

Previously, the release of Conservation Reserve Program (CRP) acres for emergency haying and grazing was a result of drought conditions. Under new program rules, haying and grazing is now allowed on eligible acres regardless of moisture conditions under managed haying and grazing.¹ Managed haying and grazing allows a given acre of CRP to be hayed or grazed once every 3 years and is one of several management tools used by the Natural Resource Conservation Service (NRCS) and contract holders to help diversify stands of grass for improved wildlife habitat.

There are specific rules for managed haying and grazing of CRP acres. Contract holders are assessed a 25 percent reduction in their annual CRP payment for all acres that are used for managed haying or grazing. Under emergency haying and grazing, the amount of forage that could be harvested by haying or grazing was limited to 50 or 25 percent. Under managed haying and grazing, the amount of harvested grass is determined by a forage management plan designed by NRCS. CRP contract holders are required to limit haying or grazing to specific dates to avoid disruption of the nesting season for upland birds.²

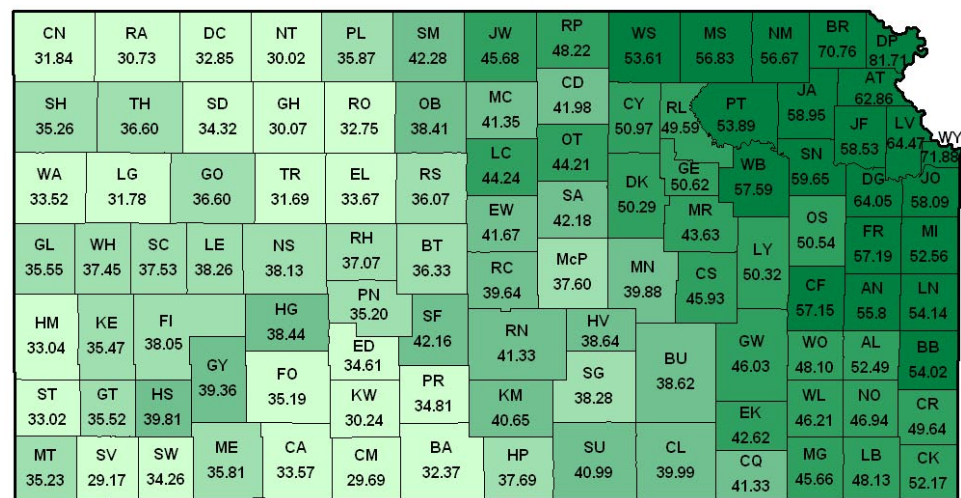
To understand the rules governing managed haying and grazing of CRP, consider the following example: a 100-acre CRP field with an annual rental rate of \$40 per acre (total annual rent of \$4,000). Under managed haying or grazing, a producer would sacrifice 25 percent of the rent on all acres used for haying or grazing, resulting in a total rent of \$3,000 (\$30 per acre in contract) for the right to hay or graze all 100 acres. The amount of forage that can be harvested by haying or grazing depends on the forage management plan of the contract holder. For the examples listed in this publication, the amount that can be harvested for both haying

and grazing is assumed to be 100 percent. However, the formulas presented allow for varying harvest rates.

To decide whether or not they should hay or graze CRP acres, producers should compare the cost of haying or grazing CRP with their alternatives. The typical alternative would be purchasing hay or leasing private land for haying or grazing. It is important that production units are consistent when comparing this calculated cost to an alternative.

The 25-percent reduction in the CRP contract payment assessed for managed haying or grazing implies the cost of haying or grazing CRP land will be a function of the CRP rental rate. County-average CRP rental

Figure 1. Kansas County Level Average CRP Rental Rates*



CRP Rental Rates (\$/acre)

■ 52.50 to 81.80 ■ 42.60 to 52.50 ■ 38.40 to 38.40 ■ 35.20 to 38.40 ■ 29.10 to 35.20

* Includes 2003 signup acres. Source: USDA-FSA, www.fsa.usda.gov/crpstorpt/09Approved/r1sumsn/ks.htm

¹ Managed haying and grazing is required on all contracts signed up since May 2003 and is optional for contracts that were signed up before that date.
² Emergency haying and grazing is still available under drought conditions. In these situations, the specific requirements for contract reductions and dates of allowable haying and grazing often are different from the rules for managed haying and grazing. For example, in 2004 the 21 Kansas counties approved for emergency grazing were assessed a 10 percent payment reduction and grazing was allowed during part of the nesting season.

rates in Kansas are presented in Figure 1. CRP rental rates are generally higher in eastern Kansas than western Kansas, which suggests the 25-percent reduction in rental rates reflects a higher opportunity cost of grazing CRP in the eastern part of the state (especially the northeast). However, it is important to consider the productive capacity of the land when estimating the total cost of haying or grazing because it will affect the cost of harvested forage from CRP land.

The following sections provide step-by-step examples of how to estimate the costs of forage from managed haying and grazing of CRP land, based on average data for several counties. The following acronyms are used in these sections:

BHHCPA (before-harvest hay cost per acre),
BHHCPT (before-harvest hay cost per ton),
AHHCPT (after-harvest hay cost per ton),
GCPA (graze cost per acre), and
GCPAUM (graze cost per animal unit month).

Because costs are specific to many factors, producers are encouraged to use their own information when calculating the cost of haying or grazing CRP for their particular situations.³

Managed Haying

County-level average rates presented in Figure 1 are used to calculate a before-harvest hay cost per acre (*BHHCPA*) using the following formula:

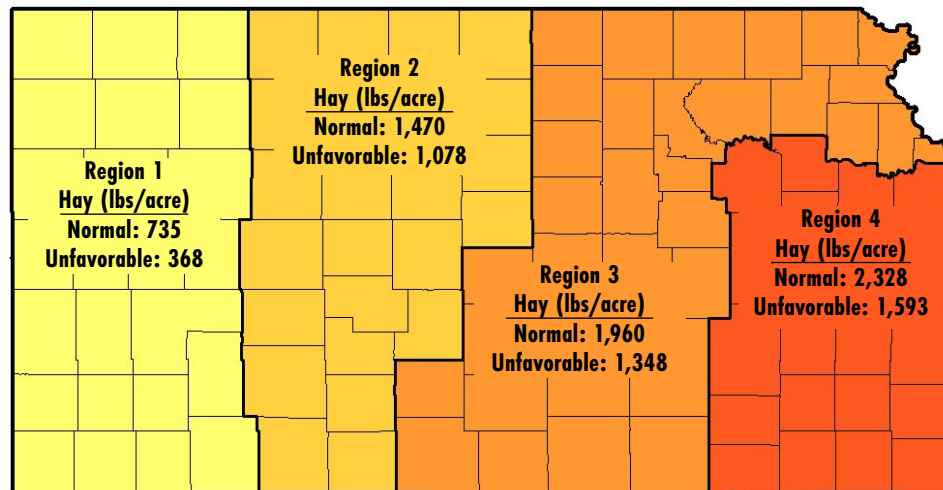
$$\frac{\text{County Average CRP Rental Rate} \times \text{Percent Reduction in Rental Rate}}{\text{Percent of Forage Available to Hay}} = \text{BHHCPA}$$

For example, the following is the *BHHCPA* of haying CRP for Hamilton County in southwest Kansas compared to Jackson County in northeast Kansas.

Hamilton County	$\frac{\$33.04 \times 25\%}{100\%}$	=	\$8.26 per acre
Jackson County:	$\frac{\$58.95 \times 25\%}{100\%}$	=	\$14.74 per acre

These costs per acre could be compared to the cost of leasing private land to harvest hay. For example, if

Figure 2. Hay Production of CRP Range under Various Conditions*



* Conditions determined by USDA-NRCS Range Evaluations. Source: USDA-NRCS, www.nrcs.usda.gov/technical/efotg/

private land could be leased for less than \$8.26 per acre in Hamilton County or \$14.74 in Jackson County, haying CRP acres is not economical. When making this comparison, remember to account for potential productivity differences between the CRP land and other land being considered. A more useful comparison is the cost of harvested CRP acres on a per-ton basis, because this accounts for land productivity (i.e., estimate cost per ton *BHHCPT* and *AHHCPT* as opposed to cost per acre *BHHCPA*). This estimated cost per ton can then be compared to either the cost per ton of harvested hay from other land or to the cost of purchasing hay.

To convert the per-acre cost of managed haying to a per-ton basis, adjust the per-acre value to account for the amount of hay available under certain range conditions. The NRCS determined the expected hay production on CRP ground under various range conditions for loamy upland soil (Figure 2). The four geographical regions in Figure 2 approximately reflect the different land resource areas described by the NRCS. These areas are classified by similar climate, topography, and vegetation. Hay production is described in pounds per acre under *normal* and *unfavorable* (drought) range conditions.

The before-harvest hay cost per acre (*BHHCPA*) is adjusted for the estimated hay production and con-

³ An Excel spreadsheet (*KSU-CRP HAYorGRAZE.xls*) is available at www.agmanager.info that performs all of the calculations discussed in this paper, based upon user-supplied inputs.

verted to a before-harvest hay cost per ton (*BHHCPT*) using the following formula:

$$\text{BHHCPA} \times \frac{2,000 \text{ lbs per ton}}{\text{Lbs of hay per acre}} = \text{BHHCPT}$$

The example using Hamilton and Jackson counties is continued by calculating the *BHHCPT* associated with haying CRP acres under *normal* range conditions:

$$\text{Hamilton County: } \$8.26 \text{ per acre} \times \frac{2,000 \text{ lbs per ton}}{735 \text{ lbs per acre}} = \$22.48 \text{ per ton}$$

$$\text{Jackson County: } \$14.74 \text{ per acre} \times \frac{2,000 \text{ lbs per ton}}{1,960 \text{ lbs per acre}} = \$15.04 \text{ per ton}$$

Even though the cost per acre is relatively low in Hamilton County, the cost per ton is high because of the low hay production. Use this formula to calculate the cost per ton under *unfavorable* conditions by substituting in the appropriate production value (*lbs of hay per acre*). The *BHHCPT* values under *unfavorable* conditions would be \$44.89 and \$21.87 for Hamilton and Jackson counties, respectively. This difference between *unfavorable* and *normal* conditions indicates the effect of expected level of production on the cost of hay harvested from CRP acres, which reinforces the importance of producers using their own information when calculating the cost of haying CRP acres.

To compare the costs of managed haying of CRP to buying hay, add the total costs of harvesting hay (i.e., cost of swathing, raking, and baling) to the before-harvest cost of hay per ton (*BHHCPT*). Adding the harvested costs gives an estimate of the total costs of harvested hay (i.e., *AHHCPT*). Table 2 shows the statewide average prices paid for custom hay harvesting for Kansas from 1999 to 2003, assuming a 1,500-pound round bale.

The cost of harvesting hay is calculated by converting the costs listed in Table 2 to dollars per ton, adjusting for the estimated amount of hay production,

and then by adding the individual costs to arrive at a total cost according to:

$$\text{Swathing cost per acre} \times \frac{2,000 \text{ lbs per ton}}{\text{Lbs of hay per acre}} = \text{Swathing cost per ton}$$

$$\text{Raking cost per acre} \times \frac{2,000 \text{ lbs per ton}}{\text{Lbs of hay per acre}} = \text{Raking cost per ton}$$

$$\text{Baling cost per bale} \times \frac{2,000 \text{ lbs per ton}}{1,500 \text{ lbs of hay per bale}} = \text{Baling cost per ton}$$

$$\text{Swathing cost per ton} + \text{Raking cost per ton} + \text{Baling cost per ton} = \text{Total cost of haying per ton}$$

To determine the managed haying after-harvest hay cost per ton (*AHHCPT*), the total cost of harvesting hay per ton is added to the *BHHCPT* using the following formula:

$$\text{BHHCPT} + \frac{\text{Total cost of harvesting hay per ton}}{\text{hay per ton}} = \text{AHHCPT}$$

Continuing with the example for Hamilton and Jackson counties, the *AHHCPT* under *normal* range conditions is:⁴

$$\text{Hamilton County } \$22.48 \text{ per ton} + \$40.13 \text{ per ton} = \$62.61$$

$$\text{Jackson County } \$15.04 \text{ per ton} + \$21.44 \text{ per ton} = \$36.48$$

The examples provided are based on the average CRP rental rates in Hamilton County and Jackson County, but the payment is not the same on all CRP land. Thus, it may be useful to calculate the breakeven CRP rental rate for an individual contract, given a purchase price for hay. Using the market rate for purchas-

⁴ Individual calculations for the costs per ton of the swathing, raking, and baling operations are not shown here. Based on the 2003 custom rates and normal conditions, the per-ton costs for swathing, raking, and baling are \$22.50, \$7.40, and \$10.23, respectively, for Hamilton County and \$8.44, \$2.78, and \$10.23, respectively, for Jackson County.

Table 2. 2003 Kansas State-Level Average Custom Hay Harvesting Rates

Year	Swathing (\$/acre)	Raking (\$/acre)	Baling (\$/bale)
2003	8.27	2.72	7.67
2002	8.42	2.95	7.67
2001	8.20	2.88	7.19
2000	7.80	2.91	6.96
1999	7.79	2.83	6.78

Source: USDA-NASS, www.nass.usda.gov/ks/custom/crsel.htm

ing hay, the following formula can be used to calculate a breakeven CRP rental rate per acre:

$$\frac{(\text{Price of hay/ton} - \text{Total cost of harvesting hay/ton}) \times \text{Lbs of hay per acre} \times \text{Percent of Forage Available to Hay}}{2,000 \text{ lbs per ton} \times \text{Percent Reduction in Rental Rate}} = \text{Breakeven CRP Rental Rate, \$/acre}$$

Continuing with the example for Hamilton and Jackson counties, and assuming a market hay price of \$61.57 per ton⁵ and *normal* range conditions, gives the following breakeven CRP rental rates:

Hamilton County	$\frac{(\$61.57/\text{ton} - \$40.13/\text{ton}) \times 735 \text{ lbs/acre} \times 100\%}{2,000 \text{ lbs/ton} \times 25\%}$	=	\$31.52 per acre
Jackson County	$\frac{(\$61.57/\text{ton} - \$21.44/\text{ton}) \times 1,960 \text{ lbs/acre} \times 100\%}{2,000 \text{ lbs/ton} \times 25\%}$	=	\$157.31 per acre

If the current per acre CRP rental rate is lower than the breakeven rental rate, then hay harvested on managed CRP acres is less expensive than purchasing hay at the market price (\$61.57 per ton in this example). The cost of haying CRP acres (25 percent reduction in payment on all acres used for haying) would be lower than the benefit of haying the land. In Hamilton County, where the breakeven rental rate is lower than the county average CRP rental rate of \$33.04, the cost of hay from CRP acres is higher than the cost of purchasing hay privately. For Jackson County, the breakeven rental rate is higher than the county average of \$58.95, indicating the cost of hay from managed CRP acres is less than the cost of purchasing hay at the market price. This assumes that hay would be available at the market rate. It should be noted that in the event of a drought (i.e., unfavorable conditions), the market price for hay could be substantially higher than the \$61.57 used in this example. As the price of hay increases, the breakeven CRP rental rate also increases and, the relative profitability of haying CRP land improves.

A similar breakeven analysis would be the calculation of the breakeven percentage of the CRP rental rate reduction that is assessed for managed grazing and haying (i.e., the 25 percent reduction in the payment). This breakeven percent reduction in the CRP rental rate is calculated according to:

$$\frac{(\text{Price of hay/ton} - \text{Total cost of harvesting hay/ton}) \times \text{Lbs of hay per acre} \times \text{Percent of Forage Available to Hay}}{2,000 \text{ lbs per ton} \times \text{CRP rental rate (\$/acre)}} = \text{Breakeven rental rate reduction, \%}$$

Assuming *normal* range conditions and a market hay price of \$61.57, the breakeven CRP rental rate reduction percentages are:

Hamilton County	$\frac{(\$61.57/\text{ton} - \$40.13/\text{ton}) \times 735 \text{ lbs/acre} \times 100\%}{2,000 \text{ lbs/ton} \times \$33.04/\text{acre}}$	=	23.8%
Jackson County	$\frac{(\$61.57/\text{ton} - \$21.44/\text{ton}) \times 1,960 \text{ lbs/acre} \times 100\%}{2,000 \text{ lbs/ton} \times \$58.95/\text{acre}}$	=	66.7%

The interpretation of this breakeven rate is that the government-imposed CRP rental rate reduction percentage would have to be less than the calculated breakeven rental rate reduction for haying of CRP to cost less per ton than purchasing hay. Based on the current statewide rate of 25 percent, the after-harvest cost of hay per ton (*AHHCPT*) from CRP acres in Hamilton County is greater than the cost of purchasing hay, so the rental rate reduction would have to be less than 23.8 percent for haying CRP to be economical. However, the *AHHCPT* for managed haying CRP in Jackson County is less than the cost to purchase hay at \$61.57 per ton. In other words, the payment reduction could be increased to 66.7 percent before it would become uneconomical to hay CRP land in Jackson County given the assumptions in this example.

To calculate a breakeven analysis at the state level, a state-level average CRP rental rate and a state-level average hay production estimate for *normal* and *unfavorable* conditions were calculated. The average CRP rental rate and the average hay production are adjusted to reflect the number of CRP acres in each county to arrive at a weighted average rental rate and production level. The acre-weighted average CRP rental rate for Kansas is \$38.69 and the acre-weighted hay production levels are 1,313 and 863 pounds per acre for *normal* and *unfavorable* range conditions, respectively. The weighted values are used to calculate the state-level breakeven rental rate and rental rate reduction percentage (Table 3). Under *normal* conditions, the breakeven rental rate is \$90.87 and the rental rate reduction percentage is 58.7 percent. Under *unfavorable* conditions, the breakeven rental rate is \$44.66 and the breakeven rental rate reduction is 28.9 percent. These results suggest that, on average across the state, the costs of hay harvested from CRP acres under both *normal* and *unfavorable* conditions is less expensive than purchasing hay at \$61.57 per ton. The formulas presented above allow for re-calculation of the breakeven values to reflect changes in the market price for purchasing hay, changes in the cost of hay harvesting, as well as different assessments of expected hay production.

⁵ Average price of "other hay" in Kansas from 1999 to 2003. Source: Kansas Agricultural Statistics.

Table 3. Breakeven Rates of Managed Haying for State-Level Values*

Normal Range Conditions		Unfavorable Range Conditions	
CRP Rental Rate	CRP Rate Reduction	CRP Rental Rate	CRP Rate Reduction
\$90.87 per acre	58.7 %	\$44.66 per acre	28.9 %

* Based on Kansas weighted-average CRP rental rate of \$38.69, a purchase cost for hay of \$61.57 per ton, and Kansas weighted-average hay production levels of 1,313 and 863 pounds per acre for normal and unfavorable range conditions, respectively.

Managed Grazing

County-level average rates in Figure 1 are used to calculate the grazing cost per-acre (*GCPA*) of CRP land using the following formula:⁶

$$\frac{\text{County Average CRP Rental Rate} \times \text{Percent Reduction in Rental Rate}}{\text{Percent of Forage Available to Graze}} = \text{GCPA}$$

For example, the following is the *GCPA* for Hamilton County in southwest Kansas compared to Jackson County in northeast Kansas.

Hamilton County	$\frac{\$33.04 \times 25\%}{100\%}$	=	\$8.26 per acre
Jackson County	$\frac{\$58.95 \times 25\%}{75\%}$	=	\$14.74 per acre

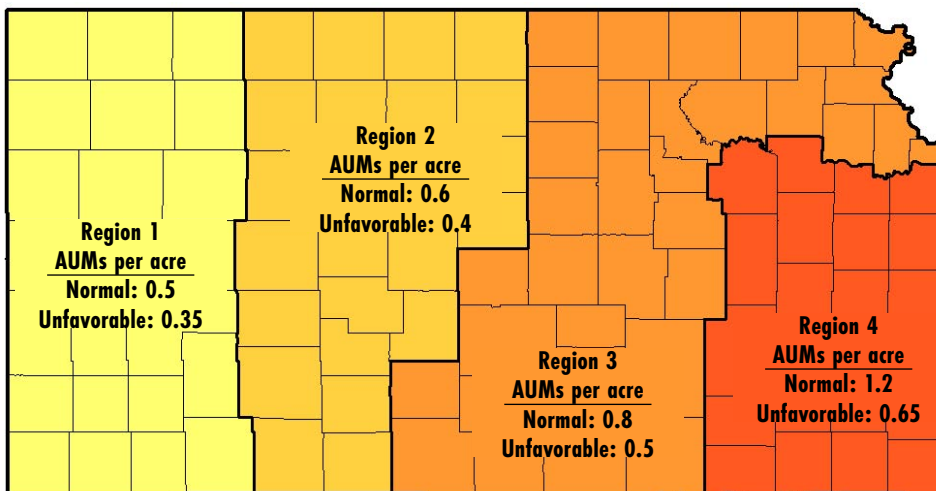
This calculation gives a per-acre value, but it may be inaccurate to compare this to the per-acre cost of grazing other pasture land due to stocking capacity. That is, the cost is a function of the forage available to graze. Most CRP ground has been seeded back to a five-grass native mix. The NRCS has determined initial stocking rates for CRP ground under various range

conditions for loamy upland soil (Figure 3). The four geographical regions in Figure 3 reflect the different land resource areas described by NRCS. These areas are classified by similar climate, topography, and vegetation. Stocking rates are described by the animal unit month (AUM) per acre under range conditions of *normal* and *unfavorable* (drought).⁷ The concept of AUM is used as a standardized measure of stocking capacity in that it accounts for the fact that the *acres-per-head-stocking-rates* (commonly referenced in a region) often vary considerably across geographical regions.

Continuing with the example for Hamilton and Jackson counties, the grazing cost per acre (*GCPA*) is adjusted to reflect the actual forage available under *normal* range conditions to arrive at the grazing cost per AUM (*GCPAUM*) according to:

	$\frac{\text{GCPA}}{\text{AUMs per acre}}$	=	GCPAUM
Hamilton County	$\frac{\$8.26 \text{ per acre}}{0.5 \text{ AUMs per acre}}$	=	\$16.52 per AUM
Jackson County	$\frac{\$14.74 \text{ per acre}}{0.8 \text{ AUMs per acre}}$	=	\$18.43 per AUM

Figure 3. Initial Stocking Rates of CRP Range under Various Conditions*



⁶ Note that this formula is the same as used as the starting point for determining the cost of haying CRP acres. This is because the cost associated with a reduction in CRP payment is the same regardless of whether the land is hayed or grazed. The formula is repeated simply for consistency purposes.

⁷ An AUM is the measure of the forage requirement for one month for a 1,000 pound lactating cow with a calf of up to 3 months old (or less than 400 pounds) at its side.

* Conditions determined by USDA-NRCS Range Evaluations. Source: USDA-NRCS, www.nrcs.usda.gov/technical/efotg/

Table 4. Kansas Grazing Fees for Cattle*

Year	Cost per AUM
2002	\$13.00
2001	\$12.50
2000	\$12.00
1999	\$11.50
1998	\$12.90

* Source: USDA-NASS, www.usda.gov/nass/pubs/stathigh/2003/econindex.htm

The same calculation made for the *GCPAUM* under *unfavorable* range conditions increases the cost of grazing CRP to \$23.60 and \$29.48 per AUM for Hamilton and Jackson counties, respectively, because less forage per acre is available and the 25 percent reduction remains the same.

How does this cost per AUM compare to private grazing fees? The statewide average grazing fee, as reported by USDA, was \$13 per AUM in 2002 (Table 4).

The examples provided are based on the average CRP rate in Hamilton and Jackson counties. However, because not all CRP land receives the same payments, it may be useful to calculate the breakeven CRP rental rate for an individual contract, given a private grazing rate. Using the average market rate for private grazing, the following formula can be used to calculate a breakeven CRP rental rate for a county assuming *normal* range conditions:

$$\frac{\text{Private Grazing Fee} \times \text{Stocking Rate} \times \text{Percent of Forage Available to Graze}}{\text{Percent Reduction in Rental Rate}} = \text{Breakeven CRP Rental Rate, \$/acre}$$

Hamilton County	$\frac{\$13 \text{ per AUM} \times 0.5 \text{ AUM per acre} \times 100\%}{25\%}$	=	\$26.00/acre
Jackson County	$\frac{\$13 \text{ per AUM} \times 0.8 \text{ AUM per acre} \times 100\%}{25\%}$	=	\$41.60/acre

The breakeven calculations indicate that the per acre CRP rental rate must be less than \$26.00 and \$41.60 per acre, respectively, for Hamilton and Jack-

son counties, in order for CRP managed grazing to be less expensive than private grazing fees of \$13 per AUM. This assumes that private land would be available at the market rate. Under drought conditions, the market rate for private grazing may be higher. The private grazing fee used in this analysis reflects local supply and demand for pasture. It also reflects capital investments, such as fencing, that may not be present on CRP ground. It is important to consider any other costs that might be incurred when estimating the cost of grazing CRP.

A similar breakeven analysis would be the calculation of the breakeven percentage of the CRP rental rate reduction that is assessed for managed grazing (i.e., the 25 percent reduction in the payment). This breakeven percent reduction in the CRP rental rate is calculated as:

$$\frac{\text{Private Grazing Fee} \times \text{Stocking Rate} \times \text{Percent of Forage Available to Graze}}{\text{CRP Rental Rate (\$/acre)}} = \text{Breakeven Rental Rate Reduction \%}$$

Hamilton County	$\frac{\$13 \text{ per AUM} \times 0.5 \text{ AUM per acre} \times 100\%}{\$33.04 \text{ per acre}}$	=	19.7%
Jackson County	$\frac{\$13 \text{ per AUM} \times 0.8 \text{ AUM per acre} \times 100\%}{\$58.95 \text{ per acre}}$	=	17.6%

The breakeven calculation indicates that the government-imposed CRP rental rate reduction would have to be less than 19.7 and 17.6 percent for managed grazing of CRP to cost less per AUM than private grazing in Hamilton and Jackson counties, respectively.

To calculate a breakeven analysis at the state level, two values are required: a state-level average CRP rental rate and a state-level average stocking rate per acre. Both the average rental rate and the average stocking rate are adjusted to reflect the number of CRP acres in each county to arrive at a weighted average rental rate and stocking rate. The acre-weighted average CRP rental rate for Kansas is \$38.69 and the acre-weighted stocking rates are 0.64 and 0.42 AUM per acre for *normal* and *unfavorable* range conditions, respectively. These weighted values are then used to calculate

Table 5. Breakeven Rates of Managed Grazing for State-Level Values*

Normal Range Conditions		Unfavorable Range Conditions	
CRP Rental Rate	CRP Rate Reduction	CRP Rental Rate	CRP Rate Reduction
\$33.28 per acre	21.5 %	\$21.84 per acre	14.1 %

* Based on Kansas average CRP rental rate of \$38.69, a private grazing rate of \$13 per AUM, and stocking rates of 0.64 and 0.42 AUMs per acre for normal and unfavorable conditions, respectively.

statewide average breakeven rental rates for *normal* and *unfavorable* range conditions (Table 5). The breakeven CRP rental rate reduction percentage is also calculated. Under *normal* conditions this value is 21.5 percent, while under *unfavorable* conditions it is 14.1 percent. These percentages compare to the current rental rate reduction of 25 percent for managed grazing. On average, the costs of grazing CRP will be greater than renting private land at \$13 per AUM. The formulas presented allow for re-calculation of the breakeven values to reflect changes in the market rental rate for private grazing.

Summary

This publication provides a framework to estimate the cost of managed haying or grazing CRP, which can be compared to the cost of purchasing hay or leasing private land for haying or grazing. Figure 4 shows the county-average costs of hay (\$/ton) from managed haying CRP acres when range conditions are *normal*. Based on these costs, it is more expensive to hay CRP than to purchase hay at \$61.57 per ton in western Kansas. For other parts of the state, the cost of haying CRP is generally lower than the cost of purchasing hay in a drought. This is due, primarily, to the differences in estimated hay production in western Kansas compared to the rest of the state.

Figure 5 shows the county-average costs of grazing (\$/AUM) CRP under *normal* range conditions. These costs indicate that producers would be better off to rent private grazing land in most counties, assuming it would be available at the average market rate of \$13.00 per

Figure 4. Estimated County-Average Cost of Hay from CRP Acres under Normal Conditions

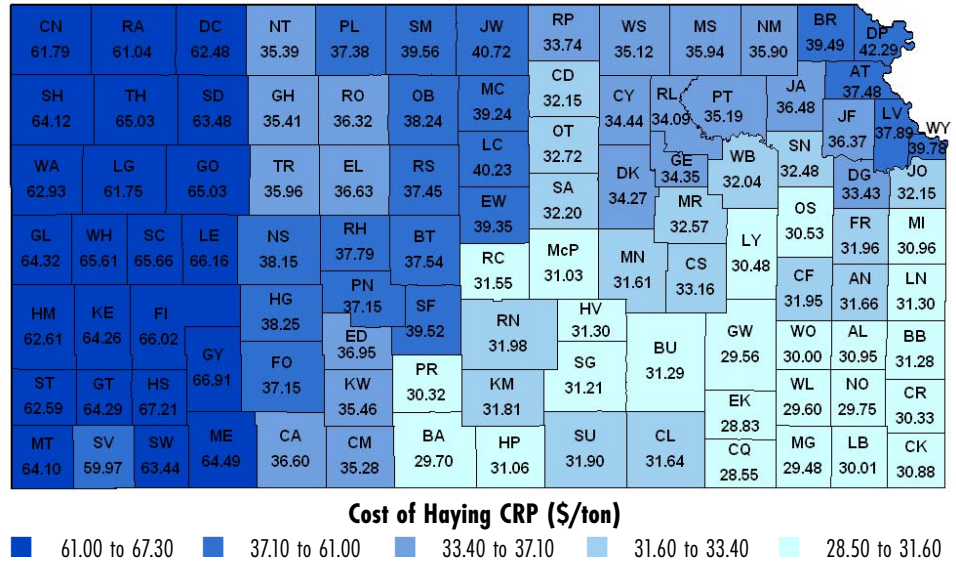
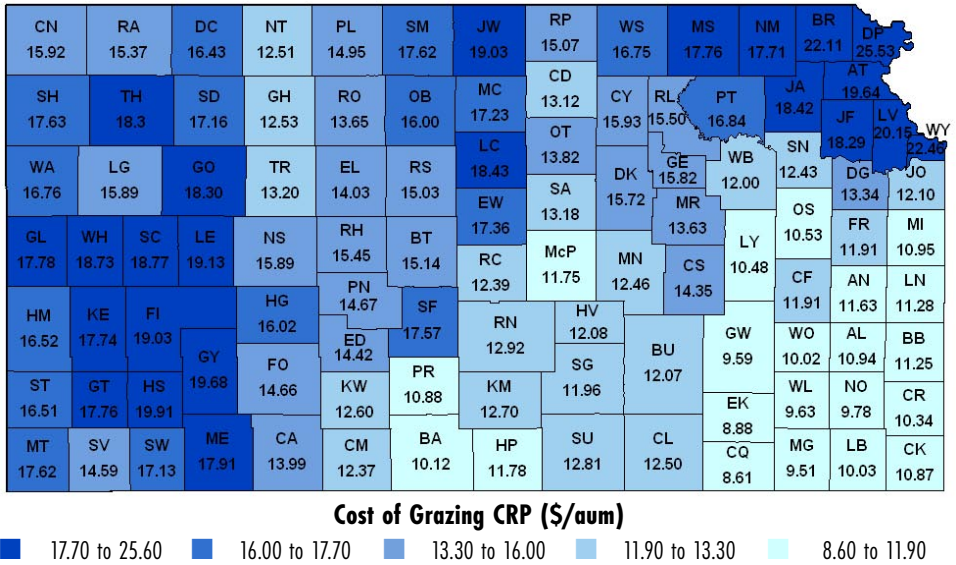


Figure 5. Estimated County-Average Costs of Grazing CRP Acres under Normal Conditions



AUM, than to incur the cost of grazing CRP. Exceptions to this are counties in the south central and southeast regions of the state. In order for grazing CRP to be less costly, the rules for managed grazing would have to be altered. For example, the rental rate reduction would have to be 21.5 percent in *normal* years and 14.1 percent in *unfavorable* years for the statewide average cost of grazing CRP to cost less than renting private pasture.

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