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# Pasture Rangeland and Forage Insurance for Good Range Management

Photo by Beverly Box of Carrizo Springs, Texas, was an entry in the Rural Life and Landscape category of the 2012 Ranch & Rural Living Photo Contest.

By John Walker  
Texas A&M AgriLife Research

**R**ain is arguably the most important factor for successful ranching. Most ranchers believe there is little that they can do to affect this most important variable for their success. While it is true that little can be done to affect the amount of rain that falls from the sky, there is much that can be done to ensure that the rain received stays where it falls. The key to keeping as much of the rain where it falls is to have lots of grass cover. Research at the Sonora AgriLife Research Station showed that infiltration doubled for each percentage unit increase in vegetative soil cover. This may seem like an odd introduction to an article on Pasture, Range and Forage Insurance (PRFI, also known as rainfall insurance), but as a range scientist I believe that it is important to put management decisions in the context of creating healthy sustainable

rangelands. Used appropriately PRFI can provide the economic flexibility to improve range condition and increase infiltration of rainfall.

Before considering rainfall insurance, a brief overview of precipitation patterns is in order. Most will agree there is no such thing as an average year, but there is still a need for a standard to compare the current situation with the past. Median annual rainfall, or the amount of rain that half of the years are above and half are below, is the best estimate of “normal” in the semi-arid ranch country. There are more annual values below the average than above it, and the median is less than the mean. In San Angelo, Texas, the long-term median rainfall is 20% less than the average rainfall. Prudent ranch managers will stock their pastures and manage their ranches for the median rainfall and insure for the average rainfall.



The USDA Risk Management Agency made pasture range and forage insurance based on the estimated rainfall in a 12x12 mile grid available as a pilot program in selected states in the 2007 crop year. The program insurance is subsidized at between 51% and 59% of the premium cost but when rainfall is below the selected coverage level the insured receives 100% of the indemnity.

This insurance is considered rather simple in that there are no reporting or record-keeping requirements for PRFI. After an individual signs up, their paperwork is essentially done. Claims are then calculated based on a chosen coverage level and paid automatically. However, on the front end there are many decisions that must be made and the program can seem a complicated labyrinth to many ranchers.

Four basic decisions must be made, and within each of the four decisions there are many levels to choose from, which can make the initial decision process rather complicated.

■ **Acreage:** Individuals can insure all or part of their property, but most commonly the entire property is insured. This is the easiest decision.

■ **Coverage Level:** This ranges from 70–90% of average rainfall. The final grid index must be below the chosen coverage level to trigger a payment. This also affects the amount of subsidy that is provided. RMA pays 59% of the premium for the 70% and 75% coverage level and only 51% for the 90% coverage.

■ **Protection Factor:** This ranges 60-150% and allows individualization based on how productive a property is compared to average property in that county.



Everyone likes to see abundant rainfall and lush pasture, but inevitably there will be dry years and drought years. Photo by Mark Blount of Ozona, Texas.

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■ **Index Intervals:** There are eleven 2-month intervals and between 2 and 6 intervals must be insured with a minimum of 10% of the enrolled acreage insured for any chosen interval. This is the most important and the most complicated of the decisions that must be made when taking out PRF insurance.

Based on the last three factors in the above list, the different levels that can be selected for each and the interactions between them, there are more than 2.7 million different ways PRFI can be taken for one designated grid, as illustrated in the figure opposite.

I decided to investigate the consequences of these many decisions based on historic index values for Grid 13918, where the Texas A&M AgriLife Research and Extension Center is located in northwest Tom Green County, Texas. To do this I calculated the net returns for all possible combinations of five coverage levels, 10 protection factors and 56 combinations of the 11 intervals for a 64 year period beginning in 1948, the year for which historic index values are available from RMA. This resulted in a total of 214,400 different outcomes.

Before describing the results of this study I would like to describe some of the complexities of PFR insurance. Premiums and indemnities are based in part on the county base value per acre of pasture. For Tom Green County that amount is \$8.25 per acre. If the lease rate for an animal unit month of grazing is \$13.50, as estimated by Extension budgets, this would be equivalent to an annual stocking rate of 20 acres per animal unit. If you insure for the actual long-term sustainable stocking rate and that stock-

## Pasture, Range & Forage Insurance Requires Many Decisions

**450 x 206 = 92,700**

**92,700 x 30 > 2.7 mil.**

Index Interval	Insured Acres per Index Interval	Policy Protection per Unit	Premium Rate per \$500	Premium Subsidy (\$/acre)	Producer Premium (\$/acre)	Actual Index Value	Indemnity (\$/acre)
Jan-Feb							
Feb-Mar							
Mar-Apr							
Apr-May							
May-Jun							
Jun-Jul							
Jul-Aug							
Aug-Sep							
Sep-Oct							
Oct-Nov							
Nov-Dec							
Per Acre	N/A	N/A	N/A				
Policy							
Total							

	Number of Intervals	Number of Combinations
	6	1
	5	6
	4	70
	3	84
	2	45
<b>Total</b>		<b>206</b>

Have it your way! Doing the math shows that there can easily be over 1 million different ways that Pasture Range and Forage Insurance can be individualized for a ranch.

ing rate is higher or lower than the county average, the protection factor can be adjusted to reflect this. For instance, if the long-term carrying capacity for your ranch is 30 acres per animal unit then a protection factor of 66% would be appropriate if you insure for the actual carrying capacity of the ranch. Thus, the protection factor is similar to the value placed on your home for a homeowner's insurance policy.

The coverage level is like the deductible on an insurance policy. The more risk you are willing to assume, the lower the premium. There are five coverage levels between 90% and 70% in 5 percentage unit increments. The level of subsidy declines as the coverage level increases. At the 90% coverage the insured will receive an indemnity if the rainfall falls below 90% of the long-term average, and RMA pays 51% of the premium. At the 75% and 70% coverage level an indemnity is paid if the rainfall falls below these levels and RMA pays 59% of the premium. The premium is also higher for the 75 compared to the 70% coverage level because the actuarial probability of falling below 75% is greater than falling below 70% of long-term average precipitation.

Premiums are highest for the fall and winter months when rainfall is less variable than for the spring months that have a greater amount of variability because of convectional thunderstorms. Fall and winter months are also more likely to be affected by El Niño/La Niña events. Premium cost for grid 13918 is \$25 to \$35

per \$100 of coverage for the November to February period, compared to \$10 to \$25 for the May to June period. Compared to homeowner's insurance, which is about \$1 per \$100 dollars of coverage in this area, PRFI is very expensive. This is because we



Even though the grass in this pasture near Leakey, Texas, in July 2011 is burnt to a crisp and the colorless appearance of the field makes it look like a winter scene, this range fared better than some pastures where animals were left to graze and took the vegetation down to the dirt. Photo by Gary Cutrer.

expect drought every few years. In contrast most people hope they never have to make a claim on their homeowner's policy.

Finally, if you decide to take out PRFI you should commit to taking it out every year and not try to outguess the weather. Again, compare this to homeowner's insurance. Most people who have homeowner's insurance keep coverage every year even though they may have never made a claim. Consider how much more important it is to keep PRFI in place for drought, which you do expect to happen. People who dropped their PRFI after paying high premiums in 2010 sorely regretted it in 2011, Texas' driest year on record.

Two important discoveries were made based on the study involving the 214,400 scenarios for rainfall insurance. First, averaged across 64 years there was no difference in net return for taking out PRFI for the different combinations of 2, 3, 4, 5 or 6 of the 2-month intervals investigated. However, averaged across these same 64 years, net returns varied four fold depending upon the coverage level and protection factor selected.

On average, higher coverage levels and higher protection factors have a higher net return. This happens even though the subsidy rate is lower at the higher coverage level. The higher return is a result of leveraging more premium subsidy dollars

at the higher coverage levels and protection factors. But this also exposes the insured to a much higher potential premium if rainfall exceeds the selected coverage level.

Precipitation in West Texas is affected by El Niño and La Niña events, which are referred to as the Oceanic Niño Index (ONI). These events have the greatest effect in the winter months when El Niño tends to have cooler wetter weather and La Niña coincides with warmer drier winters. This phenomenon begs the question: Can knowledge of these cycles assist in making wise PRFI decisions?

Beginning in 1950, years were classified as an El Niño, La Niña, or neutral year and analyzed for net returns averaged across all years and all 11 intervals. The results showed that net return for 34 neutral years and 14 El Niño years was about \$0.45 per acre, compared to 14 La Niña years that had a net return of \$1.15 per acre, or over two times as much. Clearly such information can be useful but this analysis was made after the fact. The closing date for PRFI is Nov. 15, which means that decisions must be made based on the mid October predictions of the ONI for the coming year.

Historical ONI predictions are available beginning in 2003 (<http://iri.columbia.edu/climate/ENSO/currentinfo/archive/200411/QuickLook.html>). For the 9-year period from 2003–2011 the predictions were 66% accurate. However, predictions of the two La Niña years (2008 and 2011) were 100% accurate. Averaged across all intervals net returns for the seven neutral or El Niño years were only slightly above zero but for the two

**Table 1.** Suggested distribution of percentage of acres to cover in each interval for grid 13918 based on historic net return on PRFI for different conditions of the Oceanic Niño Index (ONI) and intuitively adjusted to minimize risk by spreading coverage across more intervals than suggested by the average index for each interval, because each year is unique and does not follow the average.

ONI Condition	Index Intervals for PRFI Insurance										
	J-F	F-M	M-A	A-M	M-J	J-J	J-A	A-S	S-O	O-N	N-D
El Niño			40%			30%					30%
Neutral	40%				40%						20%
La Niña	35%		30%		10%						25%

La Niña years the net returns were \$1.62 per acre.

The distribution of rainfall also varies in response to ONI events. Index values for the different intervals were investigated relative to the ONI condition. The index value for grid 13918 indicates that the November-December interval always has a high probability of paying an indemnity and the January-February interval also has a high probability of paying an indemnity, except in El Niño years. These patterns are consistent with the higher premiums for these intervals and the known effect of El Niño years on winter precipitation. Based on index values since 1950 and classification of the years based on the ONI, the distribution of acreage across intervals for grid 13918 can be recommended (Table 1). Keep in mind that such recommendations are based on long-term averages and any given year may not follow this pattern. Furthermore, if weather patterns are changing the past may not predict the future.

For the 9 year period from 2003 through 2011, net return based on the distributions

suggested in Table 1 and the predicted ONI condition in mid-October compared to distributing acreage equally across six intervals resulted in a three fold increase in net return for grid 13918.

Another advantage of not insuring all months is the psychological one that allows you to really enjoy a good rain during a month that was not insured because not only will it help the range, but you will not have to pay a premium.

Decisions about how to participate in PRFI can be boiled down to two questions: 1) How much risk can the ranch handle? and 2) What are the expectations for rainfall distribution in the coming crop year?

Over the long-term maximizing the coverage level and the protection factor will maximize net return, it will also maximize the loss in any interval that receives rainfall in excess of the selected coverage level. But, the insured has to be able to pay the total premium in any given year without having a catastrophic effect on the business. Thus, the maximum potential premium for the chosen coverage and protection should be calculated and the impact on the business considered. PRFI will always provide a positive net return over the long-term; but bankruptcy does not allow you to participate in the long-term.

The best strategy for distributing coverage across intervals is, to base decisions on the most current long-term weather forecasts available prior to taking out the insurance and on the historic indexes for previous similar situations relative to the projected condition of the ONI. The National Weather Service makes long-term predictions (<http://www.cpc.ncep.noaa.gov/products/predictions/>) as do other free and paid forecasting services. However, the farther out a prediction is the less reliable the forecast and past six months in the future the probability of above or below normal precipitation is usually equal. You should insure the intervals with the highest probability of having below average precipitation based on reputable forecast and the historic effect of ONI on the index value for the grid that you are interested in. Insuring all intervals evenly will

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## Simple Guide to PRF Insurance Decisions

- Stock light and buy PRFI
- Distribute acreage according to expected rainfall particularly as that distribution is usually affected by anticipated El Niño or La Niña conditions.
- Coverage level is like the deductible on a homeowner's policy and ranges from 70 – 90% of normal rainfall. Higher coverage levels have higher premiums and lower subsidy rates. Choose the coverage level that matches the level of risk you want to assume and the amount of premium that you can afford to pay.
- Protection factor is like the valuation of the property on a homeowner's policy and ranges from 60 – 150% of the county average.
- High value = higher average returns
- High value = higher premium payments in average or better years.



slightly decrease the risk of paying a premium in a single year but greatly decreases the long-term net return.

PRFI helps to protect livestock producers from lost income as a result of drought that reduces carrying capacity and livestock sales. It does not protect the producer from the vagaries of the market which often work against producers forced to liquidate livestock because of drought in a down market. However, PRFI when used to offset lost income as a result of light to conservative stocking rates, can reduce exposure because reduced stocking rates decrease the need to sell animals in a drought. Using this strategy, except for exceptional drought, a producer should be able to maintain their herd with little additional feed cost and receive an insurance payment that would compensate for reduced income as a result of having a smaller herd. In above average rainfall years the additional forage can be used for range improvement with prescribed fire. The reduced cost of prescribed fire compared to chemical or mechanical control will offset the price of the PRFI premium. Or they can purchase stockers or lease grazing to other producers and use the income to pay the premium.

In summary PRFI is a good investment that can be made better by wise decisions regarding the coverage level, protection factor and distribution of coverage across intervals. It can help reduce management decisions and exposure to down markets often associated with a drought.

Finally, and perhaps most importantly, it can help justify a range management program that will maximize the benefit of every drop of rain that does fall on a ranch. ◇

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