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Area Crop Insurance: Pasture, Rangeland, and Forage Insurance

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Introduction

The types of risks that most agricultural producers are subject to can be classified as price and production risks. Price risk refers to the many different potential scenarios where realized prices differ from price expectations. Similary, production risk refers to the many different potential scenarios where realized output differs from expected output. Producers need to develop risk management plans that fit the needs and objectives of their operations to cope with both types of risk.

One production risk for livestock and forage producers is producing less forage than what is expected or needed. There are several production risks, including pests and weeds, that pose a significant risk for Arkansas forage producers. Weather is perhaps the most significant risk as it is completely out of the producer's control—for example, the quantity and timeliness of precipitation impacts forage yields. Finally, input availability and cost are also sources of forage production risk.

Several tools are available to producers for livestock price risk management. There are fewer products available for forage production risk management. Historically, producers have used farm management practices to protect against forage production risk. Namely, forage diversification, soil fertility and hay tests, practices that improve soil fertility, and grazing management like the Arkansas 300 Day Grazing System[1]. A relatively new product offered by USDA's Risk Management Agency for forage production risk management is Pasture, Rangeland, and Forage Insurance (PRF).

Pasture, Rangeland, and Forage Insurance (PRF)

PRF is an area-based subsidized insurance product offered by USDA-RMA for perennial forages used for grazing or hay[2]. The program is intended to help producers cover replacement feed costs when a loss of forage for grazing or hay is experienced due to inadequate precipitation. PRF

[1] https://www.uaex.uada.edu/publications/pdf/FSA-3139.pdf
[2] There is a separate insurance product from RMA for annual forages. This program is called Annual Forage. It allows producers to purchase two insurance policies for dual-use acreage. See https://www.rma.usda.gov/Policy-and-Procedure/Insurance-Plans/Annual-Forage

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is based on a rainfall index. As a single-peril insurance product, producers receive an indemnity payment when observed precipitation for a producer's area falls below a chosen coverage level based on a historic rainfall index. Expected rainfall is insured is because it is difficult to uniformly measure forage production on farms, and it is more feasible to measure precipitation. PRF is a tool for producers to protect against forage production risk to the extent precipitation correlates with forage production.

The Grid as an Area to Measure Rainfall

Area-based multi-peril crop insurance is based on county-level yields and revenue (Biram and Connor, 2023). Area-based PRF insurance is based on a grid. The grids used by RMA are defined as 0.25 latitude by 0.25 longitude (i.e., 69 miles by 69 miles, or 4,761 square miles). For a PRF policy, a producer chooses the grid corresponding to the location of the acreage they want to insure. If a farm is in more than one grid, the producer can select either grid but not both. For example, we provide the grid information for the University of Arkansas Livestock and Forestry Research Station in Batesville, Arkansas (see Figure 1). Using RMA's PRF Support Tool (https://prodwebnlb.rma.usda.gov/apps/prf), producers can enter an address or drop a pin to find their grid.

Figure 1. Example PRF Grid for the UA Livestock and Forestry Research Station in Independence County, Arkansas.

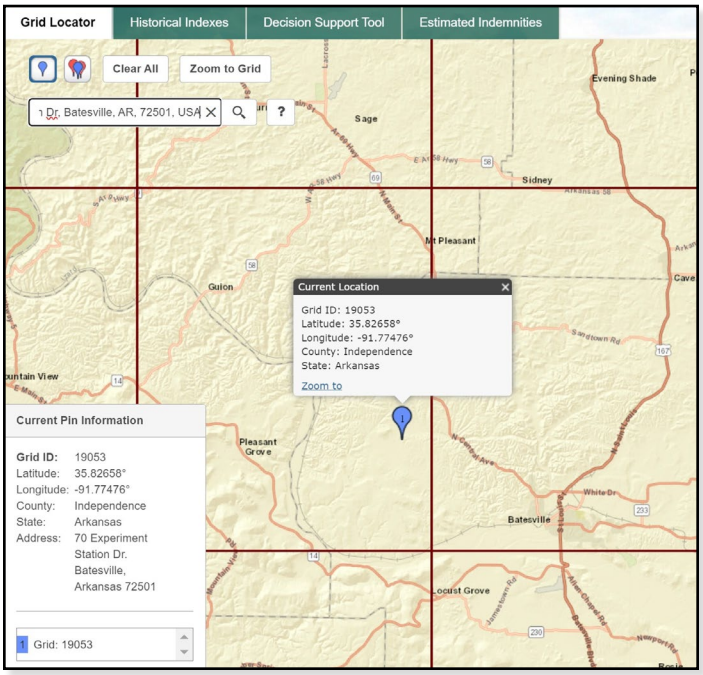
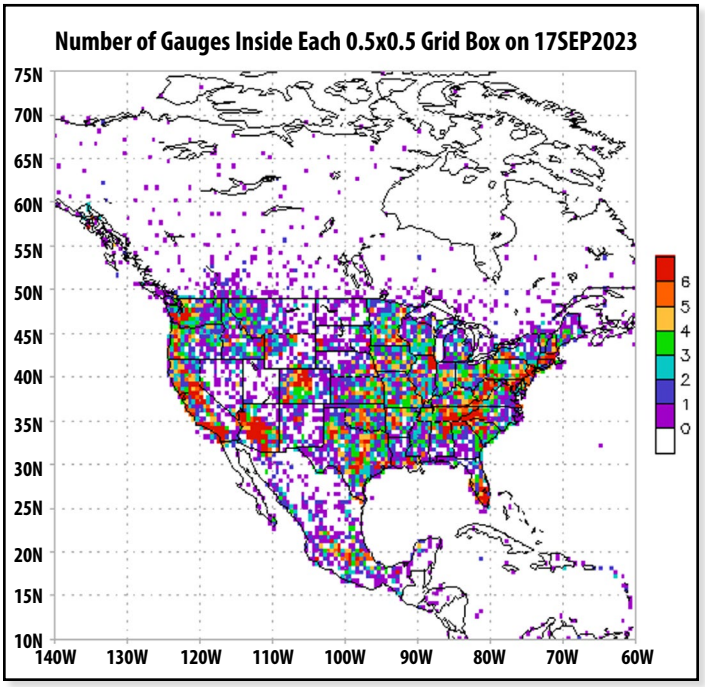


Figure 2. The number of NOAA Weather Stations within each grid.



Using Historical Rainfall to Measure Expected Rainfall

Using past precipitation data for the four closest National Oceanic Atmospheric Administration (NOAA) weather stations, historical index values are calculated for eleven 2-month index intervals for each grid: Jan/Feb, Feb/Mar, Mar/Apr, Apr/May, May/Jun, Jun/Jul, Jul/Aug, Aug/Sep, Sep/Oct, Oct/Nov, and Nov/Dec. Figure 2 provides the geographic distribution of NOAA weather stations across North America and the number of weather stations inside each grid cell. For each 2-month interval, historical index values represent average precipitation for a specific grid. Rainfall index values are calculated for each interval and grid using the same four closest weather stations. The rainfall index values reflect current precipitation compared to the long-run average. Based on a chosen coverage level, the current year's rainfall index values are compared to the historical index to determine whether a producer is paid an indemnity. Importantly, an indemnity is paid when a rainfall index value is below a chosen coverage level and historical average precipitation. Basically, the coverage level determines how much below normal rainfall needs to be before an indemnity is triggered. Normal refers to the historical rainfall average.

Figure 3. Historical Rainfall Index Values for UA Livestock and Forestry Research Station in Independence County, Arkansas, 2018-2022.
Source: USDA-RMA https://prodwebnlb.rma.usda.gov/apps/prf

Year	Jan-Feb	Feb-Mar	Mar-Apr	Apr-May	May-Jun	Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct	Oct-Nov	Nov-Dec
2022	191.9	111.6	110.9	143.9	107.0	86.6	160.4	92.5	52.5	83.0	112.5
2021	75.2	75.7	125.4	150.9	125.6	112.8	100.3	68.0	86.1	71.2	78.2
2020	155.3	129.8	121.9	119.6	134.8	114.8	151.1	187.8	150.2	89.2	65.7
2019	157.5	133.9	104.1	164.5	145.1	81.3	108.7	93.0	77.1	109.1	76.0
2018	157.7	155.3	71.6	66.7	57.2	54.8	98.3	108.0	88.1	92.2	116.4

Rainfall Index Example

Figure 3 reports historical index values for the Livestock and Forestry Research Station example for 2018-2022. The RMA website reports historical index values for each grid going back to 1948. Suppose in 2022, a producer chooses a 90% coverage level and insures value in the Oct-Nov interval. The Oct-Nov rainfall index value in 2022 was 83.0 which means rainfall was 83.0% of historical average precipitation. In the example, a loss was triggered because the rainfall index value was below the 90% coverage level. If the producer had chosen an 80% coverage level, an indemnity would not have been triggered because 83.0% is above the coverage level. Additionally, other two-month intervals which triggered an indemnity at the 90% coverage level in 2022 are the Jun-Jul and Sep-Oct intervals.

Key Decisions to Make When Choosing Coverage

Producers interested in participating in PRF will need to make several decisions about their policy that will impact premium rates and the likelihood of an indemnity payment. Producers should approach these decisions from a risk management perspective. Practically, producers also make decisions to maximize the possibility of receiving an indemnity payment. These perspectives are not always the same.

Intended Use: Producers choose the intended use of the insured forage acreage. The options are grazing and hay. Grazing acreage has lower per acre premiums and lower per acre indemnity payments when a loss is triggered.

Table 1. Subsidy Schedule for PRF.

COVERAGE LEVEL	PREMIUM SUBSIDY PERCENTAGE	PRODUCER PREMIUM PERCENTAGE
70%	59%	41%
75%	59%	41%
80%	55%	45%
85%	55%	45%
90%	51%	49%

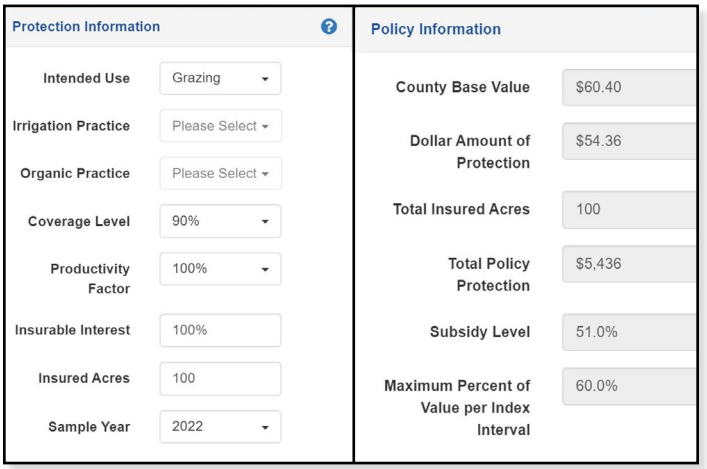
Producers may choose to purchase a policy to insure more than one intended use.

Insured Acres: Producers choose how many acres to insure for a PRF policy. Unlike other crop insurance products, producers do not have to insure all forage acreage, though that is an option. Producers using PRF for the first time might find it beneficial only to insure part of their pasture or hay acreage.

Coverage Level: PRF coverage levels range from 70% to 90% in 5% increments. Higher coverage levels are more likely to trigger an indemnity but are also more expensive. Premium subsidy rates will also depend on the chosen coverage level (see Table 1). Subsidy rates range from 51% to 59%. Lower coverage levels have higher subsidy rates.

Productivity Factor: USDA-RMA calculates a county base value of production. Hay acreage has a higher base value of production. The productivity value allows the producer to adjust how much of the base value to cover. The productivity factor ranges from 60% to 150%, and relative to the RMA base value changes how much coverage to buy. Producers with high-quality pastureland might choose a productivity factor exceeding

Figure 4. PRF example for UA Livestock and Forestry Research Station farm using PRF decision tool.
Source: https://prodwebnlb.rma.usda.gov/apps/prf



100% as the value of that forage is higher relative to the county, thus requiring a higher dollar amount of coverage. Higher productivity factors are more expensive and have higher indemnity payments when a loss is triggered.

Two-Month Index Intervals and Percent of Value: Producers choose which intervals to protect against low precipitation. At a minimum, producers must choose two 2-month intervals and cannot exceed six 2-month intervals. Producers should select the intervals that align with their forage production risks. For example, a producer interested in insuring acreage for their Bermuda hay fields should choose intervals that match the growing season. Producers then select the percent of value to protect in each chosen interval.

Importantly, the two-month intervals may not overlap with one another under the same intended use. For example, a producer wanting to insure under the grazing intended use may not choose to insure the Jan-Feb and Feb-Mar intervals. They may insure the Jan-Feb and Mar-Apr intervals. However, producers may insure across overlapping intervals under two different intended uses.

Example of Choosing PRF-RI Coverage

USDA-RMA has a decision support tool that producers can estimate historical premiums and indemnity payments based on a chosen policy. Figure 4 provides an example for the UA Livestock and Forestry Research Station farm. In the example, the PRF policy is for 100 acres used for grazing. We will choose the highest coverage level of 90% for this example. For simplicity, we have chosen a productivity factor of 100%.

The second image in figure 4 provides calculations for the policy protection based on our protection choices. The RMA base value of production for grazing acreage in Independence County is $60.40 per acre. The dollar amount of protection is calculated by multiplying the RMA county base value, productivity factor, and coverage level. For Independence County, the base value of production is $60.40 per acre. Selecting a 100 percent productivity factor and a 90 percent coverage level gives a dollar amount of protection totaling $60.40×90%×100%=$54.36 per acre. Based on our choices, we are purchasing $5,436 of coverage, which is calculated by multiplying per acre protection ($54.36) and number of insured acres (100). The last decision we need to make is how much of the protection to assign to each 2-month interval.

Example of Estimated PRF-RI Premiums and Indemnities

Figure 5 provides the estimated premiums and indemnity payments for our Independence County, Arkansas example. For this policy, we are distributing 100% of the $5,436 worth of coverage across five different non-overlapping intervals: Jan-Feb, Mar-Apr, Jun-Jul, Sep-Oct, and Nov-Dec. For illustrative purposes, we have chosen to distribute coverage unevenly across the five intervals by assigning 15% of total to the Jan-Feb interval, 20% to Mar-Apr, 20% to Jun-Jul, 25% to Sep-Oct, and 20% to Nov-Dec. The Percent of Value may be distibuted in any amount for each interval so long as all percentages add to 100%. The reason we chose to assign the highest percentage (i.e., 25%) to Sep-Oct is because the historical index has fallen below 90% for nearly all years prior to 2022. This suggests the risk of rainfall coming in below expectation is greatest in this two-month interval.

Two conditions must first hold before an indemnity is triggered for a two-month interval. First, the Actutal Index Value must fall below the chosen coverage level, which is 90% in this

Figure 5. Estimated premiums and indemnity payments for UA Livestock and Forestry Research Station farm PRF example.

Index Interval	Percent of Value (%)	Policy Protection Per Unit	Premium Rate Per $100	Total Premium	Premium Subsidy	Producer Premium	Actual Index Value	Estimated Indemnity
Jan-Feb	15	$815	17.57	$143	$73	$70	191.9	$0
Feb-Mar	N/A	$0	13.88	$0	$0	$0	111.6	$0
Mar-Apr	20	$1,087	12.80	$139	$71	$68	110.9	$0
Apr-May	N/A	$0	13.40	$0	$0	$0	143.9	$0
May-Jun	N/A	$0	13.97	$0	$0	$0	107.0	$0
Jun-Jul	20	$1,087	12.31	$134	$68	$66	86.6	$41
Jul-Aug	N/A	$0	12.69	$0	$0	$0	160.4	$0
Aug-Sep	N/A	$0	18.09	$0	$0	$0	92.5	$0
Sep-Oct	25	$1,359	19.44	$264	$135	$129	52.5	$566
Oct-Nov	N/A	$0	17.04	$0	$0	$0	83.0	$0
Nov-Dec	20	$1,087	18.08	$197	$100	$97	112.5	$0
Per Acre	**N/A**	**N/A**	**N/A**	**$8.77**	**$4.47**	**$4.30**	**N/A**	**$6.07**
Total	**100**	**$5,436**	**N/A**	**$877**	**$447**	**$430**	**N/A**	**$607**

example. Second, there must be a Percent of Value assigned to the two-month interval in which the Actual Index Value fell below 90%. The way in which indemnities are calculated for each two-month interval is as follows:

1. Divide the Actual Index Value by the chosen coverage level. For the Sep-Oct interval, we would divide 52.5 by 90 to get 0.583.
2. Next, subtract 0.583 from 1 to get 0.417.
3. Multiply the percentage found in step 2 by the Policy Protection Per Unit, which in this case is $1,359 for Sep-Oct (i.e., 25% of $5,346), to obtain $566.

Across all two-month intervals, we paid $8.77 per acre for $54.36 per acre of protection. Based on rainfall in 2022, our estimated indemnity payment would have been $6.07 per acre.

Other Resources

RMA Website: https://www.rma.usda.gov/en/Policy-and-Procedure/Insurance-Plans/Pasture-Rangeland-Forage

PRF Support Tool: https://prodwebnlb.rma.usda.gov/apps/prf

Agent Locator: https://www.rma.usda.gov/Information-Tools/Agent-Locator

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