Interval Selection Trends in the Pasture, Rangeland, and Forage Rainfall Index (PRF-RI) Program and Coverage Guidelines

Whoi Cho and Matthew Diersen

Abstract

This study examines bi-monthly interval selection trends in the Pasture, Rangeland, and Forage Rainfall Index (PRF-RI) program from 2016 to 2023 across the 48 contiguous U.S. states. Although PRF-RI was designed as a risk management tool to protect against forage losses due to low rainfall, an increasing share of coverage has shifted toward non-growing season intervals. Moreover, the higher payout probabilities associated with these intervals may drive producers to favor non-growing season intervals, even if such choices do not align with actual forage production risk. This trend raises concerns about the program's long-term sustainability, as indemnities in these intervals have exceeded premiums. In addition, this study offers risk-minimizing coverage guidelines based on an optimization analysis of eight counties in South Dakota. The findings suggest that selecting growing season intervals spread across multiple months can reduce return variability while maintaining higher expected returns compared to non-participation.

Whoi Cho is an assistant professor of applied Economics in the Ness School of Management & Economics at South Dakota State University.

Matthew Diersen is a professor and the Griffith Chair in Agricultural Finance in the Ness School of Management & Economics at South Dakota State University.

**Contact to*: Whoi Cho, Ness School of Management & Economics, South Dakota State University, Brookings, SD 57007;
Phone number: (605)688-5321; E-mail: whoi.cho@sdstate.edu

Introduction

The Pasture, Rangeland, and Forage Rainfall Index (PRF-RI) insurance program was initially introduced as a pilot program in 2007 by the Risk Management Agency (RMA). PRF-RI program expanded to cover the 48 contiguous states by 2016. The RMA plans to extend coverage to Hawaii in 2025. Despite its geographic expansion, participation remains low in certain states. In 2024, about 26% of South Dakota's pasture and rangeland were insured under the PRF-RI program, compared to 50% nationwide (USDA RMA, 2024).

The PRF-RI program provides area-based insurance for perennial pasture, rangeland, or forage producers, protecting them against production risks caused by a lack of precipitation. The PRF-RI program incorporates spatially correlated risk using a rainfall index, improving the efficiency of risk assessment and mitigation (Barnett and Mahul, 2007; Nadolnyak and Vedenov, 2013). It offers an advantage over traditional crop insurance products, particularly in addressing challenges associated with missing data (Dalhaus and Finger, 2016). The program provides a wide range of coverage selections, enabling producers to select customized insurance policies coverage to local conditions and to effectively manage agricultural risks.

However, two concerns have continued to be raised regarding the effectiveness of the PRF-RI program. One concern is choice overload. Producers who enroll in the PRF-RI program must select a coverage level, productivity factor, and bi-monthly intervals. In particular, the bi-monthly interval selection involves a large number of possible combinations, making the decision process especially complex. This complexity can be attributed to the requirement to allocate coverage weights across as many as 11 distinct bi-monthly intervals, further compounded by the restriction that overlapping months cannot be selected. Producers must allocate a total of 100% of covered acres across their chosen intervals, assigning no less than

10% to each. The maximum allowable weight varies by state but typically ranges from 50% to 70%. Choice overload may overwhelm producers during the decision-making process or lead to decision fatigue (Cho and Brorsen, 2021; Davidson and Goodrich, 2023).

Decision fatigue can lead to avoidance of enrollment or default selection by directing individuals' attention toward immediate payout opportunities, while diminishing their consideration of the program's intended purpose as a risk management product (Arunachalam et al., 2009; Pignatiello et al., 2020). Goodrich et al. (2020) show that between 2013 and 2017, producers in Kansas and Nebraska tended to choose non-growing season bi-monthly intervals with little impact on forage growth, rather than selecting growing season intervals. Davidson and Goodrich (2023) highlight that while producers tend to enroll in the PRF-RI program as they become more aware of potential forage yield loss, this increased awareness does not necessarily lead to selecting bi-monthly intervals during the growing season. Those who are aware of the potential forage yield loss enroll in the PRF-RI program but may choose non-growing season bi-monthly intervals. Intervals such as January–February or November–December fall outside the forage growing season and typically experience low rainfall. The rainfall index during these months tends to be highly volatile, and even small deviations from historical averages can trigger substantial payouts. While selecting non-growing season intervals can increase expected returns, it exposes producers to higher risk due to the variability in expected returns (Westerhold et al., 2018; Cho and Brorsen, 2021; Zapata and García, 2022).

Another ongoing concern about the effectiveness of the PRF-RI program is basis risk, which arises from the imperfect correlation between the index and actual precipitation or forage yields. While the rainfall index shows a strong correlation with actual precipitation (Maples et al., 2016; Cho and Brorsen, 2021), its correlation with forage yields is too low (Yu et al. 2019;

Keller and Saitone, 2021; Krueger et al., 2023). Recent studies recommend alternative indicators such as normalized difference vegetation index (NDVI), soil moisture, and drought monitor, which better correlate actual forage yields and help reduce basis risk (Keller and Saitone, 2021; Krueger et al., 2023; Benami et al., 2025). Higher basis risk implies a greater risk of false negatives, where no payouts are made even when real losses occur, as well as false positives, where payouts are triggered despite no actual loss. Therefore, the current high basis risk between the rainfall index and forage yields may lead producers to perceive the PRF-RI program more as an opportunity for immediate payouts than as an insurance program.

If the chances of getting a payout depend more on index movement than on forage loss from low rainfall, producers may choose intervals that offer higher expected payouts rather than those that insure their forage production risk. Davidson and Goodrich (2023) show that below-average rainfall occurs more frequently during the non-growing season, leading to a higher probability of payouts compared to the growing season across the U.S. Despite these challenges, numerous studies have provided guidelines to help producers enrolling in the PRF-RI program to protect against forage yield losses due to low rainfall (Westerhold et al., 2018; Yu et al., 2019; Goodrich et al., 2020; Cho and Brorsen, 2021; Zapata and García, 2022). Selecting growing season intervals, from March to August, is consistently recommended to offset production risk, as rainfall during these months is strongly associated with forage growth.

This study examines changes in coverage selection, particularly bi-monthly interval choices, among producers enrolled in the PRF-RI program from 2016 to 2023 across the 48 contiguous U.S. states. Assessing loss ratios for each bimonthly interval allows evaluation of the relationship between premiums paid and indemnities received. Possible recommendations for improving the PRF-RI program will be suggested based on the results. Second, the study

determines guidelines for selecting the bi-monthly index for forage producers. Two strategies are used to choose coverage selections for producers: a risk-minimizing strategy and a profit-maximizing strategy using forage yield and rainfall index data from eight counties in South Dakota. The findings could guide producers considering enrolling or are currently enrolled in the PRF-RI program.

Background on PRF-RI Program's Premiums and Indemnities

PRF-RI program is an insurance product based on a rainfall index developed by the National Oceanic and Atmospheric Administration Climate Prediction Center (NOAA CPC). Under this program, insured acreage is assigned to one or more NOAA grids. Each grid spans 0.25 degrees of latitude and 0.25 degrees of longitude—approximately 17 by 17 miles at the equator. Each grid has its own rainfall index values, therefore, producers pay premiums based on the selected bi-monthly indices corresponding to the grid(s) in which their field is located.

RMA provides two key pieces of information for calculating premiums. The first is the set of 11 different premium rates for each grid, corresponding to bi-monthly intervals throughout the coverage year. The second is the county base value. This represents the estimated dollar value of crop production for each county. Its derived from estimated hay or pasture prices and yields by RMA. The premium is determined using the RMA-provided information applicable to the producer's coverage selections. To calculate it, the dollar amount of production is established by multiplying the county base value, the chosen coverage level, and the selected productivity factor. Then the dollar amount of production is multiplied by the premium rate of the selected bi-monthly interval indices. It is further adjusted based on the weights assigned by the producer. Summing the resulting values determines the total premium. Additionally, producers receive a

U.S. government subsidy based on their coverage level: 51% for 90% coverage, 55% for 80% or 85% coverage, and 59% for 70% or 75% coverage.

The rainfall index and coverage selections drive indemnities under the PRF-RI program. For each bi-monthly interval, the payment calculation factor is determined by subtracting the final rainfall index from the selected coverage level, then dividing by that coverage level to normalize it between 0 and 1. If this factor is greater than zero, it is multiplied by the dollar amount of production, further adjusted by the producer's assigned weights, to calculate the indemnity. If the factor is zero or negative, no indemnity is paid.

Data

The descriptive statistics were based on the RMA's Summary of Business for the entire U.S. from 2016 to 2023. Data specific to non-irrigated haying fields were used for the analysis. Over 80% of the total insured acreage was insured under the 90% coverage level. Therefore, data reported for the 90% coverage level were selected for the descriptive statistics.

For the optimization process in South Dakota, rainfall index data and PRF-RI program details, including premium rates and county base values, were obtained from the RMA Actuarial Information Browser. South Dakota offers six distinct county base values through RMA. Eight counties were randomly selected for analysis, with one or two counties assigned to each county base value category (Figure 1). The United States Department of Agriculture National Agricultural Statistics Service (USDA NASS) discontinued county-level hay estimates after 2020, forage yield records for selected counties from 1994 to 2023 were used from the area plan historical yield records available in the RMA reporting system. Corresponding hay price data for South Dakota were collected from the USDA NASS database. To ensure a sufficient number of

observations, this study used data from 1994 to 2023. For years prior to the establishment of the PRF-RI program, most recent premium rates in 2023 were applied.

Conceptual Model

A producer's objective is to make a set of coverage selections under the PRF-RI program to maximize expected returns for a given level of risk (standard deviation). Using a mean-variance approach, we examine two scenarios under an expected utility maximization framework: (1) expected-profit maximization (risk-neutral), and (2) variance minimization. The coverage level is held constant at 90%. The decision variables include the productivity factor and choice of bi-monthly intervals. By optimizing these variables, we determine the portfolio (i.e., the combination of intervals) that best meets each scenario's objective.

The objective of producers is to identify the optimal coverage selection by maximizing their expected net farm income. Expected net farm income is defined as the net farm sales (π) plus the indemnity received by participating in the PRF-RI program. The objective function is specified as:

$$(1)\quad \max_{\substack{\theta\in\{0.7,0.75,0.8,0.85,0.9\}\\ 0.6\le\delta\le1.5\\ w_i\in\{1,2,\cdots,11\}}} E(R) = E\{P\cdot Y + \sum_{i=1}^{11} w_i\cdot\theta\cdot\delta\cdot \mathrm{CBV}\cdot\left(\max\left(\frac{\theta-\mathrm{F}_i}{\theta},0\right)-(1-\mathrm{s}_\theta)\cdot r_i\right)\}$$

$$= E(\pi) + \sum_{i=1}^{11} w_i\cdot E(\gamma_i)$$

where the arguments are defined by the following bi-monthly interval selection constraints:

$$(2)\quad \sum_{i=1}^{11} w_i = 1; \qquad w_i\cdot w_{i+1} = 0\ \forall\ i = 1,2,\cdots,10$$

where θ represents the coverage level, fixed at 90% in this study, δ denotes the productivity factor, w_i represents the weight assigned to bi-monthly interval (i), which is 0 if not selected and

ranges from 0.1 to 0.7 if selected in South Dakota, R denotes the net farm return from hay production and PRF-RI crop insurance program, P represents the hay price, Y is the forage yield, CBV is the county base value, F_i represents the final rainfall index for interval i, the subsidy rate, s_θ, is 51% when coverage level is 90%, as determined by the U.S. government, the premium rate for interval i is represented by r_i, and γ_i denotes the net indemnity amount received from PRF-RI program for interval i. Bi-monthly interval selection constraints require that the sum of all selected weights equals 100%, and overlapping months cannot be chosen simultaneously.

Risk is represented by the variance of the net farm return (R). The variance of the net farm return is:

$$V(R) = \sigma_\pi^2 + \sum_{i=1}^{11}\sum_{j=1}^{11} w_i \cdot w_j \cdot \sigma_{ij} + 2\sum_{i=1}^{11} w_i \cdot \sigma_{\pi i} \tag{3}$$

where σ_π^2 is the variance of net farm sales, σ_{ij} is the covariance between γ_i and γ_j, and $\sigma_{\pi i}$is the covariance between π and γ_i. The expected net farm return corresponds to the optimal coverage selection that provides the minimum risk.

Following the recommendations of Cho and Brosen (2021), the risk-minimization solution is determined by restricting non-growing season's bi-monthly index intervals. Although these restrictions may reduce the expected net farm return, the primary objective of the PRF-RI program is to stabilize net farm income rather than serve as revenue insurance. Consequently, the capacity to mitigate risk and maintain a stable income is often more important to enrolled producers than maximizing expected returns. Intervals that clearly lie outside the growing season—January–February, February–March, October–November, and November–December—are excluded from coverage. In South Dakota, low temperatures often causes early-year snowfall to remain frozen until melting occurs in March or April, potentially influencing forage growth. However, given the generally weak correlation between the rainfall index and forage yield (Yu et

al. 2019), it is challenging to assert a direct link between precipitation in January and February and forage yield. Furthermore, this study aims to evaluate whether the reduction in coverage selection can still protect against financial losses for forage producers from lack of precipitation. Coverage selection guidelines are considered with a focus on the growing season from March to October, while excluding non-growing periods.

Results

Bi-monthly interval selections among producers enrolled in the PRF-RI program from 2016 to 2023 reveals notable changes across the 48 contiguous U.S. states (Table 1). In 2016, producers selected a broad range of months, with non-overlapping intervals aligned in chronological order (January–February, March–April, May–June, July–August, September–October, and November–December). Most insured acreage was in the May–June and July–August intervals, aligning with the forage growing season and reflecting the program's intended purpose. While producers continued to select a wide range of intervals in 2017, January–February, which lies outside the forage growing season, became the leading interval in terms of insured acreage from that point forward. Although January–February rainfall is unrelated to forage production, its frequent selection suggests that producers may have chosen intervals in order, starting with the first available one. This behavior may be a signal of decision fatigue from choice overload, where producers opt to follow default selections instead of critically evaluating the program (Pignatiello et al., 2020).

A declining trend in the total insured acreage percentage for the primary growing season (April–May through August–September) has emerged from 2016 to 2023. In recent years, producers have increasingly chosen months with historically low rainfall and high variability,

such as January–February, February–March, October–November, and November–December. This adverse selection trend aligns with the risk-increasing behavior in PRF-RI program participation patterns observed by Goodrich et al. (2020). Furthermore, as shown in Davidson and Goodrich (2023), there is a behavioral pattern in which producers, despite recognizing potential forage yield losses, allocate higher weights to non-growing season intervals. While it remains unclear how much decision fatigue contributes to this behavior, it may indicate that producers are increasingly viewing the PRF-RI program as a source of immediate payouts rather than a risk management tool.

So far, the statement that low-rainfall intervals have a higher probability of payouts holds true, as shown in Figure 2. The overall average loss ratio (indemnity divided by premium) is 0.89, aligning with the U.S. crop insurance target of 0.88 (Zulauf and Schnitkey, 2023). Intervals from March–April through August–September show loss ratios below 0.88. However, in January–February and February–March, indemnities exceed premiums, with loss ratios of 1.20 and 1.53, respectively. At a 90% coverage level and 51% subsidy rate, effective loss ratios for these intervals rise to 2.45 and 3.12 (1.20/0.49 and 1.53/0.49). Producers paying $1 in premiums may expect to receive expected indemnities exceeding $2.50. Although selecting low-rainfall intervals led to substantial payouts, it is questionable whether those selections effectively insured against forage production risk resulting from low rainfall.

Figure 3 shows the probabilities of payouts by index interval over 30 years from 1994 to 2023 for eight counties in South Dakota. The frequency of rainfall indices falling below 90% was counted. Notably, non-growing season intervals have higher probabilities of payouts than growing season intervals. This may drive producers to select non-growing season intervals with higher payout probabilities, aiming to maximize returns from the PRF-RI program. As Figure 2

illustrates, total indemnities already exceed total premiums in low-rainfall intervals. If producers increasingly choose these intervals to maximize returns, it could raise serious concerns about the program's long-term financial viability.

Tables 2 and 3 present optimal coverage selections under two scenarios. In the profit-maximization scenario, producers favor low-rainfall intervals corresponding to non-growing season intervals, although June–July was also selected in Yankton County. Each selection allocated weights of 70% and 30% into two intervals, with a productivity factor set to the maximum of 150%. On average, this scenario yielded $39 more per acre compared to having no contract with the PRF-RI program. Except for Fall River, Haakon, and Harding Counties, the risk variances in returns were higher, indicating that profit-maximizing producers incur more risk to increase revenue. Selecting only two low-rainfall intervals to maximize profits may increase risk and run counter to the PRF-RI program's objectives.

In contrast, the risk-minimization scenario showed a preference for more evenly distributed selections across multiple intervals (Table 3). This approach generated $18 more per acre on average than without PRF-RI program while reducing risk variance in all counties. Codington and Yankton recommended productivity factors of 125% and 87%, respectively, while the remaining counties shared the same optimal factor of 150% as in the profit-maximization scenario. Fall River, Haakon, and Harding Counties, located in the drier, western regions of South Dakota, experience lower rainfall and pasture productivity. Both scenarios reduced risk variance in expected returns. In Fall River County, risk variance differed only slightly between the two approaches, but profit maximization still resulted in an additional $8.87 per acre.

Table 4 shows the risk-minimization scenario with bi-monthly interval selections restricted to the growing season. Under this restriction, expected returns remain higher than not enrolling in PRF-RI program, while also maintaining lower overall risk variance. However, risk variance is slightly greater than in the risk-minimization scenario without restrictions on non-growing season intervals. This marginal increase stems from higher expected returns rather than elevated production risk, making it difficult to attribute the additional risk variance solely to basis risk. Furthermore, Codington, Yankton, Hand, and McPherson exhibit lower optimal productivity factors than in unrestricted risk-minimization. Pairing non-growing season intervals with higher productivity factors appears to have acted as a multiplier, boosting returns. Although the effect is modest, it suggests that the productivity factor may help align correlation between crop productivity and rainfall index, partially mitigating basis risk.

Conclusions

This study enhances our understanding of PRF-RI program participation by analyzing producers' interval selection behavior. There has been a growing tendency among producers to assign greater weight to non-growing season intervals. These patterns imply that producers are prioritizing immediate payouts over risk management, with choice overload potentially driving them away from the program's intended purpose. For producers experiencing choice overload, clear guidelines may become especially important, and the influence of crop insurance agents may become even more pronounced. Further research is needed to explore how choice overload of PRF-RI program may lead to poor decision-making, as well as the role of crop insurance agents in this process.

The 11 bimonthly intervals, including those unrelated to forage production, may undermine the program's long-term sustainability. Total indemnities paid in specific intervals, particularly January–February and February–March, exceed the total premiums collected for those intervals. Moreover, non-growing season intervals tend to have a higher probability of payouts compared to growing season intervals. Producers may benefit in the short term by focusing on intervals with the highest expected returns, but such behavior could ultimately compromise the financial stability of both individual participants and the PRF-RI program. Although total indemnities across all intervals remain below total premiums, the continued concentration in high-indemnity intervals raises concerns about long-term sustainability. Given that more than half of premium costs are subsidized by the government, this trend warrants further scrutiny from a taxpayer's perspective. Premium rate adjustments for low-rainfall intervals or restrictions on their selection may be considered potential policy changes to improve the program's long-term sustainability.

The stated purpose of the PRF-RI program is to "help protect a producer's operation from the risks of forage loss due to the lack of precipitation" (USDA RMA, 2024). This objective implies that the program's primary function should be risk management, rather than solely maximizing expected returns. This study recommends selecting growing season intervals distributed across multiple months, rather than concentrating coverage in just two intervals. Such risk-minimizing coverage strategies not only offer higher expected returns compared to non-participation in the PRF-RI program but also help reduce return variability. Even with restrictions on non-growing season interval selections, PRF-RI program can effectively serve forage producers as a risk management tool. Consistent with Cho and Brorsen's (2021) recommendation, this study supports reducing the number of bi-monthly intervals available to

producers. Such adjustments could help ensure that PRF-RI program remains aligned with its intended purpose of mitigating production risk rather than becoming a mechanism for adverse selection.

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Table 1. Total Insured Acreage Percentage in the United States by Bi-monthly Intervals (2016–2023)

	Jan-Feb	Feb-Mar	Mar-Apr	Apr-May	May-Jun	Jun-Jul	Jul-Aug	Aug-Sep	Sep-Oct	Oct-Nov	Nov-Dec
2016	9%	5%	10%	9%	13%	8%	13%	7%	10%	5%	11%
2017	15%	6%	13%	7%	12%	7%	11%	6%	9%	4%	10%
2018	18%	10%	16%	7%	9%	6%	6%	5%	7%	7%	8%
2019	13%	7%	11%	6%	11%	8%	11%	6%	9%	5%	12%
2020	13%	8%	11%	6%	10%	8%	11%	6%	9%	7%	11%
2021	14%	8%	13%	6%	11%	7%	10%	6%	8%	6%	10%
2022	16%	14%	16%	6%	6%	6%	7%	4%	6%	10%	9%
2023	17%	13%	17%	5%	6%	5%	7%	4%	7%	10%	10%

Table 2. Profit-Maximizing Coverage Selections for the Rainfall Index Pasture, Rangeland, and Forage Crop Insurance Program in Eight South Dakota Counties

	No Contract	PF	Profit Max	JF	FM	MA	AM	MJ	JJ	JA	AS	SO	ON	ND
Codington	$352.48	150%	$427.41		70%									30%
	(12839)		(19147)											
Yankton	$334.90	150%	$382.69		70%				30%					
	(11686)		(16518)											
Hand	$215.62	150%	$254.84	30%										70%
	(7580)		(13281)											
McPherson	$205.05	150%	$252.80		70%									30%
	(8445)		(9061)											
Tripp	$216.69	150%	$264.55		70%									30%
	(10763)		(13899)											
Fall River	$84.84	150%	$102.96	30%										70%
	(2569)		(1337)											
Haakon	$102.61	150%	$122.57		30%									70%
	(3778)		(3638)											
Harding	$96.63	150%	$113.18		30%									70%
	(4117)		(4038)											

Notes: The variance of expected returns is shown in parentheses. JF (January-February), FM (February-March), MA (March-April), AM (April-May), MJ (May-June), JJ (June-July), JA (July-August), AS (August-September), SO (September-October), ON (October-November), and ND (November December) represent two-month intervals in the PRF-RI program, each covering the transition between consecutive months.

Table 3. Risk-Minimizing Coverage Selections for the Rainfall Index Pasture, Rangeland, and Forage Crop Insurance Program in Eight South Dakota Counties

	No Contract	PF	Risk Min	JF	FM	MA	AM	MJ	JJ	JA	AS	SO	ON	ND
Codington	$352.48	125%	$377.17	8%		32%		26%		26%			8%	
	(12839)		(11715)											
Yankton	$334.90	87%	$346.88	36%				10%		54%				
	(11686)		(10573)											
Hand	$215.62	150%	$230.46	27%			46%		22%					5%
	(7580)		(5225)											
McPherson	$205.05	150%	$235.30	34%		28%		31%						7%
	(8445)		(5502)											
Tripp	$216.69	150%	$242.46	7%						69%				24%
	(10763)		(8170)											
Fall River	$84.84	150%	$94.09					70%		23%			7%	
	(2569)		(1337)											
Haakon	$102.61	150%	$116.41					70%		14%				16%
	(3778)		(2061)											
Harding	$96.63	150%	$106.76			30%		70%						
	(4117)		(2618)											

Notes: The variance of expected returns is shown in parentheses. JF (January-February), FM (February-March), MA (March-April), AM (April-May), MJ (May-June), JJ (June-July), JA (July-August), AS (August-September), SO (September-October), ON (October-November), and ND (November December) represent two-month intervals in the PRF-RI program, each covering the transition between consecutive months.

Table 4. Risk-Minimizing Coverage Selections with Restricted Intervals for the Rainfall Index Pasture, Rangeland, and Forage Crop Insurance Program in Eight South Dakota Counties

	No Contract	PF	Risk Min	MA	AM	MJ	JJ	JA	AS	SO
Codington	$352.48	115%	$373.60	36%		28%		37%		
	(12839)		(11854)							
Yankton	$334.90	60%	$341.68			30%		70%		
	(11686)		(11023)							
Hand	$215.62	116%	$220.29		59%		41%			
	(7580)		(5900)							
McPherson	$205.05	120%	$225.28	41%		59%				
	(8445)		(6393)							
Tripp	$216.69	150%	$233.68			30%		70%		
	(10763)		(8548)							
Fall River	$84.84	150%	$93.28			70%		20%		10%
	(2569)		(1338)							
Haakon	$102.61	150%	$114.19			70%		30%		
	(3778)		(2135)							
Harding	$96.63	150%	$106.76	30%		70%				
	(4117)		(2618)							

Note: The variance of expected returns is shown in parentheses. MA (March-April), AM (April-May), MJ (May-June), JJ (June-July), JA (July-August), AS (August-September), SO (September-October) represent two-month intervals in the PRF-RI program, each covering the transition between consecutive months.

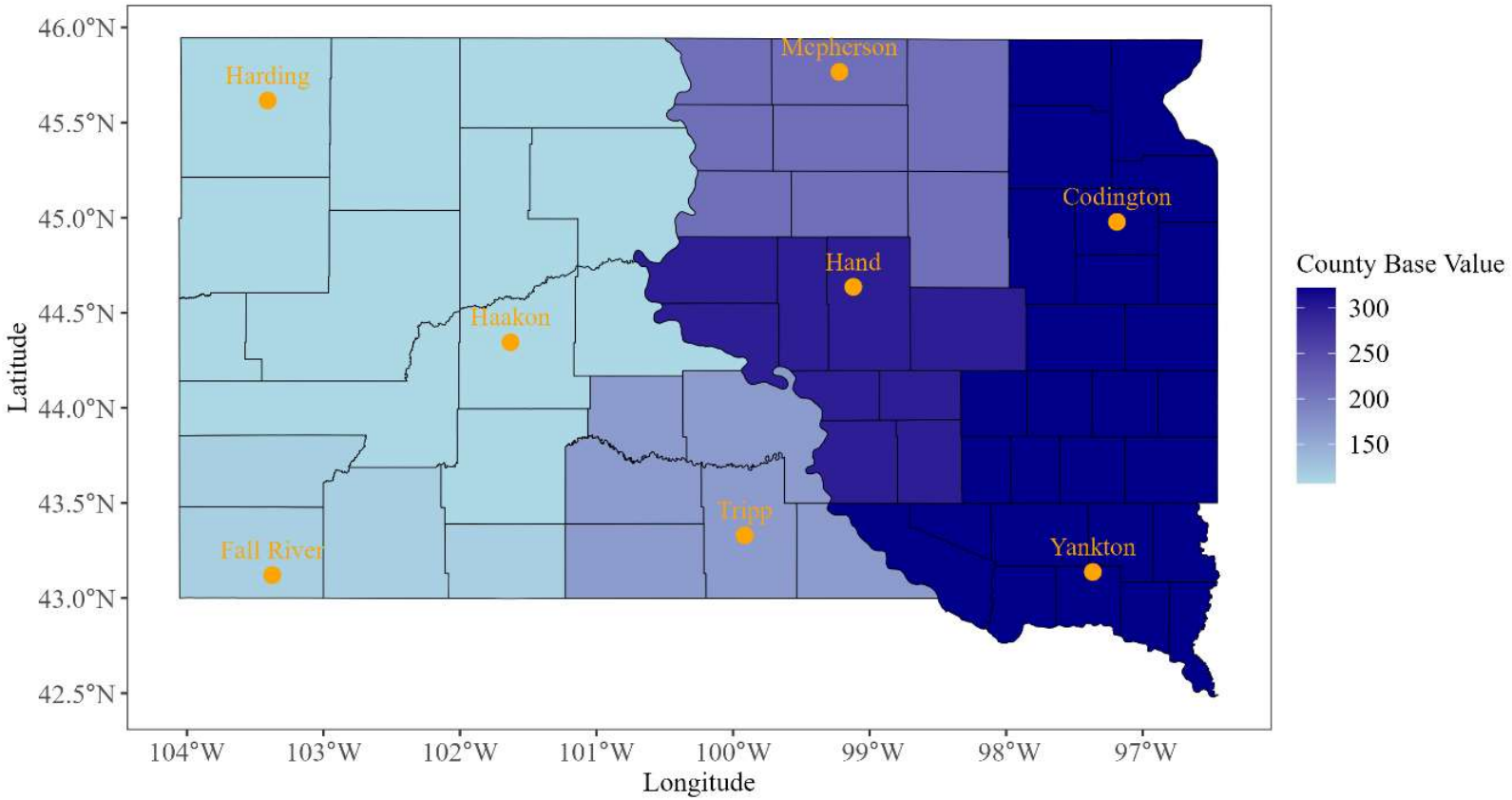


Figure 1. Risk Management Agency 6 County Base Values in South Dakota, 2023.
Note: The eight counties randomly selected for our analysis; Codington, Fall River, Haakon, Hand, Harding, McPherson, Tripp, and Yankton counties.

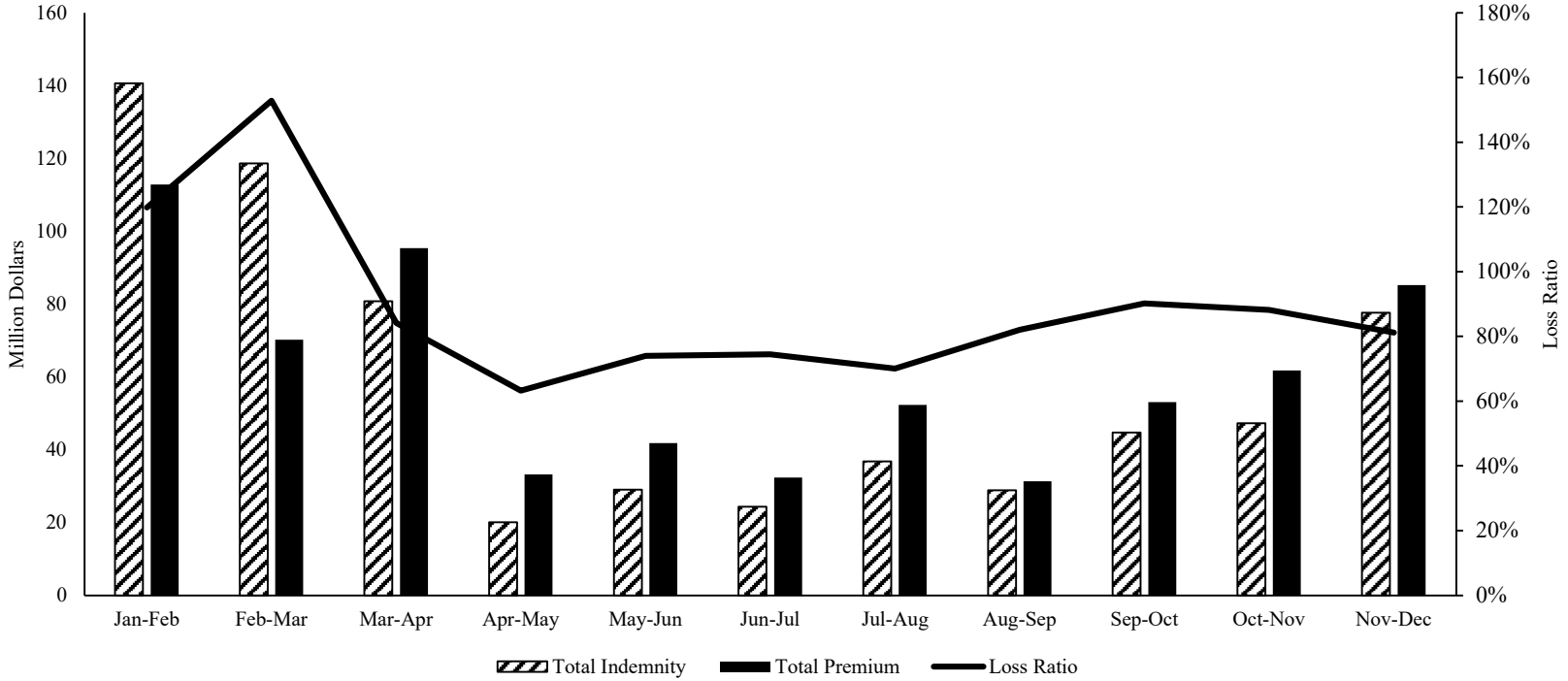


Figure 2. Reported Total Premium, Total Indemnity, and Loss Ratio by Bi-monthly Interval Selection for the Rainfall Index Pasture, Rangeland, and Forage Crop Insurance Program in United States, 2016-2023.

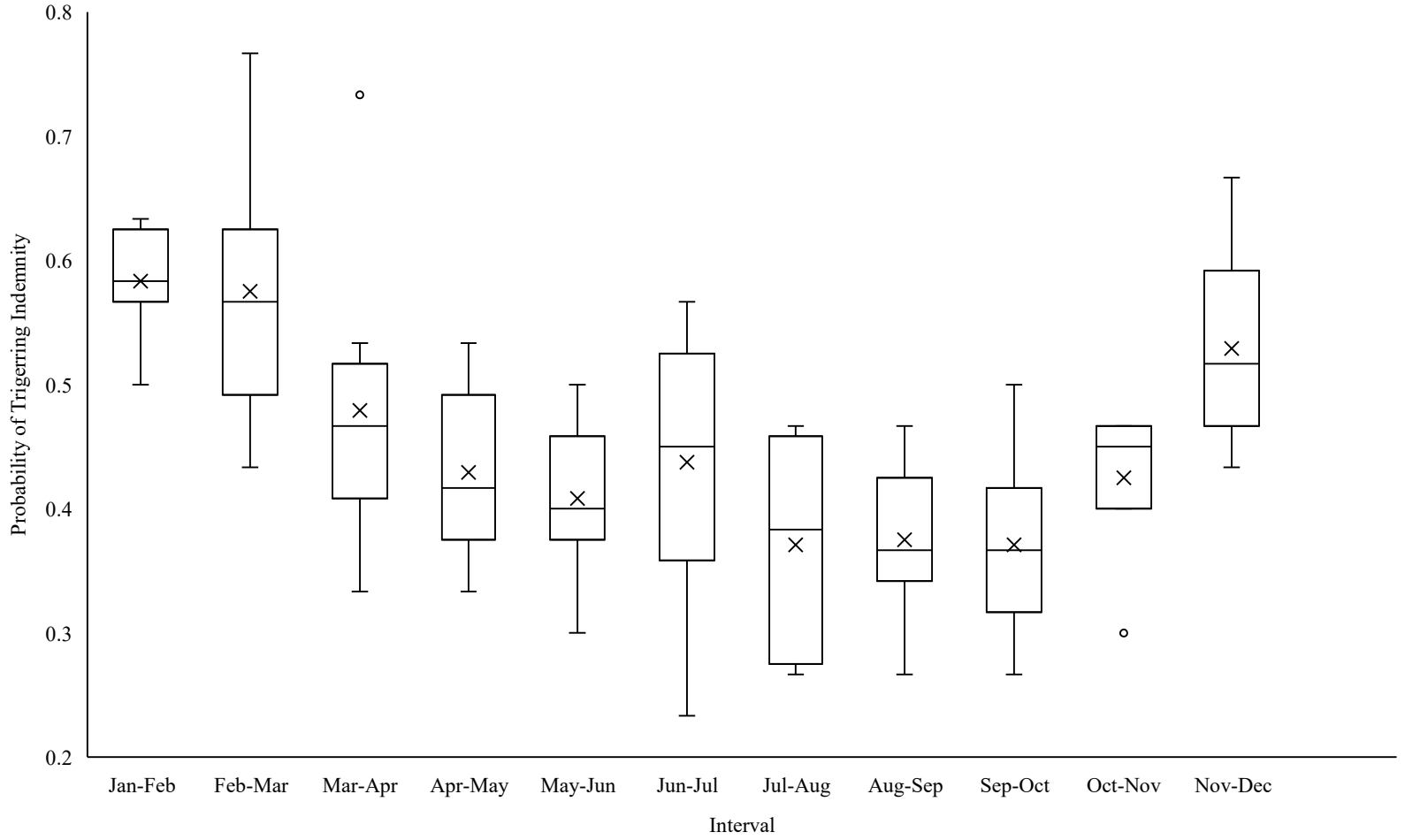


Figure 3. Box Plots of PRF Indemnity Trigger Probabilities by Index Interval for Selected South Dakota Counties, 1994–2023.
Notes: Box plots illustrate the distribution of probabilities for triggering a PRF indemnity at the 90% coverage level in eight selected grids in South Dakota. The lower and upper edges of each box represent the 25th and 75th percentiles of the probability distribution for each index interval. The horizontal line within each box denotes the median, while the "X" indicates the average.