



Risk Management Options for Wyoming Ranchers

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Objective Analysis

For Informed

Decision Making

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Executive Summary

Ranchers and farmers know they are involved in risky enterprises and use many tools to manage risk. Typically, they use several techniques to reduce the chances that they will suffer financial losses; that is, they develop and implement risk management strategies for their operations.

Ranchers also protect themselves against adverse price movements. They use output price risk management techniques such as hedging in futures and options markets and forward contracting. They also manage input price risk, often through bulk purchasing and, in the case of feed lots, hedging in futures and options markets for feed commodities such as corn and soybeans.

Increasingly, federal insurance for agricultural commodities offered by the Federal Crop Insurance Corporation has become an important and attractive risk management tool for agricultural producers. Ranchers in Wyoming now have a range of federally subsidized insurance products to facilitate their ability to manage both production and price risk.

This bulletin describes the crop, forage and livestock insurance products available to Wyoming ranch operations and presents simulations of the effects of alternative risk management strategies for representative large and small Wyoming ranches.

Two ranches, one small and one large, which represent many ranches in Goshen County, are selected to evaluate the use of several risk management strategies that involve the use of RMA insurance products.

The small ranch's livestock inventory consists of 75 bred cows, 11 replacement heifers, and 4 herd bulls. The ranch has a resource base sufficient to produce all of its feed stuffs and some alfalfa hay for sale in the cash market.

The large ranch's livestock inventory is 360 bred cows, 50 replacement heifers, and 15 herd bulls. It also has a resource base sufficient to produce all of its feed stuffs and some alfalfa hay for sale in the cash market.

Typically, many different risk management strategies can be pursued on any ranch. Ranch managers choose among these alternatives on the basis of the ranch's financial structure and their preferences about taking on or avoiding risk. In this analysis, the ranch manager is assumed to be interested in three basic risk management strategies and four combinations of these basic strategies. These strategies involve different combinations of the following insurance products that are available in Wyoming: AGR-Lite, Actual Production History (APH), Crop Revenue Coverage (CRC), Group Risk Protection (GRP), Livestock Risk Protection (LRP), Livestock Gross Margin (LGM), and Pasture, Rangeland, Forage (PRF).

Three "production year outcome" scenarios are examined for each ranch. In the first scenario, producers have an average or good year. Crop yields are close to, or above average, and prices are also close to those that were expected. Consequently there are no shortfalls in yields, prices or revenues. As a result, the ranch receives no insurance indemnities, but pays the premiums it owes for the insurance it purchases. In this scenario, the largest reduction in ranch net income for both the small and large ranch occur when the ranch operator carries AGR-Lite as an umbrella policy and purchases available commodity specific insurance policies.

In the second scenario, substantial price changes take place over the insurance period. Poor planting conditions and growing conditions in the Corn Belt result in harvest prices for corn are 50 percent higher than anticipated early in the production year. Nationally, and in Wyoming, feeder cattle prices decline substantially. The small and large ranches therefore receive indemnities if they purchase LRP policies for feeder steers and heifers.

In the third scenario, severe drought is assumed to occur in southeast Wyoming and western Nebraska, leading to a 40 percent decline in crop and forage yields (and proxy variables for yields). The drought is localized, so livestock sale prices do not change from those that were anticipated prior to the production period. At harvest, alfalfa hay prices are higher than the price of expected prior to the growing season. In this scenario, the small and large ranches receive indemnities from yield and revenue insurance products for specific crops, forages and rangeland.

It is important to note that AGR-Lite provides no indemnities any of these scenarios. The reason is that both ranches use their resource bases primarily to producer forage and feed crops for their own livestock needs. Although these range and forage enterprises are very important to the ranch businesses, they are non-revenue enterprises and, as such, are not insured under AGR-Lite.

INTRODUCTION

Agricultural production is a financially risky business. On Wyoming ranches, forage losses from natural hazards (lack of moisture, severe drought, etc.) are frequent. Livestock losses also occur because of adverse winter weather, summer heat, animal disease and predation. Ranches also encounter substantial price risks, both in the resource markets where they purchase their inputs and the commodity markets where they sell their livestock and crops. Energy, corn and other feed prices can vary substantially from one month to the next, as can nitrogen fertilizer prices. Livestock prices can also be volatile. Moreover, the link between ranch level production losses and commodity prices is weak. At the market level, when production is relatively low prices tend to be relatively high, but an individual agricultural producer may experience low levels of production because of locally adverse production conditions when commodity prices are also low.

Ranchers and farmers know they are involved in risky enterprises and use many tools to manage risk. Typically, they use several techniques to reduce the chances that they will suffer financial losses; that is, they develop and implement risk management strategies for their operations. Ranchers use production techniques that reduce forage and livestock production losses (for example, inoculating cattle against diseases, raising feed crops and forage in several locations to reduce risk of losses from hail or moisture shortage, and managing a mix of irrigated and non-irrigated pasture and rangeland). They use rotational and other cropping and forage management decisions to improve soil moisture retention, and they manage the wildlife - domestic livestock interface to reduce stock losses.

Ranchers also protect themselves against adverse price movements. They use output price risk management techniques such as hedging in futures and options markets and forward contracting. They also manage input price risk, often through bulk purchasing and, in the case of feed lots, hedging in futures and options markets for feed commodities such as corn and soybeans.

Increasingly, federal insurance for agricultural commodities offered by the Federal Crop Insurance Corporation has become an important and attractive risk management tool for agricultural producers. Ranchers in Wyoming now have a range of federally subsidized insurance products to facilitate their ability to manage both production and price risk. These include products based on an operation's actual production history (APH) that provide a rancher with an indemnity when their ranch operation experiences crop/forage specific production or yield losses or crop specific revenue loss. Yield products, called Multiple Peril Crop Insurance (MPCI) products, provide indemnities when yields for the insured crop are low. Revenue products pay an indemnity when the producer's per acre revenue for a crop is low (because of either low per acre yields, low prices, or both). Revenue Assurance (RA), Crop Revenue Coverage (CRC), and Income Protection (IP) are examples of these types of products. Some operation-specific products are crop-loss products that provide an indemnity only when the producer's yields for a crop are low. These products are widely known as Actual Production History (APH) products.

Ranchers in Wyoming are now also able to purchase insurance products that provide indemnities when the area in which the ranch operation is located experiences low per acre crop yields (called Group Risk Plans) or low per acre revenues (Group Risk Income Protection plans). Historically, the area has been the county in which the ranch is located. A new area-based product that provides insurance for forage loss, the Pasture Rangeland and Forage (PRF) product now available to Wyoming ranchers, bases indemnities on estimates of forage loss within much smaller areas. The PRF uses satellite information on vegetation for areas that are approximately five miles square instead of using county estimates.

Livestock prices and gross margins can now also be insured using RMA products. These include Livestock Risk Protection (LRP) insurance - available for feeder cattle, fed cattle, hogs and lambs - that provides insurance against unexpected price declines, and Livestock Gross Margin (LGM) insurance - available for feeder cattle, dairy cattle, and hogs - that provides insurance against declines

in gross margins caused by higher feed prices, or lower livestock and, in the case of dairy cattle, milk prices, or both.

Until recently, ranchers and farmers have had to insure each crop or forage under a separate insurance contract, leading to a complex set of insurance choices for multi-enterprise operations. Since 2007, whole farm insurance has been available in the form of Adjusted Gross Revenue Lite (AGR-Lite). This product provides indemnities to producers when a farm's adjusted gross income from multiple enterprises is either low relative to historical levels or low relative to expected revenues. AGR-Lite may be used as a stand alone product or in conjunction with crop and livestock enterprise specific insurance products.

This bulletin describes the crop, forage and livestock insurance products available to Wyoming ranch operations and presents simulations of the effects of alternative risk management strategies for representative large and small Wyoming ranches. The alternative strategies include those in which each enterprise is insured under a separate RMA insurance product, the whole ranch is insured solely using AGR-Lite, and the ranch uses AGR-Lite in combination with individual risk management products. The focus is on the premium outlays required and the indemnities received under each strategy in different price and production environments.

RISK MANAGEMENT ON WYOMING LIVESTOCK RANCHES

Some of the production risk management efforts undertaken by a ranch manager are highly visible. Other risk management efforts may not be so obvious.

Production Risk Management: In most Wyoming counties, hay is the primary forage harvested for winter feeding. Hay is subject to considerable production risk. On some ranches, only upland hay is produced and in drought years they may have no production or reduced production. Other ranches may produce hay, often alfalfa, irrigated by water diverted from a stream or small storage reservoir. In drought years, irrigation may not be possible, or

may be limited to the early part of the production season and total production will be reduced because of lower yields per cutting and/or fewer cuttings. In other years, even when good management practices are followed, hay production may be relatively low because of other natural causes such as disease or insect infestations.

Many Wyoming ranch managers use a similar risk management strategy to protect their operations from shortfalls in hay production. They maintain hay inventories in excess of what they are most likely to need in the next feeding period. This strategy generally guarantees that they will have sufficient hay if that winter feeding period is longer and/or more severe than usual. It also provides some carryover hay for the next year's feeding period. If hay production is short in the next growing season, they then have carryover hay in their inventories.

Substantial production risks are associated with rangeland utilized by Wyoming livestock producers.

Most ranch managers also employ stocking rates that maintain the quality of the rangeland and leave inventories of useable forage after grazing. Views differ about how much of a forage resource should be utilized, but in periods of adequate precipitation and other satisfactory growing season conditions, most Wyoming producers leave some forage that could have been grazed. As with harvested roughage, standing forage serves as inventory for periods when range production is restricted because of limited precipitation, excessive heat and/or other factors during the growing season. When range is stressed on rangeland leased from public agencies how rangeland forage is utilized may be restricted by, for example, lowering stocking rates or specifying an early pull-off date.

Many Wyoming ranches raise their own replacement heifers. A cow-calf operation may retain more replacement heifers than might be expected. Such "overstocking" provides the rancher with some risk protection against loss of animals or infertility. In addition, more mature cows may be culled from a herd than would be indicated by recommended culling rates. For instance, additional culling might be needed if pregnancy testing indicates that several mature

cows are open. Likewise, some replacement heifers may be without calf, or the ranch manager may wish to cull some of the replacement heifers that are with calf for other reasons.

In recent years, the range of federally-subsidized crop insurance products that address ranch production risks has expanded. These products have been developed by several entities under contractual agreements with the Federal Crop Insurance Corporation (FCIC). Such products must be reviewed and approved by the Risk Management Agency (RMA) of the United States Department of Agriculture (USDA) prior to being offered to ranchers and other agricultural producers. They are intended to reduce the adverse economic impacts of production losses associated with natural catastrophic events. On many ranches, federal-subsidized insurance products provide protection against yield and/or revenue losses of feed grain, forage and rangeland production.

Price Risk Management: Price variability is a source of risk encountered by ranch operations. Ranch managers pursue several strategies to reduce price risk.

There is a tendency to associate price risks with commodities that are produced and sold by the ranch, but price risks are also associated with many production inputs. Some ranch managers contract ahead for inputs such as fuel and fertilizer. These forward contracts often specify the quantity and price of the input to be purchased. Sometimes, ranch managers have such inputs delivered to the farm well before the next production year, perhaps in the current tax year. Ranch managers with livestock feeding enterprises sometimes forward contract for the delivery of specified feed quantities at a fixed price. For example, a rancher retaining calves may forward contract for the future delivery of several thousand bushels of corn.

Ranch managers may also contract for the future delivery of commodities they produce for sale. For instance, a rancher may contract for the future delivery of a specified number of steer calves at a pre-specified price.

Other methods exist for forward pricing of both production inputs purchased for use on the ranch and commodities produced for sale on the ranch. Some producers use commodity futures markets to manage price risk by hedging through the use of futures contracts or purchase options contract to assure the opportunity to market at a minimum price.

In recent years, some price insurance products have been approved by RMA to address livestock price risks. These federally-subsidized insurance products are available in all Wyoming counties for feeder and fed cattle, lambs and swine.

FUNDAMENTAL ELEMENTS OF RMA PRODUCTION INSURANCE PRODUCTS

Introduction: Ranch managers generally consider three production risk management options. First, they may choose not to purchase any type of insurance. A ranch that pursues this option is choosing to *self insure*. Second, for certain potential causes of production loss, *single peril* crop insurance products may be available. For instance a producer may choose to take out an insurance policy that would provide an indemnity if a growing crop such as barley were to burn as a range fire spread. Single peril insurance products are available through private insurance companies but are not products developed under RMA funding and their premiums are not federally-subsidized. Third, the ranch may use a *multiple peril* crop insurance product developed under the auspices of the RMA with premium subsidies provided by the federal government.

Actual Production History Insurance (APH): RMA-approved products that address production losses are *multiple peril offerings* that cover production losses attributable to several natural causes. There are two general APH categories. *Yield insurance* (often referred to as MPC) provides indemnities for losses when per acre yields are low. *Revenue insurance* provides indemnities when per acre revenues (price x quantity) are low or when whole farm revenue is low because of shortfalls in production declines in product quality, and/or low prices.

These products provide risk protection for production and revenue losses because of unavoidable natural occurrences, including but not limited to adverse weather, fire, insects, disease, wildlife, earthquakes, volcanic eruption, failure of irrigation supply that cause production losses and, in the case of revenue insurance, unanticipated decreases in prices. Insurance payments are not made for losses due to negligence or failure to use good farming practices.

APH yield and revenue insurance products are sold and serviced by private-sector insurance companies. The products must have been approved by the Federal Crop Insurance Corporation (FCIC) before they can be offered to producers. The FCIC, a public corporation, oversees the operations of RMA.

Units for Insurance Coverage: Producers who use RMA production and revenue insurance products that cover risks associated with individual commodities need an understanding of insurable units. For an individual insurable commodity where coverage is based on the insured producer's *actual production history* (individual established yields), multiple peril insurance is usually available at the *optional*, *basic*, and *enterprise unit* levels. In group risk plans, where the producer buys insurance based on area yields (typically county yields) for the insured commodity, coverage is only available at the *enterprise level*.

An *optional unit* is land planted to a particular crop in a given section (per the legal definition of section). Land planted to the same crop in another section by the same operator is in a different optional unit.

A *basic unit* is land planted to a particular crop under the same share arrangements. So a basic unit could be two fields planted to the same crop, either in different sections or the same section, owned and operated by the ranch. Alternatively, two fields operated under the same share or lease arrangements with a particular landlord would form a basic unit.

An *enterprise unit* consists of all the land in a county planted to particular crop by the operation.

Ranch managers have the option of selecting different units for different crops in most multiple peril contracts. For example, corn for silage might be insured at the optional unit level while feed barley might be insured at the basic unit level.

A ranch manager should consider two major issues in making the units decision – the possibility of being indemnified for an insurable loss and the premium incurred for crop insurance coverage. For example, if a ranch manager knows that there is considerable difference in most years in yields on two geographically separated fields for the same crop (perhaps because of hail), the ranch may want to insure at the optional unit level to increase the likelihood of receiving an indemnity. However, premium rates per dollar of coverage for a crop are highest for optional units and lowest for enterprise units. So the ranch manager should evaluate the tradeoff between the indemnities they are likely to receive and the premium costs they incur.

Actual Production History Insurance Yield

Issues: The yields that are relevant to assessments of the benefits of insurance contracts depend on whether the insurance product is an individual APH based yield or revenue product or, alternatively, a group risk product.

For group risk products, the yields on which coverage is based and from which indemnities are determined are the county yields for the insured commodity. The yield and production information reported by the National Agricultural Statistics Service (NASS) of USDA is used for most commodities.

Ranches who select individual ranch-specific based insurance products must establish an *actual production history* (APH) for each crop on each insured unit.

Establishing an APH is a critical part of the insurance process. An APH must be developed for each insured unit of a crop. A history of *four to ten* consecutive years is required and must include the most recent crop year. If a producer changes cropping practices, their APH may change. The term “consecutive years” applies to the years the unit is cropped under the cropping practice for which insurance is provided. If the cropping practice requires that a unit be fallowed in certain years, those years do not count as part of the APH yield history. For example, under a summer fallow cropping practice in which a field is fallowed every other year, a 10 year crop APH would require information on crop yields over the previous twenty years.

To illustrate how APHs are established, consider the following information on two production histories for the same crop.

Year	Producer A (bushels per acre)	Producer B (bushels per acre)
1998	—	104
1999	—	80
2000	—	60
2001	—	86
2002	—	105
2003	—	60
2004	90	0
2005	60	60
2006	75	75
2007	50	50
APH Yield	69	77

four provides an APH of 69 bushels per acre. Producer B had 10 years of acceptable yield records. Adding these yields and dividing by 10 provides an APH of 77 per acre.

If a ranch has less than four years of recorded yield history, a *Transitional Yield* or *T-yield* provided by RMA (generally on a county basis) is then used to calculate the ranch’s APH.

A producer who has produced the crop but has no acceptable yield information will be given an APH equal to 65 percent of the *T-yield* for the crop. If the producer has acceptable annual yield data, but for less than four years, then *T-yields* will be used in the producer’s APH calculation as follows:

Proven Production	Use of T-Yield
If there is yield/production information for one year	Use 80 percent of the <i>T-Yield</i> for the other three years
If there is yield/production information for two years	Use 90 percent of the <i>T-yield</i> for the other two years
If there is yield /production information for three years	Use 100 percent of the <i>T-yield</i> for the missing year

If a ranch manager is a “new” producer who has not previously produced the commodity in the county, then the operation’s APH will be 100 percent of the relevant *T-yield*.

In many years, Wyoming producers realize yields a little below or above their APH yields. In other years, abnormally low yields are realized. The RMA allows a producer to substitute a value equal to 60 percent of the relevant *T-yield*, called a plug yield, for the abnormally low yield in their APH calculation. Using plug yields enables producers to avoid large year-to-year decreases in their APH, but if they use plug yields they are also required to pay higher premiums.

Coverage, Premiums and Subsidies, and Price and Indemnity Information for Multiple Peril Products Using Individual Yields: Both conventional yield insurance, often referred to as APH, and revenue products like *Crop Revenue Coverage* (CRC) use a producer’s actual production history as the basis for determining their multiple peril crop insurance coverage.

Yield-based insurance requires the producer to establish a *Yield Guarantee* by selecting an insurance coverage level for losses and multiplying the coverage level by the producer’s APH; that is, the *Yield Guarantee = Actual Production History x Coverage Level*. The *Coverage Level* is defined as the percentage of the *APH* the producer selects for coverage of a crop planted on an insurable unit. The ranch’s *coverage level* choice also determines the

percent of the total premium that will be subsidized by the federal government. Coverage levels and applicable subsidies for MPC (yield risk) products are as follows:

Coverage Levels (% of APH)	Premium Subsidies (% of Total Premium)
50	67
55	64
60	64
65	59
70	59
75	55
80	48
85	38

For each MPC crop product, RMA announces an **Established Price** for the commodity based on expected marketing conditions in advance of the sales closing date. Sometimes, prior to the sales closing date, RMA will amend the **Established Price** by announcing an **Additional Price** for a crop based on up-dated market information. A producer establishes a **Price Election** by taking 55 to 100 percent of the **Established Price** (or **Additional Price**).

An indemnity is paid when, because of some insurable cause, the producer's actual yield is less than their **yield guarantee**. On a per acre basis, the producer would then receive the following indemnity:

$$\text{Indemnity} = [\text{Yield Guarantee} - \text{Actual Yield}] \times \text{Price Election}.$$

The per acre **Gross Premium** associated with the producer's insurance contract is:

$$\text{Gross Premium} = [(\text{Yield Guarantee} \times \text{Price Election})] \times [\text{Premium Rate}].$$

The producer premium, the premium the ranch must pay, equals the difference between the **gross premium** and the **gross premium** multiplied by the **premium subsidy percentage**.

Catastrophic Risk Protection (or **CAT** coverage) is available for all crops for which yield-based APH insurance is offered at the 50 percent **coverage level** and a 55 percent **price election** for **\$300 per crop** insured by a rancher (up to a maximum of three crops per operation).

The revenue insurance product, **Crop Revenue Coverage** (CRC), involves two prices for the insured crop. Prior to the production of a crop and prior to the sales closing date for CRC coverage, a **CRC Base Price** is announced. The **CRC Base Price** is specified as a specific average futures contract settlement price for delivery at harvest time for a crop over a period just prior to the closing date for the **CRC** contract (typically at or just before the crop is planted).

Given the **CRC Base Price**, the producer establishes an initial per acre **Revenue Guarantee** as follows:

$$\text{Revenue Guarantee} = \text{APH} \times \text{Coverage Level} \times \text{CRC Base Price} \times 100 \%.$$

At harvest time, the **Revenue Guarantee** may be increased if the crop's **Harvest Price** exceeds its **CRC Base Price**. The **Harvest Price** is specified as a specific average futures contract settlement price at harvest time.

The CRC per acre gross premium is:

$$\text{Gross Premium} = \text{Revenue Guarantee} \times \text{Premium Rate}.$$

The rancher's premium is the difference between the **gross premium** and the **gross premium** multiplied by the **premium subsidy percentage**. The **premium subsidy percentage** is determined by the rancher's **coverage level**.¹

Catastrophic Risk Protection is not available for Crop Revenue Coverage.

An indemnity is due when the ranch's estimated per acre **Crop Value**, defined as the producer's actual

¹ In some states, two other revenue products – **Income Protection** and **Revenue Assurance**, may be offered. These products are not available in Wyoming.

yield x *harvest price*, is less than the ranch's *revenue guarantee*.

Coverage, Premiums and Subsidies, Price and Indemnity Information for Multiple Peril Group Risk and Income Protection Plans:

Group Risk Plan (GRP) and Group Risk Income Protection (GRIP) insurance products employ county-based (or similar) yields or proxies for yields as the basis for determining multiple peril crop insurance coverage.

In GRP products, producers determine their trigger yield by multiplying the *coverage level* percentage they select by the *Expected Yield* for the crop in the county, where the National Agricultural Statistics Service (NASS) average yield (or a proxy measure) for the county is generally used as the *Expected Yield*. In GRIP products, producers determine their trigger revenue by multiplying the coverage level they select by the *Expected Revenue* for the crop (established by RMA). The premium subsidies provided at each coverage level for GRP and GRIP, which differ from those applicable to products based on individual APH yields, are as follows:

Coverage Levels (% of County Yield)	GRP Premium Subsidies* (% of Total Premium)	GRIP Premium Subsidies* (% of Total Premium)
70	64	64
75	64	59
80	59	59
85	59	55
90	55	48

* These are the subsidy rates that applied for contracts signed prior to April 29, 2008. Subsidy rates for each coverage level may change over time.

For GRP products, a producer specifies a *Trigger Yield* by choosing a coverage level where

$$\text{Trigger Yield} = \text{Expected Yield} \times \text{Coverage Level.}$$

On a county by county basis, for GRP policies, RMA announces an *Amount of Protection* per acre (that is, RMA does not announce an *Established Price* for

crops covered under GRP policies). Ranchers planning risk management strategies for the next insurance year can approximate the *Amount of Protection* by multiplying the GRP county-level historical average yield for the crop by the price announced (*Established Price*) for APH coverage for the same crop, and then multiplying this product by 1.5.

Ranchers chose to insure 60 to 100 percent of the *Amount of Protection* per acre. *Catastrophic Risk Protection (CAT)* is available at 45 percent of the *Amount of Protection*.

The gross premium per acre for GRP product is as follows:

$$\text{Gross Premium} = [\text{Dollar Protection per Acre}] \times \text{Premium Rate.}$$

The rancher's per acre premium for GRP insurance equals the difference between the gross premium and the gross premium multiplied by the subsidy rate. The subsidy rate is determined by the *coverage level* selected by the rancher.

Under GRP coverage, a rancher will be indemnified when the *Payment Yield*, the county-level yield for the crop reported by NASS, falls below the *trigger yield*. The *payment yield* is published in the calendar year following the year insured. The indemnity per insured acre is:

$$\text{Indemnity per Acre} = [(\text{Trigger Yield} - \text{Payment Yield}) / (\text{Trigger Yield})] \times [\text{Dollar Protection per Acre}].$$

Group Risk Income Protection products are similar to those of GRP products except that several terms are expressed in *revenue per acre* rather than *production per acre*.

The *Expected County Yield* per acre is based on the NASS data on average yields for the county. The *Expected Price* is defined by the average daily settlement price for the appropriate underlying futures contract. The per acre *Expected County Revenue* = *Expected Yield* x *Expected Price*. The *Maximum Protection per Acre* available to the producer is 150 percent of the *Expected County Revenue*.

A rancher determines his **Protection per Acre** by selecting from 60 to 100 percent of the **Maximum Protection per Acre**.

A rancher determines his **Trigger Revenue per Acre** by multiplying the selected **coverage level** (70, 75, 80, 85 or 90 percent) times the **Expected County Revenue**.

A rancher with a crop insured under GRIP receives an indemnity when the actual county revenue, a value determined by multiplying the final county yield times the national estimated average harvest price, is less than the **Trigger Revenue** established by the rancher.

The indemnity is calculated by first establishing a **payment calculation factor**, which is defined as:

Payment Calculation Factor = $[\text{Trigger Yield} - \text{Actual County Revenue}] / [\text{Trigger Revenue}]$.

The per acre indemnity is then:

Indemnity = $[\text{Payment Calculation Factor} \times \text{Protection per Acre}]$.

The gross premium per acre is calculated as:

Gross Premium = $\text{Protection per Acre} \times \text{Premium Rate}$.

The rancher's per acre premium is the difference between the gross premium and the gross premium multiplied by the premium subsidy percentage. The premium subsidy percentage is determined by the rancher's choice of coverage level (that is, the percent of **expected county revenue** they choose for the specification of their **trigger revenue**).

FUNDAMENTAL ELEMENTS OF RMA PRODUCTS DIRECTLY APPLICABLE TO LIVESTOCK PRICE RISKS

Introduction: The crop production yield and revenue insurance products provided by RMA are useful tools for managing financial risks on ranches. For example, some producers use these insurance products to moderate the adverse economic consequences of production losses in alfalfa hay production and rangeland production. Others use revenue insurance

to moderate revenue losses associated with the production of corn for grain.

The Risk Management Agency also offers two types of products specific to livestock prices. **Livestock Risk Protection (LRP)** constitutes a family of **single peril** insurance offerings that allow livestock producers to insure against unexpected declines in livestock prices for feeder cattle, fed cattle, swine, and lambs. **Livestock Gross Margin (LGM)** is a family of **single peril** insurance offerings that allow cattle, swine, and dairy producers to insure against losses from decreases in margins for fed livestock operations due to movements in livestock and milk prices and feeding costs. Here we focus on LRP and LGM products for fed cattle.

Livestock Risk Protection for Fed Cattle (LRP-Fed Cattle): **LRP-Fed Cattle** provides insurance against declining market prices for fed cattle below an established coverage price. This insurance is applicable to fed cattle the rancher expects to grade **select** or higher with a **grade yield** of 1 to 3 that will be marketed for slaughter between **1,000** and **1,400 pounds** at the end of the insurance period.

LRP-Fed Cattle covers **steers** and **heifers**. The **target weight**, expressed in hundredweight, is the anticipated average weight for all cattle covered under the insurance policy, allowing for differences in market weights between steers and heifers. LRP-Fed Cattle insurance policies are offered for 13, 17, 21, 26, 30, 39, 43, 47, or 52 week **endorsement lengths**. Livestock producers select the **endorsement length** that, at the time they purchase the insurance, is closest to the date at which the insured cattle are to be marketed.

To obtain **LRP-Fed Cattle** coverage, a producer must obtain, complete and have a **Substantial Beneficial Interest Reporting Form** approved. To receive approval, the applicant must have least a 10 percent share in the cattle to be fed. The form establishes the insurance eligibility of the applicant and tracks insurance limits (a maximum of 2,000 head per reporting form and 4,000 head per entity per "crop" year, where the "crop" year is defined as July 1 through June 30).

Coverage prices are the prices that may be insured by a producer. **Coverage prices** are based on the **expected ending value** of the fed cattle to be insured. **Expected ending values** are determined by RMA (not the producer) and posted for most business days on the RMA web site, www3.rma.usda.gov/apps/livestock_reports. They reflect prices for fed cattle that are expected to occur at the end of the coverage period. **Coverage levels** range from 70 to 95 percent of the expected **ending values** and are known to the producer at the time LRP-Fed Cattle insurance is attached to a group of cattle on feed. The **coverage level** and **coverage price** are determined at the same time on the date the insurance is attached when a producer selects a **coverage price** from a RMA-posted table denoting available endorsement lengths and all related information.

Premiums are based on the insured value of the fed cattle, which is defined as:

Insured Value = Number of Head x **Target Weight** x **Coverage Price** x Insured Share.

The total premium is defined as:

Total Premium = **Insured Value** x Premium Rate.

This value is rounded to the nearest whole dollar and referred to as the **Rounded Total Premium**. The federal government provides a 13 percent premium subsidy on LRP insurance. The total subsidy is calculated as:

Total Subsidy = 0.13 x **Rounded Total Premium**.

The amount paid by the producer, the producer premium, is:

Producer Premium = **Total Premium** - **Total Subsidy**.

An indemnity is paid if the **actual ending value** is less than the **coverage price** selected by the producer. The **actual ending value** for fed cattle at the end of the endorsement period is the price of fed cattle as calculated weekly by the Agricultural Marketing Service (AMS). The indemnity is calculated as:

Indemnity = [Number of head insured x **Target Weight** x **Coverage Price** - **Actual Ending Value**] x Insured Share.

Note that neither the weight nor price at which the producer sells cattle enters the indemnity calculation.

Livestock Gross Margin: Livestock Gross Margin (LGM) is insurance offered for fed cattle, dairy, and hogs. The **LGM** products for all three types of livestock are similar. **LGM for Cattle** provides protection against a decline in cattle feeding margins by hedging for feeder cattle and corn input costs and the fed cattle selling price. Although LGM is based on futures market prices, producers using **LGM** take no futures or options positions themselves.

LGM for Cattle pays an insured producer an indemnity when the spread between the fed cattle sales price and both feeder cattle and corn prices narrows beyond the producer's coverage level due to changing market conditions. As the estimated gross margin narrows because of higher corn prices and/or lower fed cattle prices, the insurance indemnity becomes larger to offset lower revenues and/or increased costs.²

LGM for Cattle is used to prevent large losses in the event reductions in feeding margins caused by lower revenues and/or increased input costs. Reduced cattle feeding margin, based on the calculations specified in this policy, can result from lower fed cattle prices and/or increases in feeder cattle and corn prices.

Two types of cattle feeding operations can be insured using **LGM for Cattle**. A yearling feeder operation may be insured where the yearlings are assumed to be placed on feed at 750 pounds, fed 57.5 bushels of corn a month during the five month feeding period, and marketed at a finished weight of 1,250 pounds. A calf finishing operation may be insured where the calves are placed on feed at 550 pounds, fed 54.5 bushels of corn during the eight month feeding period and marketed at a finished weight of 1,150 pounds. To be eligible for **LGM for Cattle** insurance, the producer must have **substantial beneficial interest** in the cattle

² The fed cattle gross margin may also decline if the fed cattle price increases but corn price increases are large enough to more than offset the effects of the increase in the fed cattle price on the gross margin.

– defined as at least a 10 percent ownership of the insured cattle. Furthermore, the cattle must be located in a state like Wyoming where *LGM for Cattle* is offered.

Once a producer has been approved for *LGM for Cattle* insurance coverage and *substantial beneficial interest* has been verified, *target marketings* are established. *Target marketings* identify the number of slaughter-ready cattle that are expected to be marketed during the insurance period and that the producer wants to insure. Specific numbers of cattle are insured for each target month in the 11-month insurance period. Producers are not required to insure all of the fed cattle they intend to produce but the total number insured cannot exceed a producer's approved total marketings. A producer may insure up to 5,000 head of cattle for any 11-month insurance period and a maximum of 10,000 head in any given "crop" year, which is defined as the period from July 1 through June 30.

LGM for Cattle is sold only on the last business day of every month. Thus coverage can only be purchased on 12 days during the year. Sales commence once RMA reviews the price data from which the *Expected Gross Margin (EGM)* is calculated; sales end at 9:00 am (Central Standard Time) on the next business day.

The *Expected Gross Margin (EGM)* is the gross margin expected at the end of each month of the insurance period at the time insurance is purchased. Once all gross margins are calculated for each of the 11 target months (no targeted marketings are allowed in the first month after the insurance purchase date), then each monthly *EGM* is multiplied by the expected monthly marketings to arrive at a total *EGM*.

The calculation of the *EGM* for a calf finishing operation is defined as:

$$EGM_t = [11.50 \text{ hundredweight} \times \text{per hundredweight Fed Cattle Live Price}_t] - [5.50 \text{ hundredweight} \times \text{per hundredweight Feeder Cattle Price}_{t-8}] - [54.5 \text{ bushels of corn} \times \text{per bushel corn price}_{t-4}]$$

Month t is the month in which the ranch expects to sell the fed cattle. The fed cattle price for the target marketing month is the Chicago Mercantile Exchange closing futures price for the month in which the cattle

are expected to be sold (month t in the formula for EGM) averaged over the last three days in the month in which the insurance is purchased. The producer's state and month specific basis is then added to the three day average expected fed cattle price.

The next step is to determine the expected feeder cattle price. For a calf feeding operation the standardized feeding period is 240 days, or eight months prior to marketing, t - 8. The feeder cattle price for the eighth month prior to the target marketing month is the Chicago Mercantile Exchange closing futures price for the last three days in the current month (the month in which the insurance is purchased). A state and month-specific basis is then added to the average expected feeder cattle price.

To determine the cost of corn, an expected corn price is established using Chicago Board of Trade futures prices. Livestock consume corn continuously throughout the feeding period. So the midpoint of the feeding period is used (four months for the eight month calf feeding period). The expected corn price is the average of the Chicago Board of Trade closing price for the corn contract that expires in the fourth month of the calf feeding period over the last three days of the month in which insurance is purchased. The state and month specific basis for corn is then added to this average expected corn price. (A similar set of calculations are used in the *LGM* product for yearling feeder operations.)

At the time of the policy purchase, *EGMs* are calculated for each target marketing month (so there could be up to 11 values for fed cattle). Each *EGM* is multiplied by its respective *target marketing* and these products are summed to create the total *EGM*.

Producers may choose not to insure all of the maximum insurable gross margin value by selecting a deductible, which can range from \$0 to \$150 per insured head in \$10 increments. Once the producer selects the deductible, the *Gross Margin Guarantee (GMG)* is established; that is, *Gross Margin Guarantee* = Total *Expected Gross Margin* - deductible.

LGM for Cattle insurance premiums depend on several factors including the producer's marketing plan. These include the number of cattle to be sold

(i.e., the *targeted marketings* for the insurance period) and the per head deductibles selected. Premiums vary for each of the 12 sales periods within a year because of movements in the underlying futures prices for fed cattle, feeder cattle and corn embodied in the premium determination.

For most RMA-approved insurance products, the total premium is calculated by determining the maximum liability for the coverage selected by the producer and multiplying that maximum value by the specified premium rate and the producer pays the difference between this premium and the premium subsidy for the policy. The premium calculation for *LGM for Cattle* is different and is based on Monte Carlo or random draw simulation procedures where the same random “draws” are used for every insured cattle producer. The premium calculation involves the following five step process:

Step 1: The total *Expected Gross Margin (EGM)* and *Gross Margin Guarantee (GMG)* are calculated, where total *EGM* is the sum of the products of the monthly gross margins times their monthly cattle marketing expectations, and *GMG* is the total *EGM* less the per head deductible level (*DL*) times the sum of the monthly *targeted marketings*.

Step 2: The calculated ten month total *Simulated Gross Margins (SGM)* are calculated, where *SGM* is the sum of the products of the simulated gross margins for each month in the insurance period times the *targeted marketings* in each month of a producer’s marketing plan for the insurance period.

Step 3: Calculate the loss for each of the 5,000 months simulated, *loss (i)*, where $loss(I) = GMG$ less *SGM* for each month.

Step 4: $premium = 1/5,000 \times \text{sum of } 5,000 \text{ } loss(i)$ values.

Step5: $total\ premium = 1.03 \times premium$.

An indemnity is paid to the insured livestock producer at the end of the 11-month insurance period if there is a positive difference between the *Gross Margin Guarantee (GMG)* and the *Actual Gross Margin (AGM)*. The *AGM* for each month in the insurance

period is the difference between the actual fed cattle revenues and the actual costs of feeder cattle and corn (determined by exchange contract prices), as described in the gross margin calculations where there are fixed weights for the included variables. The monthly values for the *AGM* values are multiplied by their *targeted marketing* values to provide a total *AGM*. This total *AGM* is subtracted from the total *GMG* to determine the indemnity.

In In the indemnity calculation, *Actual Gross Margin (AGM)* is determined as follows:

$$AGM_t = [11.50 \text{ hundredweight} \times \text{per hundredweight Fed Cattle Live Price } _t] - [5.50 \text{ hundredweight} \times \text{per hundredweight Feeder Cattle Price }_{t-8}] - [54.5 \text{ bushels of corn} \times \text{per bushel corn price }_{t-4}].$$

The actual fed cattle price for the target marketing month, *t*, is the average of the Chicago Mercantile Exchange closing futures prices for the last three days in the month the contract expires. The state and month specific basis is then added to this average actual fed cattle price.

For a calf feeding operation, the standardized feeding period is 240 days, or eight months prior to marketing, *t - 8*. The actual feeder cattle price is the average of the Chicago Mercantile Exchange closing futures prices for the last three days in the month the feeder cattle contract expires. The state and month-specific basis is then added to this average actual feeder cattle price.

To determine the cost of corn, the actual corn price is established by using Chicago Board of Trade futures prices. Because livestock consume corn continuously throughout the feeding period, the midpoint of the feeding period is used, so four months for the eight month calf feeding period. The actual corn price is average of the Chicago Board of Trade closing prices for corn in the last three days in the month the corn contract expired. The state and month specific basis is then added to this average expected corn price.

FUNDAMENTAL ELEMENTS OF ONE RISK MANAGEMENT AGENCY WHOLE FARM (RANCH) RISK MANAGEMENT PRODUCT: AGR-LITE

Introduction: *Adjusted Gross Revenue Lite (AGR-Lite)* is a whole-farm/ranch revenue protection insurance plan that covers market sales revenue losses from all unprocessed commodities on the farm. The plan protects against low revenue due to losses in production and declines in product quality and market price. Specifically, the plan provides protection against low revenue attributable to unavoidable natural disasters and market fluctuations that affect farm revenue in the insurance year. *AGR-Lite* may be used as a stand-alone insurance plan or an “umbrella plan” in conjunction with other RMA insurance plans that address crop production and revenue risks and livestock price risks. *AGR-Lite* premiums are reduced when other RMA APH insurance plans are used to address crop specific yield and revenue risks.

AGR-Lite is offered in all Wyoming counties. In the *AGR-Lite* program Coverage is based on the lower of either the ranch’s most recent five year average of its gross income, as reported to the Internal Revenue Service on Schedule F or other relevant federal income tax return forms, or the farm’s expected revenue estimated using the operation’s expected yields and expected prices (estimated by RMA) for all crops. *AGR-Lite* protects against loss in revenue attributable to any unavoidable natural occurrences or market fluctuations that cause revenue losses during the insurance year.

Some losses are not covered by *AGR-Lite*. No insurance indemnities will be made for losses attributable to negligence, mismanagement, failure to use good farming practices, theft, or mysterious disappearance. Nor will indemnification occur if losses are attributable to lack of labor, crop abandonment, or bypassing of acreage. On the marketing side, no indemnification is due when commodities cannot be marketed because of quarantines, boycotts, or failure of buyers to make payments for commodities to producers. Losses due to an insured operator’s failure to obtain a price for any commodity that is reflective of the local market value will not be indemnified. Procedurally, if a producer fails to provide adequate records when

seeking indemnification for revenue losses, indemnifications will not be awarded.

Application Information: Producers must provide five years of income and expense information from their IRS income tax returns (Schedule F or equivalent) and certify that the information is accurately reported. Specifically, historical information is needed from the Farm Income and Farm Expenses sections of a producer’s IRS tax filings. Items included in farm income reported for income tax purposes but excluded from *AGR-Lite allowable income* are (1) cooperative distributions not tied to the commodities insured, (2) agricultural program payments, (3) crop insurance indemnities and federal disaster payments, (4) custom hire income, and (5) income attributable to post-harvest value added activities. Items included in farm expenses reported for income tax purposes but excluded from *AGR-Lite allowable expenses* are (1) depreciation costs (except for animals), (2) employee benefits including pensions and profit sharing, (3) interest costs, (4) rents paid, and (5) post-harvest costs including those associated with value-added production.

The five years of *allowable income* are summed and then divided by five to obtain the **5-Year Average Preliminary Adjusted AGR**. *Allowable expenses* for each tax year are totaled to provide the **5-Year Total Adjusted Expenses** and divided by five to obtain the **5-Year Average Preliminary Adjusted Expenses**.

For each revenue generating commodity, in each insurance year, producers work with their insurance agent to report the acres (or head, number, etc.) that are to be produced, total expected production, price per unit of production, and total value of production. These commodity specific total value estimates are summed to provide **Total Expected Income**. Producers who select higher coverage levels will also be required to submit commodity profiles for the two years prior to the current insurance year. For livestock commodities, reporting will be by enterprises such as spring calves sold at weaning, calves retained and sold as yearlings, etc.

Adjustments and Uses of Information: To increase the effectiveness of insurance coverage an **Indexed Average AGR (Indexed Income)** can be calculated for an operation whose annual adjusted gross revenues are

increasing. To qualify for indexing, (1) allowable income in at least one of the last two most recent years in the five year base period must be greater than the **Average AGR** and (2) the insurance year's **Total Expected Income** must be greater than the **Average AGR**. An **income trend factor** is developed and the **Average AGR** is multiple by the **income trend factor** to provide the **Indexed Average AGR (Indexed Income)**.

The **Approved AGR** is *the lesser* of: (1) **Average AGR** or **Indexed AGR (Indexed Income)** or (2) **Total Expected Farm Income**, the estimated expected income for the insurance year.

Approved Expenses depend on which adjusted gross income value is designated as the **Approved AGR**. **Approved Expenses** may be derived by direct assignment, indexing or factoring **Allowable Expenses** up or down.

Producer Decisions and Resultant Specification:

To be eligible for **AGR-Lite**, a producer has to meet several criteria, including a maximum liability of less than one million dollars and an approved gross income of less than \$2,051,281.³ Once **Approved AGR** and **Approved Expenses** are determined, ranch managers have to make two decisions relative to **AGR-Lite**.

They must first select a **coverage level** percentage. In part, the **coverage level** percentage depends on the number of revenue generating commodities included in the operation's production and marketing plan. The available coverage levels are 65, 75 and 80 percent of the **Approved AGR**. For a producer to obtain the highest **coverage level**, at least three commodities must each contribute a significant portion of total income. A significant portion is defined as $1/\text{number of commodities in the annual farm plan} \times 0.333 \times \text{Total Expected Income}$, where **Total Expected Income** is the amount defined in the insurance year farm plan.

A producer must then select a **payment rate**. Two **payment rates**, 75 or 90 percent, are available at each **coverage level**.

Each ranch therefore chooses one **coverage level/payment rate** combination that is applied to all commodities in the farm plan.

Once a coverage level is selected, the ranch has established a **Loss Inception Point** (also called a **Trigger Revenue**) where :

The Loss Inception Point = Trigger Yield = Approved AGR x coverage level percentage.

AGR-Lite Premium Calculations: Joint application of the coverage level and the payment rate determines a ranch's maximum liability, called the **AGR-Liability** or **Coverage**. **Coverage** is specified as:

AGR-Lite = Coverage = Approved AGR x coverage level percentage x payment rate

When **AGR-Lite** is used as an "umbrella" policy, other RMA-approved multiple peril insurance policy liabilities are subtracted from the **AGR-Lite Coverage** up to a maximum reduction of 50 percent of the **AGR Lite liability**. The reduced liability is called the **Premium Liability**.

Premium Calculations are as follows:

- **Total Premium = Premium Liability x AGR premium Rate.**
- **Subsidy Amount = Total Premium x Subsidy Rate.**
- **Producer Premium = Total Premium - Subsidy Amount.**

The **AGR premium rate** is calculated using (1) the actual commodities grown on the farm, (2) the amount of diversification on the farm, and (3) the number of commodities grown on the farm. **Subsidy rates** vary by coverage level and equal 59 percent for 65 percent coverage, 55 percent for 75 percent coverage, and 48 percent for 80 percent coverage.

Indemnities: An indemnity is paid when **Total Income**, as specified in the ranch's report of actual income performance for the insurance year, is less than the **Trigger Revenue**.

³ See the RMA Fact sheet on AGR-Lite at <http://www.rma.usda.gov/pubs/rme/agr-lite.pdf> for complete details of all producer eligibility requirements.

When a ranch's *allowable income* appears likely to fall below its *Trigger Level*, the manager should contact their insurance agent for guidance on how to document an actual loss in farm/ranch revenue. In addition to submitting the information required to document *Total Income*, the ranch must also submit their IRS return for the insurance year and each of the previous five years.

Actual expenses for the insurance year are determined from the IRS forms. Some accrual adjustments may be needed to ensure that the expenses considered in the adjustment process are those for the insurance year. When actual expenses are below 70 percent of their five year average, the *Approved AGR* is reduced by one tenth of a percent for each one tenth of a percent that expenses fall below their average. The ranch's *Trigger Level* is then recalculated as follows:

Trigger Level = *Approved AGR* (for expense reductions) x *coverage level* percentage.

The *Trigger Level* is reduced by *Revenue to Count*. *Revenue to Count* includes allowable income from the sale of covered commodities, other crop insurance indemnities, NAP payments, income lost due to non-insured causes, net gains from hedging, and changes in accounts receivable and inventories held for sale.

Once *Revenue to Count* has been identified, the ranch's *Revenue Deficiency* is calculated as:

Revenue Deficiency = *Trigger Level* - *Revenue to Count*.

The payment rate is then applied to determine the indemnity: that is,

Indemnity = *Revenue Deficiency* x *payment rate*.

Risk Management Strategy Alternatives: Examples Based on Two Representative Goshen County Ranches

Two ranches, one small and one large, representative of many ranches in Goshen County, were chosen to evaluate the use of several risk management strategies that involve the use of RMA insurance products.

Small Ranch: This ranch has 100 acres of irrigated alfalfa hay, 200 acres of non-irrigated grass and alfalfa hay, 100 acres of irrigated corn for grain, 60 acres of irrigated corn for silage and 1,500 acres of native rangeland. The livestock inventory consists of 75 bred cows, 11 replacement heifers, and 4 herd bulls.

Revenue enterprises in a typical year (no catastrophic loss) are:

- Heifer calf sales: 25 head at an average of 570 pounds per calf
- Steer calf sales: 36 head at an average 600 pounds per calf
- Cull cows: 11 head at an average of 1,000 pounds per cow
- Cull Bull: 1 head at an average of 1,900 pounds per bull
- Alfalfa Hay: 85 tons (20 acres with an average yield of 4.3 tons per acre)

In 2008, the expected gross income estimated or *approved AGR*⁴ for this typical **small** ranch is:

- Heifers: 25 head x 5.7 hundredweight x \$104.85 per hundredweight = \$ 14,941
- Steers: 36 head x 6.0 hundredweight x \$104.85 per hundredweight = \$ 22,648
- Cows: 11 head at 10.0 hundredweight x \$49.68 per hundredweight = \$ 5,485
- Bulls: 1 head at \$ 19.0 hundredweight x \$62.99 per hundredweight = \$ 1,197

Cow-Calf Enterprise Subtotal = \$44,271

Alfalfa: 85 tons at \$92 per ton = \$ 7,820

Projected 2008 Ranch Gross Income = \$52,091

Non-revenue enterprises, enterprises that do not generate revenues from market sales of crops or forage for the ranch, are:

⁴ In the two ranch examples, the expected gross income is assumed to be the ranch's *Approved AGR*. As discussed above, the approved AGR may be based on the adjusted gross income reported in the ranch's relevant federal income tax forms.

- Corn for Grain: 100 acres with an average yield of 131 bushels per acre
- Corn for Silage: 60 acres with an average yield of 21 tons per acre
- Grass/alfalfa Hay: 200 acres with an average yield of 1 ton per acre
- Alfalfa Hay: 80 acres with an average yield of 4.3 tons per acre
- Native Range: 1,500 acres

Large ranch: This ranch has 360 acres of irrigated alfalfa hay, 700 acres of non-irrigated grass and alfalfa hay, 100 acres of irrigated corn for grain, 60 acres of irrigated corn for silage and 17,000 acres of native rangeland. The livestock inventory is 360 bred cows, 50 replacement heifers, and 15 herd bulls.

Revenue enterprises on this large ranch in a typical year (no catastrophic loss) are:

- Heifer calf sales: 125 head with an average weight of 625 pounds per calf
- Steer calf sales: 115 head with an average weight of 650 pounds per calf
- Cull cows: 50 head with an average weight of 1,000 pounds per cow
- Cull Bull: 4 head with an average weight of 1,900 pounds per bull
- Alfalfa Hay: 310 tons (72 acres with an average yield of 4.3 tons per acre)
- Fed Steers: 60 head with an average weight of 1,250 pounds per steer

For the 2008 production year, the expected gross income estimated for this **large** ranch is:

- Heifers: 125 head x 6.25 hundredweight x \$94.36 per hundredweight = \$ 73,472
- Steers: 115 head x 6.50 hundredweight x \$104.85 per hundredweight = \$ 78,375
- Cows: 50 head at 10.0 hundredweight x \$49.68 per hundredweight = \$ 24,840
- Bulls: 4 head ay \$ 19.0 hundredweight x \$62.99 per hundredweight = \$ 5,984

Cow-Calf Enterprise Subtotal: = \$182,941

- Fed Steers: 60 head @ 12.5 hundredweight x \$93.50 per hundredweight = \$ 28,520

- Alfalfa: 310 tons @ \$92 per ton = \$ 70,350

Projected 2008 Ranch Gross Income = \$ 281,811

Non-revenue enterprises on this ranch are:

- Corn for Grain: 100 acres with an average yield of 131 bushels per acre
- Corn for Silage: 60 acres with an average yield of 21 tons per acre
- Grass/alfalfa Hay: 700 acres with an average yield of 1 ton per acre
- Alfalfa Hay: 288 acres with an average yield of 4.3 tons per acre
- Native Range: 17,000 acres

Risk Management Strategies:

Typically, many different risk management strategies can be pursued on any ranch. Ranch managers choose among these alternatives on the basis of the ranch's financial structure and their preferences about taking on or avoiding risk. In this analysis, the ranch manager is assumed to be interested in three basic risk management strategies and four combinations of these basic strategies. These seven different strategies are described in Table 1. The insurance premiums incurred in each strategy, estimated using the RMA Premium Calculator, are presented in Table 2 for the small ranch and Table 3 for the large ranch. Coverage levels and price elections specified in the premium calculations are described in Appendix Table A for both the small ranch and the large ranch. The large ranch's options differ from those available to the small ranch only because it has a fed cattle enterprise and the small ranch does not. The large ranch may therefore choose to use RMA's Livestock Gross Margin (LGM) insurance product to handle financial risks associated with that enterprise. When the large ranch uses LGM, however, there is no effect on the premium the ranch pays if it also purchases AGR-Lite coverage.

Table 1: Alternative RMA Product-Based Risk Management Strategies For the Large and Small Ranches

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers	LRP	LRP		LRP		LRP	
Steers	LRP	LRP		LRP		LRP	
Cows							
Bulls							
Fed Steers*	LRP	LGM		LRP		LGM	
Alfalfa Hay	MPCI	PRF		MPCI		PRF	
Subtotal			AGR-LITE	AGR-LITE	AGR-LITE	AGR-LITE	AGR-LITE
Non-revenue Enterprises:							
Corn, grain	MPCI	CRC		MPCI	MPCI	CRC	CRC
Corn, silage	MPCI	MPCI		MPCI	MPCI	MPCI	MPCI
Grass/alfalfa Hay	MPCI	PRF		MPCI	MPCI	PRF	PRF
Alfalfa Hay	APH	PRF		APH	APH	PRF	PRF
Rangeland	GRP	PRF		GRP	GRP	PRF	PRF

Table 2: Insurance Premiums Paid by the Small Ranch Under Each Risk Management Strategy

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers	\$750	\$750		\$750		\$750	
Steers	\$1,136	\$1,136		\$1,136		\$1,136	
Cows							
Bulls							
Fed Steers							
Alfalfa Hay	\$270	\$191		\$270		\$191	
Subtotal	\$2,156	\$2,077	\$930	\$2,156 +748	\$930	\$2,077 + 930	\$930
Non-revenue Enterprises:							
Corn, grain	\$1,139	\$1,910		\$1,139	\$1,139	\$1,910	\$1,910
Corn, silage	\$567	\$567		\$567	\$567	\$567	\$567
Grass/alfalfa Hay	\$1,512	\$439		\$1,512	\$1,512	\$439	\$439
Alfalfa Hay	\$1,081	\$765		\$1,081	\$1,081	\$765	\$765
Rangeland	\$389	\$664		\$389	\$389	\$664	\$664
Subtotal	\$4,688	\$4,345	0	\$4,688	\$4,688	\$4,345	\$4,345
Total	\$6,844	\$6,422	\$930	\$7,572	\$5,618	\$7,350	\$5,275

Table 3: Insurance Premiums Paid by the Large Ranch in Each Risk Management Strategy

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers	\$3,699	\$3,699		\$3,699		\$3,699	
Steers	\$3,932	\$3,932		\$3,932		\$3,932	
Cows							
Bulls							
Fed Steers	\$2,511	\$2,680		\$2,511		\$2,680	
Alfalfa Hay	\$957	\$704		\$957		\$704	
Subtotal	\$11,099	\$11,015	\$4,789	\$11,099 + \$4,234	\$4,789	\$11,015 + \$4,789	\$4,789
Non-revenue Enterprises:							
Corn, grain	\$1,139	\$1,910		\$1,139	\$1,139	\$1,910	\$1,910
Corn, silage	\$567	\$567		\$567	\$567	\$567	\$567
Grass/alfalfa Hay	\$5,215	\$3,654		\$5,215	\$5,215	\$3,654	\$3,654
Alfalfa Hay	\$3,829	\$2,814		\$3,829	\$3,829	\$2,814	\$2,814
Rangeland	\$4,102	\$7,221		\$4,102	\$4,102	\$7,221	\$7,221
Subtotal	\$14,852	\$16,166	0	\$14,852	\$14,852	\$16,166	\$16,166
Total	\$25,951	\$27,181	\$4,789	\$30,185	\$16,641	\$31,970	\$20,995

Scenarios:

Three “production year outcome” scenarios are examined for each ranch.

Scenario 1: Producers have an average or good year. Crop yields are close to, or above average, and prices are also close to those that were expected. Consequently there are no shortfalls in yields, prices or revenues. As a result, the ranch receives no insurance indemnities, but pays the premiums it owes for the insurance it purchases.

Scenario 2: Substantial price changes take place over the insurance period. Poor planting conditions in the

Corn Belt during the Spring result in a substantial reduction in the total area planted to corn. Furthermore, poor weather conditions continued into the growing season with excess rains severely damaging the corn crop in certain areas and lack of rain severely reduces corn yields in other areas. The result is that harvest prices for corn are 50 percent higher than anticipated early in the production year.

On Goshen County ranches, corn for grain and silage are raised as inputs for the livestock enterprises and growing conditions in the county are typical and yields for corn for grain and silage on the ranch are about average.

The sharp increase in national average corn prices, however, results in an unexpected 25 percent decline in national average feeder heifer and feeder steer prices.

Cull prices do not require feeding subsequent to coming off of the range and slaughter prices for culls therefore do not decline. Fed cattle on the larger ranch are also sold at or close to their slaughter weights, and may therefore even sell at higher price than the price that was anticipated when they were put on feed.

Insurance indemnities, however, may be paid for steers insured under LGM because of the increase in corn prices if the margin shift is not offset by declining feeder cattle prices.

The national increase in corn prices may also result in higher alfalfa hay prices in the local market in Goshen County. Thus, at harvest, alfalfa hay sells for at least \$110 per ton, higher than the price of \$92 per ton anticipated prior to the growing season.

Scenario 3: A severe drought occurs in southeast Wyoming and western Nebraska, leading to a 40 percent decline in yields (and proxy variables for yields). The drought is localized, so livestock sale prices do not change from those that were anticipated prior to the production period. At harvest, however, alfalfa hay prices are about \$110 per ton, higher than the price of \$92 per ton expected prior to the growing season.

Scenario Outcomes:

Scenario 1: In scenario 1, neither the large ranch nor the small ranch receives any indemnities. Each ranch’s net indemnity is negative (there is a reduction in ranch net income) and equal to the premiums paid by the ranch for the insurance it purchased (see Tables 2 and 3 on pages 20 & 21). The largest reduction in ranch net income for both the small and large ranch occur under **Strategies 4 and 6**, the strategies in which the ranch operator carries AGR-Lite as an umbrella policy and purchases available commodity specific insurance policies.

Scenario 2: Indemnity outcomes under this scenario for each of the seven risk management strategies are

presented in Table 4 for the small ranch and Table 5 for the large ranch.

In Scenario 2, the small ranch receives indemnities under **Strategies 1, 2, 4, and 6**. In each case, the indemnities are paid on the LRP policies purchased for feeder steers and heifers. The LRP indemnities are calculated as follows:

$$\text{Indemnity} = [\text{Number of head insured} \times \text{target weight} \times (\text{coverage price} - \text{actual price}) \times \text{share}].$$

$$\text{Heifer Indemnity} = [25 \text{ head} \times 5.7 \text{ hundredweight} \times (\$103.71 - \$78.64) \times 1.0] = \$3,572$$

$$\text{Steer Indemnity} = [36 \text{ head} \times 6.0 \text{ hundredweight} \times (\$103.71 - \$78.64) \times 1.0] = \$5,415$$

In this scenario, the end price for the animal (\$78.64 per hundredweight) is 75 percent of the expected price at the time the insurance was attached. In eastern Wyoming, there is a positive basis estimated to be about \$4.00 per hundredweight. To obtain an estimate of the producer’s actual sales price for the ranch’s animals, this basis is added to the national price to yield an estimated actual sales price of \$82.64 per hundredweight. Thus revenues from market sales for feeder steers and heifers are assumed to be:

$$25 \text{ head} \times 5.7 \text{ hundredweight} \times \$ 82.64 = \$11,776.$$

$$36 \text{ head} \times 6.0 \text{ hundredweight} \times \$ 82.64 = \$17,850.$$

The local price for alfalfa hay is assumed to be \$110 per ton. Thus the estimated revenue for hay sales is:

$$85 \text{ tons} \times \$110 = \$ 9,350.$$

Under AGR-Lite, an indemnity is paid if the **Revenue to Count** is less than the **Trigger Revenue**, where the **Trigger Revenue= Approved AGR x Coverage Level**.

For the small ranch, the AGR-Lite **Trigger Revenue** = \$52,091 x 0.65 = \$33,859. There is no AGR-Lite indemnity as the small ranch’s **Revenue to Count** is:

Heifers	\$ 11,776
Steers	\$ 17,850
Cows	\$ 5,485
Bulls	\$ 1,197
Alfalfa Hay	\$ 9,350

Total Revenue to Count \$ 45,658

Table 4: Scenario 2 Insurance Indemnities Received by the Small Ranch Under Each Risk Management Strategy

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers	LRP \$3,572	LRP \$3,572		LRP \$3,572		LRP \$3,572	
Steers	LRP \$5,415	LRP \$5,415		LRP \$5,415		LRP \$5,415	
Cows							
Bulls							
Fed Steers							
Alfalfa Hay							
Subtotal	\$8,987	\$8,987		\$8,987		\$8,987	
Non-revenue Enterprises:							
Corn, grain							
Corn, silage							
Grass/alfalfa Hay							
Alfalfa Hay							
Rangeland							
Subtotal	0	0		0		0	
Total	\$8,987	\$8,987		\$8,987		\$8,987	

Table 5: Scenario 2 Insurance Indemnities Received by the Large Ranch Under Each Risk Management Strategy

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers	LRP \$18,234	LRP \$18,234		LRP \$18,234		LRP \$18,234	
Steers	LRP \$18,740	LRP \$18,740		LRP \$18,740		LRP \$18,740	
Cows							
Bulls							
Fed Steers		LGM \$6,539				LGM \$6,539	
Alfalfa Hay							
Subtotal	\$ 36,974	\$ 43,512		\$ 36,974		\$ 43,512	
Non-revenue Enterprises:							
Corn, grain							
Corn, silage							
Grass/alfalfa Hay							
Alfalfa Hay							
Rangeland							
Subtotal	0	0		0		0	
Total	\$ 36,974	\$ 43,512		\$ 36,974		\$ 43,512	

In Scenario 2, as shown in Table 5, the large ranch receives LRP indemnities but does not receive AGR-Lite indemnities under **Strategies 1, 2, 4 and 6**. The LRP indemnities are:

Heifer Indemnity = [125 head x 6.25 hundredweight x (\$93.34 - \$70.00) x 1.0 = \$18,234.

Steer Indemnity = [115 head x 6.50 hundredweight x (\$103.71 - \$78.64) x 1.0 = \$18,740.

The AGR-Lite situation is as follows. The basis in eastern Wyoming is positive and \$4.00 per hundredweight. Therefore, the sales prices received

by the producer for heifers and steers are respectively assumed to be \$74 and \$82.64 per hundredweight. The ranch's sales receipts for steers and heifers, required to estimate whether the ranch will receive an AGR-Lite indemnity, are:

125 heifers x 6.25 hundredweight x \$74 = \$57,813.
115 steers x 6.50 hundredweight x \$82.64 = \$61,773.

The local price of hay at harvest is assumed to \$110 per ton, and revenue from hay sales is therefore:
310 ton x \$110 = \$34,100.

For the large ranch, the AGR-Lite **Trigger Revenue** = 281,811 x 0.65 = \$183,177.

The ranch's **Revenue to Count** is:

Heifers	\$ 57,813
Steers	\$ 61,773
Cows	\$ 24,840
Bulls	\$ 5,984
Fed steers	\$ 70,350
Alfalfa Hay	\$ 34,100

Total Revenue to Count **\$254,860**

The **Revenue to Count** exceeds the **Trigger Revenue** and so there is no indemnity due under AGR-Lite.

The large ranch has the option of insuring the gross margin for feeding cattle using the Livestock Gross Margin (LGM) insurance product instead of using LRP to insure the fed cattle price. For calves put on feed around the end of October, 2007, the insurable gross margin is \$335.91 per calf. This margin is calculated using the LGM formulas and procedures described above (as specified by RMA in the LGM contract).

The ranch's expected gross margin on each calf is calculated as follows:

Expected
Gross Margin = [(11.5 hundredweight for fed animal) per calf x (expected fed cattle price + state basis)] - [(5.5 hundredweight for the feeder animal) x (expected price of the feeder animal + state basis)] - [(54.5 bushels of corn) x (expected price of corn + state basis)].

Applying the formula under the assumptions that the expected fed cattle price is \$95.33, the basis is positive and about \$17.95, the feeder cattle price is \$124.56, the feeder cattle basis is \$11.88, the price of corn is \$4 and the corn basis is 3 cents:

Expected Gross
Margin per calf = [(11.5) x (\$95.33 + \$17.95)]
- [(5.5) x (\$124.56 + \$11.88)]
- [(54.5) x (\$4.00 + \$0.03)]
= \$335.91

If the estimated Actual Gross Margin in the month sales were planned is less than the Expected Gross Margin, then an indemnity is paid to the ranch.

In scenario 2, it is assumed that, four months prior to the completion of the LGM contract, the corn futures prices increased \$6.00 per bushel, 50 percent higher than corn prices at the inception of the contract.

The feeder calf price used to calculate the Actual Gross Margin is the closing futures prices eight months prior to fulfillment of the LGM contract, essentially when the contract was initiated. Thus the initial futures price of \$124.56 is used to calculate the Actual Gross Margin. The fed cattle price is assumed to remain constant over the life of the contract. Hence,

Actual Gross Margin
per calf = [(11.5) x (\$95.33 + \$17.95)]
- [(5.5) x (\$124.56 + \$11.88)]
- [(54.5) x (\$6.00 - \$0.03)]
= \$ 226.93

The Expected Gross Margin exceeds the Actual Gross Margin. Thus, the ranch receives an LGM indemnity of \$108.98 per head, and a total indemnity of \$6,539 for the 60 steers whose margins were insured.

Scenario 3: In this scenario, drought in Goshen and nearby southeast Wyoming counties, results in yields that are 60 percent of average. Thus, in scenario 3, as shown in Table 6 and 7, both the small ranch and the large ranch receive insurance indemnities under all risk management strategies except Strategy 3, in which AGR-Lite, is used a "stand-alone" strategy.

Table 6: Scenario 3 Insurance Indemnities Received by the Small Ranch Under Each Risk Management Strategy

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers							
Steers							
Cows							
Bulls							
Fed Steers							
Alfalfa Hay	\$368	\$960		\$368		\$960	
Subtotal	\$ 368	\$ 960	0	\$ 368	0	\$ 960	0
Non-revenue Enterprises:							
Corn, grain	\$3,135	\$3,960		\$3,135	\$3,135	\$3,960	\$3,960
Corn, silage	\$1,859	\$1,859		\$1,859	\$1,859	\$1,859	\$1,859
Grass/alfalfa Hay	\$870	\$9,602		\$870	\$870	\$9,602	\$9,602
Alfalfa Hay	\$1,492	\$3,841		\$1,492	\$1,492	\$3,841	\$3,841
Rangeland	\$1,905	\$3,540		\$1,905	\$1,905	\$3,540	\$3,540
Subtotal	\$9,241	\$22,802		\$9,241	\$9,241	\$22,802	\$22,802
Total	\$9,609	\$23,762		\$9,609	\$9,609	\$23,762	\$23,762

Table 7: Scenario 3 Insurance Indemnities Received by the Large Ranch Under Each Risk Management Strategy

Item	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Revenue Enterprises:							
Cow Calf							
Heifers							
Steers							
Cows							
Bulls							
Fed Steers							
Alfalfa Hay	\$1,325	\$3,567		\$1,325		\$3,567	
Subtotal	\$1,325	\$3,567		\$1,325		\$3,567	
Non-revenue Enterprises:							
Corn, grain	\$3,135	\$0		\$3,135	\$3,135		
Corn, silage	\$1,859	\$1,859		\$1,859	\$1,859	\$1,859	\$1,859
Grass/alfalfa Hay	\$3,045	\$33,607		\$3,045	\$3,045	\$33,607	\$33,607
Alfalfa Hay	\$5,295	\$14,269		\$5,295	\$5,295	\$14,269	\$14,269
Rangeland	\$21,590	\$40,120		\$21,590	\$21,590	\$40,120	\$40,120
Subtotal	\$ 34,928	\$ 89,315		\$ 34,928	\$ 34,928	\$ 89,315	\$ 89,315
Total	\$ 36,253	\$ 92,882		\$ 36,253	\$ 34,928	\$ 92,882	\$ 89,315

Alfalfa hay, a revenue enterprise in part, receives an indemnity under APH crop insurance coverage. Indemnities are also received for the non-revenue enterprises corn for grain, corn for silage, grass/alfalfa hay, and the bulk of the alfalfa hay production that is produced for feed.

Indemnities under APH crop insurance coverage are calculated in the same manner for all commodities. The procedure is illustrated for the case of corn for silage. The corn for silage APH is **21 tons per acre** and the **coverage level** selected by the ranch is **65**

percent. Thus, under the APH insurance contract, the **payment yield** (or trigger yield) equals 21 tons per acre x 65 percent or **13.65 tons per acre**. Each ranch's actual yield is 12.60 per acre. The selected **price election** is \$29.50 per ton. So, for each ranch:

$$\text{Indemnity per Acre} = (13.65 \text{ tons} - 12.60 \text{ tons}) \times \$29.50 \text{ per ton} = \$30.97 \text{ per acre}$$

As each ranch plants the same area to corn for silage, their total indemnity for corn for silage is:

Corn for Silage Total Indemnity = 60 acres x \$30.97 per acre = \$1,859.

Corn for grain could be covered under an APH Multiple Peril Crop Insurance contract, or an APH based Crop Revenue Coverage (CRC) contract, a revenue insurance product. Under the assumption that (because of drought conditions in the Corn Belt) the Harvest price for corn is \$6.00 per bushel (as described in Scenario 2), and the yield outcomes assumed in Scenario 3, a CRC indemnity is available for corn for grain. Each ranch's CRC indemnity is calculated as follows. The initial **CRC Revenue Guarantee** = (131 bushels per acre x 0.65 coverage level) x \$5.40 per bushel = \$460.08 per acre. The **Final Revenue Guarantee** = (131 bushels per acre x 0.65) x \$6.00 per bushel = \$ 511.20. The **Indemnity per Acre = Final Revenue Guarantee - Crop Value** where the **Crop Value** = (Actual Yield x Harvest Price). For each ranch:

Actual Yield = 78.6 bushels per acre (40 percent less than the APH yield)

Crop Value = 78.6 bushels per acre x \$6.00 per acre = \$ 471.60 per acre

As the Crop Value is less than the Final Revenue Guarantee, each ranch receives an indemnity for corn for grain under CRC where:

Indemnity per Acre = \$ 511.20 - \$ 471.60 = \$ 39.60 per acre.

Total Indemnity = 100 acres x \$39.60 per acre = \$3,960.

Rangeland insurance has been available to ranchers in Goshen County and other eastern Wyoming counties for several years in the form of a Group Risk Plan that is based on net hay production. This product will be replaced by the PRF product in 2009. Under the rangeland GRP, in Goshen County the count base hay production is 7,754 tons. At a 90 percent coverage level, the GRP "Trigger Yield" is 6,978 tons.

In Scenario 3, rangeland also suffers a 40 percent loss in production, reflected by a 40 percent reduction in net hay production to 4,652 tons in the county.

The **Maximum Protection per Acre** for rangeland in Goshen County for this crop insurance product is determined by RMA to be \$4.23 per acre. Given the selected **Coverage Level** of 90 percent, the **Dollar Protection per Acre** is **\$3.81**. Net hay production falls below the "Trigger Yield" in Scenario 3. Thus each ranch receives a per acre indemnity where:

$$\begin{aligned} \text{Indemnity per Acre} &= \text{Payment Factor} \times \text{Dollar Protection per Acre} \\ &= \left[\frac{\text{Trigger production} - \text{Actual production}}{\text{Trigger production}} \right] \times \text{Dollar Protection per Acre} \\ &= \left[\frac{(6,978 \text{ tons} - 4,652 \text{ tons})}{(6,978 \text{ tons})} \right] \times \$3.81 \text{ per acre} \\ &= \$ 1.27 \text{ per acre} \end{aligned}$$

The total indemnities received by each ranch, which differ because they insure different areas of rangeland, are:

Small Ranch Total Indemnity = \$ 1.27 per acre x 1,500 acres = \$1,905.

Large Ranch Total Indemnity = \$1.27 per acre x 17,000 acres = \$21,950.

In 2008, Pasture, Rangeland, and Forage (PRF) insurance, a new group risk plan product, became available to ranchers in all Wyoming counties. PRF is a group risk insurance product based on geographic areas within counties. PRF is offered for areas or grids that are 4.8 miles by 4.8 miles in size and indemnities based on a vegetation index for each grid.

The product works as follows: RMA establishes a **County Base Value** or **Revenue Value per acre** for each county which equals \$7.96 for Goshen County and applies to all grids in the county. A producer then selects a **Productivity Factor** of 60 to 150 percent of the **Revenue Value per acre** and a **Producer Share** (the producer's insurable share of production), which may be as much as 100 percent. The producer's **Dollar Protection per Acre** = County Base Value x Productivity Factor x Insurable Share.

The RMA establishes a Grid Index for each production interval. Index values are centered on a grid value of 100, and the average or expected value for the index is therefore 100. A producer establishes a Trigger Grid Index by choosing a coverage level and applying it to the Expected Grid Index. The producer's Trigger Grid Index = Expected Grid Index x Coverage Level.

An indemnity is paid if the Final Grid Index, determined by satellite based measures of the actual vegetation during the each production interval, is less than the Trigger Grid Index. To determine the indemnity, the RMA applies the Payment Calculation Factor, where,

$$\text{Payment Calculation Factor} = \frac{[(\text{Trigger Yield Index} - \text{Final Grid Index}) / (\text{Trigger Grid Index})]}{1}$$

$$\text{Per acre indemnity} = \text{Payment Calculation Factor} \times \text{Dollar Protection per Acre.}$$

The 2008 PRF **County Base Value** for Goshen Count is **\$7.96** per acre. Each ranch is assumed to have a 100 percent share in their rangeland production and to have selected a productivity factor of 1.0 (100 percent) and a coverage level of 90 percent. Thus, for each ranch:

- Dollar Protection per Acre = \$7.96 per acre x 0.90 = \$ 7.16 per acre.
- Trigger Index Value = 100 x 90 = 90
- Final Index Value = 60 (for all production intervals)
- Payment Calculation Factor = [(90- 60)/(90)] = 0.33
- Indemnity per Acre = 0.33 x \$7.16 per acre = \$2.36 per acre.

Total indemnities differ because of the different rangeland areas insured by each ranch:

$$\text{Small Ranch Total Indemnity} = \$2.36 \text{ per acre} \times 1,500 \text{ acres} = \$3,540.$$

$$\text{Large Ranch Total Indemnity} = \$2.36 \text{ per acre} \times 17,000 \text{ acres} = \$40,120.$$

The PRF product is also available for forage production in all Wyoming counties. For 2008, the forage County Base Value was \$161.67 per acre all Wyoming counties. At a 90 percent Coverage Level:

$$\text{Forage Dollar Protection per Acre} = \$161.67 \times 0.90 = \$145.50 \text{ per acre.}$$

Given a forage Expected Index Value of 100 and an Actual Index Value of 60 for the grid, the forage Indemnity per Acre paid to each ranch is \$0.33 x \$145.50 = \$48.01.

The PRF forage indemnities for the small ranch are:

Alfalfa/grass hay: 200 acres x \$48.01 per acre	= \$9,602
Alfalfa hay for sale: 20 acres x \$48.01 per acre	= \$960
Alfalfa hay for feed: 80 acres x \$48.01 per acre	= \$3,841
Total PRF indemnities	= \$14,403

The PRF forage indemnities for the large ranch are:

Alfalfa/grass hay:	
700 acres x \$48.01 per acre	= \$33,607
Alfalfa hay for sale:	
72 acres x \$48.01 per acre	= \$ 3,567
Alfalfa hay for feed: 288 acres x \$ 48.01 per acre	= \$14, 269
Total PRF Indemnities	= \$51,433

Under AGR-Lite, the only revenue enterprise affected by the 40 percent drop in crop and rangeland yields in Goshen County is alfalfa grown for cash sale. As described above, for each ranch, revenues for expected alfalfa sales and projects ranch gross incomes are as follows:

Small Ranch:

$$\text{Alfalfa: } 85 \text{ tons @ } \$92 \text{ per ton} = \$ 7,820$$

$$\text{Projected 2008 Ranch Gross Income} = \$52,091.$$

Large Ranch:

$$\text{Alfalfa: } 310 \text{ tons @ } \$92 \text{ per ton} = \$ 28,520$$

$$\text{Projected 2008 Gross Income: } \$281,811.$$

Under AGR-Lite, indemnities are paid only if the ranch's **Revenue to Count** is less than its **Trigger Revenue** where:

Trigger Revenue = Approved AGR x Coverage Level.

At a 65 percent coverage level, the **Trigger Revenues** for each ranch are:

Small Ranch: $\$52,091 \times 0.65 = \$33,859$
Large Ranch: $\$281,811 \times 0.65 = \$183,177$

Each ranch's **Revenue to Count** is greater than its **Trigger Revenue** and no AGR-Lite indemnities are paid. The Revenue to Count for each ranch is:

Small Ranch:

Alfalfa: 51 tons @ \$110 per ton	=	\$5,610
PRF indemnity for alfalfa hay for sale:	=	\$ 960
Subtotal	=	\$6,570

Revenue to Count = $\$52,091 - 7,820 + 6,570 = \$50,841$.

Large Ranch :

Alfalfa: 186 tons @ \$110 per ton	=	\$20,460
PRF indemnity for alfalfa hay for sale:	=	\$ 3,567
Subtotal	=	\$24,027

Revenue to Count = $\$281,811 - 28,520 + 24,027 = \$277,318$.

As only alfalfa hay is sold for cash and livestock sales revenues are not affected by the drought, forage and crops are minor revenue enterprises and so, even though forage and crop losses are substantial, no indemnities are received under AGR-Lite.

CONCLUSION

Wyoming ranchers have access to a wide array of RMA crop, rangeland and livestock insurance products that can help them to manage their financial risks. This bulletin has described many of these products and demonstrates by example how ranchers may choose to combine several of them to obtain protection against crop losses and adverse movements in commodity prices. However, some products are likely to be more useful to Wyoming ranchers than others. For example, AGR-Lite may provide effective and relatively inexpensive protection against financial risks for farms that market all or most of the crops they produce. Nevertheless, for ranches that use most of the crops and forage they produce to feed their own livestock, AGR-Lite provides little protection against crop and forage losses for those crops and forages that seldom contribute directly to the ranch's adjusted gross income.

Appendix

Table A: Producer-Selected Characteristics of RMA Insurance Products Employed in Risk Management Strategies 1 through 3*

Item	Strategy 1	Strategy 2	Strategy 3
Revenue Enterprises:			
Heifers	LRP: 26 weeks, highest coverage level and price	LRP: 26 weeks, highest coverage level and price	
Steers	LRP: 26 weeks, highest coverage level and price	LRP: 26 weeks, highest coverage level and price	
Fed Steers	LRP: 30 weeks, highest coverage level and price	LGM: Target month and \$0 deductible	
Alfalfa Hay	APH: 65 % coverage level and 100 % price election	PRF: 70% coverage level and 100% payment rate	
			AGR-Lite: 65 % coverage level and 90 % payment rate
Subtotal			
Non-revenue Enterprises:			
Corn, grain	APH: 65 % coverage level and 100 % price election	CRC: 70% coverage level and 100 % price election	
Corn, silage	APH: 65 % coverage level and 100 % price election	APH: 70% coverage level and 100% price election	
Grass/alfalfa hay	APH: 65 % coverage level and 100 % price election	PRF: 70% coverage level and 100% payment rate	
Alfalfa hay	APH: 65 % coverage level and 100 % price election	PRF: 70% coverage level and 100% payment rate	
Rangeland	GRP: 90 % coverage level	PRF: 70% coverage level and 100% payment rate	
Subtotal			

* Strategies 4 through 6 include insurance choices that have the same producer-selected characteristics as they involve various combinations of Strategies 1 through 3.



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