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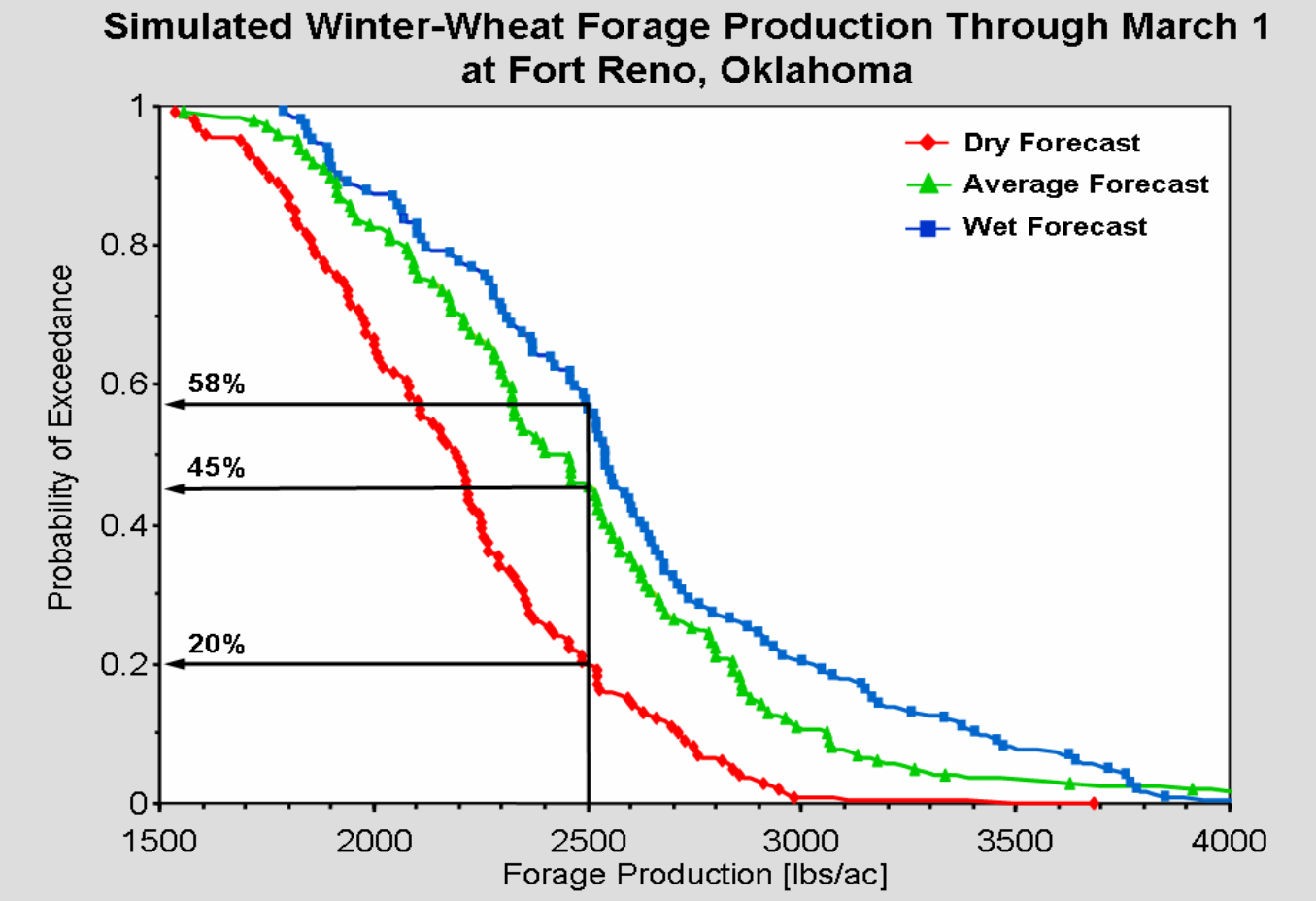
Climate and Watershed Science Fact Sheet
Grazinglands Research Laboratory, El Reno, Oklahoma January 2007

Seasonal Forecast Decision Support for Winter Wheat-Grazing Operations in Central Oklahoma

In the U.S. Southern Great Plains, winter wheat is often grazed by cattle to capitalize on the added value of beef production. Timely rainfall is critical for a successful winter wheat-grazing operation. Rainfall in late September and early October helps winter wheat establishment; rainfall in fall and early winter determines forage growth for grazing; and rainfall in spring contributes to grain production. However, rainfall is highly variable and uncertain in the Southern Great Plains. This translates into risky business when purchasing livestock ahead of the fall winter-wheat growing season. Misjudging grazing potential of the land can lead to over- or under-stocking and cut into anticipated profits. If one knew ahead of time what to expect in terms of seasonal weather, one could reduce the risk of making a wrong livestock purchase or grazing management decision. This is where seasonal precipitation forecasts produced by NOAA and climate variability information can provide some guidance. However, precipitation forecasts and climate variability by themselves are of limited decision making use. What the producers need for decision making is anticipated forage production and livestock weight gain associated with a forecast or climate variability. Crop, grazing, and livestock growth models can be combined to quantify the integrated outcome of climate forecasts, climate variability, and alternative management decisions. With such a model one can develop climate based decision information to reduce climate related risk and increase productivity and profitability of winter wheat grazing operations. Research is being conducted at the ARS Grazinglands Research Laboratory at El Reno, Oklahoma, to integrate crop, grazing and livestock growth models, and to develop climate forecasts and variability based decision information for managing grain-beef production system in the stocker region of the Southern Great Plains.

Seasonal climate forecasts are generally provided as a range of potential climate outcomes and their probability of being exceeded. An exploratory application of a crop model simulated winter wheat forage production for a range of potential precipitation outcomes associated with hypothetical wet, average and dry forecasts in central Oklahoma. The simulated forage production through March 1st for the three forecasts were plotted against their probability of being exceeded. Red data points identify forage productions associated with dry forecast outcomes; green data points with average forecast outcomes; and blue data points with wet forecast outcomes. Referring again to the figure, the probability that a forage production of 2500 lbs/ac can be achieved or exceeded is only 20% under dry forecasted conditions, 45% under average forecasted conditions, and 58% under wet forecasted conditions.



Conversely, there is a risk of 80% that a forage production of 2500 lbs/ac cannot be achieved under dry forecasted conditions, whereas the risk reduces to 42% under wet forecasted conditions. Similar plots can be developed for potential forage production for earlier dates and associated cattle weight gains under various crop and grazing management scenarios. An enterprise budget can be applied to estimate the likelihood for profitability of each scenario and forecast outcome. The producer can then review the various enterprise budgets in terms of forecast related opportunities and risk; determine if the difference in opportunity or risk due to consideration of a climate forecast is relevant; and make a crop and grazing management selection that best suits his or her farm production objectives. Additional information pertaining to this research is available at: http://ars.usda.gov/Main/docs.htm?docid=11617