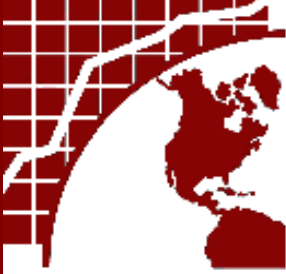


**Agricultural
Marketing**



**Policy
Center**

Rangeland Production Risk Management in Wyoming



John Hewlett*, Gary W. Brester, James B. Johnson

Objective Analysis
for Informed
Decision Making

Agricultural Marketing Policy Paper No. 8

September 2005

* University of Wyoming, Extension Educator

Introduction:

A new Group Risk Plan (GRP) Rangeland Insurance product is being offered by USDA's Risk Management Agency (RMA) in 10 Wyoming counties. For counties in which this insurance product is not offered, USDA's Farm Service Agency continues to offer the Noninsured Crop Disaster Assistance Program (See Briefing No. 14). The new GRP Rangeland Insurance product is intended to increase ranch managers' options for managing risk related to the loss of grazing from any of several causes.

GRP Rangeland Pilot Program:

The new GRP Rangeland Insurance product was first offered in certain Wyoming counties in the 2005 production year (shaded counties in Figure 1).

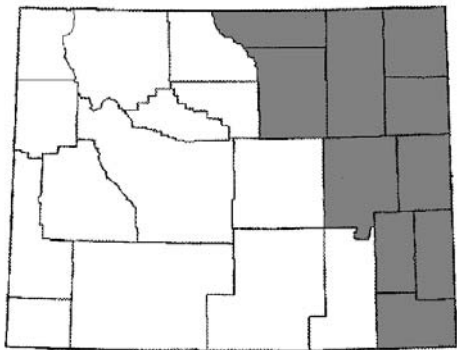


Figure 1: GRP Rangeland Insurance Availability in Wyoming, 2005

The GRP Rangeland Insurance product provides risk protection against rangeland production losses resulting from multiple causes. An individual rancher's rangeland condition is not used for assessing losses and determining indemnities in this Group Risk Plan. Rather, an individual rancher's indemnity is determined on the basis of county-wide non-irrigated hay production which is highly correlated with rangeland conditions.

GRP Rangeland Insurance does not require rangeland to be planted to grasses, but it does require that a rancher insure all rangeland within a county in which a rancher has an interest. Only rangeland intended for harvest by grazing is eligible for this coverage. If a

lease specifies the number of acres to be grazed, a rancher must insure those acres along with any owned rangeland acres. If a lease specifies the number of animal unit months (AUMs) to be grazed without specifying grazing acreage, then acres to be insured are calculated by dividing the specified AUMs by a county's rangeland productivity factor (Table 1). Rangeland productivity factors are reported in RMA actuarial documents.

Basics of the GRP Rangeland Insurance Product:

GRP Rangeland Insurance uses historical and current annual production of all non-irrigated hay production in a county to determine rangeland production losses. For each county, trigger "yields" are determined by the county's historical net production of non-irrigated hay. Net non-irrigated hay production is calculated by subtracting hay harvested from CRP land and hay harvested from small grains from all non-irrigated hay production. Net non-irrigated hay production is used as a proxy for rangeland production because it is easier to measure non-irrigated hay production than it is to determine range production directly. Moreover, the production of non-irrigated hay is highly correlated with range conditions.

GRP Rangeland Insurance is defined by the following concepts:

County Base Production: County Base Production represents adjusted average annual net non-irrigated hay production in a county. The estimate is based on approximately 40 years of production data as reported by the Risk Management Agency (Table 1).

Coverage Levels: Producers may elect 70, 75, 80, 85, or 90 percent of a county's base production as their Coverage Level. In addition, Catastrophic Risk Protection (CAT) is available for GRP Rangeland Insurance. The CAT Coverage Level is set at a 65 percent level.

Table 1: Wyoming County Base Production, Rangeland Productivity Factors, and County Base Revenue

County	County Base Production (tons)	Rangeland Productivity Factor (AUMs/acre)	County Base Revenue Per Acre (dollars/acre)
Campbell	44,320	0.29	\$3.89
Converse	4,478	0.24	3.22
Crook	78,721	0.33	4.42
Goshen	8,442	0.28	3.75
Johnson	3,484	0.31	4.15
Laramie	12,548	0.29	3.89
Niobrara	14,256	0.27	3.62
Platte	7,494	0.27	3.62
Sheridan	22,321	0.38	5.09
Weston	24,561	0.30	4.02

Net Hay Production: Net Hay Production in the insured year is calculated by subtracting hay harvested from CRP land and small grains from all non-irrigated hay production.

Dollar Amount of Protection Per Acre: Dollar Amount of Protection Per Acre is based on the private grazing fee per AUM as reported by the Wyoming Agricultural Statistics Service. The statewide rate that was applicable to the 2005 grazing year was \$13.40 per AUM. The private grazing fee may vary from year to year.

County Base Revenue Per Acre: The County Base Revenue Per Acre is the applicable state-level AUM grazing fee multiplied by a county’s rangeland productivity factor.

Price Election Percentage: Producers may select between 60 and 100 percent of a County’s Base Revenue Per Acre. Producers generally select the 100 percent Price Election Percentage level. Price Election Percentage is set at 45 percent for CAT coverage.

Trigger “Yield”: An individual ranch’s Trigger “Yield” is calculated by multiplying County Base Production by the ranch’s selected Coverage Level.

How GRP Rangeland Insurance Works: An Example:

Consider a rancher with 10 sections of rangeland (6,400 acres) in a county where County Base Production equals 20,000 tons (Table 2). The applicable state-level AUM grazing fee is \$13.40 per acre, and the county range productivity factor is 0.33/AUM per acre. Thus, the County Base Revenue Per Acre is \$4.42. If the rancher selects a Price Election Percentage of 100 percent and a Coverage Level of 90 percent, the ranch’s Trigger “Yield” will be 18,000 tons. This rancher will receive an insurance indemnity if Net Hay Production is less than 18,000 tons in the insured year. The per acre indemnity is calculated using the following formula:

$$[(\text{Trigger “Yield”} - \text{Net Hay Production}) / \text{Trigger “Yield”}] \times [\text{County Base Revenue Per Acre} \times \text{Price Election Percentage} \times \text{Coverage Level}]$$

Table 2: An Example of GRP Rangeland Insurance

Contract Data	Value	Calculation
County Base Revenue Per Acre	\$4.42/acre	RMA: (\$13.40/acre) x (0.33 AUMs/acre).
Price Election Percentage	100 percent	Producer: 60 to 100 percent
County Base Production	20,000 tons of all non-irrigated hay	RMA: This value was established for and accepted by RMA.
Coverage Level	90 percent	Producer: The producer may choose 70, 75, 80, 85 or 90 percent of the county base production.
Trigger “Yield”	18,000 tons of all non-irrigated hay	20,000 tons x 90 percent
Per Acre Indemnity	\$2.21 per acre	$[(18,000 \text{ tons} - 8,000 \text{ tons}) / (18,000 \text{ tons})] \times [(\$4.42/\text{acre}) \times (1.00) \times (0.90)]$
Total Indemnity	\$14,144	6,400 acres x (\$2.21/acre)

If Net Hay Production is 8,000 tons in the insured year, then the ranch would receive a gross insurance indemnity of \$2.21/acre or \$14,144. An equivalent procedure for calculating the gross indemnity is to use the following formula:

$$\{[\text{Coverage Level} - (\text{Net Hay Production}/\text{County Base Production})] \times \text{County Base Revenue Per Acre} \times \text{Price Election Percentage}\}.$$

GRP Rangeland Insurance Premium Calculation:

Per acre premium rates and subsidies are linked to Coverage Levels. Per acre premiums are calculated as:

Total Premium: $[(\text{County Base Revenue Per Acre}) \times (\text{Coverage Level}) \times (\text{Premium Rate for the selected Coverage Level})].$

Premium Subsidy: $[(\text{Total Premium}) \times (\text{Subsidy Rate for the selected Coverage Level})].$

Producer Premium: $[(\text{Total Premium}) - (\text{Premium Subsidy})].$

The Producer Premium represents a rancher’s out-of-pocket expenditure for the insurance. The Premium Subsidy is provided by the Federal government. Premium and subsidy rates by Coverage Level are shown in Table 3.

Premium rates are lower for lower Coverage Levels and subsidy rates are lower for higher Coverage Levels. In addition to per acre premium rates, a \$30 administrative fee is charged for each GRP Rangeland Insurance contract. In the above example, the premium rate for the 90 percent Coverage Level selected by the rancher is 12.4 percent, and the premium subsidy for that Coverage Level is 55 percent. Per acre and ranch-level premiums for this example are shown in Table 4. This producer would have paid \$1,450.80 (a \$1,420.80 insurance premium plus a \$30 administrative fee) to insure 6,400 acres of rangeland. In this example, the ranch would have received a gross indemnity of \$14,144 (Table 2). The rancher’s net indemnity (the gross indemnity

Table 3: Premium and Subsidy Rates by Coverage Level, for GRP Rangeland Insurance, 2005

Coverage Level (%)	Unsubsidized Premium Rate (%)	Subsidy Rate (%)	Administrative Fee (\$)
70%	7.4	64	\$30
75%	8.5	64	\$30
80%	9.6	59	\$30
85%	10.9	59	\$30
90%	12.4	55	\$30

CAT coverage is only available at a 65 percent Coverage Level and a 45 percent Price Election Percentage. CAT coverage requires a \$100 administrative fee per contract – but no additional premium.

less the premium and administrative fee) would have been \$12,693.20 (Table 4).

Producers also have the choice of purchasing catastrophic risk protection (CAT) coverage. Rather than a per acre premium, CAT coverage requires a \$100 administrative fee for each GRP Rangeland Insurance contract. The CAT Coverage Level is set at 65 percent and the Price Election Percentage is set at 45 percent.

Decision Criteria for Purchasing GRP Rangeland Insurance:

Ranchers must decide whether or not to purchase GRP Rangeland Insurance. The preceding example illustrates a situation in which the decision to purchase insurance resulted in a positive net indemnity for a specific year. However, rangeland losses do not occur every year, and when they do occur, they vary in severity.

Consider a specific Wyoming county -- Sheridan county. Over the 40-year period, 1965 through 2004, the RMA-specified County Base Production of all non-irrigated hay (excluding CRP and small grain hay) is 22,321 tons (Table 1). Table 5 presents non-irrigated hay production in Sheridan County for the 1965-2004 period as reported by NASS. These data include both CRP and small grains hay production because separate data were not gathered for most of that period. Non-irrigated hay production averaged 24,419 tons over the 1965-2004 period. The County Base Production is 91.41 percent of average non-irrigated hay production. The last column in Table 5 presents an estimate of “Net Hay Production” obtained by multiplying total non-irrigated hay production by 91.41 percent. The resulting estimates approximate RMA’s County Base Production values. In 2005 and future years, CRP and small grains hay production data will be collected and subtracted from all non-irrigated hay production to determine Net Hay Production.

Table 4: Total and Producer Premiums for a GRP Rangeland Insurance Example

Contract Data	Value	Calculation
Total Premium per Acre	\$0.493	RMA: (\$4.42/acre) x (0.90 coverage level) x (0.124 premium rate)
Total Premium for Ranch	\$3,155.20	RMA : (\$0.493/acre) x 6,400 acres
Premium Subsidy per Acre	\$0.271	RMA: (\$0.493/acre) x (0.55 subsidy rate)
Premium Subsidy per Ranch	\$1,734.40	RMA: (\$0.271/acre) x 6,400 acres
Producer Premium per Acre	\$0.222	RMA: \$0.493 - \$0.271
Producer Premium per Ranch	\$1,420.80	\$3,155.20 - \$1,734.40
Administrative Fee	\$30/contract	RMA

The net indemnity for the example ranch is \$12,693.20 calculated as \$14,144 - \$1,420.80 - \$30.

Table 5: Non-irrigated Hay Production and Estimated Net Hay Production, Sheridan County, Wyoming, 1965-2004

Year	All Non-irrigated Hay Production (tons)*	Estimated Net Hay Production (tons)**
1965	21,600	19,744
1966	11,600	10,603
1967	24,000	21,938
1968	13,900	12,706
1969	12,400	11,335
1970	13,800	12,614
1971	29,900	27,331
1972	20,600	18,830
1973	27,300	24,954
1974	14,350	13,117
1975	31,050	28,382
1976	36,300	33,181
1977	28,920	26,435
1978	36,180	33,072
1979	23,400	21,390
1980	29,000	26,508
1981	19,560	17,879
1982	32,000	29,251
1983	18,700	17,093
1984	25,800	23,583
1985	8,400	7,678
1986	22,700	20,750
1987	21,100	19,287
1988	7,100	6,490
1989	13,200	12,066
1990	18,900	17,276
1991	25,800	23,583
1992	31,500	28,794
1993	35,800	32,724
1994	24,700	22,578
1995	47,800	7,678
1996	26,600	20,750
1997	55,500	19,287
1998	31,000	6,490
1999	56,500	12,066
2000	30,000	27,442
2001	16,000	14,625
2002	8,300	7,587
2003	21,000	19,196
2004	4,500	4,113
Average	24,419	22,321***

*These data include hay produced from CRP acres and small grains.

** These data are calculated by multiplying all non-irrigated hay production by 91.41 percent. Although this is not the exact procedure used to develop County Base Production for GRP Insurance, it serves as a reasonable proxy for past years.

***This is the County Base Production for Sheridan County (Table 1).

Table 6 shows Sheridan county Trigger “Yields” at CAT, 70, 75, 80, 85, and 90 percent Coverage Levels. The years in which estimated “Net Hay Production” fell below Trigger “Yields” for each Coverage Level are identified in Table 7.

Table 6: Trigger “Yields” for Sheridan County, WY

Coverage Level (%)	Trigger “Yields” (tons/year)
CAT (65)	14,509
70	15,625
75	16,741
80	17,857
85	18,973
90	20,089

Suppose a rancher had the opportunity to purchase GRP Rangeland Insurance each year during the 1965-2004 period, and selected a 90 percent Coverage Level in every year. The ranch would have paid a premium in each of the 40 years. The

ranch would have received an indemnity in 18 of the 40 years. In three of these years (1965, 1987, 2003), per acre indemnities were smaller than per acre premiums. The last row of Table 8 shows the per acre total premiums paid and total indemnities received over the entire 40 years. Total per acre indemnities of \$27.22 exceed total per acre premiums of \$10.22.

The last column of Table 9 reports net indemnity calculations for the 70, 75, 80, and 85 percent Coverage Levels. The largest per acre difference between total indemnities and premiums (\$17.00) would have occurred if the rancher had selected a 90 percent Coverage Level. The smallest difference (\$9.64) occurs for the 70 percent Coverage Level. Note that these calculations do not include the \$30 annual service fee per contract that is required for the purchase of GRP Rangeland Insurance. If this service fee were applied to 1,000 acres in the above example, it would add \$0.03 per acre to the insurance premium in each year (or \$1.20 per acre in total over the 40 years).

Table 7: Years For Which Estimated Net Hay Production Was Less Than Trigger “Yields” For Each Coverage Level, Sheridan County, WY, 1965-2004

Coverage Level (%)	Number of Years Estimated Net Hay Production Was Less Than Trigger “Yield”	Years In Which Estimated Net Hay Production Was Less Than Trigger “Yield”
CAT	10	1966, 1968, 1969, 1970, 1974, 1985, 1988, 1989, 2002, 2004
70	11	1966, 1968, 1969, 1970, 1974, 1985, 1988, 1989, 2001, 2002, 2004
75	11	1966, 1968, 1969, 1970, 1974, 1985, 1988, 1989, 2001, 2002, 2004
80	13	1966, 1968, 1969, 1970, 1974, 1983, 1985, 1988, 1989, 1990, 2001, 2002, 2004
85	15	1966, 1968, 1969, 1970, 1972, 1974, 1981, 1983, 1985, 1988, 1989, 1990, 2001, 2002, 2004
90	18	1965, 1966, 1968, 1969, 1970, 1972, 1974, 1981, 1983, 1985, 1987, 1988, 1989, 1990, 2001, 2002, 2003, 2004

Table 8: Per Acre Premiums and Indemnities for the 90 Percent Coverage Level, Sheridan County, WY 1965-2004

Year	Per Acre Producer Premiums (dollars)	Trigger "Yield" (tons)	Estimated Net Hay Production (tons)	Per Acre Indemnities (dollars)
1965	\$0.256	20,089	19,744	\$0.08
1966	0.256	20,089	10,603	2.16
1967	0.256	20,089	21,938	0.00
1968	0.256	20,089	12,706	1.68
1969	0.256	20,089	11,335	2.00
1970	0.256	20,089	12,614	1.70
1971	0.256	20,089	27,331	0.00
1972	0.256	20,089	18,830	0.29
1973	0.256	20,089	24,954	0.00
1974	0.256	20,089	13,117	1.59
1975	0.256	20,089	28,382	0.00
1976	0.256	20,089	33,181	0.00
1977	0.256	20,089	26,435	0.00
1978	0.256	20,089	33,072	0.00
1979	0.256	20,089	21,390	0.00
1980	0.256	20,089	26,508	0.00
1981	0.256	20,089	17,879	0.50
1982	0.256	20,089	29,251	0.00
1983	0.256	20,089	17,093	0.68
1984	0.256	20,089	23,583	0.00
1985	0.256	20,089	7,678	2.83
1986	0.256	20,089	20,750	0.00
1987	0.256	20,089	19,287	0.18
1988	0.256	20,089	6,490	3.10
1989	0.256	20,089	12,066	1.83
1990	0.256	20,089	17,276	0.64
1991	0.256	20,089	23,583	0.00
1992	0.256	20,089	28,794	0.00
1993	0.256	20,089	32,724	0.00
1994	0.256	20,089	22,578	0.00
1995	0.256	20,089	43,693	0.00
1996	0.256	20,089	24,315	0.00
1997	0.256	20,089	50,732	0.00
1998	0.256	20,089	28,337	0.00
1999	0.256	20,089	51,646	0.00
2000	0.256	20,089	27,442	0.00
2001	0.256	20,089	14,625	1.25
2002	0.256	20,089	7,587	2.85
2003	0.256	20,089	19,196	0.20
2004	0.256	20,089	4,113	3.64
40-Year Totals	\$10.22	not applicable	not applicable	\$27.22

Suppose this same rancher had selected CAT coverage in each of the 40 years. The CAT Trigger “Yield” in Sheridan county would have been 14,509 tons (Table 6). Estimated “Net Hay Production” was less than the CAT Trigger “Yield” in 10 years during the 1965-2004 period. Because CAT stipulates a 45 percent Price Election Percentage, the ranch would have received total gross indemnities of \$4.80/acre for those 10 years of loss during the 40 year period and paid a total of \$4,000 in administrative fees to purchase the coverage. If 1,000 acres of rangeland were insured in each year, the administrative fee for CAT coverage would have totaled \$4.00/acre over the 40 year period. The net indemnity would have been \$0.80/acre. Note that the net per acre indemnity from CAT coverage is less than the smallest difference between indemnities and premiums for buy up levels (\$9.64 per acre for the 70 percent coverage level in Table 9).

Summary:

GRP Rangeland Insurance provides an opportunity for ranchers to manage downside rangeland production risks in 10 Wyoming counties. In the remaining Wyoming counties, ranchers must rely upon FSA’s NAP program for rangeland risk management. GRP Rangeland Insurance bases indemnities on county-wide net non-irrigated hay production as a proxy for rangeland production. Actual range conditions on any single ranch have little influence on the probability of receiving an

indemnity. In addition, the probability of receiving an indemnity (that is, experiencing range conditions which are poor enough to trigger an indemnity) varies by county.

Information on such probabilities for each Wyoming county is available by accessing the Western Risk Management Library website at <http://agecon.uwyo.edu/riskmgt>. The website provides county-specific data to help producers make informed decisions regarding the purchase of GRP Rangeland Insurance. After accessing the website, select "Production" at the left side of the page. Then, scroll down the alphabetical listing until you reach the link entitled "Rangeland Production Risk Management". Click on the link to access specific information on Wyoming counties.

A rancher’s decision to purchase or not purchase GRP Rangeland Insurance depends upon the probability of experiencing a crop loss, a rancher’s level of risk aversion, net worth, and cash flow situations.

References:

Johnson, James B. “Noninsured Crop Disaster Assistance Program.” Briefing No. 14 (revised). Agricultural Marketing Policy Center, Department of Agricultural Economics and Economics, Montana State University, Bozeman. November, 2001.

Table 9: Per Acre Indemnities and Premiums of GRP Rangeland Insurance Over a 40- Year Period for Selected Coverage Levels, Sheridan County, WY

Coverage Level (%)*	Total Per Acre Indemnity Over 40 Years (dollars/acre)	Total Per Acre Premiums Over 40 Years** (dollars/acre)	Total Indemnities Less Total Premiums (dollars/acre)
70	\$13.44	\$3.80	\$9.64
75	16.25	4.67	11.58
80	19.35	6.41	12.94
85	22.94	7.73	15.21
90	27.22	10.22	17.00

* Catastrophic risk protection (CAT) has a fixed 65 percent coverage level and a 45 percent elected dollar amount of protection per acre level.

**There is \$30 administrative fee per contract per year. On an annual basis, someone who insured 1,000 acres of rangeland would incur an annual fee of \$0.03 per acre on average, or \$1.20 over the 40-year period.



Copyright 2005:

The programs of the MSU Extension Service are available to all people regardless of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Dr. Douglas Steele, Vice Provost and Director, Extension Service, Montana State University, Bozeman, MT 59717.