EXTENSION

The Effect of Extended Stocker Grazing on Wheat and Stocker Profits

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Eric A. DeVuyst
Professor and Rainbolt Chair

Roger Sahs
Associate Extension Specialist

Karen W. Taylor
Former Research Assistant

Francis M. Epplin
Professor Emeriti, Department of Agricultural Economics

Gerald W. Horn
Professor Emeriti, Department of Animal and Food Sciences

Jeff T. Edwards
Professor Emeriti, Department of Plant and Soil Sciences

Background

In some years as much as two-thirds of Oklahoma's winter wheat may be planted as a dual purpose, grazing and grain, crop (true et al.; Hossain et al.). A critical decision point in dual purpose wheat profitability occurs near a physiological growth stage called first hollow stem (FHS). FHS occurs when stems of ungrazed plants begin to elongate and the stem above the roots and below the developing head becomes hollow. The wheat plant is said to be at FHS when the hollow stem portion of the plant is one half inch long. The occurrence of FHS depends on climatic factors including temperature and precipitation and on wheat variety (see Edwards et al. for more details).

For a given planting date and with a reasonable stocking density, grazing prior to FHS has limited effects on wheat yield, but extended grazing beyond FHS can greatly reduce wheat yields. Grazing, however, increases calf weights. So, if the value of weight gain exceeds the value of reduced wheat yields, extended grazing would be economically viable. The question is then what are relative values of increased weights versus reduced wheat yields? Under what circumstances, is grazing wheat intended for grain harvest past FHS advisable?

Wheat Yields and Extended Grazing

Two field trials were conducted to determine the effect of grazing past FHS on Oklahoma wheat yields. Fieser et al. report a "safety zone" past FHS, during which cattle can be grazed without damaging grain yield. After this safety zone time period, wheat grain yield decreased rapidly. However, Redmon et al. found that grazing past FHS reduced wheat yields by 1.25 bushels per day and concluded that grazing should be terminated at or before FHS.

Addressing the contradictory findings from these two studies, Taylor et al. revisited the grazing termination date issue. They combined data from the two studies with their results falling roughly halfway between Fieser et al. and Redmon et al. Taylor et al. found a 3% reduction in grain yield for grazing one day past FHS, an 8% reduction at 3 days past FHS and an 18% reduction at 7 days past FHS. Table 1 shows the percent reduction in wheat yield from extended grazing, as modeled by Taylor et al. using both the Fieser et al. and Redmon et al. data.

Economics of Extended Grazing

Table 2 shows the impact of extended grazing on wheat grain returns, feeder cattle returns and total returns. ADG is set at 3 lb/day, wheat grain yield is 35 b/ac, stocking rate is 0.64 hd/ac (1.6 ac/hd), wheat price is $7.50/bu, calf value of gain is $140/cwt ($139 for 7 days) and cattle gain charged for 30 pounds of N per 100 pounds of gain (Lollato et al.) at $0.64 per pound of N. In the best case (Fieser et al. data), extended grazing shows a decrease in profits from just one day of grazing past first hollow stem. However, producers are cautioned that yield reductions are highly variable across growing conditions and varieties. So, the results from the Fieser et al. data should not be generalized. The Fieser et al. experiment had large stockpiles of standing forage at FHS, which

may have lessened the damage from grazing. The Redmon et al. data showed the worst-case scenario. Even a single day of extended grazing reduces profit by over $11 per acre. The combined data show smaller loss of over $6 per acre.

In most circumstances, extended grazing will NOT be economically advisable. If an additional day of grazing adds 3 lb to calves and value of gain is $140/cwt, stocking rate is 0.64 head per acre and nitrogen costs $0.64 per pound, added calf net returns are about $2.32 per acre. That translates into a breakeven grain yield loss of less than a third of bu/acre at $7.50/bu for wheat. Any wheat grain yield loss greater than 0.3 bu/acre/day will reduce profit given these prices, ADG, and stock rate.

Table 3 provides a worksheet to determine if extended grazing is advisable for your situation.

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For more information contact:

Eric A. DeVuyst
Oklahoma State University
eric.devuyst@okstate.edu
405-744-6166
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530 Ag. Hall
Stillwater, OK 74078-6026

Days Past FHS	Fesiser et al. data	Redmon et al. data	Combined data
0			
1	1%	5%	3%
2	2%	10%	5%
3	3%	15%	8%
4	4%	20%	11%
5	5%	24%	13%
6	6%	29%	15%
7	7%	33%	18%
8	8%	37%	20%
9	9%	41%	22%
10	10%	45%	25%
11	11%	48%	27%
12	12%	52%	29%
13	13%	55%	31%
14	14%	58%	33%

Table 1. Estimated percent reduction in wheat grain yield from extended grazing. Source: Adapted from Taylor et al.

GRAZING DETERMINATION DATE	CHANGE IN CATTLE RETURNS ($/HD)	CHANGE IN CATTLE RETURNS ($/AC)	CHANGE IN WHEAT YIELD (BU/AC)	CHANGE IN WHEAT RETURN (BU/AC)	CHANGE IN TOTAL RETURN ($/AC)
1 Day After FHS					
Fieser et al.	$3.63	$2.32	-0.35	-$2.63	-$0.30
Redmon et al.	$3.63	$2.32	-1.75	-$13.13	-$10.80
Combined data	$3.63	$2.32	-1.05	-$7.88	-$5.55
7 Days After FHS					
Fieser et al.	$25.20	$16.13	-2.10	-$15.75	$0.38
Redmon et al.	$25.20	$16.13	-11.55	-$86.63	-$70.50
Combined data	$25.20	$16.13	-6.30	-$47.25	-$31.12

Table 2. Effect of extended grazing on cattle return, wheat grain return and total returns

Note: Assumes a 35 bu/ac wheat grain yield, a stocking rate of 0.64 hd/ac, average daily gain = 3.0 lb, wheat price = $7.50/bu, calf value of gain of $140/cwt ($139 for 7 days) and 30 pounds of N per 100 pounds of gain at $0.64 per pound for N. Adapted from Taylor et al.

Weight at FHS (lb)	x	Sale price ($/lb)	=	Calf revenue ($/hd)
_____	x	_____	=	_____(a)
Weight after extended grazing (lb)	x	Sale price ($/lb)	=	Calf revenue ($/hd)
_____	x	_____	=	_____(b)
Change in calf revenue		($/hd)		
				_____(a-b)_____(c)
Pounds of gain/100x30	x	Price of N (per pound)	=	N used in calf production ($/hd)
_____	x	_____	=	_____(d)
Net change in calf revenue		($/hd)		
				_____(c-d)_____(e)
Stock rate		(hd/ac)		
				_____(f)
Net change in calf revenue		($/ac)		
				_____(e x f)_____(g)
Reduced wheat yield (bu/ac)	x	Wheat price ($/bu)	=	Change in wheat revenue ($/ac)
_____	x	_____	=	_____(h)
Change in net return		($/ac)		
				_____(g-h)_____

Table 3. Extended grazing worksheet to determine the expected change in net return from grazing past First Hollow Stem (FHS)

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