

Potential Economic Impacts of the Managed Haying and Grazing Provision of CRP

Amanda Dickson, Research Assistant

Dr. Mike Dicks, Professor

Oklahoma State University

Agricultural Economics Department

405-744-6161

*Selected Paper prepared for presentation at the Southern Agricultural Economics Association
Annual Meeting, Atlanta, Georgia, January 31-February 3, 2009*

Copyright 2009 by [authors]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Potential Economic Impacts of the Managed Haying and Grazing Provision of CRP

Amanda Dickson, Oklahoma State University, Michael R. Dicks, Oklahoma State University

Introduction

The Food Security Act of 1985 brought about a voluntary program for agricultural landowners called the Conservation Reserve Program (CRP). Under the CRP, the U.S. Department of Agriculture (USDA) establishes contracts with agricultural producers to retire highly erodible and other environmentally sensitive cropland and pasture. During the 10- to 15-year CRP contract period, farmland is converted to grass, trees, wildlife cover, or other conservation uses providing environmental benefits, including improvement of surface water quality, and reduction of offsite wind erosion damages (Farm Service Agency, 2008). In return for retiring marginal cropland from production, the Commodity Credit Corporation (CCC) provides producers annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for establishing approved conservation practices.

The Food, Conservation, and Energy Act of 2002, allowed managed haying and grazing (including the harvest of biomass) and placement of wind turbines, if consistent with the conservation of soil, water quality, and wildlife habitat (Economic Research Service, 2007) in return for partial reductions in the annual CRP payments. In 2008, the Act included routine and prescribed grazing. The frequency of routine grazing is decided by local resource conditions. Prescribed grazing is a permissible activity for the control of invasive species.

The managed harvesting (including the managed harvesting of biomass), requires the development of “appropriate vegetation management requirements” only during specific periods. Managed harvesting will not be allowed annually nor during the primary bird nesting season. Grazing will be allowed for the control of invasive species or as a prescribed management practice to manage the health and vigor of the cover. A plan for the grazing of CRP lands is required to consider appropriate stocking rates to enable continued routine grazing that maintains or improves the health and vigor of the cover and the wildlife habitat. This plan is required to consider an appropriate frequency (number of years) and duration (period within the year) of grazing based upon the regional climate, soil type and natural resources.

The incentives to use the CRP lands for haying, grazing, or biomass production has increased due to the increasing demand for biofuels, increasing cost of livestock feeds, and the increasing cost of fertilizer. How much of the approximately 34.5 million acres of CRP land is brought back into economic use and how that use is allocated between grazing, haying, and biomass is an important question.

National-level enrollment (February, 2008) in CRP is 34.67 million acres with 30.68 million acres from the periodic sign-ups, 2.73 million acres from continuous sign-ups, 1.08 million acres in CREP and 0.18 million acres in farmable wetlands. Approximately 58 percent of the CRP acreage is located in the 10 Great Plains states, but only 22 percent of the continuous enrollment and 9 percent of the CREP enrollment is located in these states. Between 2009 and 2014 the contracts on more than 62 percent of acres will expire, 71 percent of the plains states acreage and thus important decisions and management policies need to be formulated to continue the benefits of CRP (Farm Service Agency 2007; USDA-CCC, 2007). To determine the best use of CRP lands, policy makers need to know what factors influence land owners decision, what constraints CRP lands have in terms of wildlife needs, air and water quality, and erosion, as well as potential alternative uses such as haying, grazing, growing biorefinery feedstock such as switchgrass, as well as crop production.

Objectives

The purpose of this research was to analyze the potential uses of the CRP lands to determine the average annual allocation of CRP lands across the various permitted uses in 14 states. These states represent over 85 percent of the CRP acres. More specifically, the objectives of this research were to:

1. Estimate the potential changes of CRP acres used throughout the plains states.
2. Determine the impact of those changes on regional and national markets over time.

Methods

To determine the economic impacts associated with the alternatives, a primary data collection and analysis procedure was developed. Primary data collection included obtaining data about representative fields throughout the 14 states. Each state was divided into ecological regions based upon the EPA Level 1 typology (EPA 2008); within each ecological region, four counties were chosen to provide a representative description of the diversity in agricultural production, climate, wildlife habitat, topography and other landscape characteristics. Within each

of the chosen counties, 10 CRP fields were selected by FSA/NRCS county personnel that represent the diversity of the CRP fields in the county. This diversity included availability of water on site, fencing, conservation cover type, and diversity of fields within close proximity in the landscape.

Haying and grazing scenario development

McLachlan and Dicks developed “best” haying and grazing management schemes for specific CRP tracts and compared the returns under these schemes with those under the wheat production option. They assumed that because the annual rental payments reflected the annual returns to crop production and the majority of acres in the plains were wheat acres, that the difference between the haying or grazing return and the wheat return would provide the appropriate adjustment to the annual rental payment that would be required to leave producers indifferent between no commercial use of the CRP tract and the haying or grazing option.

One to four management schemes were developed for each ecological region in each state. The management schemes determined the length of grazing and haying season, start date, quantity of forage harvested, and number of years haying or grazing would be permitted over the 10 year contract.

This assessment methodology to determine the potential economic impact was developed from production budgets and changes in producer income using IMPLAN™ software. From the information collected, alternative managed haying and grazing frequency can be analyzed to estimate the net returns from engaging in these practices. These budgets can then be used to determine the probability of producers adopting the managed haying and grazing practices, the increases in outputs and incomes, effects on local, regional and national prices and the economic impacts in the local, regional and national economies.

Each county CED was contacted and provided a data collection sheet (Table 1.) with instructions to identify 10 CRP fields that may best represent the diversity of CRP fields in the county.

Table 1. Data Collection Survey

| OSU- Research Hay vs. Grazing Management | | | | | |
|-------------------------------------------------------------|-----|-------------------------------------|------------------------------|-----------------------------------|-----|
| Your Name | | County, State | | CRP- Field ID | |
| | | | | | |
| Legal Description of CRP field | | | | | |
| Field Location | | | | | |
| Acreage | | Shape i.e. square/irregular | | Perimeter in Feet | |
| Fence | Y N | Type of Fence | | Any Cross Fencing? | Y N |
| | | | | | |
| Water Available | Y N | Type of Water Source | | Distance to Water | |
| | | | | | |
| Used for Grazing? | Y N | Which Months Available for Grazing? | | | |
| Used for Haying? | | Which Months Available for Haying? | | | |
| Details/Restrictions | | | | | |
| Estimated Capacity for Grazing (given in # of animal units) | | | | | |
| Types of Grass Present | | | | | |
| | | | | | |
| | | | | | |
| Remarks/Additional Information: | | | | | |
| | | | | | |
| Additional Items to Include | | | For Questions Please Contact | | |
| GIS photo map of field | | | Amanda Dickson | email: amanda.dickson@okstate.edu | |
| Soil Map | | | | Cell phone: 405-564-4204 | |
| EQIP Cost share sheets for the county | | | Dr. Mike Dicks | email: michael.dicks@okstate.edu | |

From the information collected, alternative managed haying and grazing frequency can be analyzed to estimate the net returns from engaging in these practices. These budgets can then be used to determine the probability of producers adopting the managed haying and grazing practices, the increases in outputs and incomes, effects on local, regional and national prices and the economic impacts in the local, regional and national economies. Due to length constraints results from only four states, Kansas, Nebraska, North Dakota, and Oklahoma are included in this report.

Baseline Conditions Analysis

A baseline condition for managed haying and grazing activities in each state was determined using data from 2004 – 2006. A sample size of 10 representative fields per county was used to approximate the percent of eligible CRP acres economically viable for grazing and hay production.

Economic viability was determined to occur if the net return per acre from haying and grazing exceeded the 25 percent CRP rental rate reduction per acre. The primary limiting factor for haying and grazing was the amount of available forage. Grazing was also limited by the

availability of water within the field. If there was no water within close proximity or within the field, the field was determined not to be economically feasible for grazing due to the potential cost associated with getting water to the livestock. The sample data were extrapolated to county and then to the state level. An expansion factor was used at each level. The percentage of current CRP acres that could produce an economically viable return per acre for both hay production and beef production given current program constraints was determined.

Kansas

From the sample size of 10 representative fields within Dickson, Hamilton, Washington, and Ness counties, approximately 43 percent of eligible CRP acres were economically feasible for grazing and 42 percent of eligible CRP acres were economically feasible for hay production. From the sampled fields, 19 out of the 37 plots were determined not to have a positive economic return for hay production.

Approximately 76.3 pounds of beef per acre were produced on economically grazable acres and 0.9 tons of hay per acre was produced on economically hayable acres. Average return per acre for each activity (hay or graze) was calculated for each sample county (Table 2). The average rental rate for CRP acres was \$39.26 in 2007; a 25 percent rental rate reduction would be \$9.82 per acre. As can be observed in Table 2, the average 25 percent rental rate reduction per county was less than the economic value of the product generated from each acre of managed haying or grazing activities except in Hamilton County.

Table 2. Average Return per Acre with a 25 Percent Rental Rate Reduction on CRP Acreage

| County | Average Revenue | Average Cost | Average 25% Rental Rate Reduction | Net (Weighted) Return | |
|------------|-----------------|----------------|-----------------------------------|-----------------------|---------|
| | (\$/acre) | (\$/acre) | (\$/acre) | (\$/acre) | |
| | Hay Production | Hay Production | Hay Production & Grazing | Hay Production | Grazing |
| Dickson | 47.78 | 35.49 | 12.88 | 19.88 | 12.44 |
| Hamilton | 21.84 | 13.92 | 8.26 | 1.63 | 1.1 |
| Washington | 39.04 | 20.3 | 13.28 | 17.95 | 10.86 |
| Ness | 45.5 | 35.33 | 9.9 | 17.15 | 9.45 |

Note:

Average Return for Hay Production = Average Revenue – Average Cost – Average 25% Rental Rate Reduction. Average Return for Stocker Cattle = Average Revenue – Average 25% Rental Rate Reduction

When extrapolated statewide, a per year average of 5.1 percent of eligible CRP acres over three years (2004-2006) were used for managed haying and grazing activities. In practice, it was estimated that only 1.8 percent of total CRP acres that were economically viable for grazing were grazed (approximately 24,000 acres), while only 3.3 percent of total CRP acres that were economically viable for hay production were used for hay production (approximately 43,000 acres). The estimated maximum amount of managed grazing activities based on these conditions would be approximately 27.6 percent of economically feasible acreage, while managed haying activities would occur on approximately 27.2 percent of the economically feasible acreage.

Alternative A-No Action Alternative

Under the No Action Alternative, eligible CRP acres would continue to be managed based on the haying and grazing settlement agreement of September 25, 2006. Analysis of the existing provisions for managed haying and grazing revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 15.4 percent of the economically feasible acreage (9.9 percent of managed grazing and 5.6 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated from each acre of managed haying or grazing activities. This would equate to approximately 90,000 acres using managed grazing activities and 57,000 acres using managed haying activities. These activities are estimated to produce approximately \$4.1 million additional beef production value (0.3 percent increase) and \$1.9 million in hay production value (0.5 percent increase). For the statewide economy, the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$6.9 million from beef production (0.05 percent increase) and \$3.9 million from hay production (0.07 percent increase) rippling throughout the rest of the state economy.

If the No Action Alternative was selected and the maximum eligible acreage was subject to managed haying and grazing activities, the hayed and grazed acreage would increase 3.8 times over the baseline conditions. Given the assumptions of the methods, this would be a substantial increase over the baseline conditions, which would generate a small positive increase over the

total value of beef production and hay production. The total value of either product would increase between 0.3 and 0.5 percent over the production value excluding managed haying and grazing acreage. The economy as a whole would experience a small positive increase of approximately 0.1 percent from activities occurring on managed haying and grazing acreage.

Alternative B

Alternative B proposes to allow both managed haying and grazing to occur once every three years on authorized conservation practices (CP), with no change to the primary nesting season (PNS). The analysis for this alternative was based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

An analysis selecting this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 18.3 percent of the economically feasible acreage (9.2 percent of managed grazing and 9.1 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 122,000 acres using managed grazing activities and 118,000 acres using managed haying activities. These activities are estimated to produce approximately \$9.8 million additional beef production value (7.6 percent increase) and \$2.7 million in hay production value (0.6 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$16.6 million from beef production (1.0 percent increase) and \$5.7 million from hay production (0.1 percent increase) rippling throughout the rest of the state economy. A comparison of the alternatives and the baseline conditions is illustrated in Table 3.

If the Alternative B frequencies are utilized and the maximum amount of acreage became enrolled in managed haying and grazing activities, the managed haying and grazing activity acreage would increase by more than 9.7 times over the baseline conditions. This would be a substantial increase over the baseline conditions, which would generate a marked positive increase over the total value of beef production and a small positive increase over the total value of hay production given the assumptions of the methodology. The total value of beef production

would increase approximately 7.6 percent and the value of hay production would increase by approximately 0.6 percent over the existing production values.

Table 3. Comparison of the Baseline Conditions and the Alternatives

| Parameter | Baseline Conditions Average Annual 2004-2006 | No Action Alternative | Proposed Action |
|-----------------------------------------------------|---------------------------------------------------------|------------------------------|------------------------|
| Managed Grazing Activities (Beef Production) | | | |
| Maximum Percent Economically Viable Acres | 0.61% | 5.52% | 9.20% |
| Maximum Number of Acres | 8,092 | 73,126 | 121,876 |
| Additional Pounds of Beef | 617,621 | 5,581,049 | 9,301,748 |
| Additional Beef Value | \$648,502.08 | \$5,860,101.26 | \$9,766,835.43 |
| Percent Change in Beef Value | 0.50% | 4.54% | 7.57% |
| Economy-wide Value Change | \$1,102,453.53 | \$9,962,172.13 | \$16,603,620.22 |
| Percent Economy-wide Value Change | 0.07% | 0.02% | 0.98% |
| Managed Haying Activities (Hay Production) | | | |
| Maximum Percent Economically Viable Acres | 1.10% | 2.72% | 9.06% |
| Maximum Number of Acres | 14,345 | 35,435 | 118,115 |
| Additional Tons of Hay | 13,236 | 12,487 | 41,623 |
| Additional Hay Value | \$860,353.63 | \$811,653.36 | \$2,705,511.19 |
| Percent Change in Hay Value | 0.19% | 0.18% | 0.59% |
| Economy-wide Value Change | \$1,806,742.62 | \$1,704,472.05 | \$5,681,573.49 |
| Percent Economy-wide Value Change | 0.02% | 0.02% | 0.08% |

Nebraska

From the sample size of 10 representative fields from Banner, Morill, Holt, and Gage counties, approximately 77 percent of eligible CRP practice acres were economically feasible for

grazing and 87 percent of CRP eligible practice acres were economically viable for hay production. Also from the sample, 20 out of the 40 fields was determined to not have an economic return of greater than \$5.00 per acre for hay production. For the grazing analysis, 26 out of 40 fields were determined to not have a return of greater than \$5.00 per acre. When extrapolated to county and state level, it was found that the majority of acreage could produce an economically feasible return per acre for both hay production and beef production, thereby indicating that the 25 percent rental rate reduction was less than the economic value of the product generated from each acre of managed haying and grazing activities.

Within the sample, approximately 43.3 pounds of beef per acre were produced on economically grazeable acres and 0.5 tons of hay per acre was produced on economically hayable acres. Average return per acre for each activity (hay or graze) was calculated for each sample county (Table 4). The average rental rate for CRP acres was \$57.02 in 2007; a 25 percent rental rate reduction would be \$14.26 per acre. As can be observed in Table 4, the average 25 percent rental rate reduction in two of the sample counties was less than the economic value of the product generated off each acre of managed haying or grazing activities.

Table 4. Average Return per Acre with a 25 Percent Rental Rate Reduction on CRP Acreage

| County | Average Revenue | Average Cost | Average 25% Rental Rate Reduction | Net (Weighted) Return | |
|--------|-----------------|----------------|-----------------------------------|-----------------------|---------|
| | (\$/acre) | (\$/acre) | (\$/acre) | (\$/acre) | |
| | Hay Production | Hay Production | Hay Production & Grazing | Hay Production | Grazing |
| Banner | 24.34 | 15.67 | 7.48 | 1.18 | 1.35 |
| Morill | 35.49 | 21.24 | 14.71 | 1.73 | 0.48 |
| Holt | 50.28 | 29.28 | 10.3 | 10.69 | 8.3 |
| Gage | 82.81 | 43.06 | 17.85 | 22.23 | 13.06 |

Note:

Average Return for Hay Production = Average Revenue – Average Cost – Average 25% Rental Rate Reduction. Average Return for Stocker Cattle = Average Revenue – Average 25% Rental Rate Reduction

When extrapolated statewide, a yearly average of 17.9 percent of eligible CRP acres over three years (2004-2006) were used for managed haying and grazing activities. In practice it was estimated that only 4.4 percent of total CRP acres that were economically viable for grazing were grazed (approximately 40,000 acres), while only 13.5 percent of total CRP acres that were

economically feasible for hay production were used for hay production (approximately 138,000 acres). The estimated maximum amount of managed grazing activities based on these conditions would be approximately 49.4 percent of economically viable acreage, while managed haying activities could occur on approximately 55.7 percent of the economically viable acreage.

No Action Alternative – MH – 1/10, MG – 1/10, PNS 15 April – 01 August

Under the No Action Alternative, eligible CRP practices could be used for managed haying activities once every 10 years; managed grazing activities once every five years; and the primary nesting season would remain established between 15 April and 01 August every year. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

An analysis of the existing provisions for managed haying and grazing activities revealed that the maximum annual percentage for these activities would be approximately 15.4 percent of the economically viable acreage (9.9 percent of managed grazing and 5.6 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 90,000 acres using managed grazing activities and 57,000 acres using managed haying activities. These activities are estimated to produce approximately \$4.1 million additional beef production value (0.3 percent increase) and \$1.9 million in hay production value (0.5 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$6.9 million from beef production (0.05 percent increase) and \$3.9 million from hay production (0.07 percent increase) rippling throughout the rest of the state economy.

If the No Action Alternative was selected and the maximum eligible acreage was subject to managed haying and grazing, the actively hayed and grazed acreage would increase by 1.5 times over the baseline conditions. This would be a substantial increase over the baseline conditions, which would generate a small positive increase over the total value of beef

production and hay production given the assumptions of the methodology. The total value of either product would increase between 0.3 to 0.5 percent over the production value excluding managed haying and grazing acreage. The economy as a whole would experience a small positive increase of approximately 0.1 percent from activities occurring on managed haying and grazing acreage. As with any CRP program, the effects vary by location and region.

Alternative B – MH – 1/5, MG – 1/3

Alternative B proposes to allow both managed haying and grazing to occur on authorized CPs with no change to the PNS. This alternative was the previous provision for the State of Nebraska prior to initiation of the NWF lawsuit settlement terms. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

An analysis selecting this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 27.6 percent of the economically viable acreage (16.5 percent of managed grazing and 11.2 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 149,000 acres using managed grazing activities and 114,000 acres using managed haying activities. These activities are estimated to produce approximately \$6.8 million additional beef production value (0.5 percent increase) and \$3.7 million in hay production value (0.9 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$11.5 million from beef production (0.1 percent increase) and \$7.9 million from hay production (0.1 percent increase) rippling throughout the rest of the state economy. A comparison of the alternatives and the baseline conditions is illustrated in Table 5.

If the Alternative B frequencies are utilized, and the maximum amount of acreage became enrolled in managed haying and grazing activities, the actively managed hayed and grazed acreage would increase by 3.4 times over the baseline conditions. This would be a substantial increase over the baseline conditions, which would generate a small positive increase over the total value of beef production and hay production given the assumptions of the

methodology. The total value of beef production would increase approximately 0.5 percent and the value of hay production would increase by approximately 0.9 percent over the existing production values. The economy as a whole would experience a small positive increase of approximately 0.2 percent from activities occurring on managed haying and grazing acreage. As with any CRP program, the effects vary by location and region.

Table 5. Comparison of the Baseline Conditions and the Alternatives

| Parameter | Baseline Conditions Average Annual 2004-2006 | No Action Alternative | Proposed Action |
|-----------------------------------------------------|-----------------------------------------------------|------------------------------|------------------------|
| Managed Grazing Activities (Beef Production) | | | |
| Maximum Percent Economically Viable Acres | 1.47% | 9.87% | 16.46% |
| Maximum Number of Acres | 13,343 | 89,572 | 149,287 |
| Additional Pounds of Beef | 578,294 | 3,882,162 | 6,470,270 |
| Additional Beef Value | \$607,208.31 | \$4,076,270.18 | \$6,793,783.63 |
| Percent Change in Beef Value | 0.05% | 0.32% | 0.54% |
| Economy-wide Value Change | \$1,032,254.12 | \$6,929,659.30 | \$11,549,432.16 |
| Percent Economy-wide Value Change | 0.01% | 0.05% | 0.08% |
| Managed Haying Activities (Hay Production) | | | |
| Maximum Percent Economically Viable Acres | 4.50% | 5.57% | 11.15% |
| Maximum Number of Acres | 46,097 | 57,075 | 114,149 |
| Additional Tons of Hay | 23,288 | 28,834 | 57,667 |
| Additional Hay Value | \$1,513,696.50 | \$1,874,189.29 | \$3,748,378.59 |
| Percent Change in Hay Value | 0.37% | 0.45% | 0.91% |
| Economy-wide Value Change | \$3,178,762.65 | \$3,935,797.52 | \$7,871,595.04 |
| Percent Economy-wide Value Change | 0.05% | 0.07% | 0.14% |

North Dakota

A sample of 10 representative fields each in Walsh, Hettinger, and Nelson counties was used. It was found that approximately 21.6 percent of CRP eligible practice acres were economically viable for grazing and 60.7 percent of CRP eligible practice acres were economically viable for hay production. From the sample, seven out of the 30 fields was determined to not have an economic return of greater than \$5.00 per acre for hay production. For the grazing analysis, 18 out of 30 fields were determined to not have a return of greater than \$5.00 per acre.

Approximately 84.4 pounds of beef per acre were produced on economically grazeable acres and 0.7 tons of hay per acre was produced on economically hayable acres. Average return per acre for each activity (haying or grazing) was calculated for each sample county (Table 6). The average rental rate for CRP acres was \$33.24 in 2007; a 25 percent rental rate reduction would be \$8.31 per acre. As can be observed in Table 6, the average 25 percent rental rate reduction per county was less than the economic value of the product generated off each acre of managed haying or grazing activities, except in Nelson County.

Table 6. Average Return per Acre with a 25 Percent Rental Rate Reduction on CRP Acreage

| County | Average Revenue | Average Cost | Average 25% Rental Rate Reduction | Net (Weighted) Return | |
|-----------|-----------------|----------------|-----------------------------------|-----------------------|---------|
| | (\$/acre) | (\$/acre) | (\$/acre) | (\$/acre) | |
| | Hay Production | Hay Production | Hay Production & Grazing | Hay Production | Grazing |
| Walsh | 60.97 | 32.39 | 11.13 | 18.4 | 8.49 |
| Hettinger | 44.36 | 24.95 | 6.97 | 12.68 | 9.62 |
| Nelson | 33.67 | 20.15 | 8.91 | 4.66 | 6.28 |

Note:

Average Return for Hay Production = Average Revenue – Average Cost – Average 25% Rental Rate Reduction. Average Return for Stocker Cattle = Average Revenue – Average 25% Rental Rate Reduction

When extrapolated statewide, a yearly average of 30.8 percent of eligible CRP acres over three years (2004-2006) were used for managed haying and grazing activities. In practice it was estimated that only 2.5 percent of total CRP acres that were economically feasible for grazing were grazed (approximately 24,000 acres), while 28.3 percent of total CRP acres that were

economically feasible for hay production were used for hay production (approximately 759,000 acres). The estimated maximum amount of managed grazing activities based on these conditions would be approximately 21.6 percent of economically viable acreage, while managed haying activities could occur on approximately 60.7 percent of the economically viable acreage.

No Action – MH – 1/10; MG – 1/5, PNS – 15 May – 01 Aug

Under the No Action Alternative, eligible CRP practices could be used for managed haying activities once every 10 years; managed grazing activities once every five years; and the primary nesting season would remain established between 15 April and 01 August every year. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

Analysis of the existing provisions for managed haying and grazing revealed that the maximum annual percentage of use for these activities would be approximately 10.4 percent of the economically viable acreage (4.3 percent of managed grazing and 6.1 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 41,000 acres employing managed grazing and 163,000 acres using managed haying. These activities are estimated to produce approximately \$3.7 million additional beef production value (1.6 percent increase) and \$7.8 million in hay production value (1.0 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$6.6 million from beef production (0.33 percent increase) and \$16.5 million from hay production (0.19 percent increase) rippling throughout the rest of the state economy.

If the No Action Alternative were selected and the maximum eligible acreage was subject to managed haying and grazing, the hayed and grazed acreage would decline approximately 21.8 percent over the baseline conditions. This decline could still generate a small positive increase due to the increase of managed grazing acreage. The economy as a whole would experience a

small positive increase of approximately 0.5 percent from activities occurring on managed haying and grazing acreage. As with any CRP program, the effects vary by location and region.

Alternative B – MH – 1/5, MG – 1/3, PNS – 15 Apr – 01 Aug

Alternative B proposes to allow both managed haying and grazing to occur on authorized CPs with no change to the PNS. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 27.4 percent of the economically viable acreage (7.2 percent of managed grazing and 20.2 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 69,000 acres implementing managed grazing and 543,000 acres using managed haying. These activities are estimated to produce approximately \$6.1 million additional beef production value (2.7 percent increase) and \$26.2 million in hay production value (3.2 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$11.0 million from beef production (0.55 percent increase) and \$54.9 million from hay production (0.65 percent increase) rippling throughout the rest of the state economy. A comparison of the alternatives and the baseline conditions is illustrated in Table 5.

If the Alternative B frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase approximately 1.3 times over the baseline conditions. This would be a substantial increase which would generate a small positive increase over the total value of beef production and hay production, given the assumptions of the methodology. The total value of beef production would increase approximately 2.7 percent and the value of hay production would increase by approximately 3.2 percent over the existing production values. The economy as a whole would experience a positive increase of

approximately 1.2 percent from allowing managed haying and grazing to occur once every three years, assuming it is implemented on all eligible CRP acreage. As with any CRP program, the effects vary by location and region.

Alternative C – MH – 1/5, MG 1/3, PNS – 15 May – 01 Jul

Alternative C proposes to allow both managed haying and grazing to occur on authorized CPs with a change to the PNS to 15 April to 15 July of each year. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 27.4 percent of the economically viable acreage (7.2 percent of managed grazing and 20.2 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 69,000 acres implementing managed grazing and 543,000 acres using managed haying. These activities are estimated to produce approximately \$7.4 million additional beef production value (3.3 percent increase) and \$31.7 million in hay production value (3.9 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$13.3 million from beef production (0.66 percent increase) and \$66.5 million from hay production (0.78 percent increase) rippling throughout the rest of the state economy. A comparison of the alternatives and the baseline conditions is illustrated in Table 7.

If the Alternative C frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase approximately 1.3 times over the baseline conditions, similar to Alternative B. The value of beef production and hay production is estimated to be greater than Alternative B, given the shorter PNS, allowing for greater value to the standing forage as a livestock feed.

Alternative D – MHG - 1/5, PNS 15 May – 01 Aug

Alternative D proposes to allow both managed haying and grazing to occur on authorized CPs on a one out of every five year basis with no change to the PNS. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 16.5 percent of the economically viable acreage (4.3 percent of managed grazing and 12.1 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 41,000 acres implementing managed grazing and 326,000 acres using managed haying. These activities are estimated to produce approximately \$3.7 million additional beef production value (1.6 percent increase) and \$15.7 million in hay production value (1.9 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$6.6 million from beef production (0.33 percent increase) and \$33.0 million from hay production (0.39 percent increase) rippling throughout the rest of the state economy. A comparison of the alternatives and the baseline conditions is illustrated in Table 7.

If the Alternative D frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase by approximately 41 percent over the baseline conditions. The value of beef production and hay production is estimated to be less than Alternative B given the fewer times managed haying and grazing can occur during a contract period.

Table 7. Comparison of the Baseline Conditions and the Alternatives

| Parameter | Baseline Conditions Average Annual 2004-2006 | No Action Alternative | Alternative B | Alternative C | Alternative D |
|-----------------------------------------------------|-----------------------------------------------------|------------------------------|----------------------|----------------------|----------------------|
| Managed Grazing Activities (Beef Production) | | | | | |
| Maximum Percent Economically Viable Acres | 0.82% | 4.32% | 7.20% | 7.20% | 4.32% |
| Maximum Number of Acres | 7,861 | 41,272 | 68,787 | 68,787 | 41,272 |
| Additional Pounds of Beef | 663,200 | 3,482,125 | 5,803,541 | 7,022,285 | 3,482,125 |
| Additional Beef Value | \$696,359.72 | \$3,656,231.13 | \$6,093,718.55 | \$7,373,399.44 | \$3,656,231.13 |
| Percent Change in Beef Value | 0.31% | 1.64% | 2.74% | 3.32% | 1.64% |
| Economy-wide Value Change | \$1,253,447.50 | \$6,581,216.03 | \$10,968,693.39 | \$13,272,119.00 | \$6,581,216.03 |
| Percent Economy-wide Value Change | 0.06% | 0.33% | 0.55% | 0.66% | 0.33% |
| Managed Haying Activities (Hay Production) | | | | | |
| Maximum Percent Economically Viable Acres | 9.43% | 6.07% | 20.24% | 20.24% | 12.14% |
| Maximum Number of Acres | 253,066 | 162,835 | 542,784 | 542,784 | 325,670 |
| Additional Tons of Hay | 187,655 | 120,747 | 402,488 | 487,011 | 241,493 |
| Additional Hay Value | \$12,197,587.47 | \$7,848,525.01 | \$26,161,750.02 | \$31,655,717.53 | \$15,697,050.01 |
| Percent Change in Hay Value | 1.51% | 0.97% | 3.23% | 3.91% | 1.94% |
| Economy-wide Value Change | \$25,614,933.70 | \$16,481,902.52 | \$54,939,675.05 | \$66,477,006.81 | \$32,963,805.03 |
| Percent Economy-wide Value Change | 0.30% | 0.19% | 0.65% | 0.78% | 0.39% |

Oklahoma

A sample of 10 representative fields each in Beckham, Dewey, and Ellis counties was used. It was found that approximately 74 percent of CRP eligible practice acres were economically viable for grazing and 95 percent of CRP eligible practice acres were economically viable for hay production. From the sample, only one out of the 30 fields was determined to not have an economic return of greater than \$5.00 per acre for hay production. For the grazing analysis, 10 out of 30 fields were determined to not have a return of greater than \$5.00 per acre. When extrapolated to county and then a state level, it was found that the majority of acreage could produce an economically feasible return per acre for both hay production and beef production.

Within the sample, approximately 86.6 pounds of beef per acre were produced on economically grazeable acres and 0.9 tons of hay per acre were produced on economically hayable acres. Average return per acre for each activity (haying or grazing) was calculated for each sample county (Table 8). The average rental rate for CRP acres was \$32.82 in 2007; a 25 percent rental rate reduction would be \$8.21 per acre. As can be observed in Table 8, the average 25 percent rental rate reduction per county was less than the economic value of the product generated off each acre of managed haying or grazing activities.

Table 8. Average Return per Acre with a 25 Percent Rental Rate Reduction on CRP Acreage

| County | Average Revenue | Average Cost | Average 25% Rental Rate Reduction | Net (Weighted) Return | |
|---------|-----------------|----------------|-----------------------------------|-----------------------|---------|
| | (\$/acre) | (\$/acre) | (\$/acre) | (\$/acre) | |
| | Hay Production | Hay Production | Hay Production & Grazing | Hay Production | Grazing |
| Beckham | 59.35 | 30.86 | 9.19 | 22.59 | 22.41 |
| Dewey | 50.27 | 27.89 | 9.19 | 12 | 9.56 |
| Ellis | 61.43 | 26.58 | 8.34 | 27.71 | 15.27 |

Note:

Average Return for Hay Production = Average Revenue – Average Cost – Average 25% Rental Rate Reduction. Average Return for Stocker Cattle = Average Revenue – Average 25% Rental Rate Reduction

When extrapolated statewide, only 18.2 percent of eligible CRP acres over three years (2004-2006) were used for managed haying and grazing activities. In practice it was estimated that only 12.3 percent of total CRP acres that were economically viable for grazing were grazed (approximately 86,500 acres), while only 5.9 percent of total CRP acres that were economically viable for hay production were used for hay production (approximately 53,000 acres). The estimated maximum amount of managed grazing activities based on these conditions would be approximately 47.6 percent of economically viable acreage, while managed haying activities could occur on approximately 61.0 percent of the economically viable acreage.

Alternative B – MH – 1/3, MG – 1/3

Alternative B proposes to allow both managed haying and grazing to occur on authorized CPs with no change to the PNS. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 36.2 percent of the economically viable acreage (15.9 percent of managed grazing and 20.3 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 111,000 acres implementing managed grazing and 183,000 acres using managed haying. These activities are estimated to produce approximately \$9.6 million additional beef production value (1.2 percent increase) and \$11 million in hay production value (3.6 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional \$16.4 million from beef production (0.1 percent increase) and \$23.1 million from hay production (0.4 percent increase) rippling throughout the rest of the state economy. A comparison of the alternatives and the baseline conditions is illustrated in Table 9.

If the Alternative B frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase by 5.3 times over the baseline conditions.

This would be a substantial increase which would generate a small positive increase over the total value of beef production and hay production, given the assumptions of the methodology. The total value of beef production would increase approximately 1.2 percent and the value of hay production would increase by approximately 3.6 percent over the existing production values. The economy as a whole would experience a small positive increase of approximately 0.5 percent from allowing managed haying and grazing to occur once every three years, assuming it is implemented on all eligible CRP acreage.

Table 9. Comparison of the Baseline Conditions and the Alternatives

| Parameter | Baseline Conditions Average Annual 2004-2006 | No Action Alternative | Alternative B |
|-----------------------------------------------------|-------------------------------------------------------------|----------------------------------|----------------------|
| Managed Grazing Activities (Beef Production) | | | |
| Maximum Percent Economically Viable Acres | 4.11% | 9.51% | 15.85% |
| Maximum Number of Acres | 28,843 | 66,783 | 111,305 |
| Additional Pounds of Beef | 2,377,722 | 5,505,324 | 9,175,540 |
| Additional Beef Value | \$2,496,608.36 | \$5,780,590.07 | \$9,634,316.79 |
| Percent Change in Beef Value | 0.32% | 0.74% | 1.23% |
| Economy-wide Value Change | \$4,244,234.21 | \$9,827,003.12 | \$16,378,338.54 |
| Percent Economy-wide Value Change | 0.03% | 0.07% | 0.12% |
| Managed Haying Activities (Hay Production) | | | |
| Maximum Percent Economically Viable Acres | 1.97% | 6.10% | 20.34% |
| Maximum Number of Acres | 17,728 | 54,962 | 183,207 |
| Additional Tons of Hay | 16,358 | 50,712 | 169,041 |
| Additional Hay Value | \$1,063,247.09 | \$3,296,301.44 | \$10,987,671.47 |
| Percent Change in Hay Value | 0.35% | 1.08% | 3.59% |
| Economy-wide Value Change | \$2,232,818.88 | \$6,922,233.02 | \$23,074,110.08 |
| Percent Economy-wide Value Change | 0.03% | 0.11% | 0.36% |

Conclusion

The interest to use CRP lands for haying, grazing, or biomass production has increased due to the increasing demand for biofuels, increasing cost of livestock feeds, and the increasing cost of fertilizer. With more than half of the CRP contracts expiring in the next 5 years, policy makers and economists seek to find the most economical alternatives for these marginal lands. They also want to determine the impact these policies will have on the national economy.

The objectives of this research were to estimate the potential changes of CRP acres used throughout the plains states and determine the impact of those changes on regional and national markets. The total state acreage potentially available to be hayed or grazed in each year under the scenario constraints along with the size of the increased value of state output from the potential haying and grazing as a percent of total state output (state GDP) are shown in Table 10. Also in the table is the total annual value of beef and hay production on potentially available acres as a percent of total annual state beef production on all lands.

Table 10. Land Use Changes and Economic Impacts

| Kansas | Economic Impact | | | | Land Use Changes | |
|-----------|-----------------|-------|----------|-------|------------------|---------|
| | State | | National | | Hay Production | Graze |
| Scenarios | Hay | Graze | Hay | Graze | acres | acres |
| A | 0.18% | 4.54% | 0.02% | 0.59% | 35,435 | 73,126 |
| B(1) | 0.59% | 7.57% | 0.08% | 0.98% | 118,115 | 121,876 |
| B(2) | | | | | | |
| C | | | | | | |
| D | | | | | | |

| Nebraska | Economic Impact | | | | Land Use Changes | |
|-----------|-----------------|-------|----------|-------|------------------|---------|
| | State | | National | | Hay Production | Graze |
| Scenarios | Hay | Graze | Hay | Graze | acres | acres |
| A | 0.45% | 0.32% | 0.07% | 0.05% | 57,075 | 89,572 |
| B(1) | 1.51% | 0.54% | 0.23% | 0.08% | 190,249 | 149,287 |
| B(2) | | | | | | |
| C | | | | | | |
| D | | | | | | |

| North Dakota | Economic Impact | | | | Land Use Changes | |
|-----------------|-----------------|-------|----------|-------|-------------------|--------|
| | State | | National | | Hay Production | Graze |
| Scenarios | Hay | Graze | Hay | Graze | acres | acres |
| A | 0.97% | 1.64% | 0.19% | 0.33% | 162,835 | 41,272 |
| B(1) | 3.23% | 2.74% | 0.65% | 0.55% | 542,784 | 68,787 |
| B(2) | | | | | | |
| C | 3.91% | 3.32% | 0.78% | 0.66% | 542,784 | 68,787 |
| D | 1.94% | 1.64% | 0.39% | 0.33% | 325,670 | 41,272 |

| Oklahoma | Economic Impact | | | | Land Use Changes | |
|-----------|-----------------|-------|----------|-------|-------------------|---------|
| | State | | National | | Hay Production | Graze |
| Scenarios | Hay | Graze | Hay | Graze | acres | acres |
| A | 1.08% | 0.74% | 0.01% | 0.01% | 54,962 | 66,783 |
| B(1) | 3.59% | 1.23% | 0.02% | 0.02% | 183,207 | 111,305 |
| B(2) | | | | | | |
| C | | | | | | |
| D | | | | | | |

The Economic Analysis of Federal Regulations under Executive Order 12866 directs agencies to provide a qualitative and quantitative assessment of the anticipated costs and benefits of a Federal mandate resulting in annual expenditures of \$100 million or more, including the costs and benefits to State, local, and tribal governments or the private sector (1996). According to the World Bank, the 2007 GDP for the United States was 13.8 Trillion dollars. The national economic impacts on the United States are depicted in Table 11.

Table 11. Economic Impacts on the National Economy

| National Impact | | | | | |
|----------------------------|-------|---------------|-----------------|-------------------------|-----------------|
| Billions of dollars | | | | | |
| | | Kansas | Nebraska | North Dakota | Oklahoma |
| Scenario A | Hay | 3.18 | 9.40 | 26.77 | 0.71 |
| | Graze | 81.48 | 6.65 | 45.39 | 1.37 |
| Scenario B(1) | Hay | 10.61 | 31.32 | 89.23 | 2.47 |
| | Graze | 135.80 | 11.08 | 75.65 | 2.40 |
| Scenario C | Hay | | | 107.97 | |
| | Graze | | | 91.53 | |
| Scenario D | Hay | | | 53.54 | |
| | Graze | | | 45.39 | |

*Note: Impact= (13.8 Trillion * National %)/1,000,000,000*

By implementing the different scenarios developed by previous research, not only will the CRP land improve or maintain the current quality but it will also generate billions of dollars of activity in the United States.

References

- U.S. Department of Agriculture, Farm Service Agency. *Conservation Reserve Program*. February 2008. Internet Site:
<http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp>
- U.S. Department of Agriculture, National Agricultural Statistics Service, *Quick Stats U.S. & All States County Data – Crop & Livestock*. September 2008. Internet site:
http://www.nass.usda.gov/QuickStats/Create_County_All.jsp
- U.S. Department of Agriculture, Commodity Credit Corporation, Federal Register. *2002 Farm Bill- Conservation Reserve Program- Long-Term Policy; Interim Rule*. 68, no. 89(May 2003)
- Mapemba, Lawrence D., Francis M. Epplin, Charles M. Taliaferro, and Raymond L. Huhnke. "Biorefinery Feedstock Production on Conservation Reserve Program Land," *Review of Agricultural Economics*, 2007, Volume 29, No 2:227-246
- Hipple, P.C., and M.D. Duffy. "Farmer's Motivation for Adoption of Switchgrass." In *Trends in New Crops and New Uses*, J. Janich and A. Whipkey, eds., pp. 252-266. Alexandria, VA: ASHA Press, 2002
- Lynne, Gary D., J. S. Shonkwiler, and Leandro R. Rola. "Attitudes and Farmer Conservation Behavior." *American Journal of Agricultural Economics*, Vol. 70, No. 1. (Feb., 1988), pp. 12-19.
- Verburg, P. H., G. H. J. de Koning, K. Kok, A. Veldkamp and J. Bouma. "A spatial explicit allocation procedure for modeling the pattern of land use change based upon actual land use." *Ecological Modelling*, March 1999, Vol. 116, no. 1:45-61.
- Rao, Mahesh, Guoliang Fan, Johnson Thomas, Ginto Cherian, Varun Chudiwale and Muheeb Awawdeh. "A web-based GIS Decision Support System for managing and planning USDA's Conservation Reserve Program (CRP)." *Environmental Modelling and Software* (September 2007): Vol 22, no. 9(1270-1280).
- Johnson, Phillip N., and Eduardo Segarra. "An Evaluation of Post Conservation Reserve Program Alternatives In The Texas High Plains." *Journal of Agricultural and Applied Economics* 27(2), December, 1995: 556-564.
- "Switchgrass." *Wikipedia, The Free Encyclopedia*. Wikimedia Foundation, Inc. 13 Mar 2008 Internet site:
<http://en.wikipedia.org/w/index.php?title=Switchgrass&oldid=197848189>

Brown, W.E., J.M. Spiers and C. W. Thurman. "Performance of Five Warm-Season Perennial Grasses Grown in Southern Mississippi." *Agronomy Journal* (1976) 68:821

De La Torre Ugarte, Daniel and Daryll E. Ray. "Biomass and Bioenergy Applications of the POLYSYS Modeling Framework." *Biomass and Bioenergy* 18 (2000) 291:308

Office of Management and Budget. "Economic Analysis of Federal Regulations Under Executive Order 12866." The White House Website. 11 January 1996. Internet site: <http://www.whitehouse.gov/omb/inforeg/riaguide.html>

Wikipedia. "List of countries by GDP." World Bank. 1 July 2008. Internet site: [http://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(nominal\)](http://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal))