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Effect of Grazing Duration on Growth and Grain Yield of Winter Wheat

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Summary

Irrigated grazing trials were conducted to determine the effects of grazing duration on growth and grain yield of 'TAM 105' winter wheat. Wheat forage was removed to 2- to 3-inch stubble height (15 to 30 percent ground cover) by stocker cattle. Three-year average grain yields were 82, 82, 73, 63, 55, and 41 bu/A for a grain-only check, February 1, March 6, March 17, March 31, and April 13 grazing termination dates, respectively. Grazing past February 1 reduced LAI and biomass and delayed heading in proportion to the loss in grain yield. Tiller weight and height were also progressively reduced by grazing past February 1. Tiller density was not reduced unless grazing continued past March 31. Grazing past February 1 appeared to reduce grain yield by limiting LAI and biomass in the spring. The earliest wheat (February 1 termination) did not reach Feekes stage 6 (first node of stem visible) until about April 1. Later grazing delayed

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elongation of the first internode by as much as 10 days; therefore, stage of development may not be very helpful in determining when to terminate grazing.

Introduction

Most winter wheat in the Texas Panhandle is grazed by stocker cattle from November until March. The present recommendation suggests grazing termination by March 15 to avoid loss of grain yield (7, 10). Grazing normally increases grain yield only when lodging occurs on ungrazed wheat (1, 2). Under less favorable conditions or with severe grazing, grain yield is reduced (11).

One recommendation to avoid loss of grain yield is to terminate grazing before spikes are high enough (1 to 2 inches above ground) to be removed by cattle (5, 9). Other reports indicate grain yield reductions when grazing or clipping was terminated earlier (3, 4, 8). This research was conducted to determine the effects of grazing duration on growth and grain yield of a popular semidwarf winter wheat, TAM 105.

Procedure

Replicated field grazing trials were conducted 3 years at Bushland on Pullman clay loam soil. TAM 105 wheat was fully irrigated by graded furrows. Grazed wheat was planted in late August and grazed from November until February 1, March 6, March 17, March 31, or April 13. An ungrazed check (grain-only) was planted in early October. An early-planted, ungrazed check was not included because excessive full growth of that treatment results in severe lodging, poor spring growth, and low grain yield.

Total above ground biomass was determined each year at heading by hand harvesting 1.0 m² areas from each plot. Tiller counts and leaf area index (LAI) were determined for these samples. Grain yield was determined by harvest with a plot combine. Grain yield is based on 13 percent moisture. Biomass and tiller weight are oven dry weights.

Results and Discussion

The grain-only and wheat grazed until February 1 had the highest grain yield (Table 1). Grain yield was reduced by each later grazing termination date. The grazing pressure in these studies was high with severe defoliation. Ground cover by green leaves when grazing ended was 15 to 30 percent and stubble height was 2 to 3 inches. Where grazing was less severe (40 to 50 percent ground cover), a

1- to 2-week longer grazing duration gave the same recovery and grain yield. Biomass and LAI at heading were reduced by grazing in proportion to the loss in grain yield (Table 1). High, positive correlations of grain yield with LAI, biomass, and percent ground cover were recorded each year. In contrast, tillers at heading were reduced only when grazing extended past March 31. Because biomass declined much faster than tiller number with late grazing, there was a severe decline in mean tiller weight. Heading date was delayed and height reduced by grazing past February 1.

Grazing appeared to reduce grain yield by limiting LAI and biomass during the spring recovery period. Grain yield reductions, except possibly with April grazing, did not appear to be due to removal of developing spikes by cattle. The spike did not reach grazing height until late in the season. The earliest development was observed in wheat where grazing was terminated February 1. This wheat reached Feekes stage 6, first node of stem visible (6), about April 1, 1 month after grazing began to reduce yield. Grazing past February 1 delayed elongation of the first internode so that jointing was delayed as much as 10 days. In fact, grazing delayed even the earliest signs of reproductive development to such an extent that stage of development may not be helpful in determining when to terminate grazing. Early development of an ungrazed check would be more helpful.

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TABLE 1. GRAIN YIELD AND GROWTH DATA FOR TAM 105 AS A MEAN OF THREE YEARS AT BUSHLAND

Grazing termination date	Grain yield (bu/A)	Heading data ¹				Heading date (day of year)	Height (inches)
		LAI	Tillers (per m ²)	Biomass (g/m ²)	Tiller weight (g)		
Grain-only	82	5.84	1,020	998	1.01	126	31
February 1	82	4.95	1,110	857	0.78	124	28
March 6	73	4.44	1,010	728	0.74	127	26
March 17	63	3.84	990	613	0.63	130	25
March 31	55	3.11	970	491	0.50	132	23
April 13	41	1.92	860	259	0.29	137	17
LSD .05	8	0.57	150	69	0.10	2	1

¹This data was taken near heading on May 11, 1982, May 16, 1984, and May 1, 1985.

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