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SOUTHERN EXTENSION RISK MANAGEMENT EDUCATION

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WHERE'S THE RISK?

A LIVESTOCK RISK MANAGEMENT HANDBOOK

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INTRODUCTION

If you are involved in production agriculture, you know producers face a litany of risks, from natural disasters to market forces that are far beyond their control. As noted by Mapp et al. (1979), uncertainty is pervasive in production agriculture, with many factors like weather events, diseases, general economic conditions, and public and private institutional policies interacting to create a unique decision-making environment for the agricultural producer.

Hall et al. (2003) noted that "Despite the apparent effectiveness of available livestock risk management tools, … researchers have described lower preference for such tools by livestock producers compared to crop producers…. One possible reason is differing levels of risk across livestock and crop enterprises. Alternatively, lower preference may imply that livestock producers perceive these risk management tools to be somehow inadequate. As well, it may be that producers simply lack either the required training to use these tools effectively or the motivation to adopt a risk management tool, given their perception of its utility. The corollary of this observation is that a greater variety of structured risk management tools and training targeted to livestock producers may be required for a significant increase in usage to occur." Maintaining animal health, being a low-cost producer, maintaining financial or credit reserves, and having off-farm investments were perceived by producers as the top strategies for managing risk associated with farm and ranch income. By contrast, futures and options were ranked the lowest.

While use of futures and options by cattle producers continues to be quite low, a number of other risk management tools have been made available to livestock producers in the 20 years since that paper was written. In this handbook, we endeavor to provide an overview of those tools. While most of them are broadly applicable to a number of different species, the focus primarily is on cattle. This is largely because cattle account for roughly 80 percent of meat animal receipts in the southern United States. Further, because livestock ownership and forage production often go hand in hand, this handbook covers both topics.

CHAPTER 1:

Programs Offered by the United States Department of Agriculture (USDA)'s Farm Service Agency (FSA)

A variety of programs are available to livestock and mixed-crop/livestock producers to address production risks from natural disasters. This includes programs that address: the impact of adverse events on land, including the Livestock Forage Program (LFP) and the Noninsured Crop Disaster Assistance Program (NAP); disaster response programs that result in adverse death loss, like the Livestock Indemnity Program (LIP); and the Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program (ELAP) that covers losses not addressed in LFP, NAP, or LIP. This chapter will provide an overview of these alternatives and is intended to provide educational information for producers as of the program guidelines in 2021. It is important to understand these programs can and do change, and producers interested in participating in them will need to contact their local USDA FSA office to learn about current eligibility and terms.

Livestock Forage Program (LFP)

Drought can cause significant damage to pastures and native rangeland. As a result, cattle and other grazing livestock inventories may be intentionally reduced to avoid overgrazing on that land, or abnormal hay supplementation may occur. The Livestock Forage Program (LFP) is one of the most heavily utilized disaster programs authorized under the Farm Bill in states where drought is more common. It is also one of the easiest programs producers can apply for since the eligibility is determined at the county level, unlike the LIP and ELAP, which require the producer to provide proof of eligibility. County-level eligibility varies by the type of pasture or range the livestock are grazing on as well as drought severity and length. This links the expected grazing conditions to the timing of drought. For example, the critical period for rainfall differs for cool-season grasses versus warm-season grasses.

The producer is required to provide an accurate inventory of the breeding herd, calves less than 500 pounds, calves over 500 pounds, and other livestock like horses grazing the farm in question at a specific date. In addition, the producer is asked to provide an accurate count of the number of cattle that may have been sold in the drought window in those same livestock classes.

County Eligibility

County eligibility is tied to the U.S. Drought Monitor. Drought conditions can range from mild (D0) and moderate (D1), to severe (D2), extreme (D3), and exceptional (D4). This national program uses consistent data from weather stations placed throughout a county. This can create some challenges for counties that are very large or that have few weather-monitoring stations.

Counties become eligible for LFP when they experience, during the normal grazing period for that type of pasture or grass, 8 consecutive weeks of D2 drought or 1 or more weeks of D3 or D4 drought. The extent of the drought determines the monthly multiplier for the payment. Specifically, the payment is equal to:

- One month of eligible feed costs when a county experiences 8 consecutive weeks of D2 drought during the normal grazing period for that type of grass or pasture.
- Three months of eligible feed costs when a county experiences at least 1 week of D3 drought.
- Four months of eligible feed costs when a county experiences at least 4 weeks of D3 drought during the normal grazing period for that type of grass or pasture.
- Five months of eligible feed costs when the county experiences at least 4 weeks of D4 drought during the normal grazing period for that type of grass or pasture.

The eligible feed cost payment is established based on USDA data, where available, and is established by the FSA State Advisory Committee where unavailable. The eligible feed cost payment is equal to 60 percent of the average monthly feed cost for pasture and grassland, or 50 percent of the average monthly feed cost for cattle grazed on federally managed rangeland. Current county eligibility for LFP is available through the USDA FSA.[1]

Livestock Indemnity Program (LIP)

The Livestock Indemnity Program (LIP) provides indemnity payments for livestock deaths that exceed normal mortality rates as a direct result of an eligible loss condition or the value loss for animals injured, but not killed, by an eligible loss condition and therefore sold at a reduced price. Eligible loss conditions include extreme or abnormally damaging weather, disease promoted by such weather, and attacks by animals reintroduced and protected in the wild by the federal government. Most commercially grown livestock are eligible to be covered by LIP, including contractually grown swine and poultry.

LIP was created in response to cold weather events, such as blizzards, but has grown to cover other natural disasters, such as flooding and hurricanes, along with losses due to federally protected predators. The Bipartisan Budget Act of 2018 removed the $125,000 payment cap on LIP, allowing a larger number of livestock owned by a single entity to be indemnified.

[1] For more information, see: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/livestock-forage/index.

It also moved LIP out from the combined $125,000 indemnity cap that applies to the other livestock disaster programs—LFP and the Emergency Assistance for Livestock, Honeybees, and Farm-raised Fish Program (ELAP).

Eligible Loss Conditions

Livestock Indemnity Program payments are triggered by an eligible loss condition associated with adverse weather, disease resulting from adverse weather, and predation by federally protected species. Adverse weather conditions are designated by the FSA Deputy Administrator for Farm Programs. Some eligible adverse weather events include hurricanes, floods, blizzards, wildfires, extreme heat or cold, tornados, and an array of other weather events which unexpectedly occur during the loss period. Producers cannot be compensated for above-average mortality levels if there is not a loss condition to accompany it.

LIP also covers above-average mortality from eligible diseases and animal attacks from federally protected predators. Eligible diseases are those that are exacerbated by an eligible adverse weather event and result in above-normal loss mortality.

For example, extremely low temperatures and increased moisture compromise the immunological robustness of animals and create more favorable conditions for pathogens. This adverse weather event results in ideal growing conditions for larkspur, which is extremely toxic to cattle. During this loss period, larkspur would be growing more abundantly, and therefore, increased consumption by livestock would result in increased mortality rates. These conditions increase the mortality rate beyond what is attributable to just the extreme cold.

In the case of animals injured by federally protected predators, livestock producers are eligible for indemnity payments calculated as the difference in the FSA published national average payment rate and the price that the producer received for the livestock. This change particularly helped producers affected by avian predators and by Mexican wolves reintroduced to Yellowstone National Park.

Producer Eligibility

To be eligible for LIP, the producer must have legally owned the livestock on the day that the livestock died. Livestock must have been for commercial use only, with recreational and show animals being excluded from eligibility. The livestock must have either died or been injured in above-normal rates of mortality or injury due to an eligible loss condition, such as the ones described above. Producers have up to 30 days after an eligible loss to provide a notice of loss and must file a full application within 60 days after the end of the calendar year in which the eligible loss condition occurred to be eligible for an LIP payment.

As with other federal programs, livestock producers must not make more than $900,000 in annual gross income to be eligible for LIP payments. As of 2017, the individual entity cap for LIP payments was removed, making every eligible head killed or injured eligible for payment.

Payment Rates

The Livestock Indemnity Program payments are set at 75 percent of market value for each type of livestock, based on national annually determined payment rates. Market values are broken down by age or weight range in some species. Livestock are not appraised individually, but collectively using the national average market rate during that period. LIP will cover losses by contracted swine and poultry growers but does not compensate for what has already been reimbursed by the integrator.

LIP payments are calculated by multiplying the national payment rate for each livestock category by the number of eligible livestock more than normal mortality in each category that died as a result of an eligible adverse weather event. Current national payment rates—which are updated annually—can be found on the FSA Livestock Indemnity Fact Sheet.[2]

The level of mortality that is considered "normal" is established on a county basis by the FSA State Advisory Committee and is based on the normally observed death rate for a specific category of livestock (e.g., weaned calves). For livestock injured due to an eligible loss condition, producers can be compensated for the difference between the national average payment and the payment received for the injured animal.

Notification Deadlines for Producers

When disaster strikes a farm or ranch, it is critical to keep the notification deadlines in mind to apply for disaster programs despite all the other demands for the producer's attention. When a producer identifies an abnormal loss, a Notice of Loss should be filed with the local FSA office. The Notice of Loss must be filed at the earlier of 30 calendar days of when the loss of livestock is apparent to producers or 30 days after the end of the calendar year in which the loss of livestock occurred. These dates are different for ELAP and LFP. The Notice of Loss doesn't have to be accompanied by the documentation discussed below. It can occur in a second step.

[2] For more information, see: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/livestock-indemnity/index.

Documentation Needed

After a notice of loss is filed, producers have until the end of the first 60 days of the new calendar year in which to file the full application with the appropriate documentation. Documentation includes proof of ownership for eligible livestock as well as proof of death due to an eligible event. Acceptable records of ownership may include:

- prior USDA records,
- tax records,
- insurance records,
- brand inspection records,
- purchase or registration records,
- veterinary records,
- loan documents,
- records from response agencies like the state Departments of Agriculture, the United States Department of Agriculture (USDA), or the National Guard,
- contracts for integrators, and
- production records tied to individual animal identification.

In addition, the producer will be asked to document the above-normal mortality by providing records such as:

- veterinary records,
- dated pictures of losses, and
- dated videos of losses.

Talk to the county Farm Service Agency office when an eligible weather or predatory loss occurs to determine what records will be accepted for the application. This is a voluntary program. However, an application may not be approved without appropriate documentation.

Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish (ELAP)

The Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program (ELAP) is the smallest of three emergency assistance programs for livestock producers. ELAP covers losses from production hardships that are not covered by the Livestock Forage Program (LFP) or the Livestock Indemnity Program (LIP). It is intended to provide broad coverage for losses not covered by other programs. Honeybees and farm-raised fish producers are able to receive indemnities from this program when they meet the eligible loss conditions. The program also covers an array of weather disasters, such as water shortages, which are not covered under LIP or LFP. Honeybee keepers are the main beneficiaries of this program due to Colony Collapse Disorder (CCD), which is not covered by other programs.

ELAP experienced five important changes due to the 2014 Farm Bill, which allowed for increased expenditures to producers:

1. Producers can be partially compensated for additional costs (i.e., water hauling to eligible livestock during an eligible drought).
2. Payments have increased from 60 percent to 75 percent for Colony Collapse Disorder (CCD) losses and livestock death losses.
3. Socially disadvantaged producers are compensated for 90 percent of all losses covered under ELAP.
4. More diseases that affect livestock have been made eligible for compensation.
5. Hail is now an eligible loss condition for livestock grazing losses.

Additionally, the Bipartisan Budget Act of 2018 removed the $20 million fiscal year spending limit on ELAP, which allowed the program to disperse indemnities to as many producers as possible that needed emergency assistance. Additionally, producers no longer have an individual payment cap on ELAP since it was removed in the 2018 Farm Bill. Before the change was made, producers could receive no more than $125,000 from both ELAP and LFP. The program is administered by the Farm Service Agency (FSA), and its payments are made through the Commodity Credit Corporation (CCC).

Eligible Loss Conditions

Eligible loss conditions are designed differently for the different livestock affected. ELAP targets additional adverse weather events not covered by LFP or LIP, feed losses not associated with drought or wildfires, and other production risks and costs that result in livestock deaths or increased production costs.

Eligible loss conditions for livestock producers include adverse weather conditions and vector-borne illnesses for which vaccinations are unavailable or ineffective. ELAP also covers costs in the prevention of fatal infectious diseases that occur independently of weather conditions—for example, cattle tick fever. Additionally, ELAP covers increased cost of water transportation due to wildfires and drought, feed losses, and livestock losses due to a decrease in access to water. These loss conditions are only covered by ELAP when not covered by one of the other two emergency assistance programs.

Feed losses are eligible for minimum indemnity payments of 60 percent of losses incurred, while livestock deaths are eligible to be compensated at 75 percent of the market value of the animal, using price data from the previous year.

Producer Eligibility

Eligible loss conditions must be reported to the FSA within 30 days of the loss to be eligible for an ELAP payment, with the exception of honeybee colony or hive losses, which must be reported within 15 days of the loss becoming apparent.

Program Payment Rates

The 2014 Farm Bill allowed for partial compensation of additional feed and water hauling costs. To apply, producers will need the number of truckloads for the year, mileage per truckload per year, share of feed cost this year (if splitting loads), number of truckloads normally hauled, the normal mileage per truckload, and the share of normal feed cost (if applicable).

Eligible producers can be reimbursed for 60 percent of feed transportation costs above what would have normally been incurred, and producers qualifying as underserved (socially disadvantaged, limited resources, beginning, or military veteran) will be reimbursed for 90 percent of additional feed transportation costs.[3] USDA uses a national cost formula to determine reimbursement costs that do not include the first 25 miles and any distances over 1,000 transportation miles. It also excludes the normal cost of transporting hay or feed. For 2021, the initial cost formula of $6.60 per mile is used before the percentage is applied.

Honeybee Program Specifics

Since some honeybee producers have experienced substantial losses due to CCD, they have been major beneficiaries of this program. Honeybee producers are eligible for indemnity payments related to feed losses, colony losses due to above-average mortality, and financial costs incurred from hive replacement.

Eligible loss conditions are like those under LFP and LIP. In the event of adverse weather events covered by ELAP, honeybee producers will be compensated for 60 percent of feed loss and 75 percent of the value of lost bees.

The unique eligible condition for honeybee producers is CCD, which is defined by the USDA's Agricultural Research Service (ARS) as the presence of few living adult bees and a live queen with immature bees and honey. The qualifications must be met, with mortality rates above 15 percent, for honeybee producers to be compensated for 75 percent of the replacement value of the bees and hive.

Farm-raised Fish Program Specifics

ELAP is also available for fish produced in controlled environments for commercial use. ELAP covers feed losses and above-normal mortality rates due to qualifying events, which include adverse weather but not disease. Farm-raised fish producers are eligible for compensation of 60 percent of feed loss due to adverse weather events, and 75 percent of the value of eligible fish lost in excess of the normal mortality rate, also due to adverse weather events, but again not disease.

Noninsured Crop Disaster Assistance Program (NAP)

The Noninsured Crop Disaster Assistance Program (NAP) provides coverage for noninsurable crops against natural disasters resulting in lower yield or crop losses or prevented planting of an eligible crop. NAP provides coverage for losses over 50 percent of expected production and 55 percent of the average market price. Beginning with the 2014 Farm Bill, additional (buy-up) coverage is available from 50 to 65 percent of production, in 5 percent increments, at 100 percent of the average market price. Importantly, crops intended for grazing are not eligible for NAP buy-up, a political compromise that allowed livestock and forage producers to continue to remain eligible for other tools described in this handbook.

When a crop or planting is affected by a natural disaster, producers with NAP coverage must notify the county FSA office and complete a "Notice of Loss and Application for Payment." This application must be completed within 15 calendar days of the earlier of a natural disaster occurrence, the final planting date if planting is prevented, the date that damage becomes apparent, or the normal harvest date. Applications for NAP payment are due within 60 calendar days of the last day of coverage for the crop year. Application closing dates are determined based on the crop and are at least 1 day before the date FSA permits coverage to begin for either prevented planting or low yield losses. These dates will be posted in the USDA Service Center, local media, and newsletters, among other sources.

[3] USDA provides a downloadable Excel spreadsheet to determine payments for feed transportation at https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-assist-for-livestock-honey-bees-fish/index.

Eligible Crops

Commercially produced agricultural commodities for which crop insurance is not available (more on crop insurance in Chapter 3) are eligible for NAP. These include the following:

- crops other than livestock that are commercially produced for food and fiber;
- crops planted and grown for livestock consumption, such as grain and forage crops, including native forage;
- crops grown for fiber, such as cotton and flax (except trees); and
- other specific crops and industrial crops (including those grown expressly for the purpose of producing a feedstock for renewable biofuel, renewable electricity, or biobased products).

Crops lost due to specific causes are eligible for NAP: damaging weather such as drought, freeze, hail, excessive moisture, excessive wind, or hurricanes; adverse natural occurrences such as earthquake or flood; and conditions related to damaging weather or adverse natural occurrences, such as excessive heat, plant disease, or insect infestation. The cause of loss must occur during the coverage period, before or during harvest, and must directly affect the eligible crop.

To be eligible, the following crop acreage information must be reported:

- name of the crop,
- type and variety,
- location and acreage of the crop,
- share of the crop and the names of other producers with an interest in the crop,
- type of practice used to grow the crop (irrigated or non-irrigated),
- date the crop was planted in each field, and
- intended use of the commodity.

Crop acreage must be reported early in the risk period and shortly after planting to make sure that no deadlines are missed and coverage is maintained. Additionally, producers must provide verifiable crop production records that can be easily understood by FSA.

Eligible forage is vegetation consisting of annual, biennial, and perennial grasses, legumes, small grains, etc., produced in a commercial operation for animal consumption or for seed for the propagation of forage for animal consumption. If a producer reports forage acreage as Conservation Reserve Program (CRP) or intended as fallow, that acreage is not eligible for NAP. If a producer intends to both mechanically harvest and graze the same acres, for NAP purposes, the producer must designate a single intended method of harvest for the crop year.

Producer Eligibility

Landowners, tenants, and sharecroppers who share in the risk of producing an eligible crop are eligible for NAP. The 2018 Farm Bill maintained NAP payment limits at $125,000 per crop year, per individual or entity for crops with basic coverage. For additional (buy-up) coverage, there is a limit of $300,000 per crop year per individual or entity. Producers must have suffered a yield or inventory value loss greater than 50 percent as the result of an eligible cause of loss. For yield-based crops, a yield loss over 50 percent of the approved yield is eligible, and for value loss crops, a loss of value over 50 percent of the total value of eligible inventory at the time of the disaster is eligible for NAP. Producers must apply for NAP coverage and submit the required service fee to their FSA county office by the application closing date for their crop before coverage can begin.

Producers cannot purchase buy-up coverage if they haven't successfully produced the crop in a previous year. Production is considered successful if at least 50 percent of the county-expected yield is produced. For crop acreage intended to be grazed, a producer must have suffered a loss of animal unit days (AUD) over 50 percent of expected AUD based on acreage, carrying capacity, and grazing period to be eligible for NAP.

Available Coverage and Information Required

Coverage through NAP for prevented planting is available. Payment is based on prevented planted acreage over 35 percent of the total intended acres to be planted. As noted above, basic NAP coverage is equal to 50 percent of the yield or inventory value at 55 percent of the average market price established by FSA. Eligible producers may elect buy-up coverage at the average market price in amounts of 50 percent to 65 percent, in 5 percent increments of the approved yield or the lesser of the total value of eligible inventory when the disaster occurred or the maximum value for coverage sought. Buy-up coverage must be elected by the application closing date, and producers who elect buy-up coverage pay a premium in addition to the service fee. Crops intended for grazing are not eligible for additional coverage.

The coverage period depends on the crop. For an annual crop, the period begins the later of the date after the coverage application is filed or the date the crop is planted. The coverage period ends the earlier of the date the harvest is completed, the normal harvest date for the crop, the date the crop is abandoned, or the date the entire crop acreage is destroyed.

Service Fees and Premiums

The 2018 Farm Bill set the service fee at the lesser of $325 per crop or $825 per producer per county. The service fee cannot exceed a total of $1,950 for a producer with interests in multiple counties. For buy-up coverage, producers must pay a premium. The premium is calculated by multiplying the following factors together:

- the producer's share of the crop,
- the number of eligible acres devoted to the crop,
- the approved yield per acre,
- the coverage level,
- the average market price, and
- a 5.25 percent premium fee.

The maximum premium for a producer is $15,750 for basic coverage only. If the producer is a joint operation, the maximum premium is based on the number of people comprising the operation. To be eligible for a service fee waiver or premium reduction, the producer must qualify as a beginning farmer or rancher, limited resource farmer or rancher, socially disadvantaged farmer or rancher, or veteran farmer or rancher.

NAP Payments

NAP payments are calculated using:

- crop acreage,
- approved yield,
- net production,
- coverage level elected by the producer,
- an average market price for the commodity, and
- a payment factor reflecting the decreased cost incurred in the production cycle for a crop that is not harvested or prevented from being planted.

The approved yield (or expected production for a crop year) is the average of a producer's actual yields over the past 10 years. If a producer reports fewer than 4 years of crop production, they must use a county-based yield that may be substantially lower. For value loss crops with buy-up coverage, payments are calculated using the lesser of the field market value of the crop before the disaster or the maximum value for which the producer requested coverage.[4]

Ad Hoc Programs

While the aforementioned programs administered by FSA are all "standing" disaster programs that are authorized in the farm bill, FSA occasionally administers "ad hoc" disaster programs that are typically funded by the annual appropriations process. On occasion, these programs are available to livestock and forage producers. For example, the Wildfire and Hurricane Indemnity Program (WHIP), the WHIP Plus (WHIP+), and the Emergency Relief Program (ERP) collectively covered losses that occurred from a number of different disasters from 2017 to 2021. To varying degrees, livestock and forage producers were eligible for assistance. However, the focus of this handbook remains on those "standing" tools that are "permanently" funded in the farm bill.

[4] For more information, see: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/noninsured-crop-disaster-assistance/index.

CHAPTER 2:

Programs Offered by USDA's Risk Management Agency (RMA)

Similar to the tools offered by FSA, federal crop insurance—administered by USDA's Risk Management Agency (RMA)—provides coverage for agricultural producers, with producers paying for a share of the premium. Row crops have long been covered by Multi-Peril Crop Insurance (MPCI) policies—for example, Revenue Protection (RP) and Yield Protection (YP)—that are very familiar to crop producers.

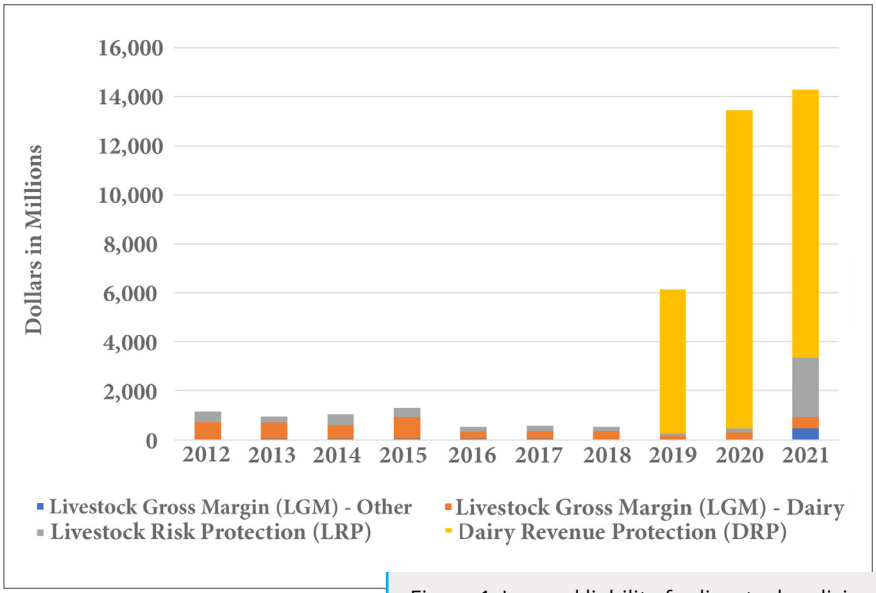

Figure 1. Insured liability for livestock policies, Federal Crop Insurance, 2012 to 2021.

Under the Federal Crop Insurance Act of 1980, spending on livestock policies was limited to $20 million per fiscal year. As a result, while RMA offered crop insurance policies for livestock producers, participation was very limited (Fig. 1). The $20 million limitation was eliminated in the Bipartisan Budget Act of 2018, and the impact could be seen almost immediately. For example, while not a focus of this handbook, Dairy Revenue Protection (DRP) was introduced soon after the passage of the Bipartisan Budget Act of 2018. As noted in Figure 1, DRP alone has resulted in an order-of-magnitude increase in the liability insured by livestock policies at RMA—increasing from just over $500 million in 2018 to just over $6 billion in 2019. In addition, the USDA recently made additional improvements to Livestock Risk Protection (LRP)—discussed in detail later in this handbook—with participation increasing significantly in 2021.[5] In addition, a new policy is currently under development that would provide revenue coverage for weaned calves for cow-calf producers.

Annual Forage (AF)

Annual Forage (AF) is part of a suite of insurance plans at RMA known as Rainfall Index (RI). AF was established as a pilot program for annual forage crops in Texas, Oklahoma, Kansas, Nebraska, North Dakota, and South Dakota (expanded to include Colorado in 2016). AF protects against a single peril: lack of precipitation. Crops eligible for AF include small grains (wheat, oats, rye, barley, triticale) intended for grazing or forage, corn for silage, sorghum forage for grazing or forage, annually planted grasses for grazing or forage, and annually planted mixed forages for grazing or forage (FCIC, 2016).[6]

AF uses a rainfall index and grid system to determine precipitation within an area. Grids are 0.25 degrees in longitude by 0.25 degrees in latitude (approximately 17 miles by 17 miles), and each is identified by an individual grid ID (RMA 2019a). For each grid ID, rainfall is tracked in 2-month intervals (also known as index intervals). The final grid index for each index interval is based on the precipitation received during the index interval and is expressed as a percentage of average historical precipitation for the grid (RMA 2017).

Final grid index values are determined by the National Oceanic and Atmospheric Administration Climate Prediction Center (NOAA CPC) and are published by RMA. For example, if NOAA estimates the rainfall in a grid for a specific index interval was 4 inches, and the average historical precipitation for the grid for that index interval was 8 inches, then the final grid index would be 50 percent (or 4/8).

Insured acres use the rainfall index for the grid in which they are physically located. If contiguous acres are located in more than one grid, the acres can all be assigned to one of the grids, or the acres can be separated and assigned to multiple grids. For example, assume a producer wants to enroll 100 contiguous acres in AF. Some of the acres are in grid 1 and the rest are in grid 2. The producer can:

1. assign 100 acres to grid 1,
2. assign 100 acres to grid 2, or
3. assign less than 100 acres to grid 1 and the remaining acres to grid 2.

[5] For example, see: https://www.rma.usda.gov/en/News-Room/Press/Press-Releases/2021-News/USDA-Announces-Implementation-of-Improvements-to--Livestock-Risk-Protection-Insurance-Program.

[6] This section (and the following on dual use) draws verbatim from Graff et al. (2021), https://afpc.tamu.edu/research/publications/files/709/BP-21-02.pdf.

TABLE 1. ANNUAL FORAGE GROWING SEASONS AND INDEX INTERVALS.			
GROWING SEASON 1	GROWING SEASON 2	GROWING SEASON 3	GROWING SEASON 4
Sept. – Oct.	Dec. – Jan.	Mar. – Apr.	June – July
Oct. – Nov.	Jan. – Feb.	Apr. – May	July – Aug.
Nov. – Dec	Feb. – Mar.	May – June	Aug. – Sept.
Dec. – Jan.	Mar. – Apr.	June – July	Sept. – Oct.
Jan. – Feb.	Apr. – May	July – Aug.	Oct. – Nov.
Feb. – Mar.	May – June	Aug. – Sept.	Nov. – Dec.

Producers have several decisions to make regarding their AF policy. Before discussing those coverage options, it is important to note a few key definitions (FCIC, 2019):

- **County Base Value (CBV)** – parameter determined by RMA for each county that measures basic per-acre productivity (in dollars) of annual forage within an area.
- **Growing season** – period in which the crop is planted/growing. Annual forage can be insured in any growing season but cannot be insured in consecutive growing seasons for the same crop on the same acreage. The four insurable growing seasons are: (1) September to March, (2) December to June, (3) March to September, and (4) June to November (AF, GMS, & RMA, 2020). Table 1 more clearly defines growing seasons and respective intervals (defined below).
- **Coverage level** – percentage of the grid index to insure. Options range from 70 to 90 percent, in 5 percent increments.
- **Productivity factor** – allows producers to individualize coverage based on productivity of the insured acreage compared to the county. Options range from 60 to 150 percent in 1 percent increments. Only one productivity factor can be selected for a crop for each county. The productivity factor is a percentage of the CBV for the crop (i.e., a producer selects a 125 percent productivity factor if they believe their productivity is 1.25 times the productivity of the county).
- **Index intervals** – period for which precipitation data is reported. Each of the four growing seasons is split into six, 2-month index intervals. There are 12 total intervals (see Table 1). For additional coverage, producers must select three intervals. Consecutive/overlapping intervals (intervals containing the same month) cannot be selected—for example, if the September to October interval is selected, the August to September and October to November intervals cannot be selected.
- **Percent of value** – percentage of the total insured value allocated to each selected index interval, applied to each applicable grid ID in the county. The sum of percentages for all index intervals by crop, intended use, irrigated practice, and grid ID must equal 100 percent. For AF, the minimum value that can be allocated to any single index interval, if selected, is 10 percent, and the maximum value is 40 percent (50 percent in Growing Season 4 only).

Catastrophic (CAT) coverage and additional coverage are available. For CAT coverage, producers specify their crop, intended use, number of acres to insure, and growing season. CAT coverage provides protection at the 65 percent coverage level and 45 percent productivity factor. For CAT coverage, the entire growing season is one 7-month interval, and 100 percent of the insured value is applied to the one interval. Additional coverage requires producer elections of coverage level, productivity factor, index intervals, and percent of value in addition to the specification of the crop, its intended use, number of acres to insure, and growing season. These coverage parameters, combined with a CBV, determine AF premiums, liabilities, and indemnities.

Calculating Annual Forage Coverage and Indemnities

AF producers receive an indemnity when the final grid index is below the selected coverage level. For AF there is no physical loss adjustment—in other words, actual crop production is not directly measured by an AF policy. Therefore, a producer may receive an indemnity payment without experiencing a production loss, or they may suffer a production loss and not receive an indemnity payment. For each index interval, the liability is:

$$Liability = productivity\ factor \times coverage\ level \times CBV \times percent\ of\ value \times acres$$

Then, the indemnity for each index interval, if triggered, is:

$$Indemnity = \frac{coverage\ level - final\ grid\ index}{coverage\ level} \times liability$$

Dual Use Option

The 2018 Farm Bill authorized annual forage producers to utilize two different insurance policies on the same acreage in the same growing season for crops intended to be both grazed and mechanically harvested. While Multiperil Crop Insurance (MPCI) policies—for example, Revenue Protection (RP) and Yield Protection (YP)—are not covered in this handbook, the Dual Use Option allows producers to insure their small grains crop with both an Annual Forage policy for grazing and an MPCI

Small Grains policy for grain. Producers enrolled in the Dual Use Option can receive indemnities under both policies if a loss under each policy is realized. This change was unique because prior to the 2018 Farm Bill, federal law generally disallowed the purchase of multiple insurance policies on the same acres. The sales closing date for the Dual Use Option is July 15 each year. July 15 is also the sales closing date for a Growing Season 1 standalone Annual Forage policy.

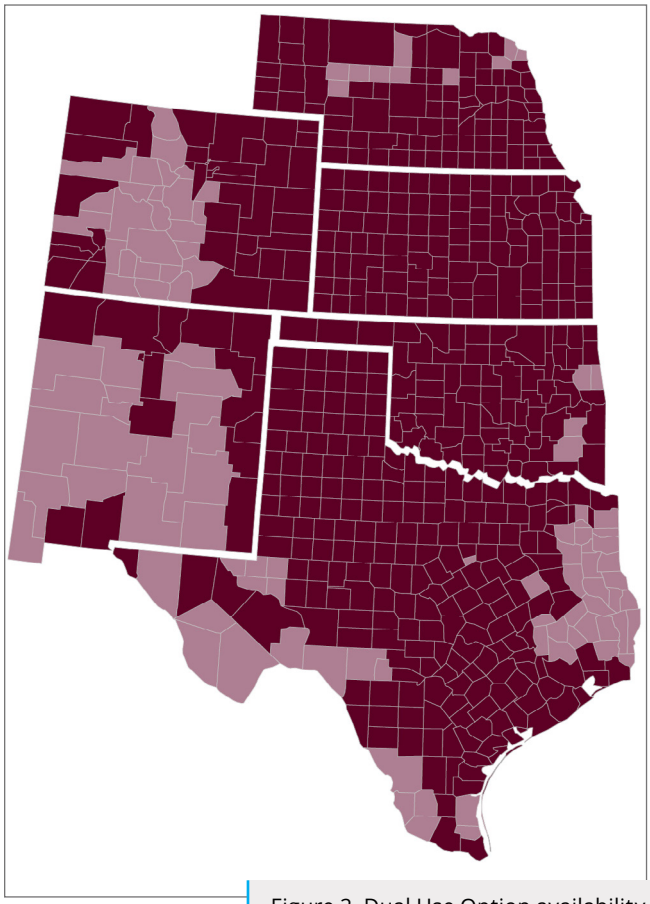

Figure 2. Dual Use Option availability.
Source: RMA 2019b.

Dual Use is only available in certain counties in Texas, Oklahoma, Colorado, New Mexico, Nebraska, and Kansas, where grain/grazing is considered a good farming practice by RMA (Fig. 2). Dual Use is intended for small grains producers who plant their crop by October 15 to graze during the winter and harvest for grain in the summer. Therefore, producers utilizing Dual Use can only select Growing Season 1 (September to March) for the annual forage portion of their Dual Use policy. For Growing Season 1, producers can choose from these interval combinations:

1. September to October, November to December, January to February;
2. September to October, November to December, February to March;
3. September to October, December to January, February to March; or
4. October to November, December to January, February to March.

RMA adjusts the annual forage CBV for a Dual Use policy to reflect the difference in grazing value for the shortened grazing period. The Dual Use CBV is 40 percent of the full-year AF CBV (RMA, 2019a). The 60 percent reduction in CBV for Dual Use reduces the coverage by 60 percent compared to full AF. The 2020 crop year was the first for which Dual Use was available.

Dual Use Option Scenarios

An example wheat and stocker operation will be used to demonstrate the Dual Use Option. This example operation and the scenarios presented are illustrations of how the policy would have worked in the specified county and year, given the chosen parameters. While these examples serve as a guide to understanding the program, producers should make decisions based on local circumstances and the risk management needs of their operation.

Example Operation Description

This example operation, located in Jones County, Texas (grid ID 15120), planted 500 acres of wheat in September, grazed stocker cattle from November to March, and harvested wheat for grain in June. We assume the farm utilized the Dual Use Option for the 2019–2020 crop year. We chose that timeframe for illustration because it was the first year for which Dual Use was available.

For the AF portion of Dual Use, all 500 acres are in the same grid. Therefore, all 500 acres used the grid index for grid ID 15120. For the 2019–2020 crop year, the AF CBV for grid ID 15120 was $195.52. The Dual Use CBV was $78.21 (40 percent of the AF CBV). For Dual Use, index intervals in Growing Season 1 (September to March) had to be selected. For each scenario, the producer also had to assign a percent of value of enrolled acres to each interval and had to select a coverage level and productivity factor. Since the same grid is used for both scenarios, Table 2 shows the final index values for grid ID 15120.

TABLE 2. FINAL INDEX VALUES FOR GRID ID 15120, 2019–2020 CROP YEAR.					
SEPT. – OCT.	OCT. – NOV.	NOV. – DEC.	DEC. –JAN.	JAN. – FEB.	FEB. – MAR.
29.9	81.8	147.4	124.1	188.3	293.2
Source: AF, GMS, and RMA (2020)					

TABLE 3. SCENARIO 1 DUAL USE OPTION SELECTIONS.					
AF INTERVALS	PERCENT OF VALUE	AF PRODUCTIVITY FACTOR	AF COVERAGE LEVEL	SMALL GRAINS POLICY	SMALL GRAINS COVERAGE LEVEL
Sept. – Oct.	34%	125%	75%	RP	70%
Nov. – Dec.	33%				
Jan. – Feb.	33%				

TABLE 4. CALCULATED LIABILITIES FOR SCENARIO 1 AF PORTION OF DUAL USE AND AF COVERAGE.											
PROGRAM	LIABILITY (SEPT. – OCT.)	=	PRODUCTIVITY FACTOR	×	CBV	×	COVERAGE LEVEL	×	% OF VALUE	×	# OF ACRES
AF Portion of Dual Use	$12,464.72	=	125%	×	$78.21	×	75%	×	34%	×	500
Annual Forage Only	$31,161.00	=	125%	×	$195.52	×	75%	×	34%	×	500

TABLE 5. CALCULATED INDEMNITIES FOR SCENARIO 1 AF PORTION OF DUAL USE AND AF COVERAGE.					
PROGRAM	INDEMNITY (SEPT. – OCT.)	=	(COVERAGE LEVEL – FINAL GRID INDEX) ÷ COVERAGE LEVEL	×	LIABILITY
AF Portion of Dual Use	$7,495.45	=	(75% – 29.9%) ÷ 75%	×	$12,464.72
Annual Forage Only	$18,738.15	=	(75% – 29.9%) ÷ 75%	×	$31,161.00

For the MPCI portion of Dual Use, the producer had to select a small grains MPCI policy such as Revenue Protection (RP) or Yield Protection (YP). For both scenarios, the Actual Production History (APH) for the farm was 10 bushels per acre, and the actual yield in 2020 was 8 bushels per acre. The projected price was $4.35/bushel, and the harvest price was $4.58/bushel.

Scenario 1

For Scenario 1, assume the producer chose the following index intervals: September to October, November to December, and January to February with 34, 33, and 33 percent of value of enrolled acres assigned to each interval, respectively, for the AF portion of Dual Use. Further, assume the producer chose 125 percent for the productivity factor and 75 percent for the AF coverage level. For the small grains policy, assume the producer selected Revenue Protection (RP) with 70 percent coverage. The producer elections for Scenario 1 are summarized in Table 3.

Tables 4 and 5 show the liability and indemnity calculations for the AF portion of Dual Use and the standalone AF policy. September to October was the only interval of the three selected that triggered an indemnity payment. Recall, an indemnity is triggered when the final index value is less than the selected coverage level, and of the three intervals selected, only the September to October value (29.9) was less than the 75 percent coverage level (Table 2). This resulted in a $7,495.45 indemnity for the AF portion of Dual Use, which is 40 percent of the standalone AF indemnity ($18,738.15).

Importantly, the Dual Use option also includes indemnities from the small grain MPCI policy (not included in Table 5). In this scenario, an RP indemnity was not triggered since the revenue guarantee ($4.58 × 10 bushels per acre × 70%) was not greater than the actual revenue ($4.58 × 8 bushels per acre). Therefore, the producer's total indemnity from Dual Use was $7,495.45. As a result, a standalone AF policy would have paid the larger indemnity. It is also important to note that these scenarios simply illustrate total indemnities and do not account for premiums paid by producers for the coverage. Because the AF portion of Dual Use is always 40 percent of a standalone AF policy, the return from the small grains policy must make up for the difference for Dual Use to be preferred.

TABLE 6. SCENARIO 2 DUAL USE OPTION SELECTIONS.					
AF INTERVALS	% OF VALUE	AF PRODUCTIVITY FACTOR	AF COVERAGE LEVEL	SMALL GRAINS POLICY	SMALL GRAINS COVERAGE LEVEL
Sept. – Oct.	40%	100%	85%	YP	85%
Nov. – Dec.	40%				
Jan. – Feb.	20%				

TABLE 7. CALCULATED LIABILITIES FOR SCENARIO 2 AF PORTION OF DUAL USE AND AF COVERAGE.											
PROGRAM	LIABILITY (SEPT. – OCT.)	=	PRODUCTIVITY FACTOR	×	CBV	×	COVERAGE LEVEL	×	PERCENT OF VALUE	×	# OF ACRES
AF Portion of Dual Use	$13,295.70	=	100%	×	$78.21	×	85%	×	40%	×	500
Annual Forage Only	$33,238.40	=	100%	×	$195.52	×	85%	×	40%	×	500

TABLE 8. CALCULATED INDEMNITIES FOR SCENARIO 1 AF PORTION OF DUAL USE AND AF COVERAGE.					
PROGRAM	INDEMNITY (SEPT. – OCT.)	=	(COVERAGE LEVEL – FINAL GRID INDEX) ÷ COVERAGE LEVEL	×	LIABILITY
AF Portion of Dual Use	$500.54 (+ $1,087.40 for YP)	=	(85% – 81.8%) ÷ 85%	×	$13,295.70
Annual Forage Only	$1,251.33	=	(85% – 81.8%) ÷ 85%	×	$33,238.40

Scenario 2

For AF in the second scenario, assume the producer assigned 40 percent of the value of enrolled acres to the October to November interval, 40 percent to December to January, and 20 percent to February to March. Further, assume the producer elected 100 percent for the productivity factor and 85 percent for the coverage level.

For the small grains policy, assume the producer chose Yield Protection (YP) with an 85 percent coverage level and insured 100 percent of the $4.35/bushel projected price. The producer elections for Scenario 1 are summarized in Table 6.

As noted in Tables 7 and 8, an indemnity for the AF portion was triggered by the October to November interval (final index value of 81.8), resulting in an indemnity payment of $500.54. A YP indemnity of $1,087.50 was also triggered since the actual production value ($4.35 × 8 bushels per acre × 500 acres) was less than the YP guarantee ($4.35 × 10 bushels per acre × 85% × 500 acres). As a result, the total indemnity from the Dual Use policy was $1,587.54. Unlike in scenario 1, Dual Use provided a larger indemnity than the standalone AF policy. With that said, as noted above, this is a comparison of total indemnities, not net indemnities, and producers should take premiums into account when selecting policies and coverage options.

Pasture, Rangeland, and Forage (PRF)

Like AF, Pasture, Rangeland, and Forage (PRF) is part of the suite of RI insurance plans that protect against lack of precipitation. While AF and PRF share a lot of common features and function much the same, the most notable difference is that PRF is intended to cover perennial pasture, rangeland, and forage acres. In addition, while AF is only available in select states, PRF is available in all 48 contiguous states. If you have pasture, rangeland, or forage and are concerned about lack of rainfall during specific monthly intervals, we encourage you to reach out to a crop insurance agent for additional information.

Livestock Risk Protection (LRP)

Livestock Risk Protection (LRP) is a single-peril insurance program designed to provide price risk protection for feeder cattle, fed cattle, lamb, and swine, though LRP Lamb contracts were discontinued in September 2021. LRP policies function similarly to a put option, locking in the right, but not the obligation, to sell at a given price, essentially establishing a price floor. Producers pay a premium for coverage, which is subsidized by the federal government. If the contract value at expiration is below the LRP contracted price, a premium is paid.

Though LRP can enhance the profitability of a feeder cattle enterprise over time, the original intent of the program was to protect against catastrophic price losses. Much like using a put option, LRP contracts insure against the change in a specific value on paper—in the case of feeder cattle, against the value of the Chicago Mercantile Exchange (CME) Feeder Cattle Reported Index. The LRP contract functions under the assumption that the CME Feeder Cattle Reported Index is strongly correlated to cash feeder cattle prices, so losses in the cash market should be offset by gains in LRP contracts. Parties interested in LRP should bear in mind that LRP does not guarantee a price for physical cattle.

Types of Coverage Endorsements, Adjustments, Basics

LRP gives significant flexibility to the producer, with contracts available under a variety of endorsements and adjustments. However, not all adjustments are available at all times. Producers commonly mention that futures contracts and options on those contracts are too costly, simply because of their size. A CME Feeder Cattle futures contract is for 50,000 pounds. Assuming a feeder weight of 750 pounds, a CME Feeder Cattle contract represents approximately 66 head, more than the average producer sells each year. On the other hand, LRP allows producers to insure a range of one to 25,000 head of cattle in a given crop year for both feeder- and fed-cattle policies. This significantly lowers the expense of setting a price floor for small producers and prevents the possibility of over- and/or under-exposure through the futures market. The ability to insure a small number of head also allows large producers who can afford a futures or options contract to insure calves that are "left over." For example, when a large producer wishes to hedge 115,000 pounds of feeder calves, they can use two futures or options contracts and buy the additional LRP coverage required to hedge the remaining 15,000 pounds. One key departure from a futures or options contract is that producers must have an ownership interest in the number of head they intend to insure.

LRP contracts are currently available for feeder cattle, fed cattle, and swine. LRP contract rates are based on the cash-settled CME Feeder Cattle Index, which only accounts for the price of steers from 650 to 849 pounds. Therefore, a number of "Types" are available within Feeder Cattle contracts, and those types can be used to tailor coverage for specific feeder cattle attributes (Table 9). LRP considers all calves that weigh 1,000 pounds or less at delivery as feeder cattle. There are two weight categories available for feeder cattle contracts: Weight 1 (less than 600 pounds) and Weight 2 (600 to 1,000 pounds). Both weight categories are available for adjustments corresponding to heifers, calves that are predominantly brahman, and calves that are predominantly dairy. Price Adjustment Factors (PAFs) are applied to the expected ending values, coverage prices, and actual ending values of cattle insured under these Types. These PAFs are applied to the values published for each Type daily and need not be added in by the producer when calculating premiums and expected ending values.

A relatively new Type is "Unborn." The Unborn Type allows producers with an ownership stake in pregnant cattle to insure feeder calves for delivery prior to their birth. The LRP contract functions exactly the same, though the coverage endorsement paperwork will require the location of the pregnant cattle and Type, and the insurance provider may request proof of pregnancy and verification that the number of cows is capable of producing the number of insured Unborn calves.

Producers can also choose from a range of coverage levels, from 70 to 100 percent of the expected ending value, with the ending value approximating the futures price for the given time period. There are advantages and disadvantages to different coverage levels. The greater the coverage level, the greater the probability of an indemnity. However, the greater the coverage level, the more expensive the contract is in absolute terms and in terms of the subsidy loss (Table 10). The lower the coverage level, the greater the federal subsidy applied to the contract. Final indemnities are paid based on the chosen coverage price relative to the expected ending value.

TABLE 9. LRP PRICE ADJUSTMENT FACTORS.

WEIGHT RANGE	PRICE ADJUSTMENT FACTORS (%)						
	STEERS	HEIFERS	UNBORN STEERS AND HEIFERS	PREDOMINANTLY BRAHMAN	UNBORN PREDOMINANTLY BRAHMAN	PREDOMINANTLY DAIRY	UNBORN PREDOMINANTLY DAIRY
< 600 pounds	110	100	105	100	100	50	50
600–1,000 pounds	100	90	N/A	90	N/A	50	N/A

TABLE 10. LRP PREMIUM SUBSIDY BY COVERAGE LEVEL.	
COVERAGE LEVEL (%)	SUBSIDY (%)
95–100	35
90–95	40
85–90	45
80–85	50
70–80	55

Finally, the producer can choose from a variety of endorsement lengths for which the coverage with the selected adjustment applies. Insurance is available for 13, 17, 21, 26, 30, 34, 39, 43, 47, and 52 weeks. The selected length should correspond with the expected marketing date for the insured cattle, though contracts with an intermediate endorsement length can be purchased and even stacked.

Producer Eligibility

Producers of feeder cattle are eligible to purchase LRP policies so long as they have ownership interest in the cattle. Ownership must be maintained until 60 days prior to the specific coverage endorsement end date. Livestock are considered sold at the time they are possessed by the buyer, not the date of the livestock purchase agreement. Cattle may also be owned beyond and sold after the endorsement end date, which means that cattle need not be sold to qualify for an indemnity payment.

LRP contracts can be purchased through a USDA-approved crop insurance provider.[7] First, a producer must complete an application, which is only required a single time. The application does not enroll a producer in an insurance product and does not obligate a producer to do so. The second step to accessing coverage is selecting a specific coverage endorsement. Each time a producer enrolls in a new endorsement, either for new livestock or for the same livestock after the expiration of a prior endorsement, they must complete a new specific coverage endorsement. Policies begin on the purchase date and are effective through the end of the selected endorsement period.

Comparison with Futures Options

Though LRP and put options are similar in nature, there are a few discrepancies that create benefits and drawbacks for each risk management tool, depending on a producer's needs. Both tools may also be used in combination to establish a more effective price floor.

Prior to subsidy changes in 2021, LRP policies were more expensive per unit than similar options on futures contracts. However, the federal subsidy rates were increased in 2021, making the cost of LRP policies comparable to similar options on futures contracts. In addition, unlike with futures and options, LRP premiums are not due up front. Rather, premiums are deducted from any indemnities due to the producer after the specific coverage endorsement end date.

LRP policies offer significantly more tailored coverage than options. The adjustments available for type and number of head, in particular, provide for coverage that better reflects the true value of the product producers are insuring. For example, a producer wishing to establish a price floor for 45,000 pounds of feeder cattle would be over-exposed to the futures market by 5,000 pounds (approximately seven head of 750-pound feeder cattle) were the producer to use a CME futures contract or option on the futures contract. The over-exposure means that a producer would need to spread the expense of the futures contract or option over a smaller number of cattle, despite paying the same as a producer establishing a price floor for 50,000 pounds of feeder cattle. An LRP policy would allow the same producer to insure exactly 45,000 pounds of feeder cattle for a similar delivery date. The same concept is true of producers wishing to establish a price floor for cattle eligible for PAFs.

LRP policies do have some drawbacks when compared to put options. For example, options on a futures contract are an American-style option, while LRP functions as a European-style option. A put option can be exercised any day between purchase and expiration, so long as the current price is above the strike price. An LRP policy only nets an indemnity if the ending value is below the expected value on the expiration date. In theory, a short-lived spike in the feeder cattle futures market could result in no LRP indemnity for a producer, though that producer may still be selling physical cattle at a lower price in the cash market.

Example

LRP premiums are based on the Expected Ending Value and the Coverage Price Level chosen by the enrolled producer. The Expected Ending Value is roughly equal to the futures price for that specific end date. The Coverage Price is chosen by the producer by multiplying their Coverage Level (a percentage of the Expected End Value) by the Expected End Value, establishing "how much" of the expected end value the producer wants to protect. The Actual End Value is based on the weighted average price of, in the case of feeder cattle, the daily settled CME Feeder Cattle Index, multiplied by any PAFs the covered livestock qualify for.

[7] For help finding an agent, see: https://www.rma.usda.gov/Information-Tools/Agent-Locator-Page.

TABLE 11. LRP COVERAGE PRICES, RATES, AND ACTUAL ENDING VALUES.									
	ENDORSEMENT LENGTH	EXPECTED END VALUE	COVERAGE PRICE	COVERAGE LEVEL	RATE	CWT	PRODUCER PREMIUM PER CWT	END DATE	ACTUAL END VALUE
A	13	164.120	$164.07	0.9997	0.03376	5.539	4.43	04/10/20	125.85
B	13	164.120	$164.07	0.9863	0.02684	4.344	3.48	04/10/20	125.85
C	13	164.120	$164.07	0.9729	0.02107	3.364	2.69	04/10/20	125.85
D	21	167.907	$167.58	0.9981	0.04290	7.190	5.75	06/05/20	141.98
E	21	167.907	$165.38	0.9850	0.03590	5.937	4.75	06/05/20	141.98
F	21	167.907	$163.18	0.9718	0.02986	4.872	3.9	06/05/20	141.98
Source: USDA RMA Livestock Reports (LRP), https://www.rma.usda.gov/en/Information-Tools/Livestock-Reports									

If the Actual End Value at expiration is above the Coverage Price, there is no indemnity, and no further action is required on the part of the producer. If the Actual End Value at expiration is below the Coverage Price, the policy nets an indemnity. The indemnity is equal to the Coverage Price less the Actual End Value.

Table 11 includes data pulled directly from RMA's Livestock Reports page for LRP for a policy established on January 10, 2020, for a Feeder Cattle Steers Weight 1 LRP policy in Texas.

Assume a producer wishes to insure 500 pounds of feeder cattle under the assumptions presented in Line A. The producer is insuring 100 percent of the expected end value of $164.07/cwt at delivery on April 10, 2020. The premium rate at that time was 3.376 percent, resulting in a total premium of $5.539/cwt. Subsidy rates were lower at the time, with 100 percent receiving only about a 20 percent subsidy. The producer's premium share was $4.43/cwt, or $22.15 total. Under the new subsidy rates, the producer would have been responsible for only 65 percent of the premium, or $3.60/cwt.

The Actual End Value of the CME Feeder Cattle Index on April 10, 2020, was $125.85/cwt. Because the Actual End Value was less than the Coverage Price at expiration, an indemnity would have been generated. The total indemnity, in that case, would have been:

$$\frac{(\$164.07 - \$125.85)}{cwt} \times 5cwt = \frac{\$38.22 \times 5cwt}{cwt} = \$191.10 \text{ per head}$$

Livestock Gross Margin (LGM)

The Livestock Gross Margin (LGM) insurance plan is intended to protect against the loss of gross margin or the market value of livestock, less feeder cattle and feed costs. Indemnity payments are the difference between the gross margin guarantee and the actual gross margin. Margins and prices for LGM are determined based on futures prices from the Chicago Mercantile Exchange (CME) and are not based on prices received in the market. LGM is unique from traditional insurance options in that it is essentially a bundled option, covering both the cost of feeder cattle and feed. Producers do not have to decide on the mix of options to purchase, a strike price, or the date of entry of coverage.

Producer Eligibility

Any producer who owns cattle is eligible for LGM coverage. However, only cattle that are sold commercially or for private slaughter primarily intended for human consumption and fed in the U.S. are eligible for coverage. "Double-dipping" is not allowed. That is, cattle cannot be insured under more than one livestock policy. LGM does not cover cattle death, unexpected increases in feed use, or anticipated or multiple-year increases in feed costs.

Coverage and Premiums

Coverage can be purchased every Thursday. The sales period starts when the coverage prices and rates are posted on RMA's website and ends on the following day at 9:00 a.m. Central Standard Time.[8] The insurance period lasts 11 months following the sales closing date, but coverage does not begin until the second month of the insurance period. For example, the insurance period for a January closing date is February through December, but the coverage period is March through December. LGM can be purchased from private crop insurance agents.[9]

Producers must elect the number of cattle to be insured during the insurance period, known as "target marketings." This determination is the maximum number of slaughter-ready cattle that the producer

[8] LGM coverage prices and rates post here: https://public.rma.usda.gov/livestockreports/LRPReport.aspx.

[9] For help finding an agent, see: https://www.rma.usda.gov/Information-Tools/Agent-Locator-Page.

will market or sell during the insurance period. The producer's target marketings may not be more than the producer's approved target marketings, which are determined by the insurance underwriter and are based on the farm capacity for the 10-month insurance period. After the initial insurance period, the producer must complete a Target Marketings Report each month they are insured to be eligible for coverage in the next insurance period. This report must also have copies of packer sales receipts that provide records of the actual marketings shown on the marketing report.

The producer may choose deductible amounts from $0 per head to $150 per head in $10 increments, and each target marketings report can have a different deductible. Premiums depend on the marketing plan, coverage the producer chooses, deductible level, and futures and price volatility. The premium is due at the end of the coverage period. Premiums can be subsidized if the producer elects multiple-month coverage and are ultimately determined by the deductible. For example, if a $0 deductible is chosen, the premium subsidy is only 18 percent, but the premium subsidy for a $150 deductible is 50 percent.[10]

Indemnities

The indemnity at the end of the insurance period is the difference, if positive, between the gross margin guarantee and the actual gross margin. Following are the primary components of the LGM indemnity calculation:

LGM Indemnity = Gross Margin Guarantee – Actual Gross Margin [if positive]

Gross Margin Guarantee = Expected Total Gross Margin – (Deductible × Total of Target Marketings)

and

Actual Gross Margin = (actual market value of cattle – feed and feeder animal costs) × Total of Target Marketings

where

Expected Total Gross Margin = (expected market value of cattle – expected feed and feeder animal costs) × Total of Target Marketings

Deductible = portion of the Expected Total Gross Margin (in $/head) that you choose not to insure

Target Marketings = number of cattle you elect to insure each month during the insurance period

For example, assume a producer has 1,000 head of cattle to sell in June with an expected gross margin per head of $125 and an actual gross margin per head of $50. The expected total gross margin would be $125,000 (1,000 × $125 = $125,000). If that producer has a $50 per head deductible, the gross margin guarantee is $75,000 [$125,000 – (1,000 × $50)]. The actual total gross margin for the producer would be $50,000 (1,000 × $50 = $50,000). The producer's indemnity would be $25,000 ($75,000 – $50,000 = $25,000).[11]

On the Horizon

AgriLogic Consulting, in collaboration with Windmark Insurance, has developed the Weaned Calf Risk Protection (WCRP) insurance program with the objective of providing coverage to the beef producer's annual spring calf crop. The program is designed to provide cow-calf producers with risk protection for their calves up to weaning age. The general structure for the coverage will be similar in concept to the widely utilized Revenue Protection (RP) insurance plans, which have long been available for major commodity crops such as corn, soybeans, and cotton and include both price and yield protection. The program has been approved by the Federal Crop Insurance Corporation Board of Directors and, as of the date of publication, AgriLogic was working with RMA to implement the program. Once implemented, WCRP will be a federally subsidized insurance program available in major beef cattle producing states through Approved Insurance Providers (AIP) of the federal crop insurance program.

WCRP is designed to provide coverage for a decline in price and lost yield in the form of decreased overall weaning weight based upon producer records. Covered perils include the following:

- Adverse weather conditions (e.g., drought, blizzard, flood)
- Fire
- Wildlife
- Earthquake
- Volcanic eruption
- Disease, but not damage due to insufficient or improper application of disease control measures
- Other causes directly damaging pastures and other forms of grazing (e.g., insects, provided acceptable control measures were followed)

[10]RMA provides a premium calculator at https://ewebapp.rma.usda.gov/apps/costestimator/.

[11]For more information, see: https://www.rma.usda.gov/en/Fact-Sheets/National-Fact-Sheets/Livestock-Gross-Margin-Insurance-Cattle.

- Calf death due to a covered peril occurring during the insurance period (e.g., disease, freezing temperatures, flood, fire, hail, predation, etc.)
- Change in harvest price from projected price unless FCIC can prove the price change was the direct result of an uninsured cause of loss

A producer will be required to insure all calves in which they have an interest in all counties listed on their application. The program will be available for spring (born between February 1 and July 31) calves. Sales closing will take place prior to the calving season, at which time the producer will choose from several coverage level options ranging from 50 to 85 percent and provide necessary production records and information about their calving operation. The Catastrophic Risk Protection Endorsement will also be available. Much like revenue protection crop insurance programs, WCRP will utilize season beginning and ending prices to be referred to as the projected and harvest prices, respectively.[12] Pricing will proxy off the feeder cattle futures contract. A calf report will be submitted (by an established deadline) to indicate the actual number of calves born to establish the production guarantee. Coverage begins once calves are reported. A notice of loss must be filed for losses occurring after coverage has attached. All notices of loss will be subject to adjuster inspection. Weaning weights will be required to determine the total weight of production to count. Weights will be verified by either a non-interested third party or an insurance company loss adjuster. Following weighing, the producer may handle calves as they choose (e.g., sell, background, etc.). WCRP will initially be offered in Colorado, Nebraska, South Dakota, and Texas. New producer procedures and Beginning/Veteran Farmers and Ranchers program provisions apply.

All the details, including the program dates and coverage specifics, will be officially released by RMA once finalized. Check with your licensed crop insurance agent, your AIP, or the RMA website for information on how to apply for coverage.

[12]Yield Protection and Revenue Protection with Harvest Price Exclusion options will also be available.

CHAPTER 3:

Risk Management Using the Futures Market

Trading futures has evolved over time to serve as a pillar of risk management in agricultural production, and it has become one of agriculture's primary methods of price discovery. Futures contracts originated as a mechanism to reduce the risk of trading grains from harvest to delivery, and now futures contracts exist for a variety of commodities, including grains, livestock, "softs" (cotton, orange juice, coffee, etc.), energies, metals, and financial derivatives that represent companies and financial instruments. Futures markets provide buyers and sellers of commodities with the opportunity to establish prices for future delivery, thereby mitigating risk, in a central marketplace that serves as a clearinghouse, setting the "rules of the game."

Despite the evolution in the futures market, over the last 5 years, producers/merchants/processors/users (shortened to "producers")—as categorized by the Commitment of Traders report—represented only 10 to 20 percent of all futures and options positions in feeder cattle contracts on a given day. Producer participation in the fed cattle contract over the last 5 years was higher—between 25 and 35 percent of futures and options positions at a given time.

There are alternatives to using the futures market. Cash marketing at harvest or sale weight is an option. This strategy does not involve any risk management and subjects producers to the market at delivery. Alternatives that manage risk to some extent include speculative storage (though this is difficult to impossible for livestock), forward contracting, hedge-to-arrive contracts, basis contracts, and minimum price contracts. However, this section will focus on using futures contracts to manage risk by placing different types of hedges. After reviewing hedging, discussing budgets and break-even prices, and detailing the structure of futures and options contracts, this section will provide brief examples of several hedging strategies using futures and options.

Hedging vs. Speculation

In agricultural production, hedging is the act of taking a position in the futures market that is equal to and opposite of the position one intends to take in the cash (physical) market at a later date. Because price moves in the cash market and futures market are typically correlated, producers of commodities can mitigate losses in the physical market for that commodity. Commodity producers (sellers) are at risk from price declines. Commodity purchasers (buyers) are at risk from price increases. In either case, hedgers typically own or intend to own the physical asset represented by a futures contract. Hedging should be used when:

- there is an opportunity to lock in a price objective,
- the price covers costs,
- a producer expects prices to decline, or
- a producer needs to facilitate a loan, with the hedge giving the loan provider assurance of the hedged price.

Hedging of agricultural commodities is possible because the futures contract converges to the spot price (in an efficient market) and the producers own the physical asset underlying their position in the futures market. The regular convergence of the futures price to the spot price means that the value of the financial contract is tied to the physical asset it represents, so the financial instrument can be used to offset price changes in the physical market. If a producer utilizing the futures market to hedge is unable to meet their financial obligations dictated by their futures contract (possibly due to issues of cash flow), they may deliver the commodity to settle their account. Delivery is not a regular occurrence, and most hedgers settle their futures position by taking an opposing move in the futures market to close out their position.

Speculators—often hedge funds or other types of "managed money"—are market participants that attempt to capitalize on market volatility. They typically do not own (and do not intend to own) the physical asset represented by a futures contract, and their intent is to either buy or sell a contract and to then sell or buy that contract at a later point for a profit. Speculators accept the risk of participating in the futures market and provide liquidity to the futures market.

Though it is counterintuitive, remember that the best-case outcome for a risk management strategy is that it expires worthless. Losing money on risk management means that the price of the physical commodity has moved in a favorable direction for the producer. Though they lost a small amount on their risk management strategy, they gained money overall. Win-win scenarios are possible, but the true purpose of risk management is to deliver consistent, predictable returns by mitigating severe downside risk and allowing upside potential when possible.

Budgets and Establishing Break-Even Price

Using the futures market to hedge is a powerful tool to achieve profitability. However, a profitable price will differ among producers and will differ for the same producer over time. How then does a producer interested in hedging know that the price they are locking in is profitable?

Projections for Planning Purposes Only — Not to be Used without Updating 2022 Estimated Costs and Returns per Animal Unit Cow-Calf Budget Panhandle Extension District - 1							
Animal Units	200						
Breeding Females	200						
REVENUE		Head	Quantity Per Head	Units	$/Unit	Total	Enterprise Total
Steer		0.425	5.25	CWT	$175.00	$390.47	$78,093.75
Heifer		0.23	4.75	CWT	$175.00	$191.19	$38,237.50
Cull Cow		0.12	10	CWT	$75.00	$90.00	$18,000.00
Cull Bull		0.008	18	CWT	$85.00	$12.24	$2,448.00
Total Revenue						$683.90	$136,779.25
VARIABLE COSTS			Quantity	Units	$/Unit	Total	Enterprise Total
Production Costs							
Miscellaneous							
Miscellaneous - Cow			1	AU	$5.00	$5.00	$1,000.00
Marketing Expense			1	AU	$25.31	$25.31	$5,062.00
Feed							
Supplement			350	Pound	$0.22	$77.00	$15,400.00
Hay Pound			280	Pound	$0.11	$30.80	$6,160.00
Mineral			50	pound	$0.43	$21.50	$4,300.00
Vet. Medicine							
Vet. Medicine - Cow			1	AU	$25.00	$25.00	$5,000.00
Fuel			1	AU	$5.03	$5.03	$1,006.00
Lube (As a % of fuel)			10.00%	Percent	$5.03	$0.50	$100.60
Repairs			1	AU	$13.03	$13.03	$2,606.00
Labor			3.72	Hours	$15.47	$57.55	$11,509.68
Interest on Credit Line					6.30%	$16.43	$3,285.09
Total Variable Costs						$277.15	$55,429.37
Planned Returns Above Variable Costs:						$406.75	$81,349.88
Average Calf Breakeven Price to Cover Variable Costs				$52.62	CWT		
FIXED COSTS			Quantity	Units	$/Unit	Total	Enterprise Total
Depreciation - Equipment			1	AU	$12.46	$12.46	$2,492.00
Depreciation - Livestock			1	AU	$17.71	$17.71	$3,542.00
Equipment Investment			$566.64	Dollars	6.30%	$35.70	$7,139.66
Pasture Cost			25	Acres	$9.50	$237.50	$47,500.00
Total Fixed Costs						$303.37	$60,673.66
Total Costs						$580.52	$116,103.03
Planned Returns to Management, Risk, and Profit:						$103.38	$20,676.22
Average Calf Breakeven Price to Cover Total Costs				$143.90	CWT		

Figure 3. Example of cow-calf enterprise budget for Texas A&M AgriLife Extension District 1 (region surrounding Amarillo, Texas).

Developing an enterprise budget will yield the necessary components to calculate a break-even price, the amount of money for which a unit of production must be sold to cover the costs of acquiring, owning, and developing that unit of production. An enterprise budget consists of expected revenue, expected variable costs, and expected fixed costs.

Revenue	Price × Quantity
– Variable Costs	Cost per Unit × Quantity
– Fixed Costs	Cost per Unit × Quantity
Net Income	Revenue – Variable Cost – Fixed Costs

The combination of revenue and costs yields a variety of useful information, one of which is the break-even price. An example of a cow-calf enterprise budget for the region surrounding Amarillo, Texas, is included in Figure 3. Many Extension systems provide representative enterprise budgets for the state and/or regions they are located in.

Utilizing the costs in the enterprise budget yields break-even price. The formula for break-even price in a cow-calf enterprise is slightly different than normal break-even prices, as it accounts for the value generated from cull animals in addition to the price received for calves. The formula for break-even price per animal unit in a cow-calf enterprise is:

$$\frac{(\text{Cost} - \text{Cull Cow Revenue} - \text{Cull Bull Revenue})}{(0.47 \times \text{Steer Weight} + 0.22 \times \text{Heifer Weight})} = \text{Break Even Price}$$

The break-even price in the cow-calf enterprise is the price for calves sold. However, this enterprise also sells cull cows and cull bulls. The sale of cull-breeding animals effectively lowers the break-even price for calves by adding an additional revenue stream. Therefore, where a basic break-even formula is simply total cost divided by quantity sold, in a cow-calf enterprise budget the cull cow and cull bull revenue is subtracted from total cost prior to dividing by quantity of calf weight sold. Then, dividing costs by the calf weight sold per animal unit yields break-even price per pound of calf sold. The expected calf weight per animal unit is about half of a steer and about a quarter of a heifer. Why? On average, a calf crop is split 50/50 between steers and heifers, and weaning weights between the categories differ. Additionally, if a cow-calf enterprise generates its own replacements, the heifer weight available for sale must be adjusted to account for that missing revenue. Therefore, only a quarter of a heifer per breeding cow is available for sale each year. Finally, some death loss is expected and must be included in the expected weight available for sale. In the example above, a 3 percent expected death loss is included. All adjustments included, the expected weaning weight available for sale per animal unit each year is about 0.47 percent of a steer and about 0.22 percent of a heifer.

In the enterprise budget example above, the break-even calf price to cover variable costs per animal unit would be:

$$\frac{\$277.15 - \$90.00 - \$12.24}{(0.47 \times 5.25\text{cwt} + 0.22 \times 4.75\text{cwt})} = \$52.62/\text{cwt}$$

How should someone interpret this, and why use only variable costs? Any price for which calves are sold in excess of $52.62/cwt ($0.52 per pound) generates revenues in excess of variable costs. In economic terms, the break-even value to cover variable costs is called the shutdown point. As long as a business is covering all of its variable costs and some portion of its fixed costs, it is better off to continue producing rather than shutting down. Every unit produced yields some revenue that can be allocated toward fixed costs, which must be paid no matter what. If the price received falls below the break-even value to cover variable costs, there is no extra money to allocate to fixed costs, money is lost with each unit produced, and therefore, the business should shut down.

In the enterprise budget example above, the break-even calf price to cover total costs per animal unit would be:

$$\frac{(\$580.52 - \$90.00 - \$12.24)}{(0.47 \times 5.25\text{cwt} + 0.22 \times 4.75\text{cwt})} = \$143.90/\text{cwt}$$

Any price received for calves in excess of $143.90/cwt ($1.44 per pound) yields true profit. The enterprise is covering its variable and fixed costs. So, for this enterprise in which the calf price exceeds the break-even price to cover fixed costs, a true profit is achieved.

Establishing the break-even price is necessary prior to implementing a hedging strategy to ensure that the established hedge is set at a profitable price. Were a producer to lock in a price at $130/cwt in the previous example, they would cover all of their variable costs per hundredweight, but not their total costs per hundredweight.

Futures

Futures Market

Futures contracts are traded through various clearinghouses, accessed by commodity brokers acting on behalf of their clients. Futures markets provide price discovery and a central marketplace where buyers and sellers from around the world can interact and determine prices. These clearinghouses establish the rules of the game by standardizing contracts,

setting rules for margins, setting rules for delivery when necessary, and processing trades. Popular clearinghouses that trade agricultural commodities include the Chicago Mercantile Exchange (CME) and the Intercontinental Exchange (ICE). The Feeder Cattle and Live Cattle futures contracts trade on the CME.

TABLE 12. FEEDER CATTLE SPECIFICATIONS FOR FUTURES CONTRACTS.

FEEDER CATTLE	
Exchange	Chicago Mercantile Exchange
Price quote	U.S. cents per pound
Contract size	50,000 pounds
Minimum tick size and value (as of April 2022)	0.025 cents per pound, $12.50 per contract
Trading times	Monday – Friday, from 8:30 a.m. U.S. Central Time to 1:05 p.m. U.S. Central Time
Principal trading months	January, March, April, May, August, September, October, and November
Settlement method	Financially settled

TABLE 13. LIVE CATTLE SPECIFICATIONS FOR FUTURES CONTRACTS.

LIVE CATTLE	
Exchange	Chicago Mercantile Exchange
Price quote	U.S. cents per pound
Contract size	40,000 pounds
Minimum tick size and value (as of April 2022)	0.025 cents per pound, $10 per contract
Trading times	Monday – Friday, from 8:30 a.m. U.S. Central Time to 1:05 p.m. U.S. Central Time
Principal trading months	February, April, June, August, October, and December
Settlement method	Deliverable

Futures Contract

A futures contract is a contractual obligation to make or take delivery of a commodity (or some contractual representation of a commodity) at a previously agreed-upon price. Futures contracts are subject to a standardized amount, a standardized quality grade, and other standardized specifications. These specifications allow traders to focus on a single type of risk: price. The specifications for the feeder cattle and live cattle contracts are shown in Tables 12 and 13.

A futures contract is, by its nature, an agreement to execute a transaction at some specific future date. Each commodity type has a specific set of contract months, which usually correspond to some biological or technical condition in the cash market. Transaction volume in the cash market is typically high during months for which futures contracts exist. Limited contract months may also be used to increase the liquidity of the existing contract months. Feeder cattle contract expiration months include January, March, April, May, August, September, October, and November. Live cattle contract expiration months include February, April, June, August, October, and December.

The value of a futures contract is calculated by multiplying the contract's price per unit by the number of units per contract. For example, assume that the CME August Feeder Cattle contract is trading at $1.50/pound. The value of the contract is:

CME August Feeder Cattle Contract = $1.50 per pound × 50,000 pounds = $75,000

Changes in the contract price are set by the Exchange. Consider, again, the Feeder Cattle contract. As of April 2022, the CME dictates that any change in a Feeder Cattle contract must occur in an increment of $0.025/cwt. Multiplied by 50,000 pounds, a full contract value changes in increments of $12.50. Price changes are also subject to daily limits that are intended to limit excessive volatility and to discourage manipulation of the market.

A producer may hedge against price changes using a futures contract by taking an equal and opposite position from the position they intend to take in the market for the physical asset at a later date. If the hedger is concerned about the price of their product declining over time, they would take a short position (sell a futures contract) for that commodity, with a delivery date close to their physical delivery date. If the price of the commodity goes down, the lower cash value realized in the physical market is offset by the profit in the futures market. If the price of the commodity goes up, losses in the futures position are offset by the improved price of the physical asset. Either way, the desired price is locked in using the combinations of gains and losses in the futures market and physical market.

If the hedger is concerned about the price of an input increasing over time, they would take a long position (buy a futures contract) for that commodity, with a delivery date close to their physical purchase date. If

the price of the commodity goes down, the lower value realized in the futures contract is offset by gains from paying less for the input in the physical market. If the price of the input goes up, gains in the futures position are offset by the increasing cost of the physical input. Either way, the desired price is locked in through the combinations of gains and losses in the futures market and physical market.

The three rules to implement a proper hedge with a futures position are:

1. The trader must hold opposite initial cash and futures positions.
2. The final cash and futures positions must be the same.
3. If the cash price risk is from declining prices, enter a short position by selling futures. If the cash price risk is from increasing prices, enter a long position by buying futures.

The "Common Hedging Strategies" section details a variety of futures strategies used to mitigate different types of price risk.

Margin Calls

Futures contracts are guaranteed by the clearinghouse that maintains an accounting of each trader's position over time. Remember, if a hedge is created by selling a futures contract, it means another market participant must have bought the contract from them, though they will never know who that buyer is.

To create some assurance that traders will not default on the contract they have entered into, the clearinghouse generally requires traders to deposit a given amount, called an initial margin, into a margin account intended to balance their account against changes in the value of the contract. If the price moves opposite the trader's hedge (the price rises against a short position or falls against a long position) enough that their margin account falls below a predetermined maintenance margin, the trader will experience a margin call. The margin call is a requirement that the trader deposits enough funds to bring their account back to the initial margin. The maintenance margin can equal the initial margin amount, though this is uncommon, and the maintenance margin is typically lower than the initial margin. In the event a trader is unable to meet their margin call, they may be forced to liquidate their position in the financial instrument to satisfy the margin requirement.

Consider this example. A cattle feeder wanting to lock in a price or to hedge against increasing costs for feeder cattle they plan to buy in March decides to buy (go long) a CME March Feeder Cattle contract on February 1 at a price of $159.43/cwt. The cattle feeder's broker required an initial margin of $3,100, and the CME requires a maintenance margin of $2,800. Rather than increasing as expected, the price of feeder cattle fell over time, and the cattle feeder had multiple margin calls.

Remember that the initial value of the contract was $159.43/cwt multiplied by 500 hundredweights, or $79,715. The contract expired with a value of $156.68/cwt, a total value of $78,340, representing a loss of $1,375. To maintain their position, the cattle feeder who held the long position was subject to a series of margin calls totaling $1,375, which was deposited into the account of the holder of the short (i.e., the person on the opposite side of the cattle feeder). It is possible that intermittent increases in value during the life of the contract also forced margin calls on the holder of the short in order to balance accounts. At the time of expiration, rather than waiting on the opposite party to "settle up," the margin calls settled accounts in increments along the way.

Remember, when managing risk, a hedger that holds an interest in the underlying asset is benefiting from the value of that real asset's increasing value, though they are subject to the cash requirements of margin calls. Producers who wish to avoid margin calls may consider options, discussed in a later section. In the previous example, though the cattle feeder lost money on the futures contract, the price they paid for the physical cattle also declined. If the cattle feeder knows that $160/cwt is a profitable purchase price, they have ensured that outcome using risk management.

Delivery

Using the futures market to hedge price risk is possible due to the ownership interest in a physical asset tied to the futures market. In the event that a producer cannot settle their account, they can deliver the physical asset rather than take the offsetting position that closes out their futures position.

Live cattle may actually be delivered physically to one of several locations to close out a futures position. In the Texas-Oklahoma-New Mexico region, live cattle may be delivered to one of four livestock yards or one of four slaughter plants. Upon delivery, the cattle are subject to a series of adjustments, including grading, to ascertain their value against the futures position.[13]

Feeder cattle futures are cash settled. For a contract that is cash settled, physical delivery of the underlying

[13]See CME Rulebook Chapter 101, Live Cattle Futures, Section 10103 (Settlement Procedures) for a detailed accounting of delivery rules for live cattle: https://www.cmegroup.com/content/dam/cmegroup/rulebook/CME/II/100/101/101.pdf.

asset—in this case, feeder cattle—is not required. The settlement is instead carried out through a cash payment. The feeder cattle contract is cash settled based upon the CME Feeder Cattle Index™ price for the 7 calendar days ending on the day on which trading ends.[14]

Basis

Basis is the amount that the local cash price of a commodity differs from the futures price for a given month.

Basis = Cash – Futures

Therefore, a positive basis means the local cash price is greater than the futures price, and a negative basis means the local cash price is less than the futures price. Livestock basis is usually calculated using the nearby contract (the contract closest to expiration) since it is usually not possible to store livestock to be sold at a date corresponding to a later futures contract for a higher price in the same way that grain can be stored for a later sale. Basis is impacted by transportation expenses, storage and handling expenses, charges for interest, and variability in local demand. Under economic theory, the law of one price suggests that basis should equal the cost to move a product from the location and time where it currently exists to the location and time where ownership will transfer.

Basis is subject to risk that can be related to or independent of the futures market, and in some cases, contracts exist to manage basis risk. A strong basis is one that is more positive or less negative than the historic average basis. A weak basis is one that is less positive or more negative than the historic average basis.

Basis can also be used in combination with the futures market to develop expectations of local prices in the future. Basis is generally more predictable than the cash or futures price, as the factors that influence a commodity's price impact the cash and futures prices equally. This may change under local circumstances, but over time the basis remains roughly stable.

Expected Price = Futures Price + Basis

The examples later in this book do not include the impact of basis on futures strategies, for simplicity. However, basis should be considered when implementing any hedging strategy, and, if managed properly, managing basis can improve the efficiency of a hedging strategy using the futures market. Assume, for example, that it is April, and a producer intends to sell fed cattle in October. The CME October Live Cattle contract is currently trading at $140/cwt, but the producer knows there is typically a basis of ($7.50)/cwt in the Texas Panhandle during the month of October. The producer knows the expected cash price at sale is $132.50/cwt. The producer can implement a more accurate hedging strategy using this expected price.

Options

An option is the right, but not the obligation, to buy or sell something at a pre-established price within a given time period. There are two types of options:

- **Put** – gives the option buyer the right to sell the underlying asset
- **Call** – gives the option buyer the right to buy the underlying asset

Put simply, an option is a contract in which one party pays another party for some form of price insurance on anything for a given period. For the purposes of this resource, an option is a contract written out on an underlying futures contract, though not all futures contracts have options written for them. The benefit of options contracts is the price insurance they provide to mitigate losses from negative price moves while leaving unlimited positive price potential.

For example, if a producer of feeder cattle expects prices to go down, they might buy a put option on a CME Feeder Cattle contract at a profitable strike price for the appropriate delivery date. Their option conveys the right to sell their Feeder Cattle contract at their strike price should the price decline. The profit from the exercise of the option at the chosen strike price will offset losses in the cash market. If the price remains greater than the strike price until the expiration date, the option expires with no value (i.e., the producer will not exercise their option). The increased value in the physical market can offset the loss incurred from paying the premium for the options contract that expired with no value.

A further consideration arises in that a trader can buy or sell an option. As with futures, there must be a party taking the opposite position in the options contract. The party that buys an options contract pays a premium to the seller for the right to buy or sell the underlying asset at their desired price. The seller of the options contract agrees to accept the premium payment and will, in return, take the opposing side of the futures contract if the price moves in a way that the options buyer can exercise their option.

[14]See CME Rulebook Chapter 102, Feeder Cattle Futures, Section 10203 (Settlement Procedures) for a detailed accounting of cash settlement for feeder cattle: https://www.cmegroup.com/content/dam/cmegroup/rulebook/CME/II/100/102/102.pdf.

TABLE 14. OPTIONS CLASSIFICATIONS.		
OPTIONS CLASSIFICATIONS	PUT OPTIONS	CALL OPTION
IN-THE-MONEY	Futures price < Strike price	Futures price > Strike price
AT-THE-MONEY	Futures price = Strike price	Futures price = Strike price
OUT-OF-THE-MONEY	Futures price > Strike price	Futures price < Strike price

Options are classified differently based on the relationship between the strike price and the futures price. As shown in Table 14, there are three classifications. The premium for options that are closer to prevailing prices—or "at-the-money"—are more expensive, as the probability of the buyer exercising them is higher, meaning the put writer (seller) is more likely to suffer the consequences of that option's exercise, so the writer must be compensated with a greater premium.

Closing out an Option Position

Option buyers have three choices to close their position. The buyer may exercise the option, trade the option with an offsetting position, or let the option expire (i.e., do nothing). Consider an option that is in-the-money that will soon expire. If the holder of that option exercises their option contract, they are now placed in a futures position opposite the writer of the option. The party who originally held the option is now subject to all of the rules of a futures contract, including margin calls, and must pay another commission to their broker.

Most of the time, rather than exercising their option, the holder of an option trades that option back to the market by selling an option with the same strike price back to the marketplace. In certain cases, the market may not be liquid enough (i.e., a party willing to take an opposing position may not be available). In that case, the trader must exercise their option if they wish to net the returns.

There are pros and cons to both futures and options (Table 15), and various combinations of both tools can mitigate different types of risk. The "Common Hedging Strategies" section details a variety of options strategies used to mitigate different types of price risk.

Seasonality

Seasonality is a useful tool when developing hedging strategies. Seasonality refers to the periodic and typically regular fluctuation in the distribution of spot or futures prices. Seasonal price movements can be measured over a period of years. To develop a seasonal index, monthly prices are averaged over time and scaled to show, proportionally, how much they are above or below the annual price average. Seasonal patterns follow the basic rules of supply and demand—as quantity supplied increases, price declines (and vice versa), holding all else constant, and as quantity demanded increases, price increases (and vice versa), holding all else constant.

In agriculture, most seasonal trends are dictated by biological and natural circumstances and/or consumer preferences. For example, most calves are born from late winter to early spring. Spring-born calves are nursed and later weaned at a time when the natural supply of forage is increasing, lowering the cost of production. Spring calving is also the result of successful breeding in the previous late spring and early summer when temperatures are low enough to not impact fertility and the supply of forage is typically somewhere near the annual peak, lowering the cost of feed for cows that may need to be lactating and gestating simultaneously.

TABLE 15. FUTURES VERSUS OPTIONS.		
	PROS	CONS
Futures	▸ Penny for penny reward on the upside (i.e., no premium to implement) ▸ Margin requirement is generally stable and known in advance ▸ No time decay of asset ▸ Greater liquidity	▸ Penny for penny risk on the downside; unlimited loss potential ▸ Initial margin required up-front ▸ Requires margin calls
(Buying) Options	▸ Price insurance that locks in floor while leaving unlimited favorable price potential ▸ No margin calls ▸ Limited risk (can't lose more than the premium)	▸ Premiums that can be expensive in volatile market and change ▸ Premiums required up front ▸ Does not mitigate basis risk ▸ Premium loses value over time ▸ Premium changes may not correlate to magnitude of futures price changes ▸ Lower liquidity

Seasonal demand patterns for beef also influence the price of live cattle and feeder cattle. Grilling season typically begins in the late spring and drives an increase in demand for beef, leading to a derived increase in demand for fed cattle and a derived increase in demand for feeder cattle. Consumer preferences, coupled with seasonal production patterns, coalesce to yield a regular, seasonal pattern for feeder cattle and fed cattle prices.

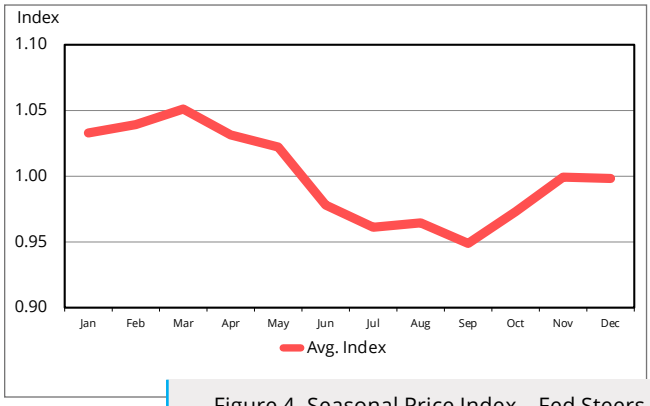

Figure 4. Seasonal Price Index – Fed Steers, Southern Plains, 2011–2020.
Data Source: USDA-AMS, Compiled & Analysis by Livestock Marketing Information Center (LMIC)

With grilling season beginning in late spring, demand for cattle that are ready for harvest grows through the spring so that merchandisers of beef can build inventory to meet demand. The demand activity pulls the price of fed cattle up, with the 10-year average seasonal price peaking in March (Fig. 4). Feedlots attempt to have adequate supplies of fed cattle for sale to capitalize on these high prices. To have finished-weight (1,300- to 1,500-pound) cattle available for sale coinciding with peak seasonal price, feedlots must place lighter (700- to 800-pound) cattle on feed approximately 5 months earlier, September to October.

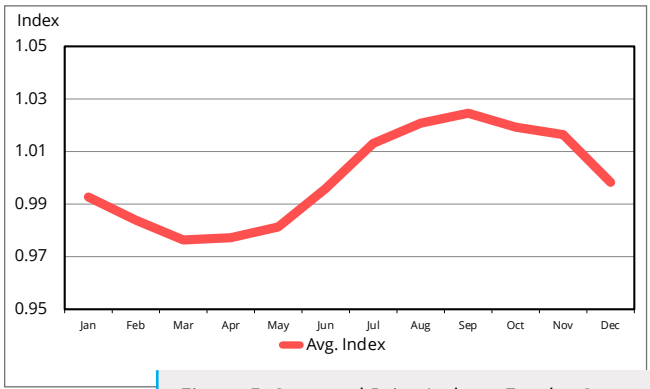

Figure 5. Seasonal Price Index – Feeder Steers, 700-800 Pounds, Southern Plains, 2011–2020.
Data Source: USDA-AMS, Compiled & Analysis by Livestock Marketing Information Center (LMIC)

However, assuming that calves gain 2 pounds a day from birth, the majority of calves will only weigh 500 to 600 pounds by late September or early October, so the lack of supply of target-weight calves for placement pulls feeder cattle price up, too. The 10-year average seasonal price for feeder cattle peaks in September as a result of these market forces (Fig. 5). The demand from feedlots pulls the prices of feeder cattle up until their demand is satiated, either by waiting for additional growth on light-weight calves or by buying calves that weigh less than 750 pounds, at which point the price for feeder cattle begins its seasonal decline. At the same time, feedlot buyers must compete with stocker operations buying cattle to stock winter small grain pastures.

As one might expect, the same forces yield seasonal minimum prices at approximately the opposite time of the year in each market. Again, if spring-born calves gain 2 pounds a day, they will reach 750 pounds approximately 11 months after birth, meaning the supply of 750-pound calves is greatest in the spring months, and increased supply yields lower price, all else equal. If those same calves gain approximately 3.5 pounds a day on feed, they will be ready for harvest in August or September. Again, this glut of calves born the spring of the year before harvest will typically pressure prices to seasonal lows, despite ongoing late-season grilling activity.

A producer can use seasonality to their advantage in a number of ways. If it is in their best business interest, a producer may consider changing their calving season to coincide with peak prices, though this is a substantial undertaking and will pose costs in the short term.

A producer could also use seasonal price indexes to forecast prices for the months ahead based on the past relationship, while keeping in mind that past performance does not necessarily guarantee future outcomes. To forecast a future month, divide the current month's average price by the index of that current month, then multiply that number by the index of the future month for which the price forecast is being determined. For example, to forecast September prices using a June feeder cattle price of $162/cwt and the seasonal index from Figure 5:

September feeder cattle price forecast = ($162 per cwt ÷ 99.59) × 102.46 = $166.67 per cwt

A producer could also consider seasonal patterns to inform the most profitable time to hedge their production. Consider the same producer from the previous example. Suppose again that the producer calculated an expected price of $166.67/cwt for feeder cattle in September based on seasonal patterns. Now assume that the CME September Feeder Cattle Futures

contract is trading at $175/cwt. They can factor into their decision-making the fact that the September Feeder Cattle Futures contract appears to be overvalued, and so, might face downward pressure prior to expiration. Considering the seasonal patterns, it is in the producer's best interest to hedge now, so long as $175 is above the producer's break-even price.

Note that seasonality in livestock contracts is not as pronounced as in some other contracts. For example, an analysis of the CME March Feeder Cattle contract over 10 years revealed that producers locking in a price in November were equally likely to make money or lose money on the hedge. The seasonal pattern of the CME December Corn contract, on the other hand, peaks at 104 percent of the annual average in June and falls to 98 percent of the annual average at expiration for 70 percent of the last 45 years. Why? Corn is largely produced and harvested on the same calendar across the country, give or take a few months. Cattle are produced, marketed, and harvested 52 weeks a year in the U.S., dampening seasonal patterns.

Fundamental and Technical Analysis

Two major analytical approaches exist when analyzing the futures market to identify opportunities for profit or hedging.

- Fundamental analysis
- Technical analysis

Fundamental analysis involves assessing an asset's value by analyzing macroeconomic and microeconomic factors. Fundamental analysis focuses primarily on factors that influence the supply and demand of an asset. The interaction between supply and demand is what yields significant price movement in contracts representing agricultural commodities and is what dictates price in the long run. Indicators tracked by fundamental analysts include weather patterns, geopolitics in agriculturally significant regions, planting reports, inventory reports, and more, all of which combine to provide expectations of supply and demand of a good.

Over time, charts representing the price of a commodity will develop patterns. The observation and use of those patterns is called technical analysis. A technical analyst operates under the assumption that price patterns in the past are useful in forming expectations about what prices will do in the future. A technical analyst need not know anything about the asset they are trading, only what the shape of the charts suggest will happen in the future. Widespread use of technical analysis may even drive the market in directions opposite of the fundamental signals at times.

Fundamentals in the marketplace will drive prices in the long run and are useful in setting up hedging strategies over time. However, technical analysis can be used in combination with fundamental analysis. When a hedger has decided on a strategy based on market fundamentals and intends to enter or exit a futures position, they may use technical analysis around the date they enter or exit a futures position to earn slightly larger or smaller returns based on the shape of a given price pattern.

Common Hedging Strategies

The following are examples of basic hedging strategies using futures, options on futures contracts, and combinations of options on futures contracts. Note that, for simplicity, the examples ignore the subject of basis, which was covered in an earlier section. However, anyone considering a hedging strategy should include the basis of the commodity in their calculations.

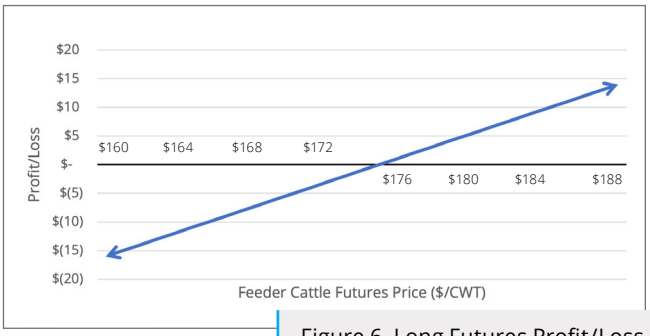

Figure 6. Long Futures Profit/Loss, Different Expiration Prices.

Buying (Long) Futures Contract

A hedger takes a long position (Fig. 6) when they expect price, in this case the price of feeder cattle, to increase in value (i.e., the hedger is bullish regarding price). To execute the hedge, the hedger would buy a feeder cattle futures contract for the given expiration month at a given price, which they expect to be less than the feeder cattle contract's price at expiration. If the price of feeder cattle rises, the physical cattle the hedger must purchase become more expensive. At the same time, the future's contract price increases at an approximately equal rate. At expiration, the hedger may sell a contract for the now higher price, netting the difference in the value of the initial contract purchased and the subsequent contract sold.

For example, assume a feeder cattle buyer plans to buy 70 head of 714-pound calves in August. The CME August Feeder Cattle Contract is currently trading at $176/cwt, and the buyer expects the price to increase over time, or at least wishes to hedge against that possibility. To

TABLE 16. OUTCOMES OF $176/CWT LONG FUTURES POSITION AT DIFFERENT EXPIRATION PRICES.							
FEEDER CATTLE PRICE ($/CWT) (FUTURES CONTRACT & PHYSICAL CATTLE)	$164	$168	$172	$176	$180	$184	$188
Gain/Loss in Physical Cattle ($/cwt)	$12	$8	$4	$0	-$4	-$8	-$12
Gain/Loss in Futures Market ($/cwt)	-$12	-$8	-$4	$0	$4	$8	$12
Net Position Change ($/cwt)	$0	$0	$0	$0	$0	$0	$0

TABLE 17. OUTCOMES OF $176/CWT SHORT FUTURES POSITION AT DIFFERENT EXPIRATION PRICES.							
FEEDER CATTLE PRICE ($/CWT) (FUTURES CONTRACT & PHYSICAL CATTLE)	$164	$168	$172	$176	$180	$184	$188
Gain/Loss in Physical Cattle	-$12	-$8	-$4	$0	$4	$8	$12
Gain/Loss in Futures Market	$12	$8	$4	$0	-$4	-$8	-$12
Net Position Change	$0	$0	$0	$0	$0	$0	$0

execute a long hedge, the producer would buy one 50,000-pound August Feeder Cattle contract at a price of $176/cwt (Table 16).

If the price of the contract at expiration is $180/cwt, the hedger would sell one 50,000-pound August Feeder Cattle contract at a price of $180/cwt, netting $4/cwt for the contract (Table 16). If the price of the contract at expiration is $172/cwt, the buyer would sell one 50,000-pound August Feeder Cattle contract at a price of $172/cwt, netting a loss of $4/cwt for the contract, the loss of which was accounted for by margin calls (Table 16). At the same time, each move was offset by corresponding changes in the value of the hedger's interest in physical cattle, netting the expected price of $176/cwt.

Note that the buyer had the option to do nothing. If the price of feeder cattle rose to $180/cwt as the buyer expected and the buyer was unhedged, they would have paid $4/cwt more for the cattle, representing a net loss of $4/cwt to their profit margin.

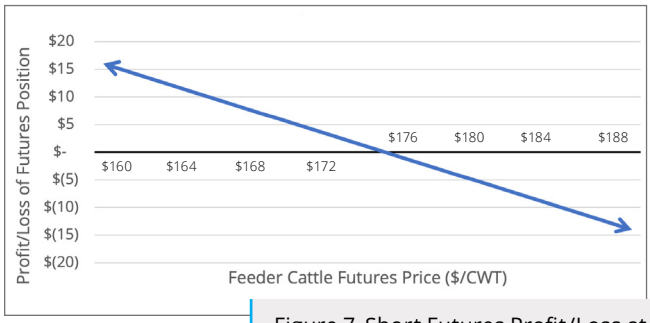

Figure 7. Short Futures Profit/Loss at Different Prices at Expiration.

Selling (Short) Futures Contract

A hedger takes a short position (Fig. 7) when they expect price, in this case the price of feeder cattle, to decrease in value (i.e., the hedger is bearish regarding price). To execute the hedge, the hedger would sell a feeder cattle futures contract for the given expiration month at a given price, which they expect to be more than the feeder cattle contract's price at expiration. If the price of feeder cattle falls, the physical cattle the hedger intends to sell become less valuable. At the same time, the future's contract price falls at approximately the equal rate. At expiration, the hedger may buy a contract for the now lower price, netting the difference in the value of the initial contract sold and the subsequent contract purchased.

For example, assume a cow-calf producer plans to sell 70 head of 714-pound calves in August. The CME August Feeder Cattle Contract is currently trading at $176/cwt, and the seller expects the price to fall over time, or at least wishes to hedge against that possibility. To execute a short hedge, the producer would sell one 50,000-pound August Feeder Cattle contract at a price of $176/cwt (Table 17).

If the price of the contract at expiration is $172/cwt, the producer would buy one 50,000-pound August Feeder Cattle contract at a price of $172/cwt, netting $4/cwt for the difference in contract prices (Table 17). If the price of the contract at expiration is $180/cwt, the producer would buy one 50,000-pound August Feeder Cattle contract at a price of $180/cwt, netting a loss of $4/cwt for the difference in contract prices (Table 17). At the same time, each move was offset by corresponding changes in the value of the hedger's interest in physical cattle, netting the expected price of $176/cwt.

Note that the producer had the option to do nothing. If the price of feeder cattle fell to $172/cwt as the producer expected and the producer was unhedged, they would have lost $4/cwt on the cattle, representing a net loss of $4/cwt to their profit margin.

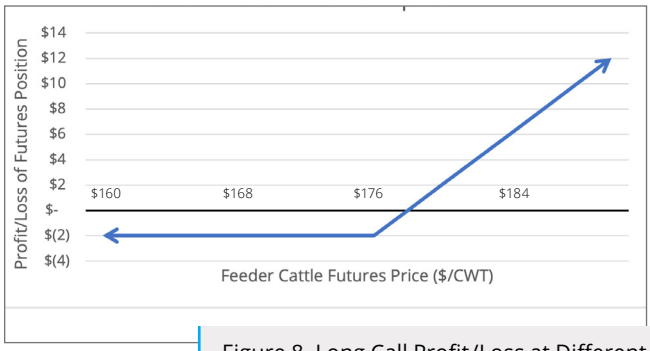

Figure 8. Long Call Profit/Loss at Different Prices at Expiration.

Long Call Option

A hedger takes a long call position (Fig. 8) when they expect price, in this case the price of feeder cattle, to increase in value (i.e., the hedger is bullish regarding price), but they wish to leave their position open for downside price potential. To execute the hedge, the hedger would buy a feeder cattle call option for the given expiration month at a given strike price, which they expect to be less than the feeder cattle contract's price at expiration. If the price of feeder cattle rises, the physical cattle the hedger intends to buy become more valuable. If a trader wishes to utilize their right to buy the contract at the strike price, they will exercise the option. Exercising is not required. The trader can simply exit the option at any time prior to expiration by selling it (i.e., going short).

For example, assume a feedlot plans to buy 70 head of 714-pound calves in August. The feedlot expects the price to rise above their break-even purchase price of $174/cwt over time, or at least wishes to hedge against that possibility. To execute a long call option hedge, the feedlot would buy a call option on a 50,000-pound August Feeder Cattle contract for a strike price of $176/cwt. The current premium for an August Feeder Cattle contract with a strike price of $176/cwt is $1.98/cwt, or $990 for the contract. The strike price net of the premium yields a price ceiling of $174.02/cwt (Table 18).

If at any point the price of the contract rises above $176/cwt, the feedlot would have the right, but not the obligation, to exercise their option by buying their contract for $176/cwt. If the contract rose to $180/cwt, the feedlot would have the right to exercise (buy) their option and would net a gain of $2.02/cwt on the futures market transaction after factoring in the option premium (Table 18).

If the contract expired with a value less than the strike price, the feedlot would simply lose the premium paid for the option—in this case, $1.98/cwt (Table 18). In this way, the long call option places a ceiling on losses from price increases but allows for unlimited downside price potential.

Note that the buyer had the option to do nothing. If the price of feeder cattle rose to $180/cwt as the buyer expected and the buyer was unhedged, they would have lost $4/cwt on the cattle, representing a net loss of $4/cwt to their profit margin.

TABLE 18. OUTCOMES OF $176/CWT LONG CALL POSITION AT DIFFERENT EXPIRATION DATES.

FEEDER CATTLE PRICE ($/CWT) (FUTURES CONTRACT & PHYSICAL CATTLE)	$164	$168	$172	$176	$180	$184	$188
Gain/Loss in Physical Cattle	$12	$8	$4	$0	-$4	-$8	-$12
Long Call Option Premium for $176/cwt	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98
Gain/Loss in Futures Contract	$0	$0	$0	$0	$4	$8	$12
Option Net Value	-$1.98	-$1.98	-$1.98	-$1.98	$2.02	$6.02	$10.02
Net Position Change	$10.02	$6.02	$2.02	-$1.98	-$1.98	-$1.98	-$1.98

TABLE 19. OUTCOMES OF $176/CWT LONG PUT FUTURES POSITION AT DIFFERENT EXPIRATION PRICES.							
FEEDER CATTLE PRICE ($/CWT) (FUTURES CONTRACT & PHYSICAL CATTLE)	$164	$168	$172	$176	$180	$184	$188
Gain/Loss in Physical Cattle	-$12	-$8	-$4	$0	$4	$8	$12
Long Put Option Premium for $176/cwt	$6.80	$6.80	$6.80	$6.80	$6.80	$6.80	$6.80
Gain/Loss in Futures Contract	$12	$8	$4	$0	$0	$0	$0
Option Net Value	$5.20	$1.20	-$2.80	-$6.80	-$6.80	-$6.80	-$6.80
Net Position Change	-$6.80	-$6.80	-$6.80	-$6.80	-$2.80	$1.20	$5.20

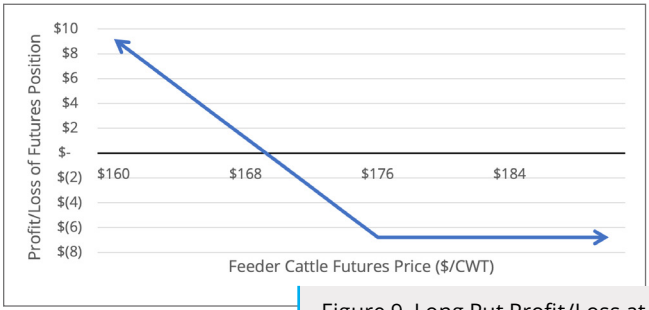

Figure 9. Long Put Profit/Loss at Different Prices at Expiration.

Long Put Option

A hedger takes a long put position (Fig. 9) when they expect price, in this case the price of feeder cattle, to decrease in value (i.e., the hedger is bearish regarding price), but they wish to leave their position open for upside price potential. To execute the hedge, the hedger would buy a feeder cattle put option for the given expiration month at a given strike price, which they expect to be more than the feeder cattle contract's price at expiration. If the price of feeder cattle fall, the physical cattle the hedger intends to sell become less valuable. At the same time, the put option contract conveys the right, but not the obligation, to sell at the strike price to the holder of the put if the price of the futures contract falls below the strike price. If a trader wishes to utilize their right to sell the contract at the strike price, they will exercise the option. Exercising is not required. The trader can simply exit the option at any time prior to expiration by selling it (i.e., going short).

For example, assume a cow-calf producer plans to sell 70 head of 714-pound calves in August. The seller expects the price to fall below their break-even sale price of $169/cwt over time, or at least wishes to hedge against that possibility. To execute a long put option hedge, the producer would buy a put option on a 50,000-pound August Feeder Cattle contract for a strike price of $176/cwt. The current premium for an August Feeder Cattle contract with a strike price of $176/cwt is $6.80/cwt, or $3,400 for the contract. The strike price net of the premium yields a floor price of $169.20/cwt.

If at any point the price of the contract falls below $176/cwt, the producer would have the right, but not the obligation, to exercise their option by selling their contract for $176/cwt. If the contract fell to $172/cwt the producer would have the right to exercise (sell) their option, though they would net a loss of $2.80/cwt on the futures market transaction after factoring in the option premium. If the contract fell to $164/cwt, the producer would have the right to exercise (sell) their option and would net a gain of $5.20/cwt on the futures market transaction after factoring in the option premium (Table 19).

If the contract expired with a value greater than the strike price, the producer would simply lose the premium paid for the option—in this case, $6.80/cwt (Table 19). In this way, the long put option places a floor on losses from price declines but allows for unlimited upside price potential.

Note that the producer had the option to do nothing. If the price of feeder cattle fell to $172/cwt as the producer expected and the producer was unhedged, they would have lost $4/cwt on the cattle, representing a net loss of $4/cwt to their profit margin.

Spreads

In addition to purchasing a single futures contract or a single option on a futures contract, there are combinations of options, forward contracts, and Livestock Risk Protection policies that can provide protection better tailored to the specific marketplace and expectations of the hedger, while simultaneously lowering the expense of hedging. The CME lists the most popular spread strategies for Feeder Cattle and Live Cattle contracts in 2020 as:

1. Put Vertical or Put Spread (Bull or Bear)
2. Call Vertical or Call Spread (Bull or Bear)
3. Risk Reversal, or Collar
4. Straddle
5. Strangle

The choice of which combination to use is dependent on a hedger's outlook. The hedger must decide whether they are bullish or bearish, the price of the asset, and to what magnitude they expect prices to change. Spreads are commonly used when expectations for price moves are modest. If a hedger expects a substantial change in price, they are likely better served using a stand-alone option.

Figure 10. Bull Put Spread Net Profit/Loss.

1. Put Spreads

A bull put spread (Fig. 10) is executed by selling a put option and simultaneously buying a put option with the same expiration date and at a lower strike price. The maximum gain is restricted to the net premium for the position (i.e., the revenue generated by selling the option with the higher strike price net of the cost of buying the option with the lower strike price). The maximum loss is equal to the difference in the strike prices plus the net premium. A bull put spread is used when the hedger expects the price to increase, but only by a modest amount.

The bull put spread is used in a relatively sideways market with small upside potential, but in which the hedger wishes to mitigate the risk of price declines. The sale of the put option with the higher strike price lowers the expense of the downside hedge.

Figure 11. Bear Put Spread Net Profit/Loss.

A bear put spread (Fig. 11) is executed by buying a put option and simultaneously selling a put option with the same expiration date and at a lower strike price. The maximum gain is restricted to the difference in the strike prices plus the net premium for the position (i.e., the revenue generated by selling the option with the lower strike price net of the cost of buying the option with the higher strike price). The maximum loss is equal to the net premium paid for the position. A bear put spread is used when the hedger expects the price to decline, but only by a modest amount. The bear put spread is used in a relatively sideways market with small downside potential, but in which the hedger wishes to mitigate the risk of price increases. The sale of the put option with the lower strike price lowers the expense of the upside hedge.

Figure 12. Bull Call Spread Net Profit/Loss.

2. Call Spreads

A bull call spread (Fig. 12) is executed by buying a call option and simultaneously selling a call option with the same expiration date and at a higher strike price. The maximum gain is equal to the difference in the strike prices less the net premium for the position (i.e., the

revenue generated by selling the option with the higher strike price net of the cost of buying the option with the lower strike price). The maximum loss is equal to the net premium paid for the position. A bull call spread is used when the hedger expects the price to increase, but only by a modest amount. The bull call spread is used in a relatively sideways market with small upside potential, but in which the hedger wishes to mitigate the risk of price declines. The sale of the call option with the higher strike price lowers the expense of the downside hedge.

Figure 13. Bear Call Spread Net Profit/Loss.

A bear call spread (Fig. 13) is executed by selling a call option and simultaneously buying a put option with the same expiration date and at a higher strike price. The maximum gain is restricted to the net premium for the position (i.e., the revenue generated by selling the option with the higher strike price net of the cost of buying the option with the lower strike price). The maximum loss is equal to the difference in the strike prices plus the net premium. A bear call spread is used when the hedger expects the price to decline, but only by a modest amount. The bear call spread is used in a relatively sideways market with small downside potential, but in which the hedger wishes to mitigate the risk of price increases. The sale of the call option with the lower strike price lowers the expense of the upside hedge.

3. Risk Reversal, or Collar

A risk reversal, or collar, (Fig. 14) is an options strategy used to protect against large losses that also limits the potential for large gains. A collar is used when a hedger is already long in the underlying asset. The hedger purchases an out-of-the-money put (below the market price of the asset) and simultaneously writes an out-of-the-money call (above the market price of the asset) with the same expiration dates. Purchasing the put protects the hedger in case the underlying asset declines in value. Selling the call yields revenue, which offsets some or all of the cost of purchasing the put. An extremely bullish hedger should not utilize a collar as it limits extreme upside potential.

Figure 14. Protective Collar Net Profit/Loss.

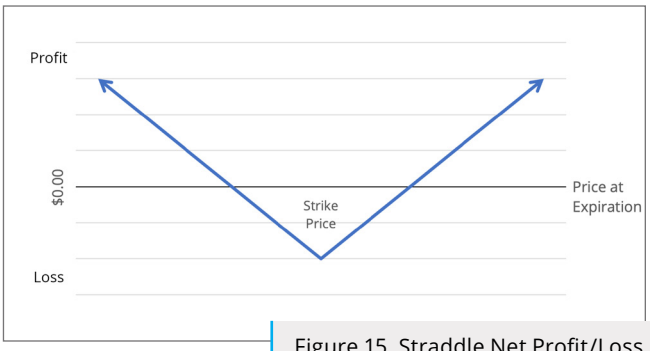

Figure 15. Straddle Net Profit/Loss.

4. Long Straddle

A straddle (Fig. 15) is an options strategy that generates profit when the price of the contract rises or falls significantly from the strike price. A straddle is employed when the hedger expects significant price moves but is unsure of the direction of the move. Examples may include timing a straddle around a USDA report that has the potential to induce significant market moves. A long straddle is executed by purchasing both an at-the-money put option and an at-the-money call option for a contract, each with the same strike price and expiration date. The maximum loss of a straddle is the sum of the amount paid for the put option and the call option. The profit potential is unlimited.

5. Strangle

A strangle (Fig. 16) is an options strategy that is similar to a straddle in that it generates profit when the price of the contract rises or falls significantly from the strike price. A strangle is employed when the hedger expects significant price moves but is unsure of the direction of the move. Examples may include timing a strangle around a USDA report that has the potential to induce significant market moves. A long strangle is executed by purchasing both an out-of-the-money put option and an out-of-the-money call option for a contract, each with the same strike price but with different expiration dates. The maximum loss of a strangle is the sum of the amount paid for both the put option and the call option. The profit potential is unlimited.

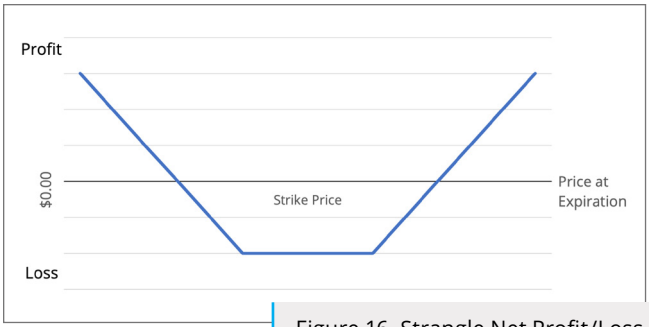

Figure 16. Strangle Net Profit/Loss.

A strangle and a straddle have similar goals but differ in the timing of contracts, expiration dates, and being in-the-money or out-of-the-money. A strangle is typically cheaper than a straddle, but for the same reason, it carries greater risk. Since the strike price of a strangle is out-of-the-money, it is cheaper than a straddle, the strike price of which is in-the-money. However, because a strangle's strike price is out-of-the-money, the contract must move by greater amounts than a straddle to generate returns on the strategy.

Other Uses for Options

Hedging Inputs

In addition to protecting against losses in the value of production, hedging can be used to manage price risk for inputs. Consider a feedlot operator that wishes to protect against an increase in the cost of corn. Assume that the cattle feeder plans to buy 20,000 bushels of corn in September. The cattle feeder expects the price to rise, or at least wishes to hedge against that possibility. In this case, the feeder would employ a long call, purchasing the right, but not the obligation, to buy corn at a given strike price.

Cross-Hedging

Now assume that the cattle feeder intends to feed sorghum, for which there is no futures contract, rather than corn. The cattle feeder knows that in most years the prices of corn and sorghum are strongly correlated (Fig. 17). Even when corn is sold in the cash market at a premium to sorghum, the direction and percentage change in their movements are typically the same.

The cattle feeder could execute a long call in the same fashion as when they hedged the price of corn. As long as the relationship between the two commodities holds, the cattle feeder would be able to offset greater expenses in the physical market for sorghum with gains in the futures contract for corn. This cross-hedge protects against price risk in one commodity using the futures contract for another commodity. Similar strategies may be considered for calves that differ in weight at the time of sale from the weight classes to which the CME Feeder Cattle and CME Live Cattle contracts converge. Though cross-hedging is useful, it typically bears increased risk of being over- or under-hedged.

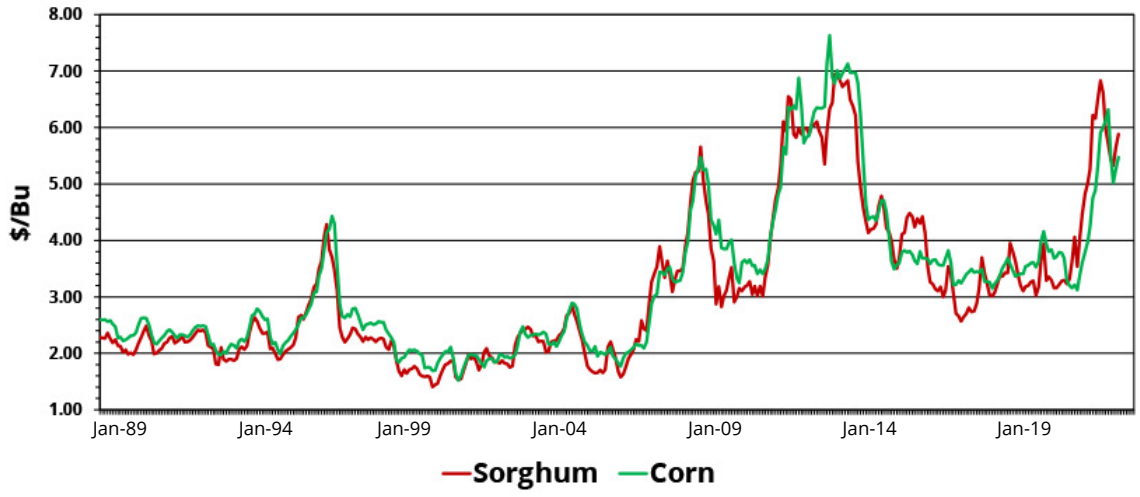

Figure 17. U.S. Average Price Received by Farmers, Corn & Sorghum, Monthly.
Data Source: USDA-AMS, Compiled & Analyzed by Mark Welch, Ph.D.

CHAPTER 4:

Summary and Conclusions

Agriculture is an inherently risky business, and many of the factors impacting a producer's bottom line are beyond their control. Over time, a number of tools have been created to help address these risks. From futures and options to programs administered by both FSA and RMA, there are more opportunities than ever for helping livestock producers manage risk.

The purpose of this handbook was to introduce you to those options and to encourage you to actively incorporate them into your operation. To that end, Appendix B provides a summary of the tools discussed in this handbook along with a place for notes. Our hope is that producers will take the opportunity to avail themselves of the litany of tools that are available.

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APPENDIX A:
Glossary of Useful Terms

Arbitrage: A strategy involving the simultaneous purchase and sale of identical or equivalent commodity futures contracts or other instruments across two or more markets in order to benefit from a discrepancy in their price relationship. In a theoretical efficient market, there is a lack of opportunity for profitable arbitrage.

At the market order: An order to buy or sell a stock at the prevailing market bid or ask price at the time the order is processed.

At-the-money: When an option's strike price is the same as the current trading price of the underlying commodity, the option is at-the-money.

Backwardation: When the current price of an underlying asset is higher than prices trading in the futures market. Backwardation can occur as a result of a higher demand for an asset currently than the contracts maturing in the coming months through the futures market.

Basis: The difference between the spot or cash price of a commodity and the price of the nearest futures contract for the same or a related commodity (typically calculated as cash minus futures). Basis is usually computed in relation to the futures contract that is next to expire and may reflect different time periods, product forms, grades, or locations.

Bear: One who expects a decline in prices. The opposite of a bull. A news item is considered bearish if it is expected to result in lower prices.

Bear market: A market in which prices generally decline over a period of months or years. Opposite of bull market.

Bear spread: (1) A strategy involving the simultaneous purchase and sale of options of the same class and expiration date, but different strike prices. In a bear spread, the option that is purchased has a lower delta than the option that is bought. For example, in a call bear spread, the purchased option has a higher exercise price than the option that is sold. Also called bear vertical spread. (2) The simultaneous purchase and sale of two futures contracts in the same or related commodities with the intention of profiting from a decline in prices, but at the same time, limiting the potential loss if this expectation does not materialize. In agricultural products, this is accomplished by selling a nearby delivery and buying a deferred delivery.

Bull: One who expects a rise in prices. The opposite of bear. A news item is considered bullish if it is expected to result in higher prices.

Bull market: A market in which prices generally rise over a period of months or years. Opposite of bear market.

Bull spread: (1) A strategy involving the simultaneous purchase and sale of options of the same class and expiration date but different strike prices. In a bull vertical spread, the purchased option has a higher delta than the option that is sold. For example, in a call bull spread, the purchased option has a lower exercise price than the sold option. Also called bull vertical spread. (2) The simultaneous purchase and sale of two futures contracts in the same or related commodities with the intention of profiting from a rise in prices but at the same time limiting the potential loss if this expectation is wrong. In agricultural commodities, this is accomplished by buying the nearby delivery and selling the deferred.

Call option: An option contract that gives the buyer the right but not the obligation to purchase a commodity or other asset or to enter into a long futures position at a specified price on or prior to a specified expiration date.

Carrying charge: Also called cost of carry. Cost of storing a physical commodity or holding a financial instrument over a period of time. These charges include insurance, storage, and interest on the deposited funds, as well as other incidental costs. It is a carrying charge market when there are higher futures prices for each successive contract maturity. If the carrying charge is adequate to reimburse the holder, it is called a "full charge." See Contango.

Certified stocks: Stocks of a commodity that have been inspected and found to be of a quality deliverable against futures contracts, stored at the delivery points designated as regular or acceptable for delivery by an exchange. In grain, called stocks in deliverable position.

Clearinghouse: An entity through which futures and other derivative transactions are cleared and settled. It is also charged with assuring the proper conduct of each contract's delivery procedures and the adequate financing of trading. A clearing organization may be a division of a particular exchange, an adjunct or affiliate thereof, or a freestanding entity. Also called a clearinghouse, multilateral clearing organization, central counterparty, or clearing association. A clearing organization that is registered with the Commodity Futures Trading Commission (CFTC) is known as a Derivatives Clearing Organization.

Contango: A situation where the futures price of a commodity is higher than the spot price. Contango usually occurs when an asset price is expected to rise over time. That results in an upward sloping forward curve.

Contract grades: Various qualities of a commodity.

Crop year: The time period from one harvest to the next, varying according to the commodity (e.g., July 1 to June 30 for wheat; September 1 to August 31 for soybeans).

Deferred: Futures delivery months other than the nearby month.

Delivery: The tender and receipt of the actual commodity, the cash value of the commodity, or the cash value of a delivery instrument covering the commodity (e.g., warehouse receipts or shipping certificates), used to settle a futures contract.

Delivery month: The specified month within which a futures contract matures and can be settled by delivery or the specified month in which the delivery period begins.

Delivery points: A location designated by a commodity exchange where stocks of a commodity represented by a futures contract may be delivered in fulfillment of the contract. Also called location.

Delivery price: The price fixed by the clearing organization at which deliveries on futures are invoiced—generally the price at which the futures contract is settled when deliveries are made. Also called invoice price.

Equity: As used on a trading account statement, refers to the residual dollar value of a futures or option trading account, assuming it was liquidated at current prices.

Expiration date: The date on which an option contract automatically expires; the last day an option may be exercised.

Fundamental (analysis): Study of basic, underlying factors that will affect the supply and demand of the commodity being traded in futures contracts.

Futures contract: An agreement to purchase or sell a commodity for delivery in the future: (1) at a price that is determined at initiation of the contract; (2) that obligates each party to the contract to fulfill the contract at the specified price; (3) that is used to assume or shift price risk; and (4) that may be satisfied by delivery or offset.

Hedger: A market participant who enters into positions in a futures or other derivatives market opposite to positions held in the cash market to minimize the risk of financial loss from an adverse price change, or who purchases or sells futures as a temporary substitute for a cash transaction that will occur later. One can hedge either a long cash market position (e.g., one owns the cash commodity) or a short cash market position (e.g., one plans on buying the cash commodity in the future).

Initial margin: Customers' funds put up as security for a guarantee of contract fulfillment at the time a futures market position is established. Also called original margin and margin deposit.

In-the-money: A term used to describe an option contract that has a positive value if exercised. A call with a strike price of $1.50 on feeder cattle trading at $1.60 is $0.10 in-the-money.

Intrinsic value: A measure of the value of an option or a warrant if immediately exercised—that is, the extent to which it is in-the-money. The amount by which the current price for the underlying commodity or futures contract is above the strike price of a call option or below the strike price of a put option for the commodity or futures contract.

Life of contract: Period between the beginning of trading in a particular futures contract and the expiration of trading. In some cases, this phrase denotes the period already passed in which trading has already occurred. For example, "The life-of-contract high so far is $2.50." Same as life of delivery or life of the future.

Limit move: A price that has advanced or declined the permissible limit during one trading session, as fixed by the rules of an exchange.

Limit order: An order in which the customer specifies a minimum sale price or maximum purchase price, as contrasted with a market order, which implies that the order should be filled as soon as possible at the market price.

Limited order: A type of order to purchase or sell a security at a specified price or better.

Liquidation: The closing out of a long position. The term is sometimes used to denote closing out a short position, but this is more often referred to as covering.

Long: (1) One who has bought a futures contract to establish a market position; (2) a market position that obligates the holder to take delivery; (3) one who owns an inventory of commodities. See Short.

Long hedge: Hedging transaction in which futures contracts are bought to protect against possible increases in the cost of commodities.

Maintenance margin: Maintenance margin is an amount that must be maintained on deposit at all times. If the equity in a customer's account drops to or below the level of maintenance margin because of adverse price movement, the broker must issue a margin call to restore the customer's equity to the initial level. Exchanges specify levels of initial margin and maintenance margin for each futures contract, but futures commission merchants may require their customers to post margin at higher levels than those specified by the exchange.

Margin call: (1) A request from a brokerage firm to a customer to bring margin deposits up to initial levels; (2) a request by the clearing organization to a clearing member to make a deposit of original margin, or a daily or intra-day variation margin payment because of adverse price movement, based on positions carried by the clearing member.

Market order: An order to buy or sell a futures contract at whatever price is obtainable at the time it is entered in the order book, ring, pit, or other trading platform.

Nearby: The month of the futures contract closest to maturity; the front month or lead month.

New crop: During harvest months, the newly harvested crop comes to market and creates a greater supply.

Offset: Liquidating a purchase of futures contracts through the sale of an equal number of contracts of the same delivery month, or liquidating a short sale of futures through the purchase of an equal number of contracts of the same delivery month.

Old crop: During planting months, the source of grain that is available for sale or purchase by end users is from the crops that were harvested during the previous harvest season.

Open interest: The total number of futures contracts, long or short, in a delivery month or market that has been entered into and not yet liquidated by an offsetting transaction or fulfilled by delivery. Also called open contracts or open commitments.

Option premium: The current market price of an option contract.

Option writer or grantor: The person who originates an option contract by promising to perform a certain obligation in return for the price or premium of the option. Also known as option grantor or option seller.

Out-of-the-money: A term used to describe an option that has no intrinsic value. For example, a call with a strike price of $400 on gold trading at $390 is out-of-the-money 10 dollars.

Position: An interest in the market, either long or short, in the form of one or more open contracts.

Premium: the price of the option, set by the exchange and made up of:

> **Intrinsic value:** the positive difference between the strike price and the underlying asset price. Exists when the option holder can exercise their option for a gain.
>
> **Time value:** a portion of the premium associated with the inherent risk in holding an asset over time. Increases with increased market volatility and declines as the expiration date approaches and eventually reaches zero.

Price slide: Livestock prices tend to decrease as an animal's weight increases.

Put: An option contract that gives the holder the right but not the obligation to sell a specified quantity of a particular commodity, security, or other asset or to enter into a short futures position at a given price (the strike price) prior to or on or prior to a specified expiration date.

Put option: An option contract that gives the holder the right but not the obligation to sell a specified quantity of a particular commodity, security, or other asset or to enter into a short futures position at a given price (the strike price) prior to or on a specified expiration date.

Roll-over: A trading procedure involving the shift of one month of a straddle into another future month while holding the other contract month. The shift can take place in either the long or short straddle month. The term also applies to lifting a near futures position and re-establishing it in a more deferred delivery month.

Settlement price: The daily price at which the clearing organization clears all trades and settles all accounts between clearing members of each contract month. Settlement prices are used to determine both margin calls and invoice prices for deliveries. The term also refers to a price established by the exchange to even up positions which may not be able to be liquidated in regular trading.

Short: (1) The selling side of an open futures contract; (2) a trader whose net position in the futures market shows an excess of open sales over open purchases. See Long.

Speculator: In commodity futures, a trader who does not hedge, but who trades with the objective of achieving profits through the successful anticipation of price movements.

Spread: The purchase of one futures delivery month against the sale of another futures delivery month of the same commodity; the purchase of one delivery month of one commodity against the sale of that same delivery month of a different commodity; or the purchase of one commodity in one market against the sale of the commodity in another market, to take advantage of a profit from a change in price relationships. The term spread is also used to refer to the difference between the price of a futures month and the price of another month of the same commodity. A spread can also apply to options.

Stop order: This is an order that becomes a market order when a particular price level is reached. A sell stop is placed below the market. A buy stop is placed above the market. Sometimes referred to as stop-loss order.

Stop-loss order: This is an order that becomes a market order when a particular price level is reached. A sell stop is placed below the market. A buy stop is placed above the market. Sometimes referred to as stop order.

Storage hedge: Placing grain in the bin and "selling the carry" by pricing grain for delivery later in the crop year.

Strike price: The price, specified in the option contract, at which the underlying futures contract, security, or commodity will move from seller to buyer. Also called exercise price.

Technical (analysis): An approach to forecasting commodity prices that examines patterns of price change, rates of change, and changes in volume of trading and open interest, without regard to underlying fundamental market factors. Technical analysis can work consistently only if the theory that price movements are a random walk is incorrect.

Technical correction: A decrease in the market price that is greater than 10 percent but lower than 20 percent, from the recent highs. Also called a market correction.

Volume: The number of contracts traded during a specified period of time. It is most commonly quoted as the number of contracts traded, but some physical commodities may be quoted as the total of physical units, such as bales, or bushels, pounds, or dozens of barrels.

APPENDIX B:
Comparing USDA Livestock Risk Management Tools

POLICY/TOOL	ADMINISTERING AGENCY	RISK(S) COVERED	APPLICATION MATERIALS	NOTES
Livestock Forage Program (LFP)	FSA	Drought	Inventory of cattle kept and sold	
Livestock Indemnity Program (LIP)	FSA	Above-normal mortality rates	Proof of ownership, proof of above-normal mortality	
Emergency Assistant for Livestock, Honeybees, and Farm-Raised Fish Program (ELAP)	FSA	Additional feed and water hauling, loss not covered by LFP or LIP	Feed and water hauling costs (both normal and additional)	
Noninsured Crop Disaster Assistance Program (NAP)	FSA	Lower yield, crop losses, or prevented planting for noninsurable crops	"Notice of Loss and Application for Payment," crop acreage, service fee, and premium	
Annual Forage (AF)	RMA	Lack of precipitation for annual forage crops	Crop, intended use, number of acres to insure, growing season, premium	
Dual Use Option (DU)	RMA	Lack of precipitation for dual-use crops	Same as AF	
Pasture, Rangeland, and Forage (PRF)	RMA	Lack of precipitation for perennial pasture, rangeland, and forage crops	Same as AF	
Livestock Risk Protection (LRP)	RMA	Price risk for fed cattle, feeder cattle, and swine	Premium, weight at delivery, and proof of pregnancy	
Livestock Gross Margin (LGM)	RMA	Loss of gross margin	Target Marketings Report, packer sales receipts, premium	

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