NDSU AGRICULTURAL RISK POLICY CENTER

Projected Impact of the 2026 Strait of Hormuz Closure on Corn, Soybean, and Wheat Profitability in North Dakota

ARPC White Paper 2026–05

Rwit Chakravorty, Shawn Arita, and Sandro Steinbach

Agricultural Risk Policy Center, North Dakota State University

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Key Insights

- **Hormuz Closure Triggers Input Cost Shock.** Operation Epic Fury triggered Iranian retaliation, halting commercial shipping through the world's most critical fertilizer corridor. Urea prices rose 28.2% within three weeks of the closure, DAP 2.6%, MAP 1.5%, and potash 0.8%. Farm diesel prices rose 34.7% over the same period, creating a two-channel input cost shock that adds new pressure on top of an already-stressed North Dakota margin structure.
- **Corn and Wheat Already in Negative Territory Before the Shock.** The 2026 NDSU Projected Crop Budgets, published before the closure, show corn net returns at −$27.60/acre and wheat at −$33.41/acre. Both crops had entered the closure period in a worse position than at the onset of the 2022 Russia–Ukraine war, when corn stood at +$70.17/acre and wheat at +$24.15/acre.
- **Corn Bears the Hormuz Burden Through the Nitrogen Channel.** Corn's high dependence on nitrogen fertilizers means urea alone accounts for $22.29 of the $23.21/acre total Hormuz fertilizer cost increase, equal to 96% of the fertilizer shock. Combined with $8.48/acre in additional fuel costs, corn faces a $31.70/acre total input shock. With corn prices rising only 3.6%, corn net returns worsen by $12.75/acre to −$40.35/acre.
- **Wheat Shows a Negative Hormuz Outcome.** Wheat's 5.9% price response (+$17.12/acre) narrowly exceeded its $15.98/acre fertilizer cost increase; however, adding $5.20/acre in fuel costs pushes the total shock to $21.18/acre, resulting in a net margin decline of $4.07/acre to −$37.48/acre.
- **Fuel Is a Key Shock Channel and the Primary Driver for Soybeans.** Diesel prices rose 34.7%, adding $8.48/acre for corn, $4.98/acre for soybeans and $5.20/acre for wheat. For soybeans, which carry only $9.50/acre in fertilizer, the fuel shock ($4.98/acre) is larger than the fertilizer shock.
- **Pre-Purchase Timing Bounds Fertilizer Exposure.** A March 2026 producer survey ($n = 27$) found that 63% of respondents had locked in more than 75% of their nitrogen before March 1. At the survey-weighted central estimate (65.3% nitrogen and 59.7% phosphate locked in), corn's fertilizer cost increase drops to $8.05/acre, but the $8.48/acre fuel shock applies in full regardless, for a total cost increase of $16.53/acre.
- **Most North Dakota Producers Remain Exposed for Spring Fertilizer Purchases.** Despite the strong pre-purchase rate, 51.9% of survey respondents reported they still have spring fertilizer purchases to make. The fall 2026 fertilizer contracting season, which was largely unpriced as of early March, represents a separate and potentially larger exposure window.

Background

In early March 2026, Iranian forces retaliated against U.S.-led Operation Epic Fury by targeting commercial shipping in the Strait of Hormuz, the narrow waterway through which a substantial share of globally traded fertilizer and energy passes. Major Protection and Indemnity clubs suspended war-risk insurance coverage, effectively halting commercial transit. Within three weeks, urea spot prices had risen 28.2%, and farm diesel prices had risen 34.7%, creating a simultaneous fertilizer and energy cost shock with direct consequences for agricultural producers (Arita et al., 2026). This market disruption arrives at a particularly adverse moment: the 2026 NDSU Projected Crop Budgets, published before the closure, already showed corn and wheat net returns in negative territory before the closure.

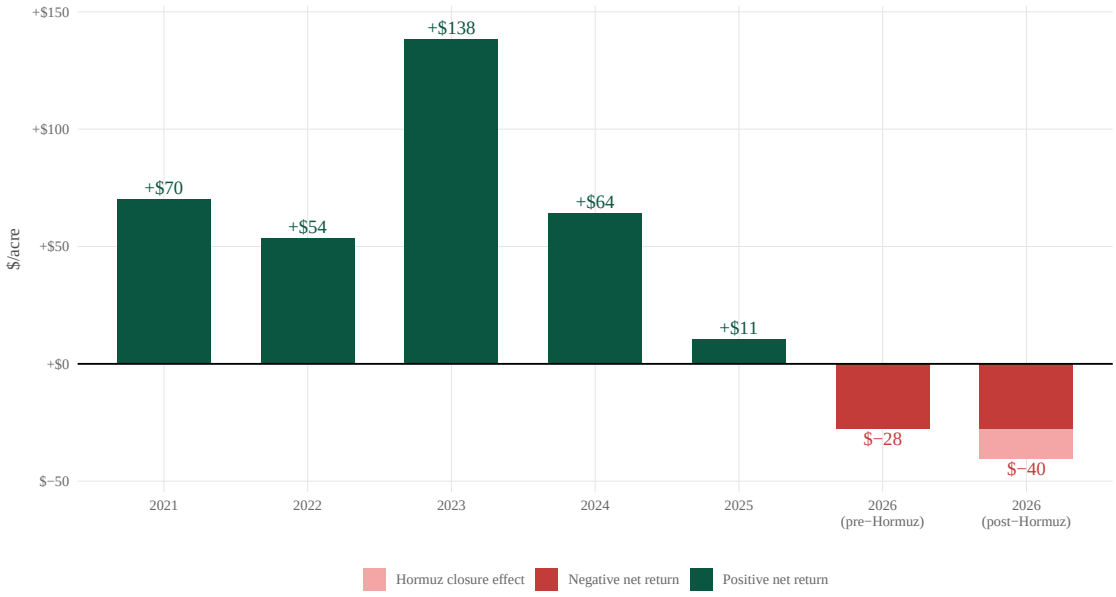
This ARPC White Paper assesses the near-term profitability impact of the closure on North Dakota corn, soybeans, and wheat producers. We first update the 2026 NDSU Projected Crop Budgets with post-closure fertilizer and fuel prices to estimate how the Hormuz shock alters production costs and net returns. We then report results from a March 2026 producer survey on fertilizer purchase timing and behavioral responses.

Updated Crop Budgets Under the Hormuz Fertilizer and Fuel Shock

North Dakota crop margins have deteriorated sharply since 2021 (Chakravorty et al., 2025). Corn net returns stood at +$70.17/acre in 2021, recovered strongly in 2023 when prices reached $5.25/bu (+$138.26/acre), then fell through 2024 (+$64.11/acre) and 2025 (+$10.60/acre) as prices retreated, reaching −$27.60/acre in 2026, a decline of $97.77/acre from 2021. Wheat tells a parallel story: net returns peaked in 2022 (+$44.81/acre) when prices surged to $7.47/bu, moderated through 2023 and 2024, turned negative in 2025 (−$13.06/acre), and fell to −$33.41/acre in 2026 as wheat prices retreated to $5.73/bu while production costs remain nearly $67/acre above 2021 levels. Soybeans have followed the same arc with smaller swings and remain positive at +$38.88/acre in 2026.

Corn and wheat entered the 2026 Strait of Hormuz closure in a significantly more stressed position than they faced at the onset of the 2022 Russia–Ukraine war: corn at −$27.60/acre versus +$70.17/acre at the 2021 pre-war baseline, and wheat at −$33.41/acre versus +$24.15/acre (see Table A1 in the appendix for the detailed comparisons). Both crops were already in negative margin territory before any external shock was applied.

Figure 1: ***North Dakota Corn Net Return per Acre, 2021–2026.***



Source: NDSU using data from the North Dakota Projected Crop Budgets (2021-2026).

The Strait of Hormuz closure has produced a two-channel input cost shock. The fertilizer channel is familiar from 2022: urea prices rose 28.2%, DAP 2.6%, MAP 1.5%, and potash 0.8%, driven by the disruption of Persian Gulf shipping routes that carry a substantial share of globally traded nitrogen (Table 1). Farm diesel prices rose 34.7% over the same period, reflecting the broader energy market disruption from the closure. Updated 2026 NDSU crop budgets with post-closure fertilizer and fuel prices show that:

Corn: The combined fertilizer (+$23.21/acre) and fuel (+$8.48/acre) shock adds $31.70/acre of additional cost. Total production costs rise from $553.88/acre to $585.58/acre. Corn prices have risen only 3.6%, generating $18.96/acre of additional revenue, not enough to offset the $31.70 total cost increase. Net margin change: −$12.75/acre, pushing net returns from −$27.60/acre to −$40.35/acre (see Figure 1 and Figure 2).

Wheat: The combined shock adds $21.18/acre ($15.98 fertilizer + $5.20 fuel). Wheat's 5.9% price response generates $17.12/acre of additional revenue. Net margin change: −$4.07/acre, moving net returns from −$33.41/acre to −$37.48/acre.

Soybeans: Because the North Dakota budget fertilizer baseline is $9.50/acre, the fertilizer cost increase is just $0.14/acre. However, the $14.34/acre fuel budget generates a $4.98/acre fuel shock. Combined with a −0.1% crop price decline, the total net margin change is −$5.46/acre. As a result, net returns fall from +$38.88/acre to +$33.42/acre.

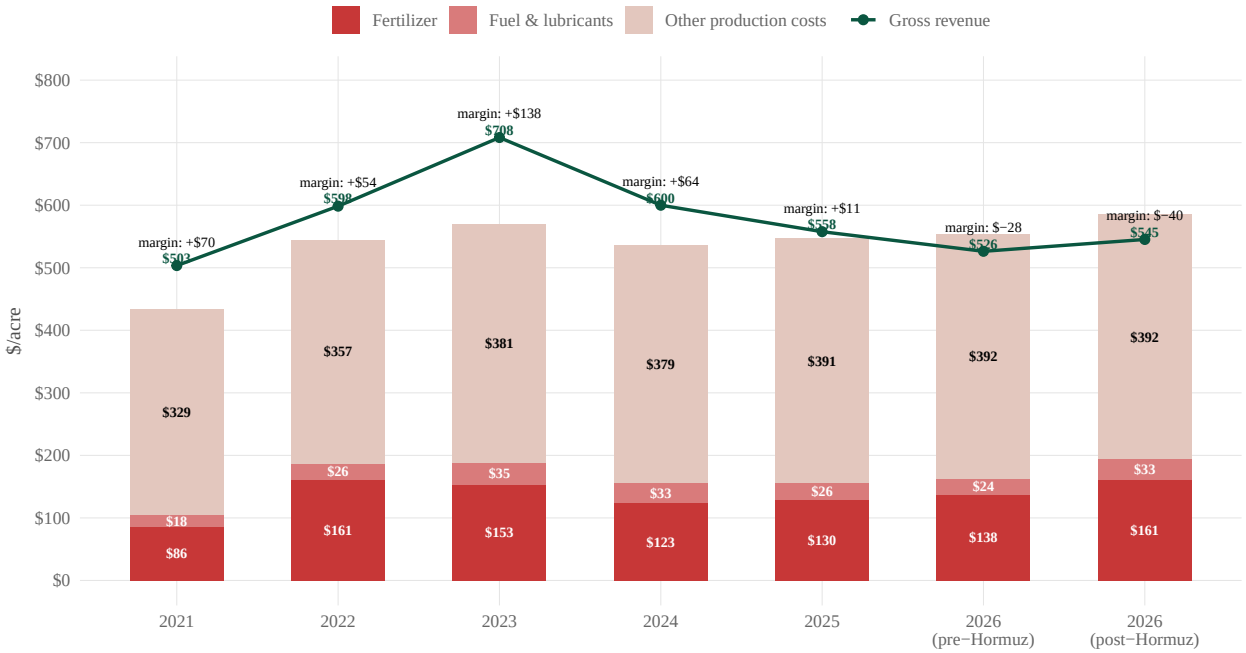
Table 1: ***Commodity and Fertilizer Price Movements: 2022 Russia–Ukraine Conflict vs. 2026 Hormuz Strait Closure.***

Commodity / Product	Jan 2022	2022 Peak	Change	Pre-Closure	Post-Closure	Change
Crop Prices ($/MT)						
Wheat	289.30	502.60	73.8%	210.50	222.90	5.9%
Corn	239.70	322.10	34.4%	172.70	178.90	3.6%
Soybeans	513.70	650.00	26.5%	425.20	424.90	-0.1%
Fertilizer Prices ($/MT)						
Urea	712.60	1,003.10	40.8%	518.10	664.10	28.2%
DAP	786.30	1,096.80	39.5%	686.20	703.80	2.6%
MAP	814.40	1,088.50	33.7%	735.80	746.80	1.5%
Potash	741.00	884.60	19.4%	330.70	333.50	0.8%

Note: $/MT = dollars per metric ton.

Source: NDSU using Bloomberg data.

Figure 2: ***North Dakota Corn Total Production Cost vs. Gross Revenue per Acre, 2021–2026.***



Source: NDSU using data from the North Dakota Projected Crop Budgets (2021-2026).

Table 2 places the 2026 Hormuz shock in the historical context. The upper panel compares the 2021 and 2023 NDSU Projected Crop Budgets, capturing the full realized impact of the Russia–Ukraine war commodity cycle from the pre-war baseline through the post-invasion price peak. The 2021 budget represents the last "normal" year before the invasion shock, and 2023 represents the year in which both the fertilizer cost surge and the commodity price recovery were fully reflected in published budget assumptions. For corn, revenue increased $204.75/acre against a $136.66/acre total cost increase, delivering a net margin improvement of $68.09/acre. Wheat's revenue gain of $93.21/acre against $80.58/acre in additional costs produced a $12.63/acre improvement. Even soybeans, with a modest $2.25/acre fertilizer increase, saw revenue rise $61.48/acre on the strength of the broader commodity price rally, adding $13.53/acre to net returns. The takeaway from the 2021-to-2023 comparison is that large cost increases were absorbed and then exceeded by even larger revenue gains.

Table 2: ***Crop Net Return Changes: 2021–2023 Russia–Ukraine Cycle Vs. 2026 Hormuz Shock.***

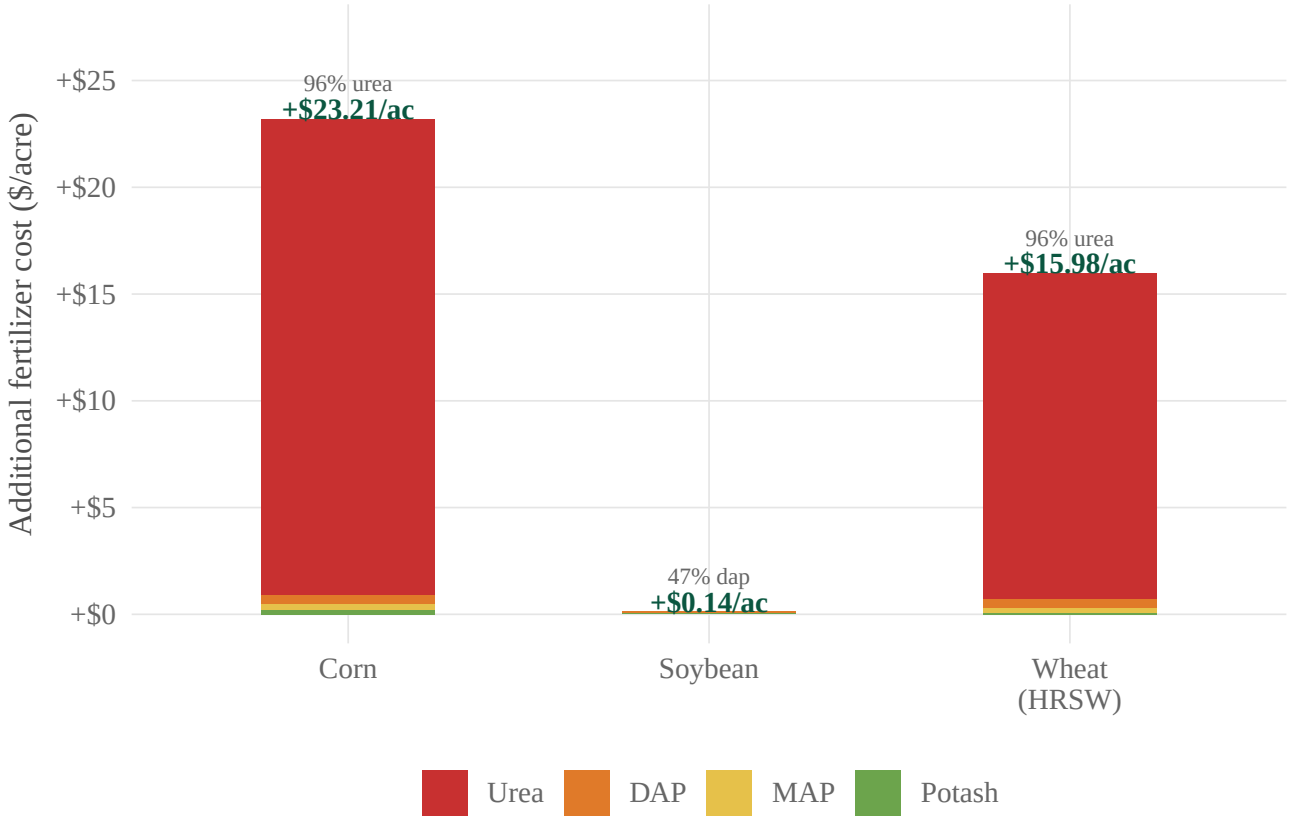
Crop	Fertilizer Cost Change (1)	Fuel Cost Change (2)	Total Cost Change (3=1+2)	Revenue Change (4)	Net Return Change (5=4−3)	Base $/acre (6)	Post $/acre (7=6+5)
2023 Impact of Russia–Ukraine Conflict (2021 → 2023 NDSU Budgets)							
Corn	+67.06	+17.31	+136.66	+204.75	**+68.09**	+70.17	+138.26
Soybeans	+2.25	+9.85	+47.95	+61.48	**+13.53**	+94.63	+108.16
Wheat	+40.37	+10.07	+80.58	+93.21	**+12.63**	+24.15	+36.78
2026 Hormuz Shock — Fertilizer + fuel cost only, ceteris paribus							
Corn	+23.21	+8.48	+31.70	+18.96	**−12.75**	−27.60	−40.35
Soybeans	+0.14	+4.98	+5.12	−0.34	**−5.46**	+38.88	+33.42
Wheat	+15.98	+5.20	+21.18	+17.12	**−4.07**	−33.41	−37.48

Note: All values in $/acre. For the 2021–2023 rows, (6) = 2021 net return and (7) = 2023 net return; values taken directly from NDSU Projected Crop Budgets. (3) reflects total cost change including all cost components, not only fertilizer and fuel. For the 2026 Hormuz Shock rows, (6) = 2026 pre-closure net return; columns (1–4) reflect observed Bloomberg and USDA AMS price changes for fertilizer and fuel applied to 2026 NDSU budget baselines, all other input costs held constant. (7) is net returns post-closure.

Source: NDSU using data from the North Dakota Projected Crop Budgets 2021–2026, Bloomberg price data, USDA AMS data.

The 2026 Hormuz shock tells the opposite story on both dimensions (lower panel). The baseline entering this shock is significantly weaker, with corn at −$27.60/acre and wheat at −$33.41/acre, compared to the +$70.17 and +$24.15/acre positions that absorbed the 2022 input cost surge. And unlike 2022–2023, where commodity prices eventually rose faster than costs, the 2026 revenue response so far is insufficient on every crop. Corn's 3.6% price increase generates only $18.96/acre of additional revenue against a $31.70/acre combined fertilizer and fuel shock, producing a $12.75/acre net margin loss. Wheat's 5.9% price response, the strongest of the three crops, generates $17.12/acre against a $21.18/acre total cost increase, for a $4.07/acre net loss. Soybeans, facing a $5.12/acre shock driven almost entirely by fuel rather than fertilizer, see revenue fall $0.34/acre on a slight price decline, adding another $5.46/acre of margin erosion. The 2026 Hormuz shock is therefore structurally different from the Russia–Ukraine episode in two compounding ways: producers enter it from a far weaker margin position, and there is no current evidence of the commodity price pass-through that ultimately rescued margins in 2023.

Figure 3: ***Hormuz Cost Increase by Crop and Fertilizer Type.***



Source: NDSU using Bloomberg data.

Table 3: ***Fertilizer and Fuel Cost Per Acre by Product, Pre- and Post-Hormuz Closure.***

Crop	Product	Price Change	Lbs/acre	Pre $/acre	Post $/acre	Increase $/acre
Corn	Urea	28.2%	326.1	79.10	101.39	22.29
	DAP	2.6%	56.5	18.15	18.62	0.47
	MAP	1.5%	50.0	17.22	17.48	0.26
	Potash	0.8%	150.0	23.21	23.42	0.20
Corn Total (Fertilizer)				137.70	160.91	**23.21**
	Diesel	+34.7%	—	24.44	32.92	**8.48**
Soybeans	Urea	28.2%	0	0.00	0.00	0.00
	DAP	2.6%	28.3	2.60	2.67	0.07
	MAP	1.5%	25.0	2.47	2.50	0.04
	Potash	0.8%	100.0	4.43	4.47	0.04
Soybeans Total (Fertilizer)				9.50	9.64	**0.14**
	Diesel	+34.7%	—	14.34	19.32	**4.98**
Wheat (HRSW)	Urea	28.2%	195.7	54.18	69.44	15.27
	DAP	2.6%	43.5	15.95	16.36	0.41
	MAP	1.5%	38.5	15.14	15.36	0.23
	Potash	0.8%	50.0	8.84	8.91	0.08
Wheat Total (Fertilizer)				94.10	110.08	**15.98**
	Diesel	+34.7%	—	14.98	20.18	**5.20**

Note: Individual product values are rounded to two decimal places; totals may not sum exactly due to rounding.

Source: NDSU using data from North Dakota Fertilizer Recommendation Tables, NDSU Extension; Bloomberg; USDA AMS Livestock, Poultry and Grain Market News.

The Hormuz closure has created two distinct input cost channels that affect each crop differently. For fertilizer, the mechanism is the urea price channel: corn's 150 lb N/acre requirement means urea alone accounts for $22.29 of the $23.21/acre fertilizer increase, 96% of the entire fertilizer shock for corn. DAP, MAP, and potash together add only $0.93, as seen in Figure 3. Soybeans fix atmospheric nitrogen biologically, eliminating urea exposure. Because the 2026 NDSU soybeans budget carries only $9.50/acre in fertilizer, their total fertilizer shock is just $0.14/acre. Wheat's 90 lb N/acre program produces a $15.27/acre urea increase, with DAP, MAP, and potash adding $0.71/acre for a $15.98/acre total fertilizer shock. Soybeans' $14.34/acre fuel budget produces a $4.98/acre fuel shock, much more significant than the fertilizer shock. For corn ($24.44/acre fuel base, +$8.48/acre shock) and wheat ($14.98/acre fuel base, +$5.20/acre shock), fuel adds a second meaningful layer on top of the fertilizer channel. The combined effect means soybeans face a $5.12/acre total shock, nearly all of which is fuel-driven (see Table 3).

The Hormuz fertilizer shock does not fall evenly across North Dakota. Because the post-closure cost increase is applied as a percentage of each region's 2026 fertilizer cost base, regions that entered 2026 with higher fertilizer spending bear a larger absolute dollar burden. The fertilizer cost increase for corn ranges from $11.86/acre in the Southwest, where the 2026 fertilizer base is the lowest in the state at $70.32/acre, to $28.35/acre in the South Valley, where the fertilizer base of $168.07/acre is the highest. The Southeast and South Valley regions, which combine high fertilizer intensities with high yields, face the largest absolute cost increases. Table 4 reports the full regional breakdown alongside 2026 yield benchmarks.

Table 4: ***Corn Fertilizer Cost ($/acre) by NDSU Region, 2021–2026, and Post-Closure Cost Increase.***

Region	2021	2022	2023	2024	2025	2026 (Pre-Closure)	Post-Closure Cost Increase	2026 Yield (bu/acre)
East Central	95.05	180.40	167.70	143.28	141.84	155.14	26.17	149
North Central	73.70	116.64	119.72	91.87	101.13	108.52	18.30	111
North East	87.67	145.79	148.48	123.29	124.94	129.23	21.80	121
North Valley	86.92	156.99	152.87	120.06	125.65	131.14	22.12	142
North West	66.66	120.03	119.91	88.71	89.23	85.07	14.35	84
South Central	71.01	130.62	125.36	102.17	—	119.10	20.09	122
South East	104.44	211.37	186.03	152.17	153.71	164.73	27.79	168
South Valley	106.63	217.85	192.35	157.23	157.70	168.07	28.35	170
South West	51.77	69.19	78.10	56.92	57.19	70.32	11.86	82
ND State Average (acreage weighted)	**86.17**	**161.12**	**153.23**	**123.38**	**129.83**	**137.70**	**23.21**	**140**

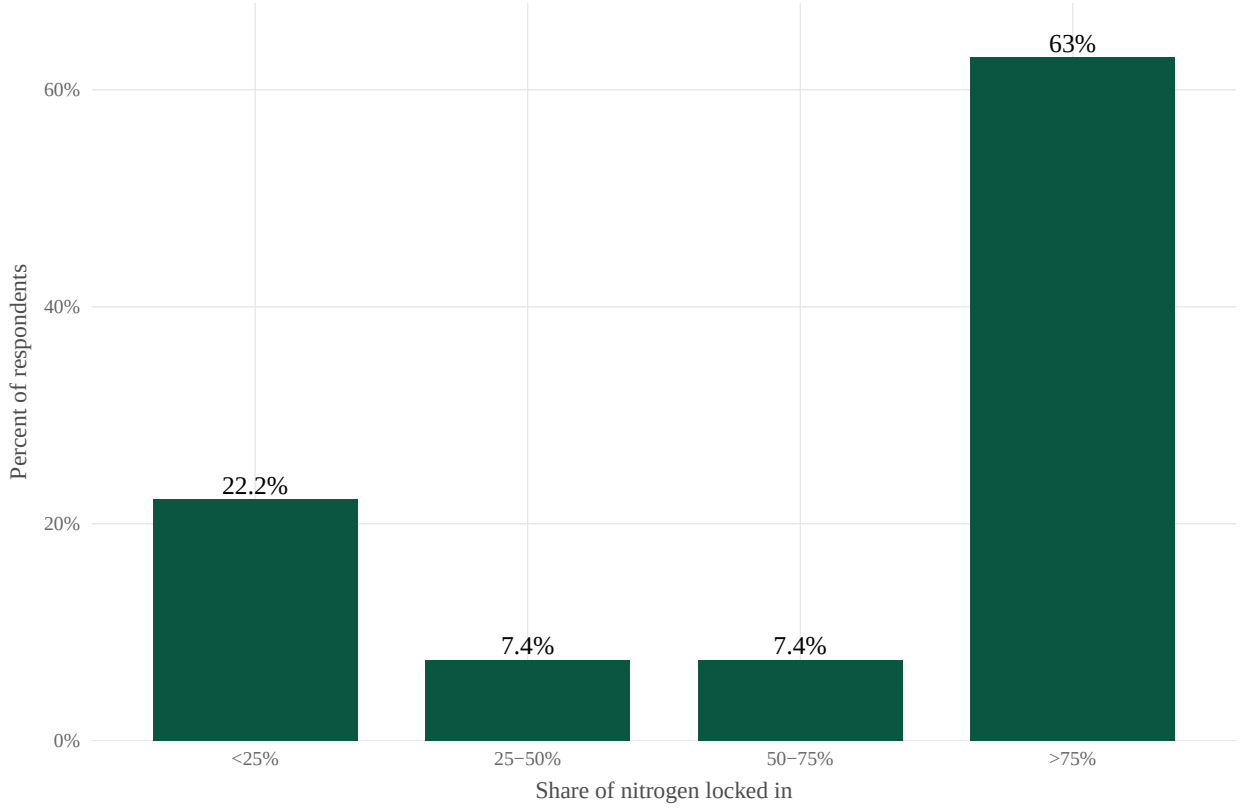
Note: All values in $/acre. Post-Closure cost increase = 2026 budget fertilizer × 16.86% increase. Fuel shock ($8.48/acre state average) not shown; applies additionally across all regions. South Central 2025 is not available in the current dataset.

Source: NDSU using data from the North Dakota Projected Crop Budgets 2021–2026; USDA FSA planted acre data.

2026 Producer Survey of Fertilizer Purchase Timing and Behavioral Responses

To provide additional context on how the Hormuz shock intersects with actual producer purchasing behavior, a brief survey was conducted March 19–22, 2026 with board members of North Dakota corn, soybean and wheat commodity organizations ($n = 27$). Respondents were asked what share of their nitrogen and phosphate fertilizer was locked in before March 1, 2026, whether they had purchased any fertilizer at post-disruption prices, and whether they were adjusting application rates or crop mix in response to the price environment. Results are indicative, given sample size; the survey was not designed for statistical inference. Figure 4 shows that 63% of respondents had locked in more than 75% of their nitrogen before March 1. However, 22% had less than 25% locked in. The survey-weighted mean is 65.3% of nitrogen locked in before the closure. For phosphate, 55.6% had more than 75% locked in, with a weighted mean of 59.7%.

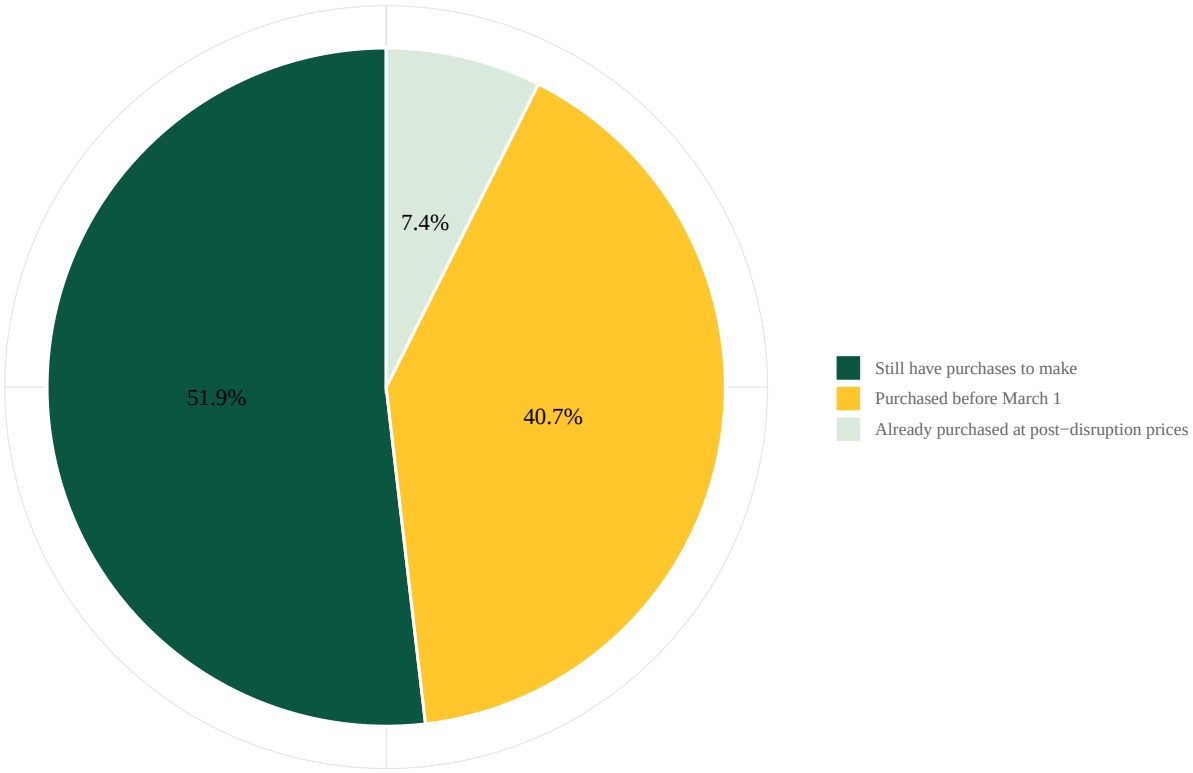
Figure 4: ***Nitrogen Locked in before March 1, 2026.***



Source: NDSU using data from the North Dakota Producer Fertilizer Survey, March 2026.

The distribution is notably bimodal: the largest groups are those with more than 75% locked in and those with less than 25%. This pattern likely reflects the structural split between fall anhydrous applicators and producers who rely on spring urea or UAN application or delayed purchasing. This bimodality is analytically important because the survey-weighted mean (65.3% nitrogen locked in) blends two structurally distinct populations: a majority that entered the closure substantially hedged and a sizable minority that had locked in less than a quarter of their nitrogen. For this latter group, the realized cost shock is closer to the upper-bound estimates in Table 5 than to the central estimate, and any policy or extension guidance framed around 'average' pre-purchase rates may significantly understate the exposure of the most vulnerable operations. Because fall 2026 fertilizer purchasing is largely unpriced (see Table A2 for survey results), the potential cost exposure for the fall contracting season may exceed the realized spring impact documented in this analysis. If post-closure prices persist into the summer fill window, producers who fall-apply will face the full Hormuz price premium with no pre-purchase buffer.

Figure 5: ***Spring 2026 Fertilizer Purchase Status.***



Source: NDSU using data from the North Dakota Producer Fertilizer Survey, March 2026.

Figure 5 shows that 40.7% of respondents had completed all spring 2026 fertilizer purchases before March 1. Only 7.4% had already purchased fertilizer at post-disruption prices. The remaining 51.9% reported they still have spring purchases to make.

The full-shock estimates earlier assume 100% of fertilizer and fuel is purchased at post-closure prices. Pre-purchase of fertilizer partially buffers the fertilizer channel, but not the fuel channel. Because fuel is consumed over the course of the production season rather than contracted in advance, the fuel shock ($8.48/acre corn, $5.20/acre wheat, $4.98/acre soybeans) is treated as fully exposed in all three scenarios. Only the fertilizer portion varies by pre-purchase timing.

This has a critical implication for soybeans: since soybeans' fertilizer exposure is only $0.14/acre, pre-purchase timing is essentially irrelevant. The $4.98/acre fuel shock applies in full regardless of when or how much fertilizer was contracted. Net margin changes for soybeans across all three pre-purchase scenarios differ by only $0.12/acre. Three exposure scenarios are constructed: (1) Lower Bound (87.5% fert pre-purchased): Corn: $2.90/acre fertilizer + $8.48/acre fuel = $11.38/acre total, net margin change +$7.58/acre. (2) Survey-Weighted Central Estimate (65.3% Nitrogen (N) / 59.7% Phosphate (P) locked in): Corn: $8.05/acre fertilizer + $8.48/acre fuel = $16.53/acre total, net margin change +$2.43/acre. Revenue gain of $18.96/acre covers cost increases at this pre-purchase level. (3) Upper Bound (0% fert pre-purchased): The full fertilizer shock applies. For corn: $23.21/acre fertilizer + $8.48/acre fuel = $31.70/acre total, net margin change −$12.75/ac.

The key interpretive findings differ meaningfully by crop. First, at the survey-weighted central estimate, corn still produces a positive net margin change (+$2.43/acre), but the buffer is thin: the $18.96/acre revenue gain covers the $16.53/acre combined cost increase by only $2.43/acre, leaving little room for further price deterioration or yield shortfalls. Second, for wheat, the upper bound is negative (−$4.07/acre): producers who had not pre-purchased fertilizer face a net loss even with wheat's favorable 5.9% price response, once fuel costs are included alongside the full fertilizer shock. Third, the outcomes for soybeans are consistently negative across all three pre-purchase scenarios (−$5.34 to −$5.46/acre), driven almost entirely by the fuel channel.

Figure 6 shows that 50% of respondents reported applying fertilizers at normal rates. 11.5% are reducing slightly (<10%) and 15.4% are reducing meaningfully (10–25%). 23.1% are still undecided. In terms of crop planting decisions, 55.6% reported no changes planned. 22.2% are shifting acres away from wheat. 14.8% are shifting acres away from corn. 7.4% are still undecided.

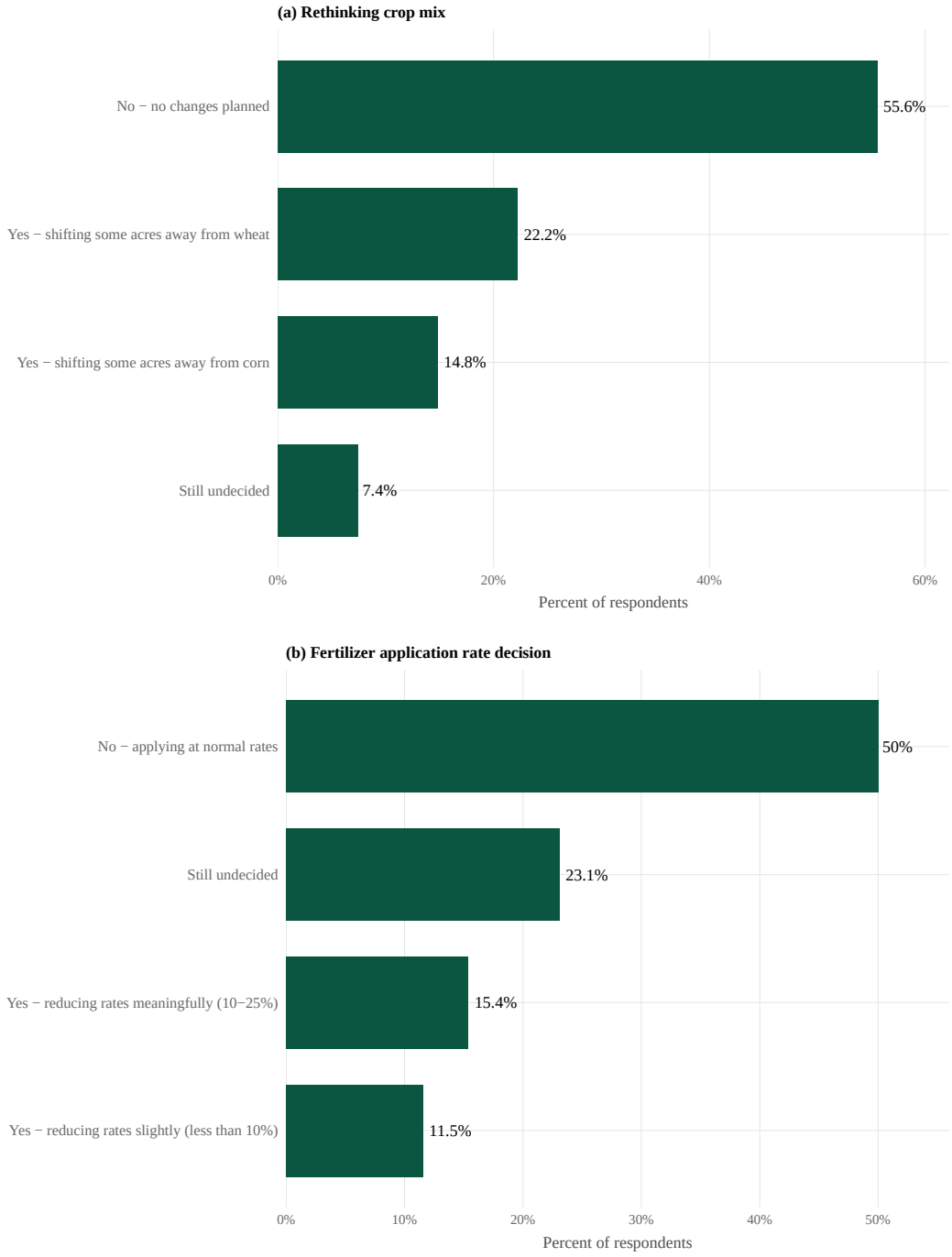
Table 5: ***Fertilizer and Fuel Cost Increase and Net Margin Change Bounds by Crop and Pre-Purchase Scenario.***

	Fertilizer Cost Increase	Fuel Cost Increase	Total Cost Increase	Revenue Change	Net Margin Change
Corn					
Lower Bound (87.5% fertilizer pre-purchased)	2.90	8.48	11.38	+18.96	**+7.58**
Central (65.3% N / 59.7% P locked in)	8.05	8.48	16.53	+18.96	**+2.43**
Upper Bound (0% pre-purchased)	23.21	8.48	31.70	+18.96	**–12.75**
Wheat					
Lower Bound (87.5% fertilizer pre-purchased)	2.00	5.20	7.20	+17.12	**+9.92**
Central (65.3% N / 59.7% P locked in)	5.54	5.20	10.74	+17.12	**+6.38**
Upper Bound (0% pre-purchased)	15.98	5.20	21.18	+17.12	**–4.07**
Soybeans					
Lower Bound (87.5% fertilizer pre-purchased)	0.02	4.98	5.00	–0.34	**–5.34**
Central (65.3% N / 59.7% P locked in)	0.05	4.98	5.03	–0.34	**–5.37**
Upper Bound (0% pre-purchased)	0.14	4.98	5.12	–0.34	**–5.46**

Note: All values in $/acre. N = Nitrogen, P = Phosphate. Fertilizer exposure varies by pre-purchase scenario; fuel exposure fixed at 100% (no pre-purchase). Lower Bound = 87.5% fert pre-purchased (midpoint of >75% locked-in bracket). Survey-Weighted Central = 34.7% N exposed / 40.3% P exposed (survey midpoint means). Upper Bound = 100% exposed, no pre-purchases. Individual product values are rounded to two decimal places; totals may not sum exactly due to rounding.

Source: NDSU using data from the North Dakota Producer Fertilizer Survey, March 2026.

Figure 6: ***Spring 2026 Producer Survey Responses: Crop Mix and Fertilizer Application Rate Decisions.***



Source: NDSU using data from the North Dakota Producer Fertilizer Survey, March 2026.

Conclusion

The 2026 Strait of Hormuz closure has created a two-channel cost shock for North Dakota crop producers through fertilizer and fuel. Corn is the most exposed: the urea shock alone accounts for nearly all of the fertilizer cost increase, and when combined with higher diesel costs, the observed 3.6% rise in corn prices is not sufficient to preserve margins under full exposure. Wheat faces a smaller but still negative net effect under full exposure, as its stronger price response is ultimately outweighed once fuel costs are included. Soybeans are the least fertilizer-exposed crop, but they are not insulated from the closure: because fertilizer costs are already low, diesel becomes the dominant transmission channel, producing a modest but consistently negative margin effect across all purchase-timing scenarios.

The most important distinction from the 2022 Russia–Ukraine conflict is not simply that input prices are rising again, but that this shock arrives when baseline margins are already substantially weaker. Corn and wheat entered March 2026 in negative territory, unlike the positive starting point that producers had at the onset of the 2022 conflict. At the same time, the current commodity price response remains far below the pass-through observed during the 2023 recovery. In practical terms, this means producers are absorbing a larger share of the shock directly through reduced margins rather than through offsetting revenue gains.

Producer survey evidence suggests that fertilizer pre-purchase timing partially offsets price exposure for many operations, especially for corn and wheat. A majority of respondents had already locked in most of their nitrogen before March 1, which may partially offset the realized fertilizer price shock relative to the upper-bound estimates. More than half of respondents still reported spring fertilizer purchases outstanding. Survey responses indicate that fall 2026 fertilizer purchasing remains largely unpriced, with 61.5% of respondents reporting it was too early to consider contracts and an additional 30.8% indicating they were holding off until prices settle, leaving open the possibility that the current disruption affects not only this year's spring margins but also the next production cycle.

The findings suggest that the Strait of Hormuz closure is best understood not as a repeat of the 2022 margin environment, but as a more adverse version of it: a major input shock arriving into an already-fragile farm economy, with much weaker commodity-price relief. Unless crop prices strengthen substantially from current levels, the closure will deepen existing losses for corn and wheat producers and erode soybean profitability through the fuel channel. The central policy and management implication is therefore not only monitoring fertilizer markets, but tracking whether commodity prices begin to transmit enough of the shock to restore margins. At present, the evidence suggests they have not.

Appendix

Table A1: ***NDSU Projected Crop Budget Summary: Corn, Soybeans, and Wheat, 2021–2026.***

Year	Crop	Fertilizer $/Ac	Fuel ($/acre)	Direct Cost ($/acre)	Total Cost ($/acre)	Yield (bu/acre)	Price ($/bu)	Rev-enue ($/acre)	Net Return ($/acre)	Net Change
2021	Corn	86.17	18.03	287.96	433.29	132.5	3.800	503.46	**+70.17**	—
2021	Soybeans	5.88	10.77	146.96	265.49	35.1	10.241	360.12	**+94.63**	—
2021	Wheat	62.01	11.39	161.52	256.43	49.8	5.630	280.58	**+24.15**	—
2022	Corn	161.12	26.29	397.17	544.77	134.5	4.450	598.44	**+53.67**	−16.50
2022	Soybeans	8.59	15.63	184.92	304.88	34.9	11.491	401.89	**+97.01**	+2.38
2022	Wheat	100.36	16.50	226.12	322.77	49.1	7.472	367.58	**+44.81**	+20.66
2023	Corn	153.23	35.34	414.21	569.95	134.9	5.250	708.21	**+138.26**	+68.09
2023	Soybeans	8.13	20.62	188.76	313.44	34.4	12.240	421.60	**+108.16**	+13.53
2023	Wheat	102.38	21.46	237.19	337.01	46.8	7.973	373.79	**+36.78**	+12.63
2024	Corn	123.38	33.23	371.26	535.86	136.4	4.400	599.97	**+64.11**	−6.06
2024	Soybeans	9.05	19.48	170.51	301.15	35.1	10.986	386.37	**+85.22**	−9.41
2024	Wheat	78.64	20.31	204.94	310.99	47.1	6.971	328.98	**+17.99**	−6.16
2025	Corn	129.83	25.78	372.23	547.05	139.4	4.000	557.65	**+10.60**	−59.57
2025	Soybeans	9.33	15.24	168.83	305.77	34.9	9.490	331.28	**+25.51**	−69.12
2025	Wheat	86.40	15.68	206.13	314.28	48.3	6.220	301.22	**−13.06**	−37.21
2026	Corn	137.70	24.44	378.21	553.88	140.3	3.750	526.28	**−27.60**	−97.77
2026	Soybeans	9.50	14.34	167.61	304.94	35.3	9.736	343.82	**+38.88**	−55.75
2026	Wheat	94.10	14.98	212.16	323.36	50.6	5.726	289.95	**−33.41**	−57.56

Note: Net return = gross revenue minus total production cost. Net change calculated with respect to 2021.

Source: NDSU using the North Dakota Projected Crop Budgets 2021–2026.

Table A2: ***Fertilizer Pre-Purchase Timing and Producer Responses.***

Question	Response	n	Share of Responses
Nitrogen locked in before March 1 ($n = 27$)	More than 75%	17	63.0%
	25–50%	2	7.4%
	50–75%	2	7.4%
	Less than 25%	6	22.2%
Phosphate (DAP/MAP) locked in before March 1 ($n = 27$)	More than 75%	15	55.6%
	50–75%	3	11.1%
	Less than 25%	9	33.3%
Purchased fertilizer at post-disruption prices? ($n = 27$)	No — all purchased before March 1	11	40.7%
	Not yet, but still have purchases to make	14	51.9%
	Yes — already purchased at higher prices	2	7.4%
Fall 2026 fertilizer contracting ($n = 26$)	Too early — haven't considered yet	16	61.5%
	Yes — holding off until prices settle	8	30.8%
	Yes — already looking at contracts	2	7.7%
Reducing fertilizer application rates? ($n = 26$)	No — applying at normal rates	13	50.0%
	Still undecided	6	23.1%
	Yes — reducing slightly (<10%)	3	11.5%
	Yes — reducing meaningfully (10–25%)	4	15.4%
Rethinking crop mix? ($n = 27$)	No — no changes planned	15	55.6%
	Yes — shifting acres away from wheat	6	22.2%
	Yes — shifting acres away from corn	4	14.8%
	Still undecided	2	7.4%

Note: Total survey sample was n=27. Item-specific response totals may be lower where respondents skipped individual questions; percentages calculated using valid responses for each question.
Source: NDSU using data from the North Dakota Producer Fertilizer Survey, March 2026.

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The Agricultural Risk Policy Center at North Dakota State University conducts independent, evidence-based economic research to inform agricultural policy and strengthen the farm safety net. Our work focuses on evaluating risk management tools such as crop insurance and disaster assistance, analyzing market disruptions, and providing timely insights that support agricultural producers, policymakers, and industry leaders.

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Contact Us

arpc@ndsu.edu

www.ndsu.edu/agriculture/arpc

Richard H. Barry Hall 400, Fargo, ND

https://www.linkedin.com/company/ndsu-agricultural-risk-policy-center

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