniques will be used to determine the best seasonal or monthly weather variable for prediction of the upcoming growing season productivity. Multi-variate regression analysis and time series analysis will examine the precision of the predicted forage production associated with adding successive climatic inputs received during the year prior to cessation of plant growth. An analysis goal is to identify a weather variable existing early enough in the year for livestock producers to respond to predicted forage production by making relevant stocking level adjustments before financial hardship or resource damage are probable.

Results will be disseminated through the CES web site and county offices statewide. Other print and visual/audio media will also be used.

Principal Findings and Significance:

This is the end of the first year of a project approved for three years. A graduate assistant was recruited to conduct sampling and analysis duties. In the first year, six cooperator production sites were established including the following counties-cooperators, Converse-CES, Laramie-CES and HPGRS, Campbell-CES, Johnson-CES, Washakie-TNC, Sublette-CES. Five additional cooperator sites have been confirmed for this years sampling and analysis; Crook , Carbon, Platte, Washake, and Natrona. The site in Carbon County, maintained for 16 years jointly by UW and Saratoga Cons. Dist., was again sampled. In aggregate, these sites provide a geographic dispersion oriented toward east of the continental divide where effective precipitation for forage growth largely comes in spring. We assisted cooperators with aid in sampling and weighing materials as needed.

Preliminary analysis of data from Saratoga site (Figs. 1A-D and 2A-D) indicates as has previous treatments of this data, that winter precipitation is not an effective predictor of growing season productivity. Normal winter precipitation wets the upper few centimeters of the soil providing moisture for early growing species. Precipitation received in April produces the highest level of correlation with forage yields of the months/season tested. May and June precipitation are less effective predictors of growth but are valuable in extending the green season and maintaining higher forage quality. An end of April decision point for stocking
decisions related to predicted forage production, is early enough in the year for economically effective decisions in most years.

The data from other sites in the state when examined in the context of the data from Saratoga (Fig. 3A-C), reveals that many of these sites responded to precipitation in 2002 similar to the long term responses. These tentative results imply that fewer long term sites around Wyoming may be needed to effectively inform producers and land managers of upcoming forage production.

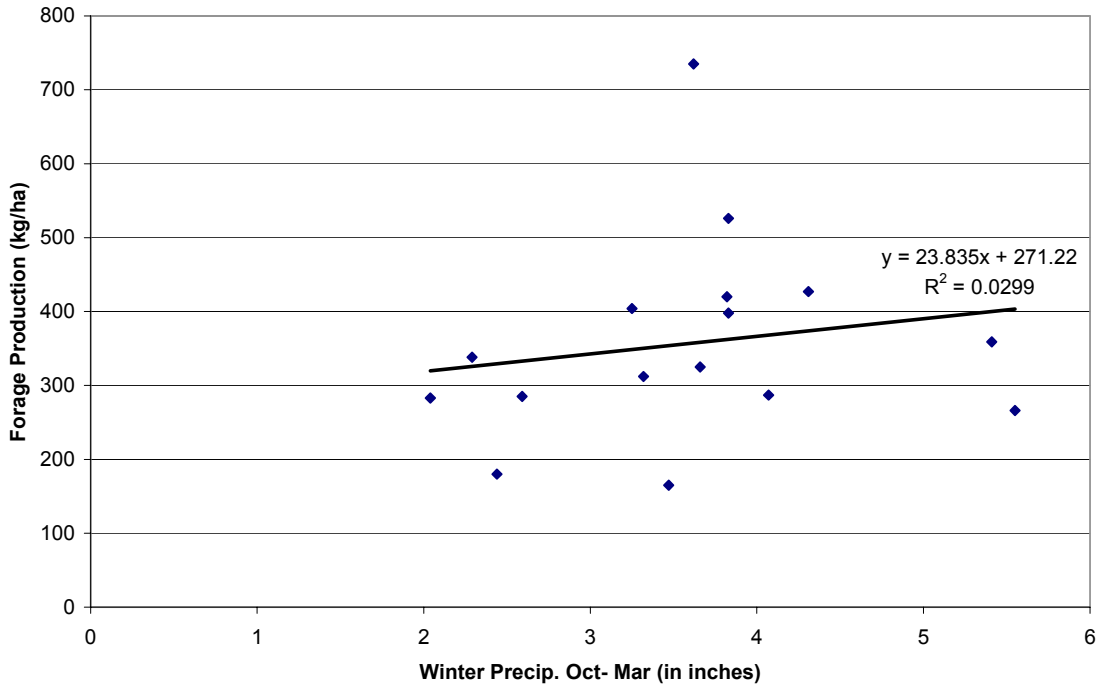


Figure 1A. Oct- Mar Precip vs. Forage Production for Check plots (no sage removed) 1987-2002

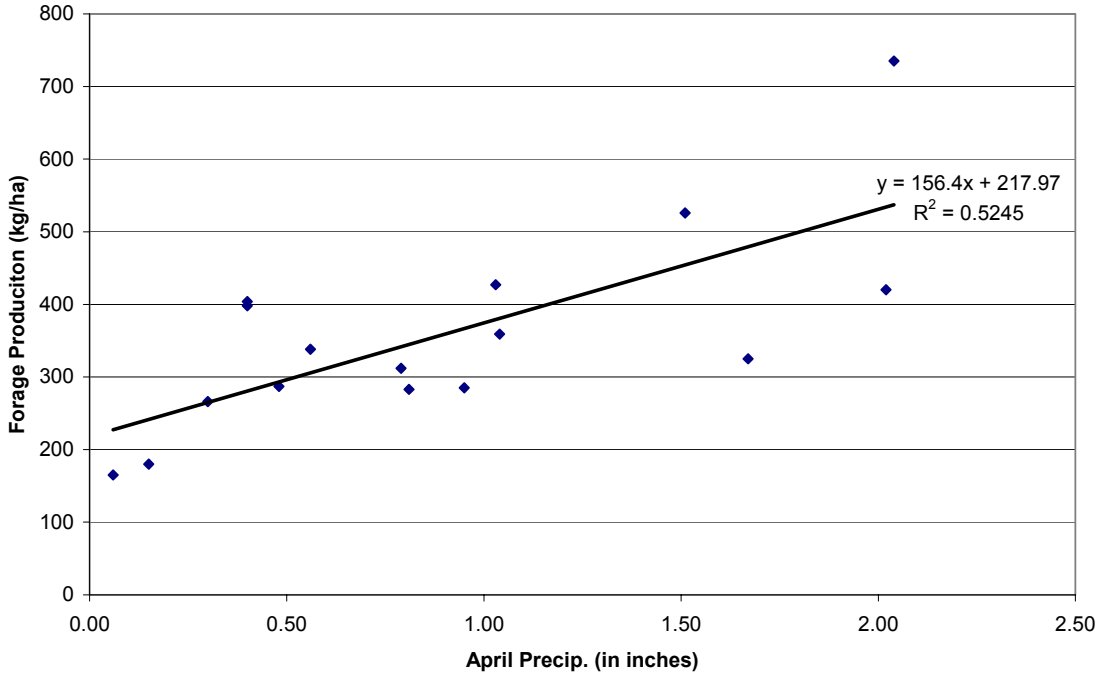


Figure 1B. April Precip. vs. Forage Produciton for Check Plots (no sage removed)1987-2002

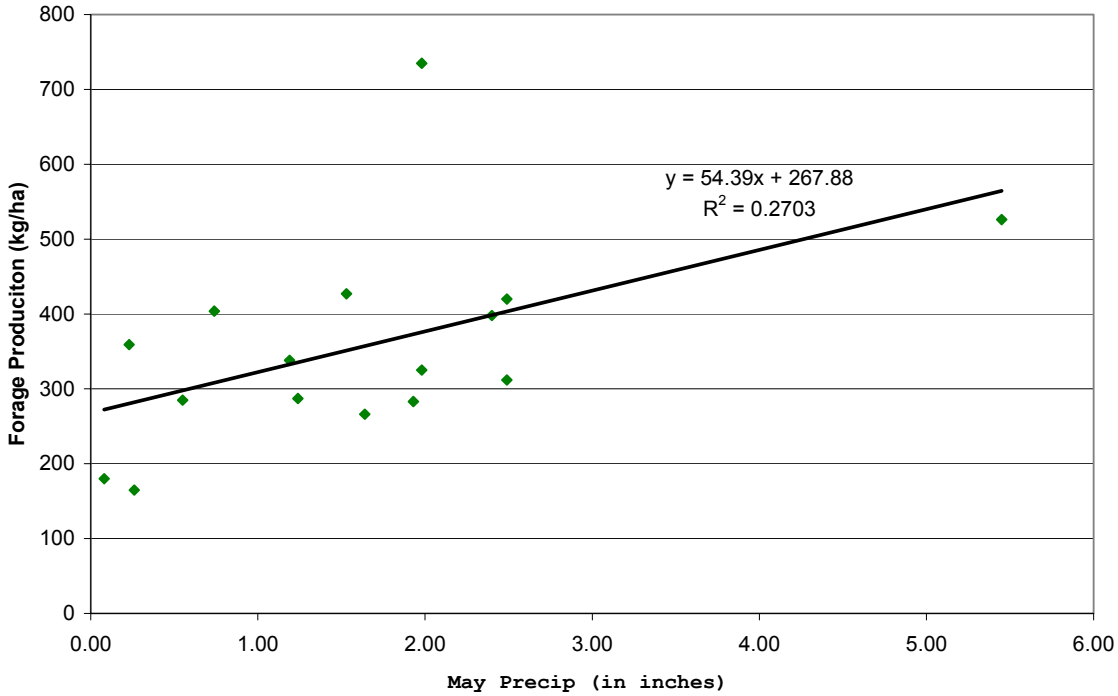


Figure 1C. May Precip. vs. Forage Production for Check Plots (no sage removed)1987-2002

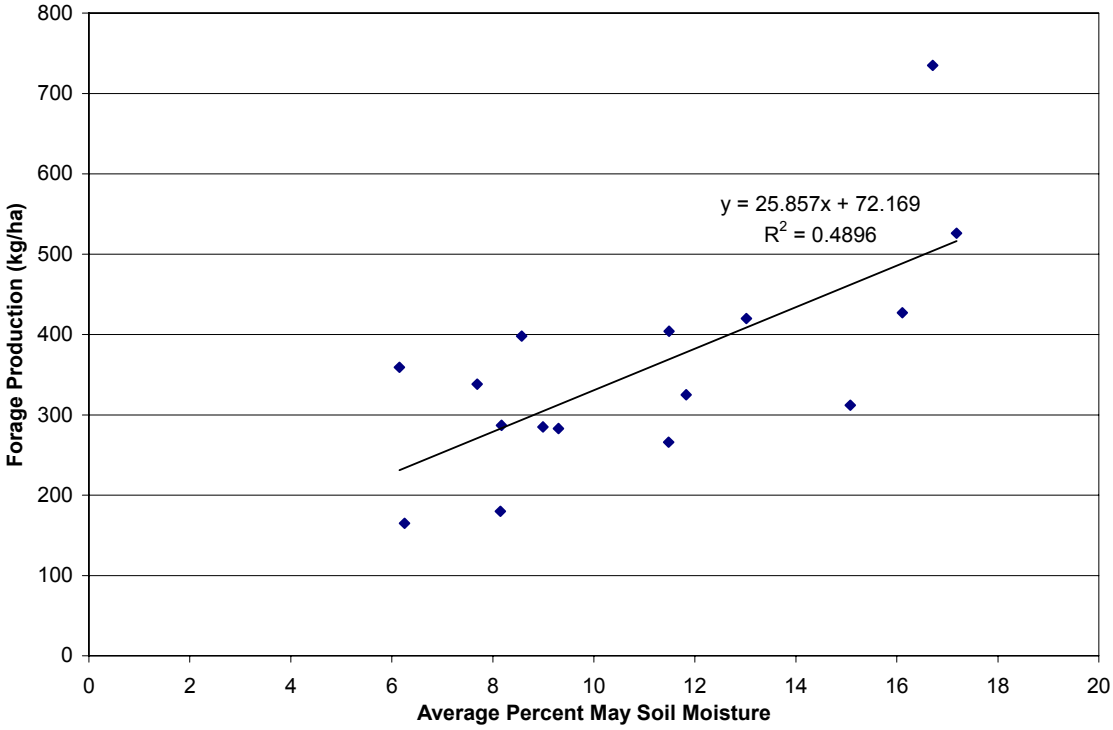


Figure 1D. May Percent Soil Moisture vs. Forage Production for Check Plots (no sage removed) 1987-2002

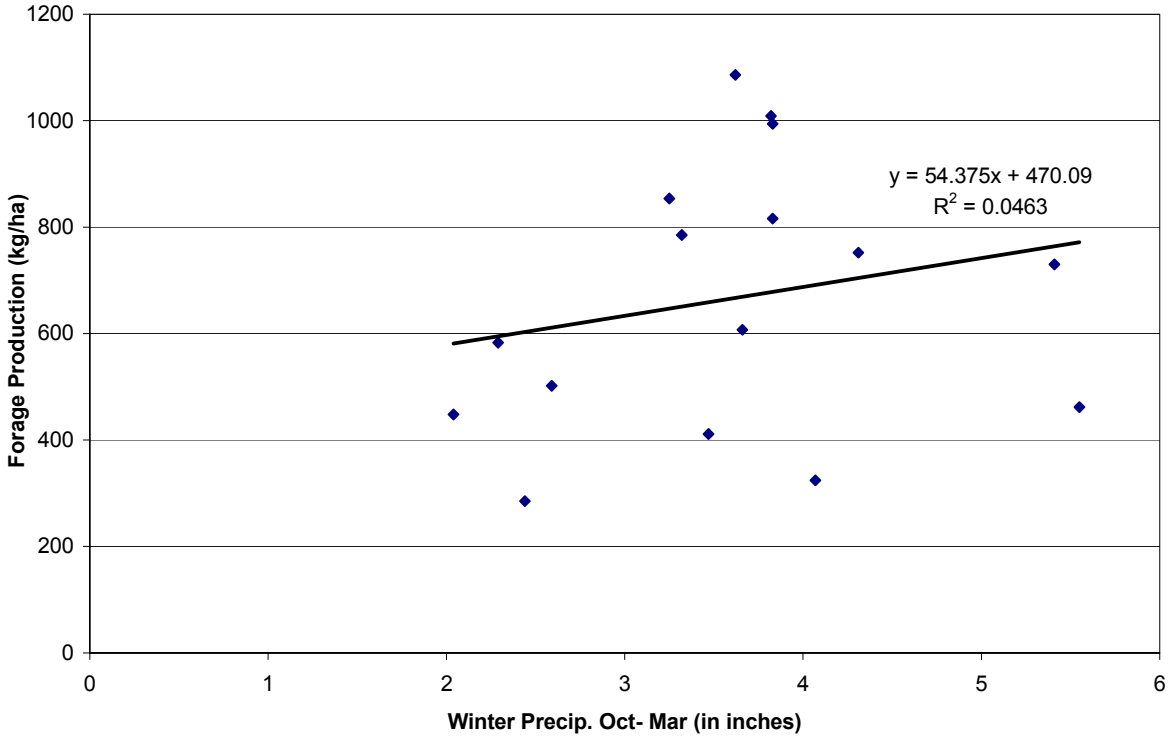
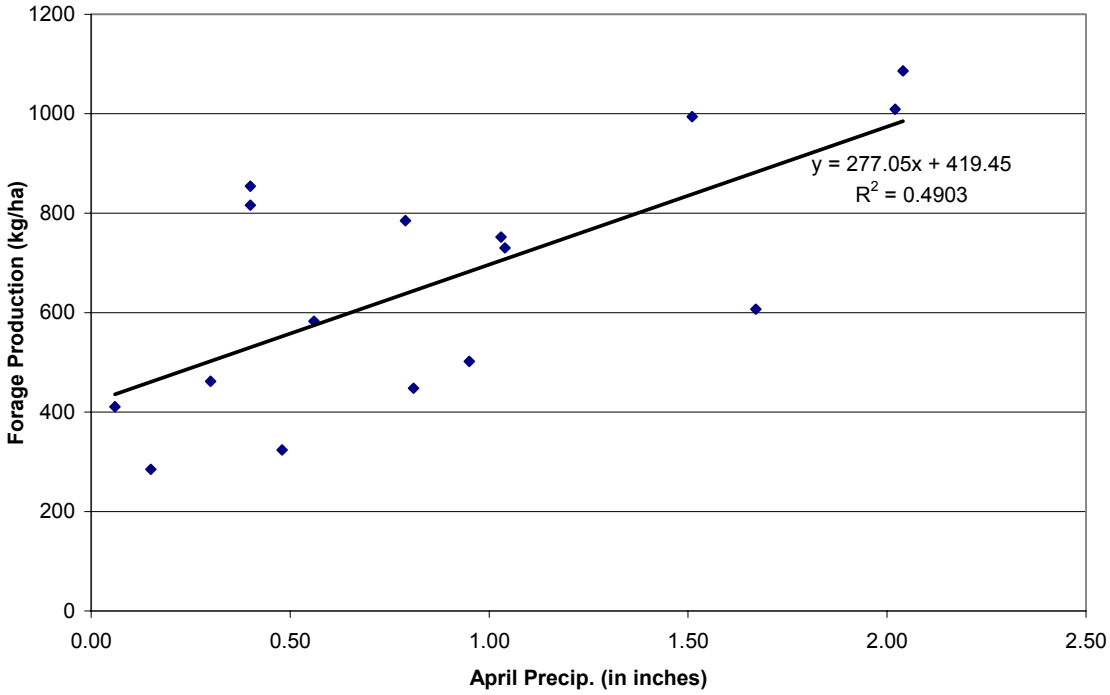


Figure 2A. Oct- Mar Precip. vs. Forage Production for Treated Plots (sage removed) 1987-2002



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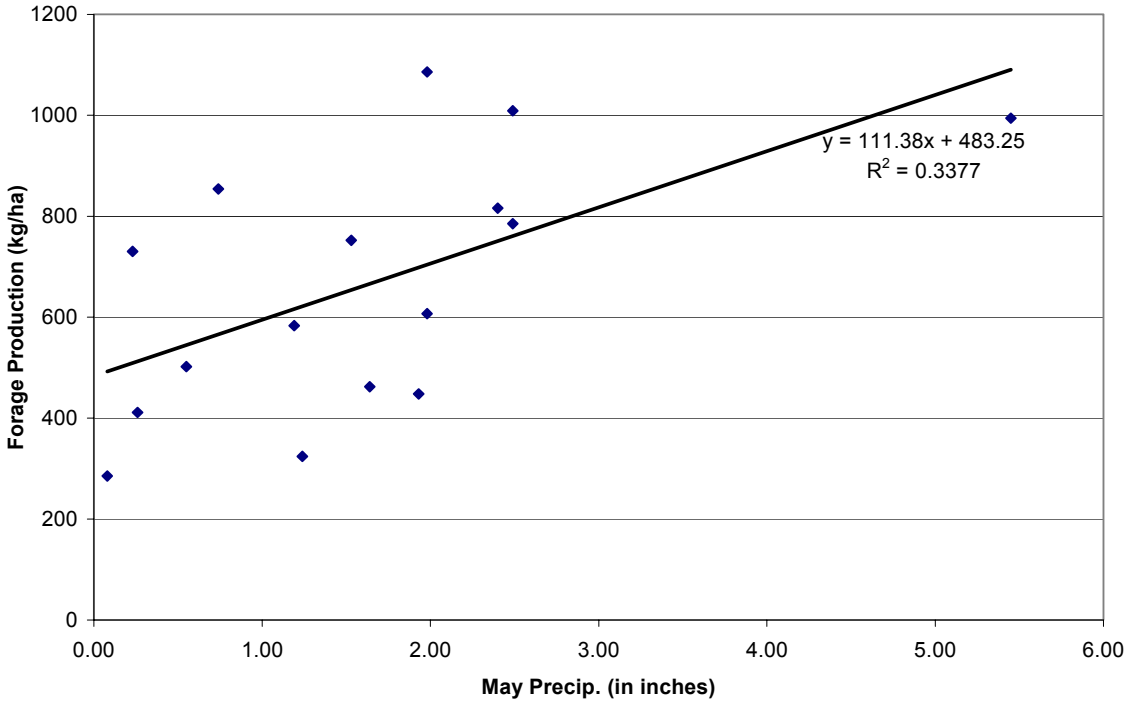

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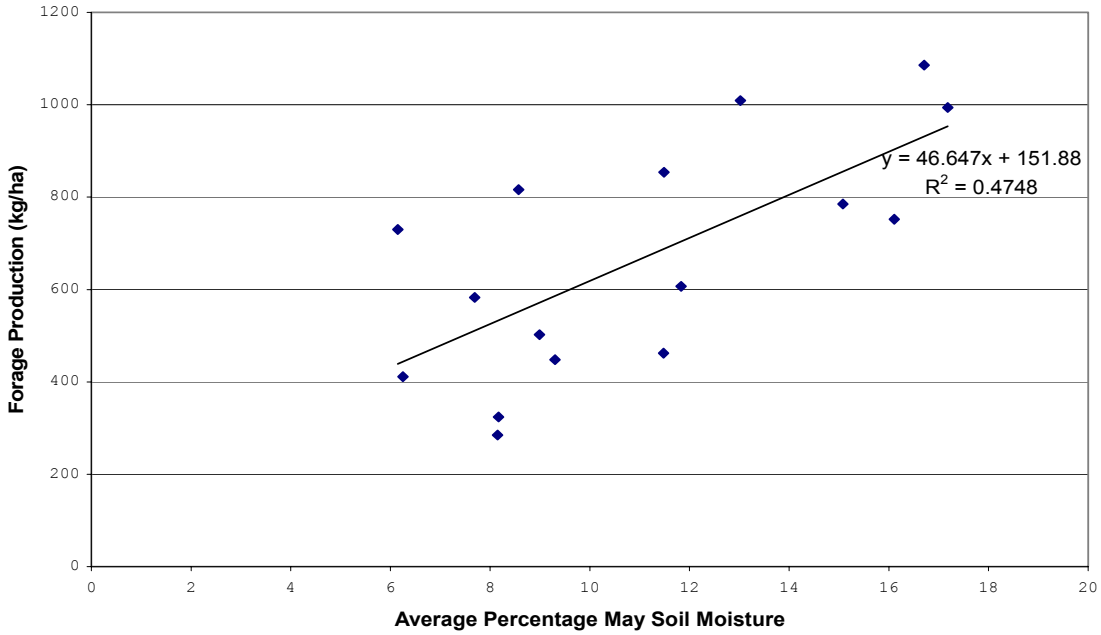

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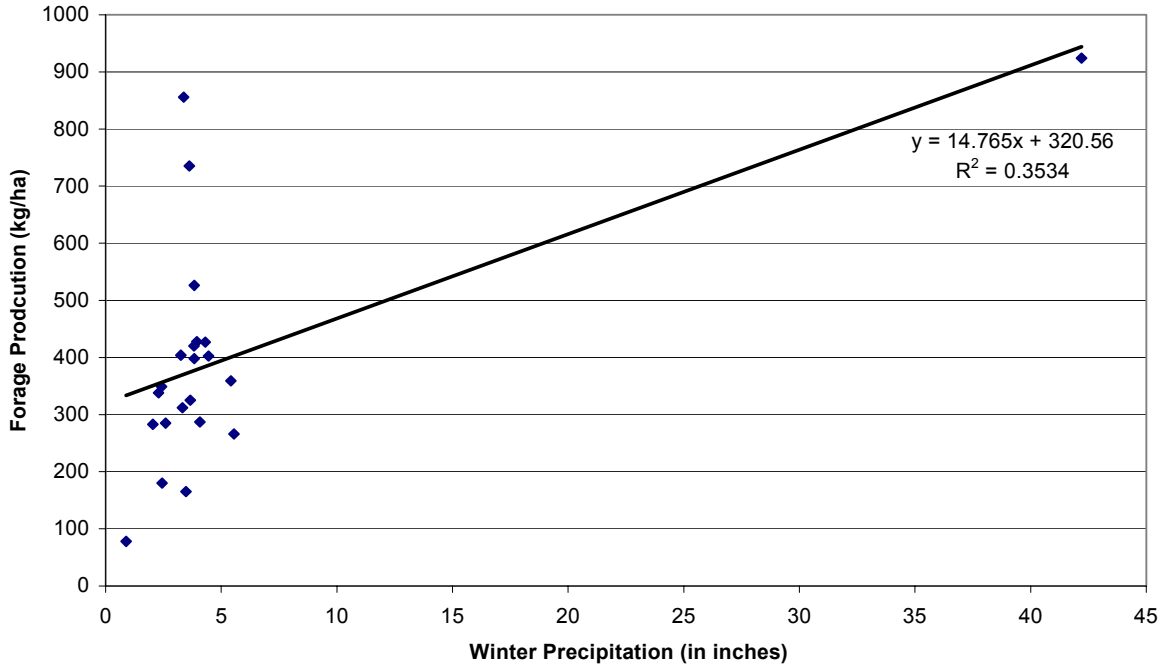


Figure 3A. October- March vs. Forage Production - Saratoga (1987-2002) and Statewide contributors data 2002

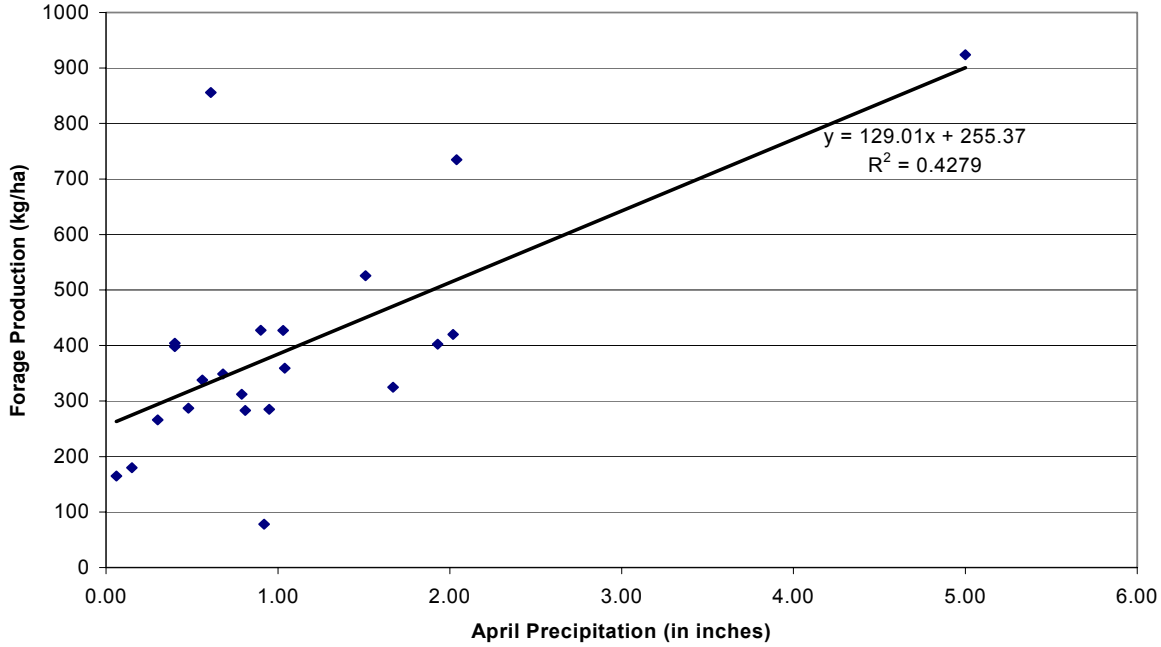
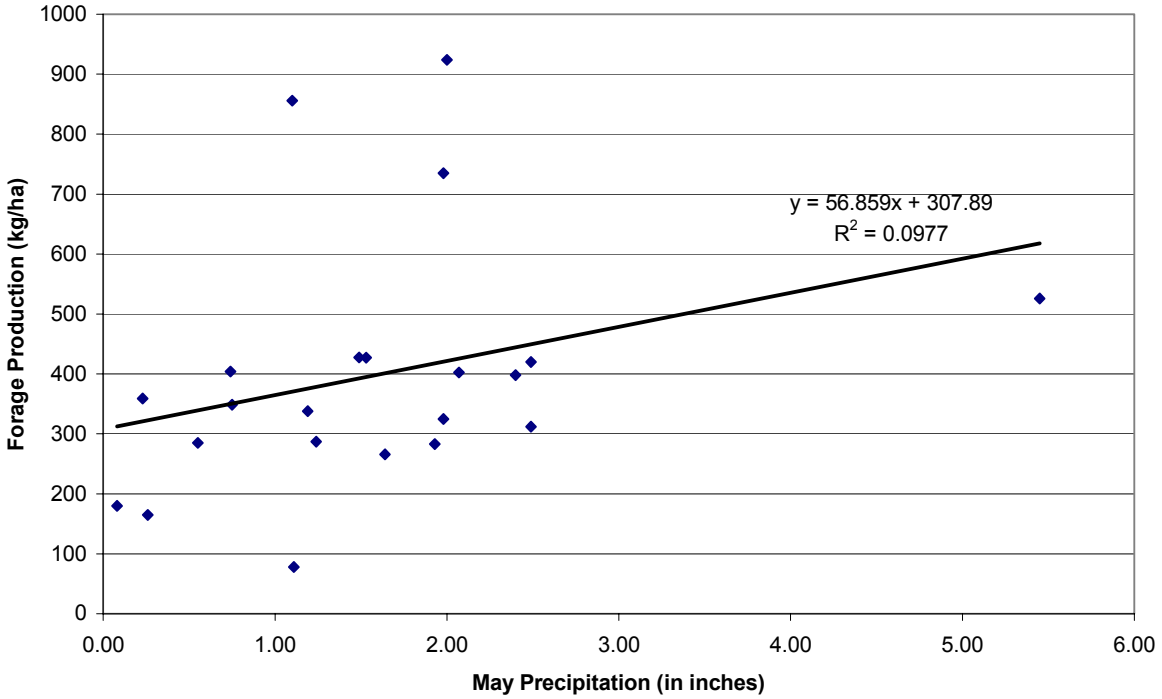


Figure 3B. April Precip. vs. Forage Production- Sartaoga (1987-2002) and Statewide contributors data (2002)



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