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Managing Price Risk through the Livestock Risk Protection Insurance Plan in the Western United States

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Introduction

The United States Department of Agriculture (USDA) Risk Management Agency (RMA) has supported and managed federally subsidized insurance for crops and forages since the 1980s. More recently, RMA introduced insurance products that are explicitly designed for livestock producers to use against unexpected declines in livestock prices and gross margins (the difference between expected prices and expected feed costs).

In 2003, RMA introduced a Livestock Risk Protection (LRP) insurance product to offer protection against unexpected reductions in the prices expected for livestock at the time the producer anticipates the livestock will be sold. LRP policies are marketed by private insurance agents and managed by private insurance companies, but premium rates and insurance policy provisions are established by RMA.

Livestock Risk Protection insurance policies are currently offered for feeder cattle, fed cattle, swine and lambs. The dollars of insurance liability incurred in recent years for feeder cattle, lambs and fed cattle in the western United States are shown in Table 1. State-level dollars of insurance liability are presented in appendix tables.

The purpose of LRP is offset the risk of price declines below the price, as established by RMA, that is expected to exist at the time the livestock covered under the policy are expected to be sold. The expected price against which indemnities are determined is established by RMA using procedures that are explicitly defined and available to the insured producers. Those procedures use futures market price information.

The focus of this briefing is to describe the LRP for feeder cattle, the category of livestock raised most extensively in many western states, and the potential use of LRP as a price risk management tool by producers in those states. However, farm and ranch operations in the western United States also raise fed cattle, hogs and lambs. Therefore, this briefing paper also describes the basic characteristics of the LRP policies for those commodities.

Table 1: Dollars of Insurance Liability for Livestock Risk Protection Insurance in the Western United States, by Type of Livestock*

Year	Feeder Cattle ($)	Lamb ($)	Fed Cattle ($)
2016	12,031,737	7,626,349	2,750,220
2017	19,729,363	17,656,758	797,741
2018	11,163,815	34,427,027	1,010,576

*These data are available on the RMA website under the general heading *Summary of Business.* LRP for swine is available in the 11 Western United States. Insurance liability by state for feeder cattle, lamb and fed cattle is reported in the appendix tables.

Basic Characteristics of LRP Policies

The LRP policies for feeder cattle, fed cattle, swine and lambs have similar core characteristics. To understand these characteristics, it is important to define the major concepts used by RMA in establishing the provisions of LRP's for each category of livestock. These concepts are as follows:

Specific Coverage Endorsement*:** An endorsement to the LRP policy required for coverage that includes specific information about the class (of livestock) to be insured. As an example if a producer this week wants to insure some heavy steers the producer would need a ***Specific Coverage Endorsement. If a producer buys some light weight feeder steers the next week and wants to insure them, then the producer will need ***a second Specific Coverage Endorsement.***

***Expected Ending Value*:** The expected value at the end of the coverage period, at the time coverage is obtained, for one insured animal in the livestock category for which insurance is purchased, as published on the RMA website.

Actual Ending Value: The actual value of the insured animals at the end of the period covered by the insurance, as established by RMA. The value is the weighted average price for the animal over a period just prior to the end date of the period covered by the insurance policy using procedures explicitly defined in the Specific Coverage Endorsement for the insured category of livestock (feeder cattle, fed cattle, swine, lambs).

***Coverage**:* The insurance provided in a LRP policy against a decline in price as specified in the Specific Coverage Endorsement for the class of livestock to be insured.

Coverage Level: The percent of the expected ending value selected by the insured from the percentages available as provided in a policy.

Coverage Price: The level of protection provided by the policy on a dollar per cwt basis as published each day on the RMA website.

Coverage Limitations: LRP policies only cover changes in livestock prices. LRP policies do not cover any other peril including mortality, condemnation, physical damage, disease, individual marketing decisions, local price aberrations, or any other cause of loss.

Crop Year: The twelve month period, beginning on July 1 and ending on the following June 30, and designated in the calendar year in which the period ends. The crop year in which the ***effective date*** at which the policy is obtained falls will determine the crop year for a Specific Coverage Endorsement.

Cwt: Hundredweight

Effective Date: The date associated with the beginning of insurance for a Specific Coverage Endorsement.

End Date: The date selected by the producer and stated in the Specific Coverage Endorsement that coverage ends.

Ending Period: The period specified by the Specific Coverage Endorsement, ending on the end date, over which the ending value for the insured class of livestock is determined.

Insured Value: The insured value is the total dollar amount of coverage calculated by multiplying the ***number of livestock*** or livestock product insured under the Specific Coverage Endorsement by the ***target weight*** for the class of livestock (as shown in the Specific Coverage Endorsement), by the

coverage price in dollars per cwt., and by the insured ***share***.

Insurance Period: Coverage begins on the covered livestock on the effective date of the Specific Coverage Endorsement. Coverage ends on the covered livestock on the end date stated on each Specific Coverage Endorsement.

Lean Weight: Lean weight is a measure of animal carcass weight, presented in cwt.

Live Weight: Live weight is a measure of the live animal's weight, stated in cwt.

Target Weight: The anticipated weight of the insured livestock at the ending period as specified in the Specific Coverage Endorsement.

The basic characteristics of all LRP policies, which are common for all covered livestock, are presented in Table 2 for fed cattle, swine and hogs. In each of these livestock classes, the producer is able to insure against price declines relative to the animals' expected ending values by selecting a coverage level of between 70% and 100% of those ending values for fed cattle and swine and between 80% and 95% for lambs.

For example, if the expected ending value for fed cattle is $1,000 and producers selected a 100% coverage level, they would receive an indemnity if the actual ending value for the livestock fell below $1,000. If producers selected a 70% coverage level, they would only receive an indemnity if the actual ending value fell below $700.

Table 2: Basic Characteristics of LRP for Fed Cattle, Swine, and Lambs

	Fed Cattle	Lambs	Swine
Coverage: Price Range	70 to 100% of the expected ending value	80 to 95% of the expected ending value	70 to 100% of the expected ending value
Coverage: Endorsement Limit	2,000 head	2,000 head	10,000 head
Limit per Crop Year July1-June 30	4,000 head	28,000 head	32,000 head
Lengths of Specific Coverage Endorsements	13,17,21,26,30,34, 39,43,47, or 52 weeks	13, 26, or 39weeks	13, 17,21 or 26 weeks
Livestock Specifications	weigh 1,000 to 1,4000 pounds and marketed near end of insurance period	feeder or slaughter lambs expected to weigh 50 to 150 pounds by the end of marketing period	Market hogs (barrows and gilts) 150 to 225 pounds on a lean (dressed) weight basis; approx. 203 to 304 pounds live weight
Availability in the Western States	All 11 contiguous continental western states	All 11 contiguous continental western states	All 11 contiguous continental western states

There is also an explicit limit on the number of animals that can be insured under any given policy (2,000 head for fed cattle and lambs and 10,000 head for swine). A producer is also able to obtain coverage for more than one insurance period within a crop year under multiple and separate policies. For example, insurance periods for swine begin at 13 weeks and can be as long as 26 weeks. Thus there is a cap on the total number of animals that can be insured during the 12 month crop year period for each class of livestock being insured (4,000 head for fed cattle, 28,000 head for lambs, and 32,000 head for swine).

In addition, within a given class of livestock, different end weights for the livestock may be insured (for example, the expected range of weights at the end of the marketing period that could be insured for feeder or slaughter lambs is from 50 to 150 pounds). A producer therefore has to determine the expected weight of the livestock to be insured at the end of the period covered by the insurance.

Livestock Risk Protection for Feeder Cattle

The purpose of LRP insurance for feeder cattle is to offset the risk of price declines below a coverage price that is selected by the producer.

The LRP for feeder cattle is specific to livestock that fall into different insurance types, each with a specific ***target weight*** that is defined at the time coverage is obtained. The ***target weight*** is the expected weight of each insured animal near the end of the insurance contract coverage period. The insurable types and target weights for feeder cattle are described in Table 3.

Table 3: Feeder Cattle Types and Weights Eligible for LRP feeder Cattle Insurance

Insurable Type	Target Weight****
Steers weight 1*	less than 6.0 hundredweight
Steers weight 2	6.0 to 9.0 hundredweight
Heifers weight 1	less than 6.0 hundredweight
Heifers weight 2	6.0 to 9.0 hundredweight
Brahman weight 1 *,**	less than 6.0 hundredweight
Brahman weight 2 ***	6.0 to 9.0 hundredweight
Dairy weight 1*,**	less than 6.0 hundredweight
Dairy weight 2***	6.0 to 9.0 hundredweight

*These types include bulls of these weights.
**These types include steers, heifers and bulls of these target weights.
***These types include steers and heifers of these target weights.
****These are target weights on or near the end of the insurance period.

Other key provisions of the LRP for feeder cattle -- coverage options, endorsement limits, alternative periods of coverage, and availability--- are summarized in Table 4.

The coverage price, as illustrated for feeder cattle, is the expected end value of an insured animal multiplied by the coverage level selected by the producer, which ranges from 70% to 100% of the expected ending value. The expected end value is calculated by RMA using relevant futures market prices on the day the producer obtains LRP coverage.

Table 4: Basic Characteristics of the LRP Feeder Cattle Policy

Characteristic	Feeder Cattle
Coverage: Price Range	70 to 100% of the expected ending value
Specific Coverage Endorsement Limit	1,000 head
Limit per Crop Year July1-June 30	2,000 head
Lengths of Specific Coverage Endorsements	13,17,21,26,30,34,39,43,47, or 52 weeks
Availability in the Western States	All 11 contiguous continental Western States + Hawaii

Procedures for Obtaining Livestock Risk Protection Coverage

To obtain LRP coverage for feeder cattle, producers must first submit applications through a crop insurance agent. Not every crop insurance agent is authorized to sell LRP. However, eligible agents can be identified by using the Agent Locator Tool available on the USDA RMA website.

The application process for LRP coverage is used to establish a producer's eligibility to purchase LRP feeder cattle insurance. An important first step in the application process is to submit a ***Substantial Beneficial Interest Reporting Form***. The beneficial interest form records information required about any entity that has at least a 10% interest share in the feeder cattle for which the application is submitted. This form is required to establish the applicants' eligibility for LRP insurance and enables the insurance company and RMA to track the extent to which the requested insurance complies with the specific coverage limits for feeder cattle (as described in Table 3).

The producer incurs no fee in the enrollment process, the purpose of which is to establish the producer's right to coverage but does not obligate the producer to purchase the LRP insurance policy.

Once the application for coverage is approved by the insurance company to which it is submitted, the coverage (as specified in the application) is assigned a policy number. The producer may then activate insurance coverage by applying for a ***Specific Coverage Endorsement***. As discussed above the endorsement is used to initiate coverage for a specific group of feeder cattle to be marketed at or near the end of the endorsement period, which is selected by the producer.

More than one ***Specific Coverage Endorsement*** may be purchased in any given crop year. Producers interested in using LRP to manage downside price risk can only insure up to 1,000 head of feeder cattle under each endorsement but no more than 2,000 head of feeder cattle in any crop year.

On completion and approval of the application to become eligible for coverage, a producer is able to determine the coverage that can be obtained and the premium that will be incurred under that specific coverage endorsement.

It is important to note that producers must work through their insurance agent to obtain LRP coverage. Further, in general the sales period is each business day. The business day begins when coverage prices and rates for specific endorsements are posted on the RMA website and ends at 9:00 am Central Time (8:00 am Mountain Time; 7:00 am Pacific Time) the following day.

In general coverage may be obtained from Monday through early Saturday morning, but ***not*** on Sunday. In addition, coverage cannot be obtained on dates that are effectively Federal or futures market holidays. Coverage also cannot be obtained if any of the required data for establishing coverage prices or rates are not available, or if futures contracts do not continue trading at the

end of the day (for example, if the futures contract price moves by the maximum allowed by the exchange) or for any other reason specified in the LRP policy.

Coverage and Premiums

Coverage prices, defined as dollars per cwt for feeder cattle, are the prices used to value the cattle that are insured by the producer. ***Coverage prices*** are determined using the ***expected ending value*** for the feeder cattle to be insured and the ***coverage level*** selected by the producer, as described above for fed cattle. ***Coverage prices*** are posted by the RMA on its website on most business days. The relevant RMA table reports ***coverage prices*** for each class of livestock, and within each class for livestock with different expected weights at the end of the coverage period. Those ***coverage prices*** are based on the prices for feeder cattle that, as calculated by RMA, are expected to occur at the end of each specific coverage period. The table also reports the specific end dates for each coverage period. An example obtained from the RMA website for March 9, 2018 is presented in Table 5.

The ***expected ending values***, as calculated by RMA, underlie the LRP insurance that can be obtained. These ***expected ending values*** are calculated using the Chicago Mercantile Exchange's (CME) Feeder Cattle Contract.

The CME Feeder Cattle Contract is for steers weighing 650 to 849 pounds, excluding predominantly Brahman or dairy breeds. The ***expected ending values*** are derived from the current day's closing futures price, volume and volatility and correspond to different endorsement lengths for LRP insurance coverage.

In Table 5, as posted by RMA on March 9, 2018, for the 13 week long endorsement period the reported expected end value for feeder type **Wt. *1*** (steers less than 600 pounds) was $160.702. For 13 week contracts, producers could select between seven coverage percentages and the seven corresponding coverage prices. If the producer anticipated that the insured feeder steers would weigh 600 pounds at the end of the 13 week endorsement period, then he could select LRP insurance coverage at one of these coverage prices. For example, the producer could choose a 98.8% coverage level and the corresponding ***coverage price*** of **$158.780 per cwt**.

If the producer selected a different endorsement period (for example, 21 weeks), at the same 98.8% coverage level the ***expected end value*** would be different ($162.37 per cwt). The reason is that the relevant CME contract would almost always imply a different ***expected end value*** for the different end dates associated with insurance contracts of different lengths.

The ***expected end values*** reported in Table 5 are for steers expected to weigh less than 600 pounds at the end of each of the different endorsement periods available under the feeder cattle LRP. However, the underlying CME futures contracts are for steers expected to be in the 650 to 849 pound range. Therefore, prior to RMA posting ***expected ending values*** for the various classes and weights of feeder cattle, an adjustment is made for each insurable weight class.

In percentage terms, the price adjustment factors are shown in Table 6. The adjustment factor for light steers is 110% of the price for steers weighing 650-849 lbs. that is reported in the CME contract. The CME futures contract based price reported for steers weighing 650-849 pounds (Weight 2) at the end of the 13 week endorsement period was $146.10 per cwt. Thus the expected ending value for steers weighing less than 600 lbs. (Wt. 1) for the same 13 week endorsement period was $160.70.

Table 5: Example of information available from RMA for LRP for Steers of Weight Class 1 (less than 600 lbs.) as reported on March 9, 2018 for Wyoming Producers

Coverage Period Length	Type	Crop Year	Expected End Value ($)	Coverage Price ($)	Coverage Level	Premium Rate	Cost per Cwt. ($)	End Date
13	Wt. 1	2018	160.702	158.780	0.988000	0.037786	6.000	6/08/18
13	Wt. 1	2018	160.702	156.580	0.974400	0.031446	4.924	6/08/18
13	Wt. 1	2018	160.702	154.380	0.960770	0.025730	3.972	6/08/18
13	Wt. 1	2018	160.702	152.180	0.947000	0.020782	3.163	6/08/18
13	Wt. 1	2018	160.702	149.980	0.933300	0.016584	2.487	6/08/18
13	Wt. 1	2018	160.702	147.780	0.919600	0.012982	1.918	6/08/18
13	Wt. 1	2018	160.702	145.580	0.905900	0.010156	1.479	6/08/18
17	Wt. 1	2018	162.957	160.030	0.988200	0.042831	6.897	7/06/18
17	Wt. 1	2018	162.957	158.830	0.974700	0.036734	5.834	7/06/18
17	Wt. 1	2018	162.957	156.630	0.961200	0.032084	4.869	7/06/18
17	Wt. 1	2018	162.957	154.430	0.947700	0.026056	4.024	7/06/18
17	Wt. 1	2018	162.957	152.230	0.934200	0.021649	3.296	7/06/18
17	Wt. 1	2018	162.957	150.030	0.920700	0.017699	2.655	7/06/18
17	Wt. 1	2018	162.957	147.830	0.907200	0.014517	2.146	7/06/18
21	Wt. 1	2018	164.298	162.370	0.988300	0.046359	7.527	8/03/18
21	Wt. 1	2018	164.298	160.070	0.974900	0.045267	6.491	8/03/18
21	Wt. 1	2018	164.298	157.970	0.961500	0.035018	5.532	8/03/18
21	Wt. 1	2018	164.298	155.770	0.948100	0.030040	4.679	8/03/18
21	Wt. 1	2018	164.298	153.570	0.934700	0.025593	3.930	8/03/18
21	Wt. 1	2018	164.298	151.370	0.921300	0.021503	3.255	8/03/18
21	Wt. 1	2018	164.298	149.170	0.907900	0.018148	2.707	8/03/18
26	Wt. 1	2018	165.197	155.710	0.942600	0.031395	4.889	9/07/18
26	Wt. 1	2018	165.197	146.910	0.889300	0.016458	2.418	9/07/18
30	Wt. 1	2018	165.647	162.840	0.983100	0.048034	7.822	10/05/18
34	Wt. 1	2018	165.232	165.232	1.000000	0.058798	9.715	11/02/18

Table 6: Livestock Risk Protection Feeder Cattle Price Adjustment Factors

Weight	Steers	Heifers	Brahman	Dairy
Weight 1<600 pounds	110%	100%	100%	85%
Weight 2 (600-900 pounds)	**100%** *	90%	90%	80%

***** The CME contract for feeder cattle quotes prices for steers in the Weight 2 category for 650-849 pound steers.

Using LRP to Insure Feeder Cattle: An Example

To illustrate the use of LRP insurance for feeder cattle, consider the following example. A central Wyoming rancher has 200 head of late season steer calves that have been weaned, are being fed a growing ration while in a feedlot. The calves are expected to be sold as 600 pound light feeders for another operation to put out on grass in early summer.

The rancher, having followed the cattle market carefully, is concerned that prices may fall before he is in position to market the steers; that is, he is concerned about downside price risk. The rancher works with an insurance agent who is eligible to sell LRP policies to obtain an estimate of the cost of downside price protection using LRP.

If the rancher's usual agent does not handle LRP policies, as discussed above, the rancher may choose to identify an agent that sells LRP policies using the Agent Locator on the RMA website at https://prodwebnlb.rma.usda.gov/apps/AgentLocator/#/. On March 9, 2018, working with an eligible insurance agent, the rancher opts for a 13 week endorsement period and selects a ***coverage price*** of $158.78 using the RMA website.

Premiums for LRP policies are directly linked to the total insured value of the livestock covered in those policies. In LRP policies, insured value is equal to the ***number of insured animals*** multiplied by their ***expected end weight*** and the ***coverage price*** selected by the producer.

In the example, the rancher insures 200 head of feeder cattle with expected end weights of 600 lbs. (6 cwt) at a coverage price of $158.78, yielding a total insured value of $190,536. The ***total premium*** of $7,114 for this contract is equal to the ***total insured value*** ($190,536) multiplied by the ***premium rate*** for the coverage (as shown in Table 5, is 0.037786).

The rancher receives a 13% premium subsidy from the federal government which, rounded up to the nearest dollar, amounts to $925, ($7,114 x 0.13). His out of pocket premium cost for this LRP contract will therefore be $6,189, ($7,114 - $625). Details of the premium cost calculation are presented in Table 7.

After reviewing the premium the rancher would have to pay for the contract, the rancher decided to purchase LRP coverage for the 200 head of feeder cattle. The insurance agent reminded the producer of the following aspects of the LRP contract:

1) The rancher should choose an ending period within 30 days of the intended marketing date.
2) The premium has to be paid in full at the time of purchase; and the ***subsidy percentage*** for the premium ***does not*** vary with the coverage level for LRP for feeder cattle.
3) The rancher must have ownership of the feeder cattle for the insurance to become effective.
4) The insurance will remain in effect as long as the rancher retains ownership or the end date on the LRP policy is attained.
5) The rancher is under no obligation to sell the feeder cattle at the end date or the target weight.
6) The rancher is not allowed to enter into any transaction that would convert into funds available for use; that is, the rancher cannot cover the value of the insured livestock by taking an offsetting position in the futures/options market.

Table 7: Insured Value and Premium Calculations for LRP Insurance

Line Number	Item/Calculation	Value
1	Number of head (whole number)	200
2	Target weight (cwt per head)	6 cwt
3	**Coverage price** ($ per cwt)----- from Table 5	$158.780/cwt
4	Insured Share	1.00
5	Insured Total Value (Line 1 x Line 2 x line 3 x Line 4) **(200 head x 6cwt/head x $158.780/cwt)**	$190,536
6	**Rate**----- from Table 5	0.037786
7	Total Premium (Line 5 x Line 6) **($190,536) x (0.03734)**	$7,114
8	Subsidy Rate	0.13
9	Subsidy (Line 7 x Line 8) **($7,114 x 0.13)**	$925
10	Producer Premium (Line 7 - Line 9) **($7,114- $925)**	$6,189

After reviewing the premium that would have to be paid out of his own pocket, the central Wyoming rancher decided to purchase the 13-week LRP feeder cattle insurance for 200 head of light steers during the afternoon of Friday, March 9, 2009.

Indemnification under LRP Coverage

An insured producer is due an indemnity under LRP coverage when the ***actual ending value*** is less than the ***coverage price.***

The ***actual ending value*** is the weighted average price of feeder cattle as calculated by the CME for the Cash-Settled Commodity Index Prices, and reported as the CME Feeder Cattle Reported Index. The reported index is a seven-day weighted average of the USDA reported prices from a 12 state region (Colorado, Iowa, Kansas, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming) using prices from auctions, video and online sales, and direct sales transactions.

Actual ending values are posted on the RMA website at ***www.rma.usda.gov***. If the end date is a Saturday, Sunday, a non-report day due to a Federal holiday, or if there is no reported information for whatever reason, then the calculation will be based on the report day just prior to the ***end date***.

The ***actual ending values*** for all endorsement lengths for light weight steers offered on March 9, 2018 for Wyoming producers, each of which have different endorsement ***end dates,*** are presented in Table 8.

Table 8: Actual Ending Values per cwt for Steers in Wyoming of less than 600 Pounds Insured on March 9, 2018, by Endorsement End Date

End Date of Endorsement	6/08/18	7/06/18	8/03/18	9/07/18	10/05/18	11/02/18
Actual End Value	$154.670	$161.30	$164.710	$167.900	$173.970	$168.010

Table 9: Indemnity Calculations for LRP Insurance on Feeder Cattle

Line Number	Item/Calculation	Value
1	Number of head (whole number)	200
2	Target weight (cwt per head)	6 cwt
3	**Coverage price** ($ per cwt)----- from Table 5	$158.780/cwt
4	**Actual End Value** ($ per cwt)----- from Table 8	$154.670/cwt
5	**Coverage Price - Actual End Value** Line 3- Line 4 ($158.780 cwt- $154.670 cwt)	$4.110/cwt
6	Insured Share	1.00
7	**Total Indemnity** Line 1 x Line 2 x Line 5 x Line 5 (200 head x 6 cwt/head x $4.110/head x 1.00)	$4,932

The end date for the central Wyoming rancher's endorsement was June 8, 2018, as the rancher had purchased LRP coverage for a 13 week endorsement period that began on March 9, 2018. The rancher had 60 days after the close of the endorsement period to file for any indemnity due.

Soon after coverage ended on June 8, the rancher and the insurance agent met to determine whether an indemnity should be paid and, if so, to estimate the amount of the indemnity owed to the rancher.

Under any LRP contract, an indemnity is payable when the ***coverage price*** exceeds the ***actual ending value*** for the livestock**.** In this example, the ***coverage price*** was $158.780 per cwt and ***actual ending value*** of $154.670 per cwt was lower. Thus the rancher was owed an indemnity payment, the amount of which is shown in Table 9.

The total indemnity is calculated by taking the difference between the ***coverage price*** and the ***actual ending value***, $4.11 per cwt, multiplying that amount by the expected end weight (600 lbs. or 6 cwt) to obtain the indemnity due on each head ($24.66), and multiplying that amount by the number of insured cattle (200 head of cattle). The result was a total indemnity amount of $4,932 ($24.66 x 200 head of cattle).

Note however that in this example, the premium that was paid by the rancher out of his own pocket (net of the 13% federal subsidy) was $ 6,189. So the rancher spent $1,257 more on LRP premiums than he realized in indemnities.

The rancher effectively insured against a national feeder price for light weight steers dropping below the insured level of $ 158.780 per cwt. However, the net premium cost at a 98.8% coverage level exceeded the indemnity the rancher received.

Finally, it is important to recognize that the price the rancher actually received for his steers was not necessarily the ***ending value*** reported in the insurance contract. LRP coverages and LRP

indemnities are based on national prices, not the prices actually paid to the ranchers for their livestock by the buyers to whom the livestock are sold.

Risk and Outcome Variability

As the example demonstrates, one outcome is that a rancher could purchase an LPR contract and not receive an indemnity large enough to cover the cost of the policy. We might reasonably ask how often that happens.

To answer the question requires that we include risk in the analysis. The underlying variability of greatest concern to us includes: (1) Variations in the cash prices paid to the rancher for the livestock when sold and (2) Variations in the LRP ***actual ending value***.

Where the analysis also includes calf sales revenue, it can help a producer to carefully consider their options for protecting income instead of just trying to profit from the insurance.

The Risk Scenario Planning (RSP) tool, developed by RightRisk (***RightRisk.org***), allows a rancher to apply partial budget analysis to decision making under uncertainty. The tool addresses the four traditional budgeting categories: added returns, added costs, reduced costs, and reduced returns.

Figure 1 shows values from the above example entered into the RSP tool interface. Lines 1 and 2 in the Added Return section are used for the uncertain ***basis*** value and the yet-to-be-determined ***actual ending value***. Also, on the positive side of the ledger we enter the calf sales revenue from selling calves on the cash market, calculated on line 5 as the ***actual ending value*** minus the ***basis*** value.

With the scenario described, we next consider the variation in returns from changes in the cash price received. This can be most easily calculated as a variation in the ***actual ending value***.

Figure 1. Completed Partial Budget Analysis with Basis and Actual End Value Risk

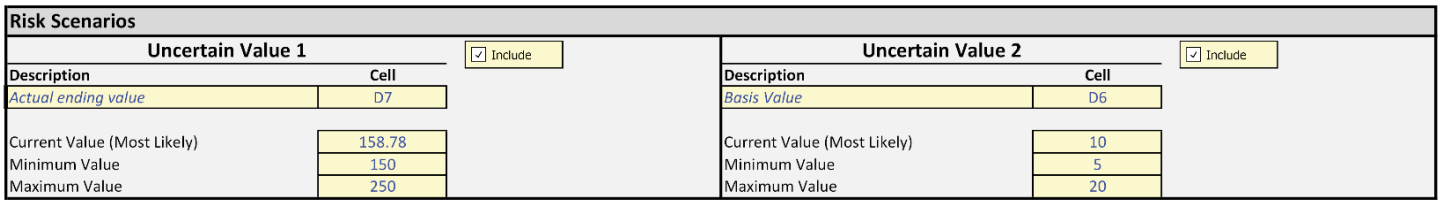
RightRisk™ — *Partial Budget For:* *LRP Feeder Cattle Insurance Decision*

Positive Effects				*Negative Effects*			
Added Returns	**Quantity**	**Value**	**Total**	**Added Costs**	**Quantity**	**Value**	
Basis Value		$10.00	$ -				$ -
Actual ending value		$158.78	$ -				$ -
			$ -				$ -
			$ -				$ -
Calf Sales (cwt.)	1200	$148.78	$ 178,536.00				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
Total Added Returns			$ 178,536.00	**Total Added Costs**			$ -
Reduced Costs	**Quantity**	**Value**		**Reduced Returns**	**Quantity**	**Value**	
			$ -				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
Total Reduced Costs			$ -	**Total Reduced Returns**			$ -

Total Positive Effects (Added Returns + Reduced Costs)	$ 178,536.00	**Total Negative Effects** (Added Costs + Reduced Returns)	$ -

Net Benefit of: LRP Feeder Cattle Insurance Decision	$ 178,536.00

Figure 2. Sample Risk Scenario for the LRP Feeder Cattle Decision



Risk Scenarios					
Uncertain Value 1		☑ Include	Uncertain Value 2		☑ Include
Description	Cell		Description	Cell	
Actual ending value	D7		*Basis Value*	D6	
Current Value (Most Likely)	158.78		Current Value (Most Likely)	10	
Minimum Value	150		Minimum Value	5	
Maximum Value	250		Maximum Value	20	

The RSP tool allows for uncertainty to be incorporated into any two cells in the scenario (Figure 2). Here Uncertain value 1 is the ***actual ending value*** entered in cell D7. The currently expected ***actual ending value*** of $158.78 (Figure 1) is entered as the current/most likely value for this variable.

Looking back at RMA LRP reports for ***actual ending values*** on Steers of Weight Class 1 reported on March 9 in 2015-17, we see values ranging roughly from $150 per cwt, entered as a possible minimum value, and $250 per cwt entered as a possible maximum value (Figure 2).

These risk scenario values are used to create a beta distribution of possible ***actual ending values***.

Another variation in the total revenue the rancher receives is the difference between the national price and local cash price, also known as ***basis.*** Uncertain value 2 is the ***basis*** value entered in cell D6. The currently expected basis value of $10.00 (Figure 1) is entered as the current/most likely value for this variable, $5 is entered as a possible minimum value, and $20 is entered as a possible maximum value.

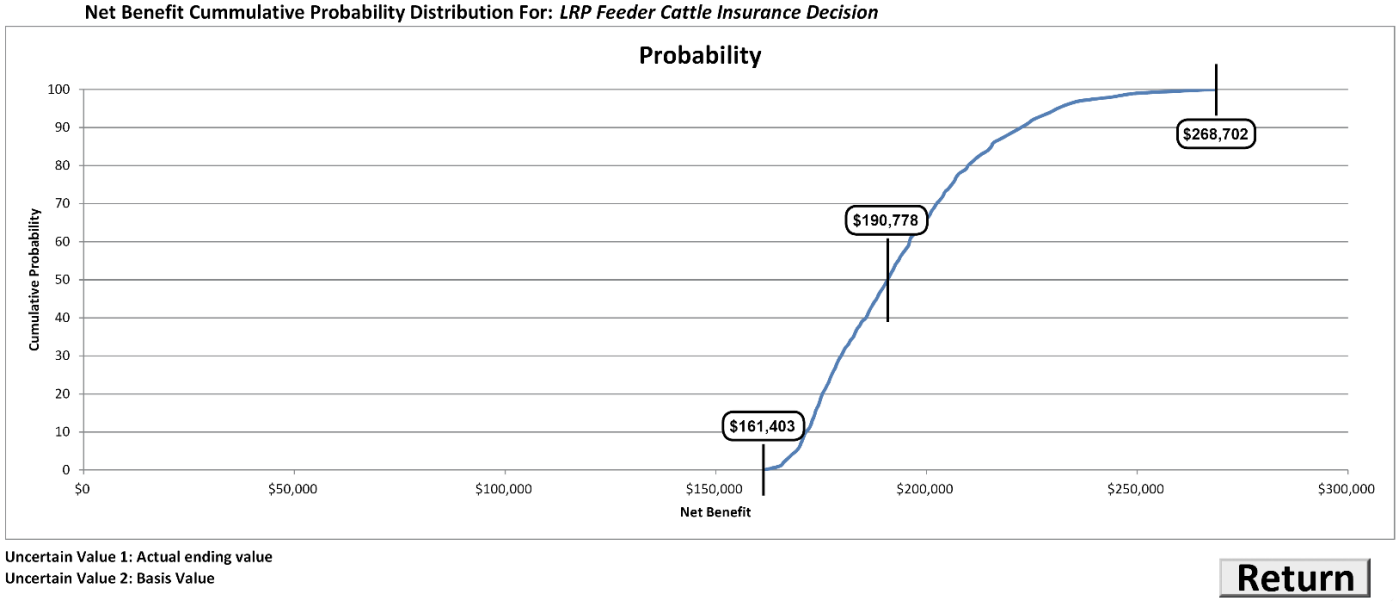
The calculated net benefit is $178,536 with ***basis*** set at $10 per cwt under the ***actual ending value*** (Figure 1).

Figure 3 shows the result of allowing the ***actual ending value*** to vary from the expected value of $158.78 per cwt and ***basis*** to vary from the expected value of $10.00 per cwt (Figure 1). The net return for any combination of ending value and basis are easily calculated. What is not so easy is assigning a probability to each of those net returns.

When the user clicks the "Run" button, the RSP tool performs an analysis based on the specified risk scenario (1,000 iterations). The results are depicted as a cumulative distribution graph (Figure 3). In this graph, we can see that the net return values range from a possible low of $161,403 to a high of $268,702. In addition, we can see there is a 50/50 probability the value will fall around $190,778.

Within the RSP tool, the user is allowed to mouse over points on the graph to read the probabilities for earning individual returns. In this way, the graph describes the range of possibilities, as well as the probability of achieving a particular threshold of net revenue.

Figure 3. Distribution of Results from Basis and Actual End Value Uncertainty Introduced into the LRP-Feeder Cattle Decision



Armed with this information about the range of net returns possible without an LRP policy in place, let's now consider the benefit of adding LRP insurance. In this case, we must include the added returns in the form of potential indemnity payments, as well as the added costs in the form of insurance premiums.

Figure 4 shows the values from our example entered into the RSP tool interface, including LRP insurance. Line 3 now includes the LRP ***coverage price***. An additional source of revenue, calculated on line 6, is an LRP insurance indemnity payment that will occur if the ***actual ending value*** ends at a value lower than the ***coverage price***.

Figure 4. Completed Partial Budget Analysis for Purchasing LRP-Feeder Cattle Contract, with Basis and Ending Value Risk

RightRisk™ — *Partial Budget For:* *LRP Feeder Cattle Insurance Decision*

Positive Effects				*Negative Effects*			
Added Returns	**Quantity**	**Value**	**Total**	**Added Costs**	**Quantity**	**Value**	
Basis Value		$10.00	$ -	*LRP Premium*	1200	$ 5.16	$ 6,189.00
Actual ending value		$158.78	$ -				$ -
Coverage Price		$158.78	$ -				$ -
			$ -				$ -
Calf Sales (cwt.)	1200	$148.78	$ 178,536.00				$ -
LRP Indemnity	1200	$0.00	$ -				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
Total Added Returns			$ 178,536.00	**Total Added Costs**			$ 6,189.00
Reduced Costs	**Quantity**	**Value**		**Reduced Returns**	**Quantity**	**Value**	
			$ -				$ -
			$ -				$ -
			$ -				$ -
			$ -				$ -
Total Reduced Costs			$ -	**Total Reduced Returns**			$ -

Total Positive Effects (Added Returns + Reduced Costs)	$ 178,536.00	**Total Negative Effects** (Added Costs + Reduced Returns)	$ 6,189.00

Net Benefit of: LRP Feeder Cattle Insurance Decision	$ 172,347.00

On the negative side of the ledger, line 1 in the Added Cost section, the added cost of the LRP insurance premium is calculated on the basis of the ***premium rate*** of $5.16 per cwt.

Ranchers purchase LRP-Feeder Cattle for the protection it provides when they are worried about possible price declines.

The calculated net benefit totals $172,347 with the ***basis*** set at $10 per cwt, the ***actual ending value*** at $158.78 per cwt, and the ***total premium*** at $6,189. This makes sense where the difference is exactly the amount of the policy premium ($6,189) lower than the value calculated without the LRP policy (Figure 1).

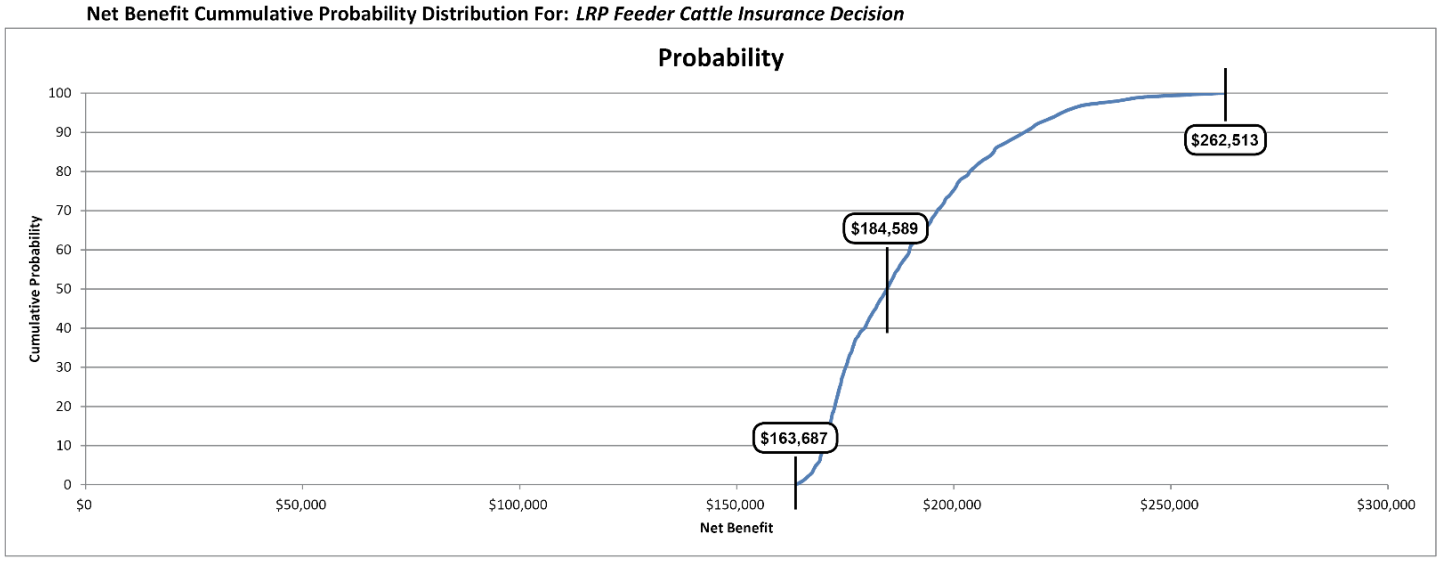
Again, when the user clicks the "Run" button, the RSP tool performs an analysis based on the specified risk scenario (1,000 iterations). The results are depicted as a cumulative distribution graph (Figure 5).

The graph displays the total net benefit ranging from a low value of $163,687 to a possible high value of $262,513. In addition, we can see there is a 50/50 probability the value will fall around $184,589, exactly $6,189 lower than without the LRP contract in place (the amount of the LRP policy premium).

Note that the benefit of the LPR policy we are most concerned with occurs when the ***actual ending value*** falls below the ***coverage price***. Comparing the results from the analysis in Figures 1 and 3, we see that the minimum was $2,284 higher with the LRP policy in place.

A careful comparison will also reveal that the maximum net return is $6,189 lower with the LRP policy in place, where LRP coverage requires the payment of that amount in ***total premium.***

Figure 5. Distribution of Results from Basis and Actual Ending Value Uncertainty Introduced into the LRP-Feeder Cattle Decision



So far, the results suggest that LRP coverage can be helpful in enhancing revenue where ***actual ending values*** are low. However, we have not yet answered the question of how often this is a benefit.

To evaluate this question, we can select an option within the RSP tool to leave variation in the ***basis*** value out of the analysis. In this case, ***basis*** is set at the most likely value of $10 per cwt.
Making this single change, we rerun the analysis. The results are depicted as a cumulative distribution graph (Figure 6).

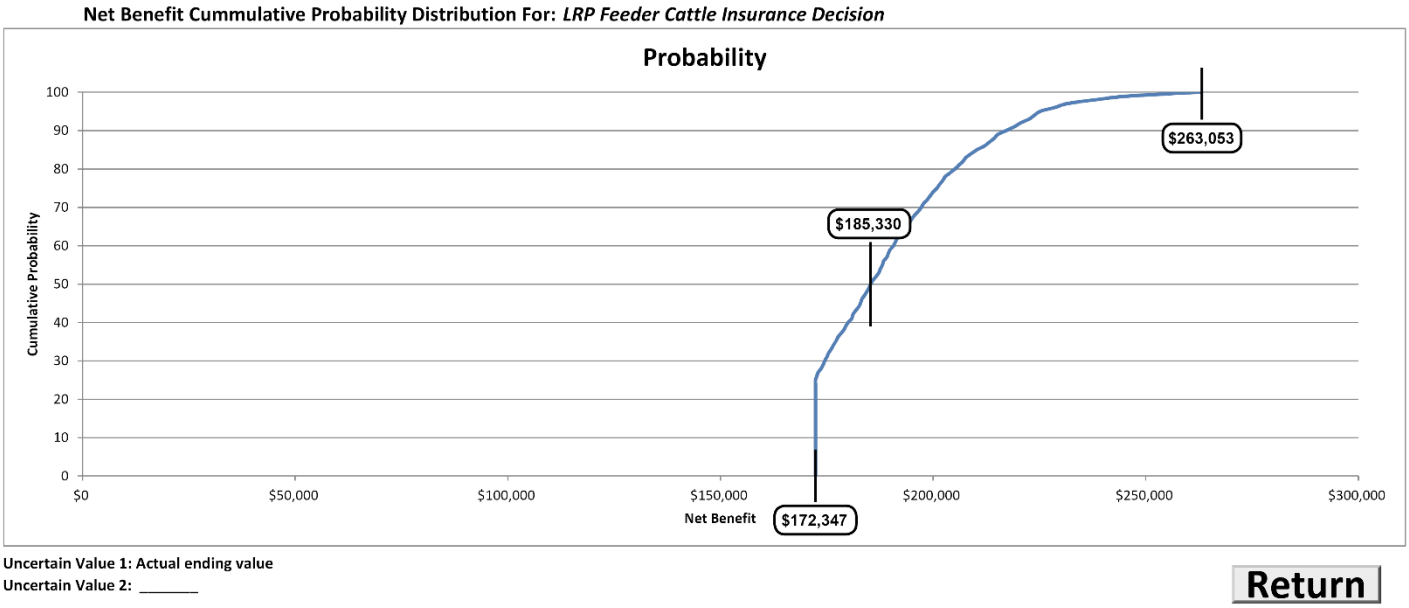
The resulting graph displays the total net benefit ranging from a low value of $172,347 to a possible high value of $263,053. In addition, we can see there is a 50/50 probability the value will fall around $185,330.

The significance of this result is that the minimum is prevented from falling below the net benefit of $172,347 by LRP indemnity payments. Remember these payments are only triggered when the ***actual ending value*** falls below the ***coverage price***.

Even further, our analysis provides a probability estimate associated with that minimum value. In this case, the graph in Figure 6 shows that the minimum value was reported 25 percent of the time. This implies that the LRP insurance policy supported ranch income above the minimum value of $172,347 in return for an annual premium payment of $6,189 roughly 1 out of every 4 years.

It may be obvious but worth noting that these results will vary, depending on the range of ***actual ending values*** and ***basis*** values used.

Figure 6. Distribution of Results from Actual Ending Value Uncertainty Introduced into the LRP-Feeder



Discussion

LRP feeder cattle insurance is a single peril insurance product. It allows an individual feeder cattle producer to insure against downside price risk. That is, a feeder cattle owner can purchase with the payment of a premium insurance against the actual national-level LRP feeder cattle price at or near the time of the sale of the ranch's feeder cattle moving below some insured national-level price specified in the LRP insurance contract.

Such a contract may be of interest to certain feeder cattle producers, especially those that produce a limited number of feeder cattle or have a specific group on feeder cattle that would be far less than those represented in a futures market feeder cattle contract. The use of LRP insurance by Wyoming feeder cattle producers in shown in Table 10.

Basis risk concerns arise due to changes in the difference between local prices and the national price or regional price. In the context of LRP insurance for feeder cattle, the feeder cattle basis is defined as the difference between local feeder cattle prices and the CME Feeder Cattle Reported Index values. Traditionally feeder cattle basis calculations consider the difference between local feeder cattle prices and the average cash settlement prices of the CME Feeder Cattle Futures prices. The basis will change over time--over a period of years and also within relatively short periods (days, weeks and months). Thus LRP does not insure against changes in the basis (basis risk) because, as discussed above, indemnities are based on national prices.

Producers considering the use of LRP insurance would benefit from understanding the local historical information regarding local feeder cattle cash prices and the CME Feeder Cattle Reported Index. They may benefit from the use of LRP insurance if their basis risk is less than the national price risk for feeder cattle.

Table 10: The Use of Feeder Cattle LRP Insurance in Wyoming, 2016-2018

Year	Liability	Premium	Premium Subsidy	Producer Premium	Indemnity	Indemnity/ Total Premium	Indemnity/ Producer Premium
2016	$537,681	$32,320	$4,202	$28,118	0	0	0
2017	$3,680,383	$176,467	$22,941	$153,526	$71,597	41%	47%
2018	$371,574	$ 9,154	$1,190	$7,964	0	0	0

Appendix

Appendix Table 1: Dollars of Liability for Livestock Risk Protection Insurance, by Type of Livestock and State, Western United States, 2016

State	Feeder Cattle ($)	Lamb ($)	Fed Cattle ($)
Arizona	0	0	0
California	2,516,510	326,071	69,684
Colorado	1,963,255	2,465,802	429,828
Hawaii	0	NA*	NA*
Idaho	161,902	400,881	149,244
Montana	2,130,992	246,953	0
Nevada	1,078,630	515,562	0
New Mexico	3,072,128	0	945,770
Oregon	313,333	2,366,713	753,773
Utah	0	60,854	0
Washington	207,306	14,487	0
Wyoming	587,681	1,229,026	401,921
Total	12,031,737	7,626,349	2,750,220

*NA---not available in Hawaii

Appendix Table 2: Dollars of Liability for Livestock Risk Protection Insurance, by Type of Livestock and State, Western United States, 2017

State	Feeder Cattle ($)	Lamb ($)	Fed Cattle ($)
Arizona	0	889,523	0
California	1,621,776	507,729	0
Colorado	2,828,803	3,810,052	543,132
Hawaii	0	NA*	NA*
Idaho	1,466,216	4,775,575	0
Montana	4,790,448	382,329	0
Nevada	3,344,377	83,843	0
New Mexico	0	0	123,367
Oregon	684,155	1,262,145	0
Utah	0	1,244,170	0
Washington	1,349,205	0	0
Wyoming	3,680,383	4,701,392	131,242
Total	19,729,363	17,656,758	797,741

*NA---not available in Hawaii

Appendix Table 3: Dollars of Liability for Livestock Risk Protection Insurance, by Type of Livestock and State, Western United States, 2018

State	Feeder Cattle ($)	Lamb ($)	Fed Cattle ($)
Arizona	0	1,041,162	0
California	1,497,473	4,701,392	0
Colorado	2,177,122	11,733,617	0
Hawaii	0	NA*	NA*
Idaho	2,461,072	3,571,521	0
Montana	3,043,930	313,464	0
Nevada	167,240	480,904	0
New Mexico	825,798	0	0
Oregon	189,657	1,644,132	0
Utah	81,431	2,231,131	0
Washington	348,518	0	112,788
Wyoming	371,574	9,190,308	897,788
Total	11,163,815	34,427,027	1,010,576

*NA---not available in Hawaii