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Preparation and Use of Wheatgrass Stands after CRP and Associated Costs/Income — Part I

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Introduction

Wheatgrass species (*Agropyron* spp.) were seeded on many Conservation Reserve Program (CRP) acres in western Nebraska and adjoining states. These species included crested (*A. cristatum, desertorum*), intermediate (*A. intermedium*), pubescent (*A. trichophorum*) and western (*A. smithii*) wheatgrasses. Good to excellent stands of wheatgrass can be valuable forage sources for livestock during the spring, summer, or fall, however, accumulation of large amounts of poor quality residual herbage during 10-year CRP contract periods can reduce animal performance.

Field Evaluations

The effects of spring residue management on end-of-season forage production was measured in excellent stands of wheatgrasses on CRP fields near Mitchell, Harrisburg, and Bridgeport, Nebraska. In late March 1996, 16 residue management treatments were replicated twice at each location. Old accumulated herbage was mowed to a 2- or 6-inch stubble height and the residue was either left or removed. Selected plots then received nitrogen (60 lb N/ac) and/or phosphorus (20 lb P_2O_5/ac) fertilizer. Yields were measured by clipping to a 2-inch stubble height on July 15, 1996.

Long-term average annual precipitation at these locations was 12.0 to 14.2 inches. In 1996 precipitation ranged from 5.6 inches below average to 2.0 inches above average at different locations. Spring precipitation was below average until May when rainfall was well above average. Rainfall was below average during June at all three locations.

Weeds dominated less than 1.0 percent of the wheatgrass stands in this study. There were no measurable differences in current year yield of wheatgrasses among locations, and phosphorus fertilizer had no measurable effect on yield.

Wheatgrass bugs, also known as black grass bugs (*Labops* spp.), reduced yield in many of the treatments. Wheatgrass bugs are very common on CRP acres because of the carryover herbage. Old stems are the primary egg-laying site of this insect. Annually removing most stems by grazing or haying will keep populations below economic thresholds after the first year. See NebGuide G87-841, *Grassbugs in Nebraska*, for more information.

Results

Removing residue after mowing at 2 inches and applying nitrogen fertilizer at 60 lb N/ac increased yield from 1,160 to 2,570 lb/ac *(Table I)*. Leaving mowed residue in the field reduced yield response to fertilizer by about 50 percent. Populations of soil microorganisms that decompose plant residue may have increased when litter and cut herbage were left in the field, temporarily immobilizing considerable nitrogen in microbial tissue. High populations of wheatgrass bugs reduced yield response to nitrogen fertilizer by an additional 30 percent. Consequently, 50-80 percent of the potential benefit of 60 lb N/ac was lost when residue was not removed after mowing to a 2-inch stubble height the first year after CRP.

Relatively little residue was cut when CRP fields were mowed at 6 inches compared to 2 inches. Quantities of residue were not high enough after mowing at 6 inches to affect response to nitrogen fertilizer *(Table I)*. However, where wheatgrass bug populations were high, leaving residue cut at 6 inches reduced yield response to fertilizer by 24 percent. Apparently most wheatgrass bug eggs were deposited in the upper portion of residual seed stalks. When nitrogen fertilizer was not applied, leaving mowed residue in the field had no measurable effect on yield, regardless of mowing height.

Table I. Effects of wheatgrass bug populations during the growing season and mowing height, nitrogen fertilizer and residue management in late-March on yield from excellent stands of wheatgrasses in 1996 in the Nebraska Panhandle.

Wheatgrass Bug Populations	*Mowing Height*	*Fertilizer 60 lb N/ac*	*Residue Management*	*Yield*[1]
	(inches)			(lb/ac)
Low or High[2]	2	Yes	Remove	2,570
Low	2	Yes	Leave	1,910
High	2	Yes	Leave	1,490
Low or High	2	No	Leave or remove	1,160
Low	6	Yes	Leave or remove	1,750
High	6	Yes	Remove	1,750
High	6	Yes	Leave	1,330
Low or High	6	No	Leave or remove	1,325

[1]Oven-dried weight of current year herbage harvested at a 2-inch stubble height July 15, 1996.
[2]The word "or" indicates that wheatgrass bug populations or residue management had no effect on yield.

Recommended Preparations after CRP

• **Reduce the height of residue to increase availability and quality of forage.** Mow or shred residue to a 2 inch-stubble height or concentrate livestock when plants are dormant, November 1-March 15. If winter shelter, water and access to feed are adequate, feeding and/or calving on ex-CRP fields can effectively reduce the height of residue. When feeding weaned calves or dry cows, livestock activities can be concentrated and moved progressively across ex-CRP fields with portable electric fences. Removing residue with prescribed burning will create considerable risk of erosion on sandy soils and in areas with average annual rainfall less than 16 inches.

• **If nitrogen fertilizer will be applied, remove the residue.** Apply fertilizer only after soil tests indicate possible nutrient deficiencies and only when several feet of soil are moist at the time of spring application. After 10 years of non-use, about 75 percent of the standing herbage on CRP fields is carried over from preceding years. If haying equipment is used to mow and remove residue, forage quality of the hay will be extremely low. Protein and energy supplements will generally be required to meet livestock nutrient requirements when feeding first-cut hay from CRP fields. The hay may be best used for bedding or soil conservation purposes.

Spring Grazing

Wheatgrass can be grazed two to three weeks before native rangeland. The economic advantage of replacing days on feed with days on wheatgrass pasture may exceed $1.00/animal unit day (AUD). The total number of animal units (AUs) in the herd can be estimated by dividing the average weight of the animals in the herd by 1,000 lb and multiplying by the total number of animals. Early-spring use of wheatgrasses will be most efficient using rotation grazing. Progressively moving cattle from one wheatgrass pasture to the next allows plants to grow without interruption in future pastures. Begin spring grazing when new growth — measured from the base of stems in the middle of wheatgrass plants — is at least 4 inches tall. Remove livestock when the average height is reduced to 2 inches.

Summer Grazing

Stocking rates (AUD/ac) for summer grazing can be much higher than for spring grazing. Pastures fully utilized in the spring should not be grazed again until after killing frost that year. To ensure that an adequate amount of forage is produced to carry livestock all summer, begin summer grazing when plants are 6 inches high and remove livestock when average height is 4 inches. Summer stocking rates depend on pasture management objectives.

Sustainable stocking rates for long-term productivity of wheatgrass stands can be estimated if the average peak standing crop is known. This is the maximum yield of current year herbage after plants have headed, generally in late-June or early-July for wheatgrasses. Natural Resources Conservation Service (NRCS) and UNL Extension personnel can help estimate peak standing crop and stocking rates. Sustainable stocking rates (AUD/ac) will be near one-fourth of peak standing crop divided by 26 lb (daily dry-matter intake of one animal unit, 1,000 lb of beef). Using this guideline, stocking rates for excellent stands prepared by methods summarized in *Table I* would range from 11 AUD/ac (0.37 AUM/ac) for unfertilized stands cut at 2 inches to 25 AUD/ac (0.82 AUM/ac) for fertilized stands when residue is removed after mowing at 2 inches.

Estimated Sustainable Stocking Rates Using Yields from *Table I*

Unfertilized, cut at 2 inches

1160 lb/ac ÷ 4 = 290 lb/ac

290 lb/ac ÷ 26 lb/AUD = 11 AUD/ac

Fertilized, cut at 2 inches, residue removed

2,570 lb/ac ÷ 4 642.5 lb/ac

642.5 lb/ac ÷ 26 lb/AUD = 25 AUD/ac

When less than excellent stands occur, stocking rates must be reduced because less herbage is available for livestock forage. Adjustments for stand quality can be based on a percent of the field dominated by weeds *(Figure 1)*. If weeds are predominantly palatable species, they should be considered as a forage resource for summer grazing only until they begin to head or flower. Examples of palatable and unpalatable weeds are included in *Figure 1*. When palatable weeds dominate 40 percent of the field, reduce projected stocking rate by 20 percent. For example, stock at 20 AUD/ac compared to 25 AUD/ac for excellent stands with 60 lb N/ac and residue removal after cutting at 2 inches ((2,570 lb/ac ÷ 4) ÷ 26 lb/AUD) × 0.80. In contrast, if 40 percent of a field is dominated by unpalatable weeds at any growth stage or palatable weeds that have headed or flowered, a 40 percent reduction in projected stocking rate would be necessary, 15 AUD/ac compared to 25 AUD/ac.

Year to year dependability of forage from annual weeds is relatively poor compared to perennial grasses. The potential for stands to thicken over time will depend upon primary reproduction methods. Crested wheatgrass reproduces by seed and also may thicken by increasing the diameter of established plants. Both processes are slow. In contrast, intermediate, pubescent and western wheatgrass are rhizomatous. These species can spread as much as 12 inches a year when weed competition is reduced and growing conditions and grazing management are favorable.

Some wheatgrass pastures may be grazed for several years before they are converted to cropland. Average daily gain of yearling cattle grazing crested wheatgrass near Cheyenne, Wyoming, from mid-May to mid-July during three consecutive years, was not affected by grazing pressure up to 20 AUD/1,000 lb of peak standing crop of current year herbage measured in July (Hart et al., 1983). Based on the critical grazing pressure reported by Hart et al. (1983) and the information in *Table I*, summer stocking rates that would not reduce animal performance during mid-May to mid-July, on excellent stands of wheatgrass, could range from 23 AUD/ac (0.77 AUM/ac) for unfertilized stands cut at 2 inches to 51 AUD/ac (1.70 AUM/ac) for fertilized stands where residual herbage was cut at 2 inches and removed. While these stocking rates will reduce the quality of wheatgrass stands, beef production could be as high as 150 lb/ac on fertilized fields with no reductions in average daily gain for several years before stand quality deteriorates or before fields are converted to cropland.

Cost and Income Potential

Itemized costs and values for haying and grazing alternatives are presented in *Tables II* and *III*. These estimates are based on yield responses summarized in *Table I*, average infrastructure costs in cost-share contracts administered by the NRCS, and published animal performance, pasture lease, and estimated production cost data. **Use local costs and values for items when appropriate.** To evaluate the potential net return to land for various alternatives, combine the appropriate items. These items assume the CRP payments recouped the grass establishment costs ($125-$150/ac). Property taxes would depend on land type and use. Land taxes were not included in these budgets, but any differences in these taxes need to be included in budgets for comparison purposes.

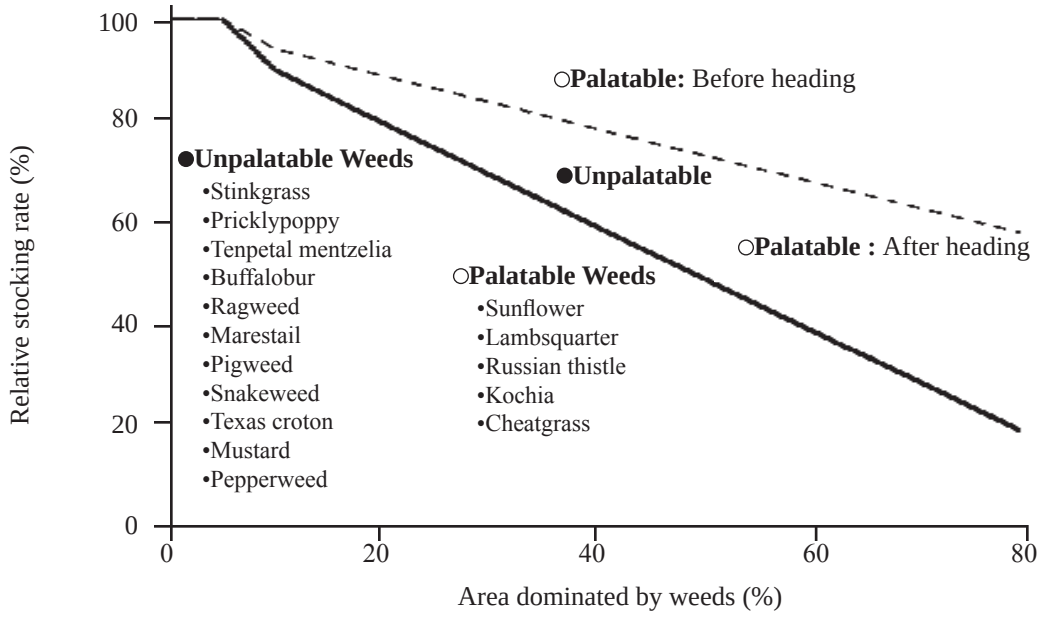

Figure 1. Recommended stocking rate adjustments for wheatgrass pastures when weeds dominate more than 5 percent of the pasture area. Summer stocking rates calculated from yields in *Table I* should be multiplied by the appropriate percentage of relative stocking rate in this figure. If weeds are mostly palatable species, they should be grazed only until they begin to head or

Table II. Estimated costs and income when preparing wheatgrass stands for haying after CRP in semi-arid environments. Cost of residue management in the spring would be eliminated after the first year.

Cost or income items	*Per acre costs or income*	*Number of acres*	*Your estimate*
Haying			
Mow 2" height and rake	$ 2.37	_____	_____
60 lbs N and application	18.85	_____	_____
Mow, rake and bale (twine)	4.26	_____	_____
Load, move and stack	2.50	_____	_____
Labor (.80 hr @ $6.50)	5.20	_____	_____
Interest (equipment and operating)	5.79	_____	_____
Depreciation (equipment)	6.25	_____	_____
Overhead, management, unpaid labor	5.17	_____	_____
Forage Value			
Hay Yield 2540 lbs @ $60/T	$76.20	_____	_____
Flex acres — Fed. payment	9.00	_____	_____

Table III. Estimated costs and income when preparing wheatgrass stands for grazing after CRP in semi-arid environments. Costs of residue management in the spring would be eliminated after the first year.

Grazing			
Mow 2" height and rake	$ 2.37	_____	_____
60 lbs N and application	18.85	_____	_____
Labor Costs on mow, rake and fertilize	1.52	_____	_____
Oversight of Livestock:			
Labor 1 hr/day x $6.50 x no. of days per season			_____
Pickup 5 mi/day x $.42 x no. of days per season			_____
Fence costs (use worksheet)			_____
Water system cost (use worksheet)			_____
Forage Value — Spring Use Only			
Hay savings (26 lb/AUD x 6 AUD/ac @ $60)	$ 4.68	_____	_____
Increased calf weight (.8 lb/day x 5 pair days/ac @ $.80)	3.20	_____	_____
Spring lease (6 AUD/ac (pairs) @ $20/AUM)	4.00	_____	_____
Flex acres — federal payment	9.00	_____	_____
Forage Value — Summer Use			
Summer lease (.4-1.7 AUM/ac (yrlgs) @ $15/AUM)	$6.00-12.00	_____	_____
Flex acres — federal payment	9.00	_____	_____

Literature Cited

CRP Economic Committee and Other Contributing Authors. Anderson, D. (chair). 1996. Conservation Reserve Program. CRP Land Use Guide. EC96-142.

Hart, R.H., E.F. Balla, and J.W. Waggoner, Jr. 1983. Gains of steers and calves grazing crested wheatgrass. J. Range Manage. 36:483-484.

Selley, R., et al. 1996. Nebraska Crop Budgets. EC 96-872.

Worksheets for calculating costs and income for using wheatgrass stands after CRP for your operation are available in a companion publication, *Preparation and Use of Wheatgrass Stands after CRP and Associated Costs/Income — Part II,* NF98-373.

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