Introduction

The United States Department of Agriculture - Risk Management Agency (USDA – RMA) has overseen the administration of the Rainfall-Index Pasture, Rangeland and Forage (RI-PRF) crop insurance program in Oklahoma since 2011, although it was offered as a pilot program in other states from 2007-2011. RI-PRF seeks to protect producers from losses of perennial pasture, rangeland or forage brought about by the lack of precipitation. Unlike other multi-peril crop insurance products, the RI-PRF does not measure production or loss from too little (or too much) rainfall. Instead, program payments are based on a rainfall index. When rainfall is sufficiently lower than historical rainfall in the coverage area, the insurance policy holder receives an indemnity.

Although Oklahoma has variable rainfall, so producers could potentially benefit from this program, use has been low. Nationally, only 22% of total pasture and rangeland in the U.S. was insured with RI-PRF in 2019. This report provides recommendations for producers who are considering participating in the program, whether for the purposes of reducing the risk of losses associated with low precipitation or for the purpose of increasing farm profit.

Program Details and Coverage Types

The rainfall index used for payment is published by the National Oceanic Atmospheric Administration Climate Prediction Center (NOAA CPC). NOAA CPC’s rainfall index values are based on a grid system, where each grid is 0.25 degrees in latitude by 0.25 degrees in longitude or approximately 17 miles by 17 miles at the equator. The rainfall index is the sole determinant of payments by each grid.

Indemnity payments are based on the difference between historical rainfall and the coverage period rainfall index multiplied by the base values and coverage options chosen when the policy was purchased. Unlike the rainfall index that is specific to a grid, the base values are specific to a county. Each county includes 10 to 15 grids, so a producer may have the same base value for fields covered under multiple rainfall indices.

The RI-PRF crop insurance program offers many options to customize protection:
- Coverage Level (five levels): 70 %, 75 %, 80 %, 85 % and 90 %
- Productivity Factor: 60% to 150% in 1% increments
- Bi-monthly coverage intervals (11 levels) i.e. January-February, February-March and so on out to November-December.

The coverage options above interact to complete the coverage choice. Each index interval included in the coverage choice can have different weights (from 10% to 60% in Oklahoma), and the sum of interval weights must be 100%. At least two, and up to six, intervals may be selected but cannot overlap. For example, January-February and February-March cannot both be selected because of the overlap in February.

In addition, there is a premium subsidy rate that depends on the coverage level. These subsidy rates and coverage levels are: 59% subsidy for 70% and 75% coverage; 55% subsidy for 80% and 85% coverage; and 51% subsidy for 90% coverage. Due to the premium subsidy, over time producers are likely to receive more indemnity payment than they pay in premium (Cho and Brorsen, 2021). For example, during the time period from 2011 to 2017, an Oklahoma producer would have averaged getting back $18 per acre with total premium $20 per acre. Producers averaged paying less than $10 per acre because of the 51% to 59% premium is subsidy.

Evaluation of the Program

In this fact sheet, three issues are considered 1) how well the rainfall index corresponds with actual rainfall (and hay yields), 2) the accuracy of county base values for hay in Oklahoma and 3) optimal choices for producers.

The first question is how well the rainfall index matches up with actual rainfall and hay yields. As shown in Table 1, the average correlation between rainfall index and actual rainfall is 0.95. So, the rainfall index values appear to track actual rainfall. With that said, hay yields are weakly correlated with the rainfall index, so the “rainfall” risk protection provided by this program does not directly translate to “hay yield” risk reduction. The second question is how accurate county base values for hay are in Oklahoma. The county base values in 2018 given by USDA RMA had strong correlation (0.94) with actual hay yields in Oklahoma, even though the 77 counties were aggregated into nine regions (Figure 1).

Cho and Brorsen (2021) evaluated optimal choices for Oklahoma producers. Economic analysis considered two differ-
Table 1. The Estimated Pearson Product-Moment Correlations by bi-monthly intervals between rainfall index and the actual rainfall in Oklahoma, 1994-2017.

<table>
<thead>
<tr>
<th>Bi-monthly intervals</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>January-February</td>
<td>0.9416</td>
</tr>
<tr>
<td>February-March</td>
<td>0.9417</td>
</tr>
<tr>
<td>March-April</td>
<td>0.9537</td>
</tr>
<tr>
<td>April-May</td>
<td>0.9607</td>
</tr>
<tr>
<td>May-June</td>
<td>0.9534</td>
</tr>
<tr>
<td>June-July</td>
<td>0.9263</td>
</tr>
<tr>
<td>July-August</td>
<td>0.9125</td>
</tr>
<tr>
<td>August-September</td>
<td>0.9040</td>
</tr>
<tr>
<td>September-October</td>
<td>0.9303</td>
</tr>
<tr>
<td>October-November</td>
<td>0.9502</td>
</tr>
<tr>
<td>November-December</td>
<td>0.9541</td>
</tr>
</tbody>
</table>

*Note:* The correlations were obtained by county and by season and then averaged across counties.

The solution to reduce the risk from the lack of precipitation is to choose a 90% coverage level, 60% productivity factor, and choose bi-monthly intervals between March and September. Moreover, a common strategy appears to be to place equal weights on five or six intervals but spreading the weights across only the spring and summer seasons is recommended.

**Summary**

If your goal is to reduce risk, then
- Choose the 90% coverage level
- Choose the lowest productivity factor allowed (60%)
Choose bi-monthly intervals during spring and summer (intervals that include months from March to September)

If your goal is to take advantage of the subsidies and maximize expected income
- Choose the 90% coverage level
- Choose the highest productivity factor allowed (150%)
- Choose the two (2) bi-monthly intervals for the winter months (November-December and January-February)

These are general conclusions, and a producer may want to consult with their crop insurance agent to help decide what insurance options are right for their operation. Contact an RMA agent to sign up this RI-PRF crop insurance program: the annual sign-up deadline is November 15.

Reference
The Oklahoma Cooperative Extension Service

WE ARE OKLAHOMA

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

• The federal, state, and local governments cooperate to share in its financial support and program direction.

• It is administered by the land-grant university as designated by the state legislature through an Extension director.

• Extension programs are nonpolitical, objective, and research-based information.

• It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.

• It utilizes research from university, government, and other sources to help people make their own decisions.

• More than a million volunteers help multiply the impact of the Extension professional staff.

• It dispenses no funds to the public.

• It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.

• Local programs are developed and carried out in full recognition of national problems and goals.

• The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.

• Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.