#8447

1990

Insurance, crop.

THE SASKATCHEWAN ALL-RISK CROP INSURANCE PROGRAM: AN EXAMINATION OF REGIONAL INSURANCE VALUE

by

W. P. Weisensel

W. H. Furtan

and

A. Schmitz

May 7, 1990

W.P. Weisensel and W.H. Furtan are Professional Research Associate and Professor, respectively, at the Department of Agricultural Economics at the University of Saskatchewan.
A. Schmitz is a Professor in the Department of Agricultural Economics at the University of California–Berkeley.

AAEA 1990

5.24

THE SASKATCHEWAN ALL-RISK CROP INSURANCE PROGRAM:

AN EXAMINATION OF REGIONAL INSURANCE VALUE

ABSTRACT

Saskatchewan All-Risk Crop Insurance is an important income stabilization program to grain producers. However, critics of the program maintain that it is not a useful risk management tool for producers who farm in higher yielding regions. They support their arguments by the fact that participation rates in more productive regions are substantially lower than the less productive regions. The purpose of this paper is to examine yield expectations in conjunction with the regional design of the 1989 crop insurance program to determine if these criticisms are valid.

The results of the analysis indicate that many of the above criticisms are correct. In addition, they point out that the current premium structure of the program tends to make insurance of stubble crops a better deal than the insurance of summerfallow crops. Finally, the results suggest that crop insurance has a greater influence on land use in those areas where more marginal land exists.

#8447

THE SASKATCHEWAN ALL-RISK CROP INSURANCE PROGRAM: AN EXAMINATION OF REGIONAL INSURANCE VALUE

Introduction

The Saskatchewan All-Risk Crop Insurance program is an important stabilization policy to grain producers. Its importance is indicated by the fact that 75 percent of the farmers in the province currently participate in the program. However, participation rates in the Saskatchewan All Risk Crop Insurance program have been substantially lower in the black soil zone when compared to the brown and dark brown soil zones (Weisensel, Furtan and Schmitz, 1990). Many argue that the reason for this phenomena is that crop insurance is a less valuable program in Northern areas where crop yields, on both summerfallow and stubble tend to be higher. Therefore, for many of these farmers, the value of the coverage is less than the cost of attaining it.[1]

Therefore, the purpose of this paper is to determine whether the above statements are valid using the empirical data collected in a farm survey as part of a larger research effort (Weisensel, Furtan and Schmitz, 1990).[2] The second section of this paper discusses the methodology used to derive our results. In addition, it provides some theoretical support for those who maintain that higher yielding regions are less likely to collect indemnities based on the current method of calculating guaranteed yields. The third section illustrates and discusses the results for the four regions surveyed. The fourth section presents similar results for selected rural municipalities in Saskatchewan. These results are based on historical yield data to see how they compare with the results of the survey data in section three. Our conclusions follow.

Methodology

Recent literature in the area of agricultural insurance illustrates that the decision to purchase crop insurance is like the decision to purchase any other input in production. Participation must result in a net

---

[1] Many producers state this despite the fact that crop insurance premiums are subsidized dollar for dollar by government.

[2] Approximately 60 personal surveys were conducted in four regions of the province. These are illustrated in Figure 1. The two southern regions are identified as Chaplin-Central Butte (Risk Area 9) and Moose Jaw (Risk Area 8) while the two northern are Meadow Lake (Risk Area 23) and Melfort (Risk Area 17). Within these two geographic areas of the province the two regions are meant to represent a low and high quality land area, respectively.

increase in total utility (Skees and Reed, 1986; Nelson and Loehman, 1987). Therefore, if the producer is risk neutral, he equates expected marginal cost to expected marginal revenue. In other words, he is willing to pay a price for the insurance up to the point where he breaks even on the possibility that he will collect.[3] The value of the insurance to an individual is:

$$\text{Expected Value of Insurance} = p^* \int_0^{y^c} (y^c - y)\, f(y/x) * dy \tag{1}$$

where p is the price of the commodity he produces (wheat), f(y/x) is the probability density function of yield given a particular level of input use, and y^c is the guaranteed yield provided by crop insurance. Consequently, the level of participation in a particular region should depend greatly on the value of equation (1) relative to the premium cost associated with participating.[4]

In 1989, the Saskatchewan All Risk Crop Insurance program provided three basic levels of coverage; (1) 60% of area average yield, (2) 70% of area average yield, and (3) 80% of individual yield, if the individual producer could provide the records necessary to calculate a 10 year average yield for each crop insured on his farm operation. Each of the coverage levels above has associated with it a premium rate structure which is sensitive to the area and crop insured.[5] Therefore, it should incorporate the actuarial risk of insuring a crop in a particular region.

From a theoretical standpoint, it appears that the most important factor which could cause discrepancies in the value of insurance across regions is the percentage nature of the guaranteed yields offered by crop insurance. As Skees and Reed (1986) point out, crop insurance programs that use this approach to set yield guarantees are based on the implicit assumption "that relative yield risk (coefficient of variation) is constant across farms with different expected yields" (p.654). In other words, if the standard deviation of crop yield does not increase proportionately with average expected yield as one moves from regions with lower yields to regions with higher yields, then crop insurance has to provide less protection

---

[3]Risk averse individuals discount the marginal cost of insurance, and as a result, are willing to pay more than the risk neutral individual for the same level of coverage (Nelson and Loehman, 1987).

[4]We are assuming that the profile of risk preferences is similar in each of the regions.

[5]These are adjusted for different soil productivity indexes in each of the risk areas.

in higher yielding regions. As an hypothetical example, suppose a producer in a lower yielding region chooses 70 percent of area average coverage where the area average yield is 20 bu/acre. This producer is guaranteed a yield of 14 bu/acre. In comparison, a producer in a higher yielding region chooses the same level of coverage with an area average yield of 40 bu/acre. His/her guaranteed yield is 28 bu/acre. Therefore, the first producer must take a 6 bushel loss before collecting any indemnities while the second takes a 12 bushel loss. If both producers are paying similar premium rates, and both have similar variances of expected yield, then obviously the first producer is much more likely to collect indemnities and participate than the second. Consequently, the percentage nature of the guaranteed yields may penalize higher yielding areas if premiums are not modified to reflect the lower probability of collecting.

Interestingly, this same argument applies directly to stubble versus summerfallow yield coverage in the Saskatchewan program. Currently, the crop insurance program charges the same premium rate for a particular crop regardless of whether the crop is grown on stubble or summerfallow. Therefore, since crop insurance guarantees a percentage of the area average yield, and stubble yields are generally lower then fallow yields, the above principle maintains that insuring crops grown on stubble must be a "better deal" than insuring crops grown on fallow. Therefore, it appears that Soil Conservation Canada's statement that crop insurance provides incentives to continue erosive wheat-fallow crop rotations can be rejected outright. However, we save our final conclusion on this issue until we view the empirical results.

The data calculated and presented in this paper are based on a methodology outlined in Skees and Reed (1986). The authors of that research were interested in showing how rate making in the United States Federal Crop insurance program could result in adverse selection. In their paper, they used the polynomial function for integration of a normally distributed density function to estimate the expected losses associated with a given yield guarantee. We show the formulae they used in their analysis below:

$$Z = 1/\ 2\pi\ e^{-1/2[(EY - Y_g)/SD]^2} \tag{2}$$

$$T = 1/[1 + b(EY - Y_g)/SD] \tag{3}$$

$$P = Z\ (a_1T + a_2T^2 + a_3T^3) \tag{4}$$

$$EL = P\ (Y_g - EY) + Z\ SD \tag{5}$$

where b = 0.33267, a_1 = 0.4361836, a_2 = -0.1201676, and a_3 = 0.937298 (see Skees and Reed, 1986). In addition, EY is the expected yield, Y_g is the yield guarantee provided by crop insurance, SD is the standard deviation of yield, P is the probability of collecting in a given year and Z and T are intermediate variables necessary to calculate expected losses (EL).

Mean yields (EY) and the standard deviation of yields (SD) were calculated from the percentile based beta (triangular) distribution collected through the farm survey (see Weisensel, Furtan and Schmitz, 1990). The formulae used to calculate this data are illustrated below (Young, 1983):

$$EY = (LY + 4MY + HY)/6 \tag{6}$$

$$SD = (HY - LY)/3.19 \tag{7}$$

where LY, MY and HY refer to the lowest yield, most likely yield and the highest yield, respectively. Using the data from the survey, expected yields and variability of yields were calculated for each producer surveyed. These figures represent the distribution of yield for each crop grown on the farm and are directly comparable to the yield coverage offered by the crop insurance program.[6]

Table 1 illustrates the yield distributions for the major crops grown in each of the regions. These distributions are based on the results of equations (6) and (7).[7] Overall, the yield distributions reported tend to align fairly well with other data sources. For example, the Saskatchewan Agriculture Statistics Handbook (1987) show 10 year average yields of 23.0, 27.3, 29.1, and 29.1 bushels/acre for the Chaplin-Central Butte, Moose Jaw, Meadow Lake and Melfort regions, respectively.[8]

[6]They are comparable because they represent the distribution of production broken down to a per acre figure for the total acreage allocated to a particular crop on the farm surveyed. Therefore, they have the same interpretation as the yield guarantees offered by crop insurance. The only component of the insurance coverage that the yield distributions do not represent is the spot loss nature of hail insurance coverage. Therefore, we deal with the hail insurance component of crop insurance separately in the following paragraphs.

[7]It is important that we clarify this point. In Table 1, the mean and standard deviation (Std Dev) are both means in the statistical sense. The first is the group mean for the results of equation (6) while the second is the group mean for the results of equation (7). Therefore, Table 1 gives no indication regarding the variability of these group estimates.

[8]The 10 year averages are from crop districts 3an, 2b, 9b and 8a, respectively. With the exception of the Melfort region, these crop districts correspond fairly well with the surveyed regions. However, the discrepancy between crop district 8a and the producers surveyed in the Melfort region could explain the substantial difference in yield expectations from the two sources. The farm survey was performed in close proximity to Melfort, while crop district 8a expands from Melfort to the eastern border of the province.

The Benefits of Participation: A Regional Comparison

The purpose of this section of the paper is to compare and contrast the expected value of participating in crop insurance in the four regions based on the individual farm yield distributions used to calculate Table 1.[9] The benefits of participating in crop insurance are broken down into two basic components; (1) drought loss and (2) spot hail loss. The drought loss component was calculated using equations (2) through (5) and therefore represents the expected loss associated with crop production across the entire farm. In contrast, the spot hail loss component must be treated separately from the whole farm analysis, since it is adjusted on a field by field basis. Therefore, we used 1989 hail rates as determined by the Cooperative Hail Insurance Company Ltd. to calculate the expected value of hail coverage for each of the regions. It was felt that the Cooperative Hail Insurance Company would provide the most reasonable rates because of their policy to provide insurance at cost.[10] The hail rates are calculated for each township in the province. Consequently, the rate used for each of the regions represents an average for the townships within that region. Crop Insurance premiums in each region were based on the average soil productivity index for that region. Finally, a net benefit of insurance figure is calculated as the expected indemnity of insurance, which includes both the drought and hail loss components, less the premium cost. The results of this analysis are presented in Tables 2 through 5. The units used in these tables are bushels per acre. Therefore, they are independent of the prices offered by the market or crop insurance.

The net benefit of crop insurance is the highest for the Chaplin-Central Butte region since the average producer has positive benefits on both stubble and summerfallow. Therefore, in the Chaplin-Central Butte region well over half the producers perceive a positive net benefit to participating in the program. This contrasts to the Moose Jaw region where only participators who seed stubble wheat perceive a net benefit from crop insurance. Surprisingly, in the Meadow Lake region, summerfallow coverage has a positive net

[9]In this chapter, we assume that all farmers choose the 70% of area average yield coverage. In addition, we assume that each producer has no experience discount on premiums or changes in coverage adjustment. Therefore, the analysis will give the expected value of insurance by region as if all farmers were starting the program for the first time.

[10]The nature of a cooperative company is to supply services at cost to its members. Finally, since the cooperative returned an average dividend of 20% over the last 5 years, all hail rates were adjusted to reflect this as an actuarial rate.

benefit, while stubble coverage has a negative net benefit. However, if one examines Table 1 closely, this result is easily explained, since the group reported greater variability in summerfallow yields as compared to stubble. Finally, the average risk neutral producer in the Melfort region will not participate in crop insurance since the net benefit is negative for both fallow and stubble wheat.

Unfortunately, the results in Tables 2 through 5 do not indicate whether the value of insurance is significantly different across the regions. To test whether there are differences, we use a linear regression model which has as its dependent variable (Y_i) the net benefit of insurance by region.[11] The independent variables are dummy variables which delineate whether the Y_i is associated with a particular region. The dummy variable takes a value of 1 if it is associated with that particular region and 0 otherwise.[12] The results of the regression model are presented below:[13]

$$Y = \underset{(2.78)}{0.459} + \underset{(-2.03)}{-0.430}\,X_1 + \underset{(-1.04)}{-0.236}\,X_2 + \underset{(-2.90)}{-0.659}\,X_3 + e \qquad (8)$$

Usable Observations = 270 Significance of F-statistic = 0.9997

In the regression equation, X_1, X_2 and X_3 are the dummy variables associated with the Moose Jaw, Meadow Lake and Melfort regions, respectively. The coefficient for the Chaplin-Central Butte region is incorporated in the intercept term. The significance level of the F-statistic as well as two of the t-statistics indicate that there are substantial differences in the value of crop insurance across different regions in Saskatchewan. Both the Melfort and Moose Jaw regions have significantly less coverage from the crop insurance program when compared to the Chaplin-Central Butte region.[14] However, there is no significant difference in the average net benefit of the Meadow Lake region when compared to the Chaplin-Central Butte

[11] We examine spring wheat, since it is the main crop grown consistently across all four regions. The analysis includes all observations on the net benefit of spring wheat seeded on fallow and stubble.

[12] A regression model of this type is analogous to one-way analysis of variance where the treatments are the different regions. Therefore, the F-statistic will determine whether there are significant differences between regions. The advantage of the regression method is that the t-statistics will determine which regions are significantly different.

[13] T-statistics are presented below each of the coefficients in brackets.

[14] The average net benefit of insurance in the Chaplin-Central Butte region is 0.459 bu/acre. This reduces to 0.029 and -0.200 bu/acre in the Moose Jaw and Melfort regions, respectively. These results are significant at a 95% level of confidence.

region. As an additional check of differences in the benefit of insurance across regions, we tested if there were significant differences in the coverage at Moose Jaw and Melfort when compared to Meadow Lake. We used a t-test to determine whether there are significant differences in the coefficients estimated in equation (8).[15] Based on a 90% level of confidence, there is a significant difference between the Melfort and Meadow Lake regions (t = -1.91). However, no other comparisons yielded significant results.

Overall, the statistics reported in this section definitely support the hypothesis that there are significant differences in the value of crop insurance across the four regions. Generally, it appears that higher yielding regions receive less benefits from the crop insurance program. Therefore, from a land use perspective, crop insurance has little effect on major enterprise decisions (i.e., pasture versus grain production) in these regions. However, in areas which have lower and wider variability in land quality (i.e., Chaplin-Central Butte and Meadow Lake) crop insurance has a more significant impact on the margin. This is an important result, since it is in these more marginal regions where a net benefit from crop insurance is likely to have an impact on major land use decisions.

The results of this section have shown the regional value of crop insurance based on the yield expectations of producers. Some may argue that producers responding to the yield questions have a strategic bias to overestimate their yields, particularly if they believe that their responses may have an impact upon future coverage levels from crop insurance. We point out that members of the survey team emphasized the independent nature of this study. Finally, they highlighted the fact that no results would be reported that were not in area average form. However, to alleviate any concerns critics may have, the following section performs a similar analysis based on 15 years of average yields from selected rural municipalities. Many of the rural municipalities correspond to the surveyed regions, however others were selected outside the survey regions to expand the analysis.

---

[15] The t-test used is shown below:

$$T = \frac{(B_i - B_j) - 0}{s\,(a_{ii} + a_{jj} + 2a_{ij})^{0.5}}$$

where s, a_{ii}, a_{jj}, and a_{ij} are the estimated standard error of the regression and the respective coefficients from the variance-covariance matrix of B.

The Benefits of Participation: An Historical Analysis

To confirm and expand the results of the previous section, this section uses historical record of production data collected by the Crop Insurance Corporation to calculate the value of crop insurance for spring wheat in various rural municipalities. Mean yields and standard deviation of yields were calculated based on 15 years of average yields collected from each rural municipality.[16] Therefore, the expected loss figures illustrated in Table 6 represent a single point estimate as determined from the historical distribution of yields. Similar to the last section of the paper, spot loss hail rates determined from the Cooperative Hail Insurance Co. are used to calculate the expected hail losses. Finally, the premium rates and yield guarantees illustrated in Table 6 are based on the average soil productivity index for each rural municipality.

When one compares the historical yield distributions from Table 6 to the distributions elicited from producers, they tend to correspond reasonably well.[17] It is interesting to note that the correspondence is much closer in the two southern regions when compared to the two northern regions. However, one could hypothesize a reasonably simple explanation. Since a larger percentage of the producers in the two southern regions participate in crop insurance (Weisensel, Furtan and Schmitz, 1990), it is likely that the sample of farmers in Tables 1 and 6 are similar. However, lower participation rates in the northern regions, means that the sample of producers in the two tables are likely to be substantially different. Table 6 is based on the group of producers who participate in crop insurance, where adverse selection has already been shown to be a problem (Weisensel, Furtan and Schmitz, 1990). Therefore, the expected yields in the northern rural municipalities are bound to be lower in Table 6 when compared to Table 1.

The results of Table 6 also support the earlier section with regards to the net benefit of insurance. The RMs west of Chaplin (RMs 168 and 169) tend to have higher net benefits from insurance. In contrast, the Moose Jaw area tends to get positive benefits for wheat seeded on stubble but negative benefits for

---

[16]The yields in each of the municipalities were checked for technological trends. All tests rejected the hypothesis that yields increased over time due to a technology factor.

[17]Chaplin-Central Butte corresponds to (rural municipality) RMs 164, 193, 194 and 224. Moose Jaw corresponds to 160, 161, and 191. The Melfort region encompasses RMs 428, 429, and 457. Finally, the Meadow lake region is made up of the RMs 561, 588, and 622. However, very few observations were collected from RM 622. See Figure 1 for the location of the above RMs as well as those not located within the surveyed regions but illustrated in Table 6.

wheat on summerfallow. With the exception of RM 622, investment in crop insurance for spring wheat in the Meadow Lake region appears to be marginal at best.[18] Finally, based on 15 year average yields crop insurance is not a profitable investment in the Melfort region. The only exception is wheat on stubble in RM 457.

Generally speaking, the results of Table 6 tend to support comments that crop insurance has less benefit as you move from RMs in the brown and dark brown soil zones to RMs in the black soil zone. In addition, they confirm the theoretical comment made in section two which stated that insurance coverage on stubble yields must always be a better deal than insurance coverage on summerfallow yields for areas where stubble yields are lower than summerfallow yields. The only exception to this statement occurs in the Meadow Lake region.[19] However, in this area due to the nature of the soil, summerfallow is avoided as much as possible since it resulted in severe soil packing. This may explain the above result.

Conclusions

It is important to keep in mind the fact that crop insurance is a subsidized program where the government provides a dollar for dollar contribution with the participator. Therefore, theoretically one would expect that all producers would receive a net benefit from insurance that is just equal to the premium they pay. Consequently, crop insurance would be a subsidy to grain production in all areas of the province and would affect all land at the economic margin of grain production. However, like all programs designed for groups of heterogeneous economic agents, the results of this paper highlight the practical problems and significant income redistributions of crop insurance in the province of Saskatchewan.[20] Below is a systematic accounting of some of these problems.

First, the results give substantial support to the statement that crop insurance is a more beneficial

---

[18]It is important to note that in the Meadow Lake region frost, and therefore, low grain quality can be important components in the decision to participate. The results in this chapter do not address this issue since we deal exclusively with yields and not price changes due to quality differences. Since crop insurance does insure for crop quality, the estimates for the Meadow Lake region may slightly underestimate the net benefits of insurance.

[19]It is interesting that the same result occurs in both Table 6 and Table 4.

[20]Most of the inequities are likely due to adverse selection and possibly moral hazard (Weisensel, Furtan and Schmitz, 1990).

program in the less productive regions of the province. This is an important point, since it is in these less productive regions where changes in land use are more likely to occur. It is in these regions where a majority of the marginal land exists.

Second, the results also support the statement that stubble crops are a "better insurance deal" than summerfallow crops due to the nature of crop insurance premium determination. This paper provides both theoretical and empirical evidence to support this statement.

Third, the results of this paper tend to explain regional differences in participation rates in crop insurance fairly well. Areas with higher insurance benefits tend to have higher participation rates.

REFERENCES

Nelson, C., and E. Loehman. "Further Toward a Theory of Agricultural Insurance". American Journal of Agricultural Economics, 69(1987): 523-31.

Saskatchewan Agriculture. Agricultural Statistics 1987, Economics Statistics Section, June 1988.

Skees, J., and M. Reed. "Rate Making for Farm-Level Crop Insurance: Implications for Adverse Selection". American Journal of Agricultural Economics, 68(1986): 653-59.

Weisensel W.P., W.H. Furtan and A. Schmitz. The Saskatchewan All-Risk Crop Insurance Program: An Evaluation of Participation, Land Use and Technology Adoption. Technical Bulletin: Department of Agricultural Economics, University of Saskatchewan. Funded by the Agricultural Development Fund (pp. 140).

Table 1: Distribution of Yields for Spring Wheat by Region

SPRING WHEAT YIELDS

(bushels/acre)

	Chaplin		Moose Jaw		Meadow Lake		Melfort	
	Fallow	Stubble	Fallow	Stubble	Fallow	Stubble	Fallow	Stubble
Mean	23.1	17.0	31.5	24.5	31.4	30.6	40.8	34.1
Std Dev	7.7	5.6	8.4	8.4	8.0	6.5	8.3	9.8
Observ	50	7	54	33	27	38	12	51

Source: Farm Survey.

Table 2: The Value of Insurance for Selected Crops: Chaplin-Central Butte

Spring Wheat	Fallow				Stubble			
(bushels/acre)								
	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost
Mean	1.210	1.747	1.258	0.489	0.746	1.122	0.8806	0.241
Std. Dev.	1.101	1.101	NA	1.101	0.524	0.524	NA	0.524
Minimum	0.088	0.625	NA	-0.633	0.110	0.486	NA	-0.395
Maximum	4.519	5.056	NA	3.798	1.586	1.962	NA	1.082
Observ.	50	50	NA	50	7	7	NA	7

Table 3: The Value of Insurance for Selected Crops: Moose Jaw Region

Spring Wheat

(bushels/acre)

	Fallow				Stubble			
	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost
Mean	0.538	1.027	1.183	-0.156	0.844	1.206	0.876	0.330
Std. Dev.	0.450	0.450	NA	0.450	0.801	0.801	NA	0.801
Minimum	0.000	0.490	NA	-0.694	0.000	0.362	NA	-0.513
Maximum	1.719	2.209	NA	1.026	3.220	3.582	NA	2.706
Observ.	54	54	NA	54	33	33	NA	33

Table 4: The Value of Insurance for Selected Crops: Meadow Lake Region

Spring Wheat (bushels/acre)

	Fallow				Stubble			
	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost
Mean	1.344	1.941	1.150	0.791	0.281	0.774	0.950	-0.176
Std. Dev.	3.154	3.154	NA	3.154	0.510	0.510	NA	0.510
Minimum	0.000	0.596	NA	-0.554	0.000	0.493	NA	-0.458
Maximum	16.668	17.265	NA	16.115	2.064	2.557	NA	1.606
Observ.	26	26	NA	26	37	37	NA	37

Table 5: The Value of Insurance for Selected Crops: Melfort Region

Spring Wheat

(bushels/acre)

	Fallow				Stubble			
	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost	Drought Loss	Hail + Drought	Premium	Net Benefit or Cost
Mean	0.167	0.650	1.299	-0.650	0.620	1.042	1.137	-0.095
Std. Dev.	0.376	0.376	NA	0.376	0.689	0.689	NA	0.689
Minimum	0.001	-0.484	NA	-0.815	0.000	0.422	NA	-0.715
Maximum	1.394	1.877	NA	0.577	2.450	2.873	NA	1.736
Observ.	12	12	NA	12	51	51	NA	51

Table 6: The Value of Insurance for Selected Rural Municipalities: 15 Year Historical Spring Wheat Yields

	164 FALLOW	STUBBLE	168 FALLOW	STUBBLE	169 FALLOW	STUBBLE	193 FALLOW	STUBBLE	194 FALLOW	STUBBLE
					(bushels/acre)					
Mean	21.44	12.38	23.63	13.50	25.50	13.44	23.88	14.87	23.63	14.50
Std Dev	7.01	6.14	6.72	4.62	7.49	10.22	7.82	6.32	7.03	6.03
Yguarantee	17	11.9	17.6	11.4	17.6	11.4	17	11.9	17	11.9
Premium	1.258	0.881	1.144	0.741	1.144	0.741	1.258	0.881	1.258	0.881
Expected Loss	1.120	2.220	0.678	0.981	0.562	3.140	0.815	1.312	0.654	1.326
Hail Loss	0.571	0.400	0.803	0.520	0.563	0.365	0.585	0.409	0.612	0.428
Net Benefit	0.433	1.740	0.337	0.760	-0.019	2.764	0.142	0.841	0.008	0.874

	224 FALLOW	STUBBLE	160 FALLOW	STUBBLE	161 FALLOW	STUBBLE	191 FALLOW	STUBBLE	345 FALLOW	STUBBLE
Mean	20.25	12.31	30.63	22.88	30.19	22.44	27.31	20.63	27.44	21.19
Std Dev	8.02	6.83	7.92	8.20	7.83	8.27	7.85	6.91	7.62	7.88
Yguarantee	16.8	11.7	19.5	14.2	19.5	14.2	19.5	14.2	21.6	16.8
Premium	1.176	0.608	1.151	0.838	1.151	0.838	1.151	0.838	1.123	0.991
Expected Loss	1.766	2.431	0.288	0.611	0.310	0.694	0.660	0.657	0.973	1.426
Hail Loss	0.376	0.262	0.390	0.284	0.343	0.250	0.671	0.488	0.778	0.605
Net Benefit	0.966	2.085	-0.473	0.057	-0.498	0.106	0.180	0.307	0.628	1.040

	346 FALLOW	STUBBLE	347 FALLOW	STUBBLE	371 FALLOW	STUBBLE	401 FALLOW	STUBBLE	428 FALLOW	STUBBLE
Mean	29.38	19.81	28.44	19.31	30.13	22.31	33.56	25.31	31.56	30.31
Std Dev	7.50	7.53	5.73	6.48	7.33	7.17	6.43	7.17	5.60	8.01
Yguarantee	20.3	14.2	20.3	14.2	20.2	15.2	22.4	17.4	23.2	20.3
Premium	0.995	0.696	0.995	0.696	0.990	0.745	1.053	0.818	1.299	1.137
Expected Loss	0.412	0.995	0.202	0.794	0.297	0.608	0.108	0.488	0.167	0.406
Hail Loss	0.520	0.364	0.763	0.534	0.824	0.620	0.573	0.445	0.427	0.374
Net Benefit	-0.063	0.662	-0.030	0.632	0.132	0.483	-0.372	0.115	-0.706	-0.357

	429 FALLOW	STUBBLE	457 FALLOW	STUBBLE	561 FALLOW	STUBBLE	588 FALLOW	STUBBLE	622 FALLOW	STUBBLE
Mean	34.88	31.81	30.00	26.38	28.00	23.50	26.69	24.44	23.81	19.75
Std Dev	7.03	8.34	7.26	7.61	6.94	6.00	5.00	6.66	6.11	5.06
Yguarantee	23.2	20.3	23.2	20.3	21.3	17.6	21.3	17.6	21.3	17.6
Premium	1.299	1.137	1.299	1.137	1.150	0.950	1.150	0.950	1.150	0.950
Expected Loss	0.141	0.319	0.682	0.917	0.617	0.516	0.358	0.528	1.383	1.122
Hail Loss	0.464	0.406	0.557	0.487	0.596	0.493	0.596	0.493	0.767	0.634
Net Benefit	-0.694	-0.412	-0.060	0.267	0.063	0.058	-0.196	0.070	0.999	0.805

Source: Historical Record of Production Yields, Saskatchewan Crop Insurance Corporation

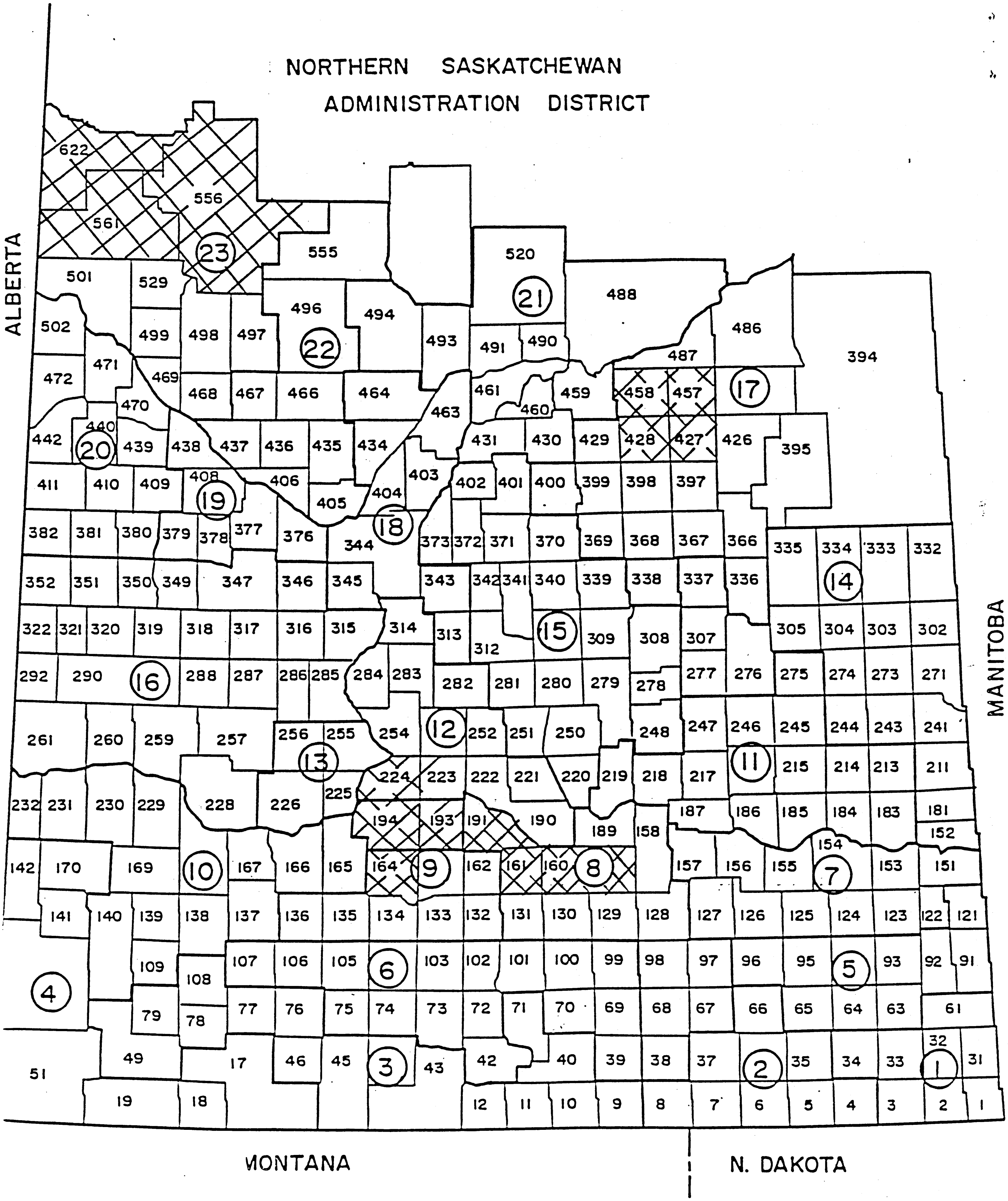

FIGURE 1 LOCATION OF SURVEYED REGIONS