Effects of Clipping and Grazing Termination Date on Grain Production

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Physiology of Growth

Small grains tend to produce more tillers and leaves than are necessary for maximum grain production. In the southern Great Plains much research has been conducted indicating that some of this plant tissue can be grazed with little or no yield penalty.

Leaf growth and tillering or stooling are markedly influenced by climatic conditions (temperature, light intensity, day-length, rainfall) and nutritional status under which the plants are growing (Evans, 1975). Leaves formed prior to floral induction originate close to the crown, and after induction the stem internodes elongate and the leaves are separated permitting more effective light distribution within the canopy. The rate of tillering is maximal at 77°F, but a larger number of tillers are often found at lower temperatures since the duration of tillering is longer.

With the onset of stem elongation the head or growing point is elevated from near ground surface to a height that the grazing animal can remove them from the plant. Stem elongation is also very much under climatic control and is related with varietal maturity. Dates for removal of the grazing animals will be different for various varieties, localities and years. The primary tillers usually have the largest heads and thus will have a strong effect on yield reduction if they are grazed off.

Grazing and Clipping Studies

Literature is definitely not in agreement on the benefits or damage of grazing on grain production if animals are removed before stem elongation. There is literature showing that yields will be reduced if grazing continues after stem elongation. There may be some apparent reasons for the various results.

Research at Overton, Texas shows considerable difference in forage yields existed between the two years (Table 1) and indicates the effect climate can have on yields from year to year.

Grazing or clipping of wheat in East Texas (Nelson, et al., 1982) increased the yields of some varieties, had no effect on others, and decreased the yields of others (Table 2). The two years of the study show about 4 bushels grain loss per 1,000 pounds of forage. Since the forage is important for grazing, it is advantageous to look at the rate of gain or days of grazing relative to grain yield loss. In 1980-81, an average daily gain of 1.06 pounds was obtained for 89 days and 1.50 pounds of daily gain in 1981-82 for 87 days. Animal gain per acre was 112 pounds in 1980-81 and 150 pounds in 1981-82. There was about 26.5 pounds of gain or 22 days grazing per bushel loss in 1981 and 19.5

pounds of gain or 6.7 days grazing per bushel loss in 1982. In one year of the study, diseases and ryegrass reduced the yields.

A clipping trial at College Station, Texas (Dunphy, et al., 1982) showed that clipping at the early joint had little or no effect on grain yield while clipping at mid to late joint reduced yields (Table 3). Tiller number was not significantly reduced by clipping treatments, but seeds per head were reduced. This would indicate that younger tillers reached maturity and seed initials are being laid down during these stages so clipping could be removing leaves which reduces photosynthate available for seed initiation.

Jointing dates varied as much as a month among cultivars and years, and this response raises the question of the value of a set calender date for livestock removal from wheat (Table 4). While clipping might be different from a grazing situation, dates of morphologic development of the plants would be the same.

In a grazing study in the Texas Panhandle (Shipley and Regier, 1972) animals gained an average of 1.4 pounds per day during fall and early spring. With the initiation of rapid spring-growth gains of 2.2 pounds per day were obtained. Heading dates were delayed and yields were reduced after March 30 in response to later dates of termination for grazing (Table 5).

Planting and clipping date effects on forage and grain yields were evaluated at Clovis, New Mexico (Fuehring, 1981). Data in Table 6 show that the highest forage yields were obtained from August 15 seeding and the highest grain yields from September 13 seeding. Clipping through March 22 did not significantly reduce grain yields although there was a slight decline in grain yield. He concluded that grazing through March produced a decrease of 26 pounds of grain per acre per day in 1979, a wet year and only seven pounds in 1980, a dryer year.

A wheat grazing study has been initiated at Bushland, Texas (Winter, 1982). In 1981-82, it was necessary to terminate grazing on early-planted wheat February 1, six weeks prior to the commonly recommended date to prevent a yield reduction. Grazing was severe in 1982 and this could account for the fact the later termination dates did not allow the plants time to grow the leaf area necessary for high yields.

Research in Nebraska (Kiesselbach, 1925) demonstrated that the grazing or mowing of wheat which had the potential to lodge could increase yields; however in years when there was no lodging, grazing delayed the maturity and reduced yields.

Summary

Grazing would appear to favor increased yields or not reduce yields when 1) fertility was adequate, 2) wheat was not grazed severely, 3) forage and water use was reduced, and 4) lodging was reduced. Grazing could reduce grain yields when 1) nutrients were limiting, 2) grazing was too severe, 3) there was little or no water

limitation, 4) lodging was not a problem, and (5) wet conditions permitted plants to be trampled into the ground.

Animals must be removed before floral initiation or jointing to prevent yield reductions. Floral initiation dates are influenced by temperature, fertility and variety so any set calender date for an area must be sufficiently early to represent a large number of years. Determination of jointing is not difficult, but does take some close observations and is something which farmers can do. It would be necessary to have an enclosure for observations to be sure that animals are not grazing off heads before jointing is observed. The value of grazing versus the grain yields may warrant accepting some yield reductions in exchange for the increased animal gains.

Literature Cited

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Table 1. Forage yields on plots mechanically clipped until February 16 for two years at Overton, Texas.

	Clipping Date			
	Dec. 12	Jan. 23	Feb. 16	Total
	Dry weight, pounds per acre			
1980-81	542	297	148	987
1981-82	1879	1052	322	3252

Table 2. Grain yields (bushels/Acre) of wheat over 2 years under 3 forage treatments at Overton, Texas

Variety	Forage treatment		
	Grain Only	Clipped to Mid-February	Grazed to Mid-February
		1980-81	
Tx 73-93	59	59	57
McNair 1003	52	53	47
Coker 85-15	55	48	32
Tx 72-9	40	45	42
Arthur 71	31	43	38
Mean	47	50	43
		1981-82	
Tx 73-93	46	42	30
McNair 1003	38	24	28
Coker 68-1	32	23	17
Northrup King	31	20	14
TAM W-106	25	25	16
Mean	34	27	21

Table 3. Wheat forage and grain yields at different stages of harvest at College Station, Texas.

Stage	Sturdy	Coker 68-15
	Forage Yield, pounds/acre	
Early joint	1547	1618
Mid joint	1869	1830
Late joint	2268	2179
	Grain Yield, bushels/acre	
Not cut	33.0	43.0
Early joint	27.8	34.2
Mid joint	18.5	28.9
Late joint	13.3	21.8

Table 4. Effect of forage removal at different stages of growth on dates of jointing and plant maturity at College Station, Texas.

Treatment	Sturdy			Coker 68-15		
	1977	1978	1979	1977	1978	1979
			Date of jointing			
Not cut	2-29	1-26	2-24	2-5	1-6	1-15
Early joint	2-19	3-17	3-5	2-5	1-23	2-13
Mid joint	2-26	3-25	3-12	2-14	3-1	2-27
Late joint	3-2	3-29	3-19	2-26	3-10	3-5
			Date of maturity			
Not cut	5-6	5-14	5-15	5-2	5-10	5-10
Early joint	5-7	5-15	5-16	5-4	5-12	5-16
Mid joint	5-12	5-17	5-17	5-6	5-13	5-17
Late joint	5-13	5-21	5-22	5-13	5-13	5-16

Table 5. Effect of grazing date removal on dates of heading and grain yields at Etter, Texas.

Grazed Date	Headed	Yield, Bushels/Acre
Not grazed	May 6	--
March 1	May 11	48.1
March 20	May 15	49.1
March 30	May 18	42.8
April 10	May 20	43.6
April 30	May 23	20.1

Table 6. Forage and grain yields of wheat by planting date (average over 5 clipping dates) and by clipping date (average over 5 planting dates) at Plains Br. Station, Clovis New Mexico in 1979 and 1980.

Date of Plant	Date of Clip	Forage Yields Pounds/Acre	Grain Yield Bushels/Acre
August 15		8180	65.1
August 30		7726	66.7
September 13		5688	73.0
September 29		3212	68.5
October 16		1563	66.8
	December 21	3770	74.3
	March 2	4547	70.7
	March 13	5296	70.6
	March 22	5952	63.9
	March 30	6579	63.0
LSD .05		819	10.1