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GEORGE MORRIS CENTRE

Canada's Independent Agri-Food Think Tank

Fertilizer Price Volatility, Risk, and Risk Management Strategies

FINAL REPORT

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Executive Summary

Canadian fertilizer prices are high, increasing, and becoming more volatile. The increases in fertilizer price levels and volatility are related to a number of factors including rising and volatile energy prices, increased crop production to meet biofuels demand, exchange rate movements and global demand and supply conditions, among others.

The result is that farmers are left to purchase fertilizer in an increasingly complex and volatile market.

The purpose of this paper is to provide farmers with a better understanding of fertilizer price volatility and risks and to identify potential actions that could mitigate unwanted effects of these risks.

There are two specific objectives:

- To describe potential sources of fertilizer price volatility and risk.
- To describe potential actions that farmers could take to mitigate the negative effects of fertilizer price volatility and risks.

The description of the risks that farmers face when purchasing fertilizer is based on a review of published (secondary) information. The description is primarily qualitative, but quantitative data and graphical presentations have been used where appropriate.

The discussion of risk management strategies is based on knowledge and information from the George Morris Centre's educational programs related to commodity risk management and agricultural management.

The conclusion reached is that farmers currently face two major fertilizer risks: rising and volatile fertilizer prices, and growing demand for limited supplies. Rising and volatile Canadian fertilizer prices are caused by rising input prices, exchange rate fluctuations, and increasing global demand for fertilizer. The increases in global demand are caused by increases in the demand for both food and non-food uses of major crops, US demand for corn for ethanol with accompanying demand especially for nitrogen, and increasing use of fertilizer in China and other emerging economies. These risks appear to be persistent over the foreseeable future.

These risks are mitigated by the current high prices for most crops. Additional risk management strategies for farmers include pre-purchasing fertilizer, forward contracting, volume purchases either individually or in groups, and maintaining relationships with dealers based on price, service, and consistency of product. Farmers can also re-evaluate their nutrient management plans, crop rotations and beneficial management practices in light of these significant changes in fertilizer prices.

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1. Introduction and Objectives

Canadian fertilizer prices are high, increasing, and becoming more volatile. The increases in fertilizer price levels and volatility are related to a number of factors including rising and volatile energy prices, increased crop production to meet biofuels demand, exchange rate movements and global demand and supply conditions, among others.

The result is that farmers are left to purchase fertilizer in an increasingly complex and volatile market.

This paper aims to help farmers understand the risks associated with the fertilizer market and the potential effects on their businesses. As price levels and volatility within the fertilizer market increase, farmers may be more interested in tools to manage these risks. This paper outlines alternative strategies that farmers can use to manage the risks associated with purchasing fertilizer.

1.1 Purpose and Objectives

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- To describe potential sources of fertilizer price volatility and risk.
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1.2 Procedures and Methods

The description of the risks that farmers face when purchasing fertilizer is based on a review of published (secondary) information. The description is primarily qualitative, but quantitative data and graphical presentations have been used where appropriate.

The discussion of risk management strategies is based on knowledge and information from the George Morris Centre's educational programs related to commodity risk management and agricultural management.

1.3 Outline

Within this paper, section 2 identifies the different types of risks associated with the fertilizer market. Section 3 outlines alternative strategies that farmers can use to mitigate these risks for their operations. Section 4 provides a brief summary of the paper, as well as conclusions.

2. Fertilizer Price Volatility and Risks

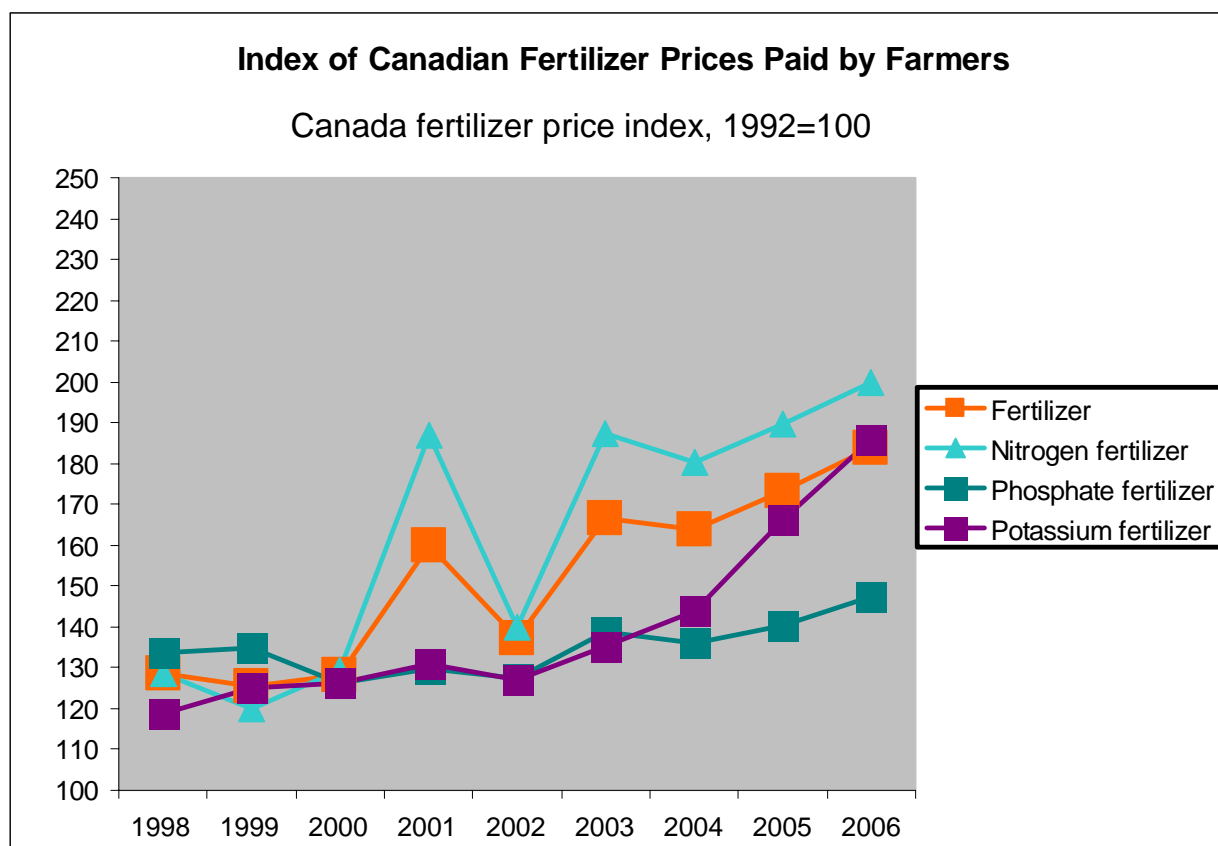
This section explores the different types of risks associated with the fertilizer market in order to help farmers understand the potential effects of these risks on their businesses.

2.1 Fertilizer Price Risk

Fertilizer price risk, in general, is the risk that the farmer purchases fertilizer at “too high” a price, with “too high” often being a matter of opinion. More objectively, fertilizer price risk is the risk that fertilizer prices will be higher than expected. In particular, farmers are subject to risk if fertilizer prices are volatile and thus farmers purchasing at a peak may pay substantially more than the average price.

Fertilizer prices in Canada have increased dramatically in recent periods. Figure 1 shows an index of the fertilizer prices paid by farmers in Canada from 1998 to 2006.

Figure 1 Index of Canadian Fertilizer Prices Paid by Farmers, 1998 - 2006



Source: Statistics Canada.

Table 1 illustrates more recent price increases by comparing retail prices east of Saskatoon, Saskatchewan in January 2007 versus January 2008. Increases range from 29% for sulphur to 69% for phosphate.

Table 1 Fertilizer Retail Prices, East of Saskatoon

	January 2007	January 2008	Percent Change
	CDN\$/tonne		
Urea (46-0-0)	410	620	51%
Anhydrous ammonia	650	880	35%
Phosphate	385	650	69%
Sulphur	275	355	29%

Source: CGF Brokerage and Consulting as cited in Hursh, 2008.

Local fertilizer prices in Canada are based on international prices, the exchange rate, and basis. International prices are important because the North American fertilizer price is largely determined in the US market. Basis, in its simplest form, refers to geographical differences in prices for the same product. Basis reflects factors such as transportation costs between the location and the delivery point, local supply and demand conditions, and carrying costs (i.e. storage, insurance, and interest on the invested funds) (Daniels Trading, 2008).¹ All of these components influence the local price of fertilizer in Canada.

$$\text{Local price} = \text{world price} \times \text{exchange rate} + \text{basis}$$

The risks associated with each component are discussed in the following sections.

2.1.1 Increases in the World Price of Fertilizers

To replenish fertilizer inventories in Canada, fertilizer wholesalers purchase fertilizers on the international market and are subject to increasing prices.

A comparison of fertilizer prices at international port and mining locations in mid-January 2007 and 2008 is presented in Table 2. Urea and potash prices increased by approximately 1/3; the phosphate price nearly tripled. These prices are subject to other factors such as transportation costs, shrink and margins, as well as conversion to Canadian dollars and metric tonnes before becoming the prices that farmers might see in Canada. However, the point is that North American fertilizer prices have increased significantly year over year.

Table 2 International Fertilizer Pricing²

	Middle of January 2007	Middle of January 2008
	US\$/short ton	
Granular Urea (FOB U.S. Gulf)	303-310	420-428
Phosphate (FOB Central Florida)	233	611
Potash (FOB Saskatchewan)	193-198	307-312

Increases in the global prices of fertilizers are based on supply and demand conditions worldwide. Stronger than expected demand for fertilizers has caused supplies to be rather tight, driving up prices. Demand is being driven primarily by growth in Asia as well as other factors

¹ In some cases, basis is also used to refer to price spreads over time or across similar but different products.

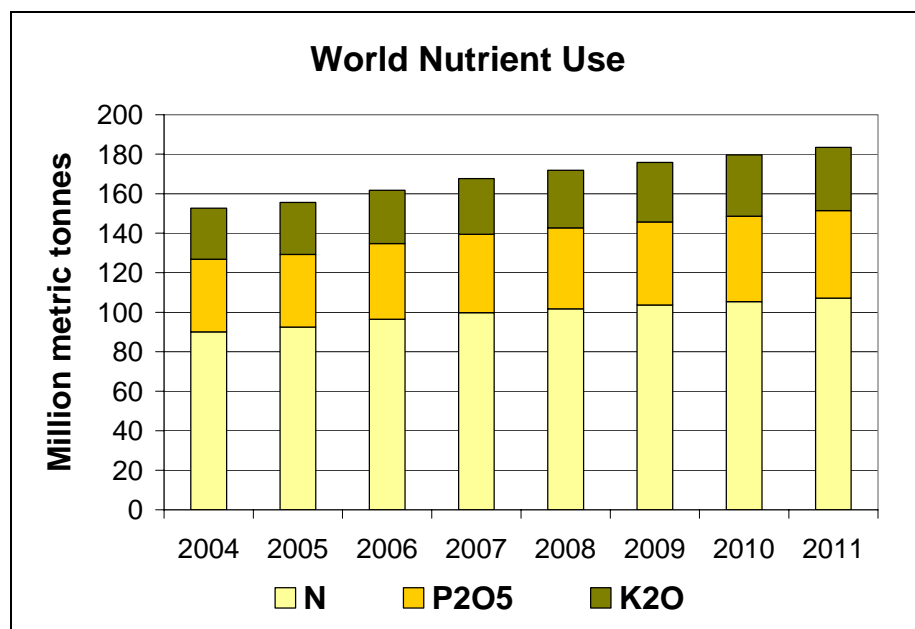
² Source: Personal communication with a Canadian fertilizer wholesaler.

such as biofuels. In addition, as a key purchased ingredient in the production of nitrogen fertilizers, natural gas prices have an influence on fertilizer prices. The following sections provide background information on recent changes with respect to demand and supply, biofuels, and natural gas prices in order to provide perspective on the factors influencing global fertilizer prices as well as potential implications for the future.

World Fertilizer Demand and Supply

From 2001 to 2006, global nitrogen use increased by 14%; phosphate use grew by 13% and potash consumption grew by 10% (Canadian Fertilizer Institute, 2008). The International Fertilizer Industry Association (IFA) predicts that global use of nitrogen, phosphate and potash will increase by 13%, or more than 20 million tonnes from 2006 to 2011 (Figure 2). South Asia and East Asia together are predicted to account for some 70% of the total increase in demand (Heffer, 2007).

Figure 2 **World Nutrient Use, 2004-2011**



Source: (Heffer, 2007).

Given the growth in global demand, nutrient markets could remain tight until 2009 (Vroomen, 2008). While urea supply is expected to grow, supply will remain limited in 2008 due to strong demand. Supply limitations are expected to ease slightly in 2009. If planned expansions in urea production capacity emerge, there may be excess supply in 2010 (Vroomen, 2008).

The market for phosphate fertilizers is expected to be relatively balanced over the next few years (Vroomen, 2008).

Potash supplies are expected to increase in most exporting countries (Vroomen, 2008). However, increases in global demand for potash in order to balance nutrient applications will consume additional supplies. Therefore, no significant surpluses will likely develop until at least 2011 (Vroomen, 2008).

Given strong world demand and tight supplies, upward pressure on fertilizer prices is expected over the next several years.

Biofuels

The movement toward biofuels is resulting in higher commodity prices and increased crop production, thereby creating increased demand for fertilizers.

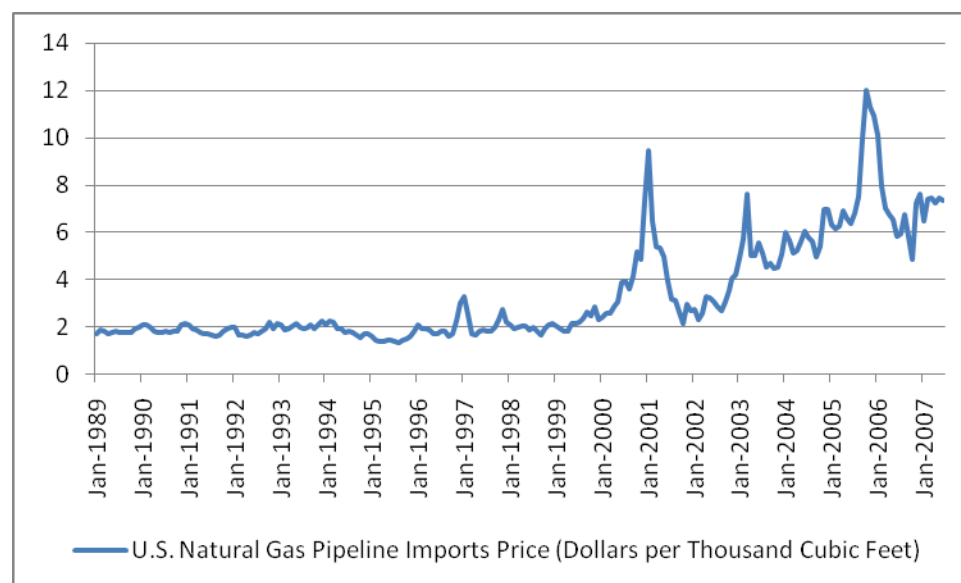
In 2007, acreage planted to corn in the United States increased to 94 million acres from 78 million acres in 2006, largely in response to increasing demand for corn used in ethanol production (USDA-ERS, 2008). As a result of the high fertilizer requirements of corn, fertilizer demand increased.

In 2008, analysts are predicting a shift in acreage toward soybeans and wheat, resulting in a slight decrease in corn acreage to 88 million acres (Doane Advisory Services as cited in Canadian Fertilizer Institute, 2008). Overall, however, demand for corn in ethanol production is expected to increase in the coming years, thereby maintaining strong demand for fertilizers.

Natural Gas and Other Raw Inputs

Natural gas is the key purchased ingredient in the production of anhydrous ammonia, and thus the price of natural gas influences nitrogen fertilizer prices. During the 1990s, the price of natural gas was relatively low and stable at approximately US\$2/thousand cubic feet (tcf) (Figure 3). Natural gas prices spiked in late 2000 and have continued to rise since that time. From January 2000 through to June 2007, natural gas prices nearly quadrupled to just under US\$8/tcf. Volatility also increased noticeably.

Figure 3 ***U.S. Natural Gas Pipeline Imports Price, January 1989 to June 2007***



Source: (Energy Information Administration, 2007).

Natural gas prices are more volatile in the winter than in the summer (Table 3). The primary reason for this volatility is weather fluctuations that influence the quantity of natural gas used for heating homes and commercial buildings.

From 1994 to 2006, monthly volatility increased during the months of May through December, while monthly volatility from January through April has remained flat or declined (Mastrangelo, 2007).

Table 3 **Average US Natural Gas Monthly Volatility by Month**
January 1994 – December 2006

Month	Average Monthly Volatility	Coefficient of Variation
January	25.38%	52.98%
February ³	27.45%	99.06%
March	16.49%	70.37%
April	12.63%	42.30%
May	11.38%	31.47%
June	12.87%	30.06%
July	12.67%	30.72%
August	16.32%	35.42%
September	17.05%	43.89%
October	22.79%	43.76%
November	24.75%	58.43%
December	26.74%	47.29%
Shading indicates months with statistically significantly higher volatility relative to unshaded months?		

Source: (Mastrangelo, 2007).

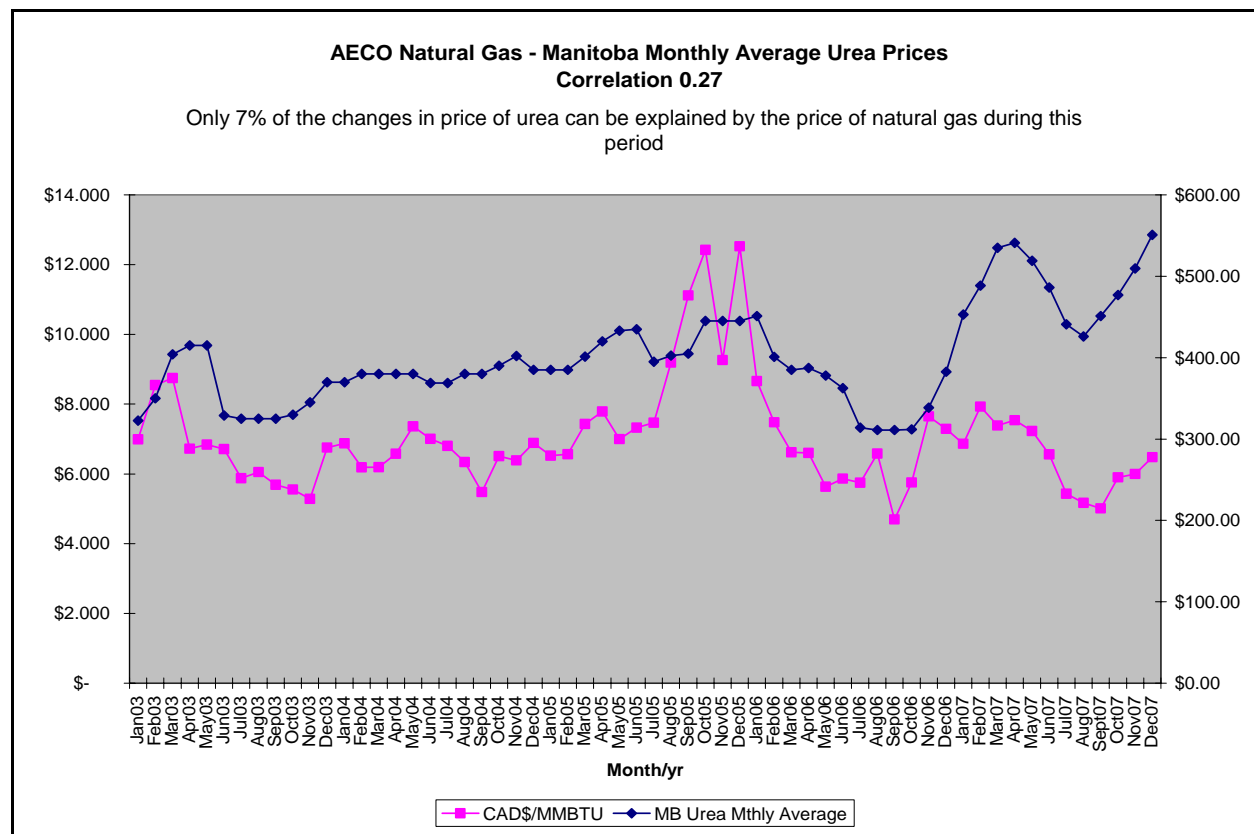
Nitrogen fertilizer prices generally track natural gas prices, with an increase in natural gas prices leading to an increase in nitrogen fertilizer prices.⁴ However, this relationship is not always straightforward. For example, from January 2003 to December 2007, nitrogen fertilizer prices rose more rapidly than natural gas prices.⁵ This is consistent with the idea that capacity constraints in the industry have become the bind, rather than the purchase price of natural gas, even in the face of rising natural gas prices. In this case, the natural gas price and standard conversion efficiency to ammonia will determine a floor price for ammonia and nitrogen based fertilizers, but strong demand and limited fertilizer production capacity may act to pull prices higher than that floor. Figure 4, which shows a growing divergence between natural gas prices and Manitoba urea prices over the past 18 months, is consistent with demand-driven price increases.

³ The calculated February values exclude the first two weeks in February 1996. If these weeks were included average February volatility would be 38% with a coefficient of variation of 69%.

⁴ Agriculture and Agri-Food Canada estimates a correlation between the price of natural gas and the price of fertilizer to be 0.82 based on 17 years of monthly data (AAFC, 2008b). This is fairly typical in a situation where capital costs are relatively stable, there is high reliance on a single input, and there is reasonable capacity in the industry.

⁵ The correlation of AECO Natural Gas prices to urea prices in Manitoba is 0.27 which means only 7% of the change in the price of urea can be explained by the price of natural gas during this period (Andersen, 2008). The AECO "C" spot price, which is the Alberta gas trading price, has become one of North America's leading price-setting benchmarks. It is closely tied to the Henry Hub natural gas price after accounting for transportation costs and exchange rate movements.

Figure 4 Relationship between Natural Gas Prices and Urea Prices in Manitoba



Source: (Andersen, 2008).

During the past few years, but particularly during the past twelve months, there have been significant increases in the prices of other raw inputs into fertilizer, namely potassium, potash and sulfur. Mosaic reports that the price of potash FOB a Midwest terminal has increased 160% since January 2007 and that the price of diammonium phosphate (DAP) FOB a Tampa vessel has increased 270% since January 2007 (Rahm, 2008). Scotiabank reports a 73% increase in potash (FOB Vancouver) prices over the same time period (Mohr, 2008). The current Vancouver sulphur⁶ price reported by Fertecon is US\$130-\$428/t, compared to around US\$100/t a year earlier. Note that the \$130 price is a six month contract with Brazil that ended on March 31, 2008 (Rahm, 2008).

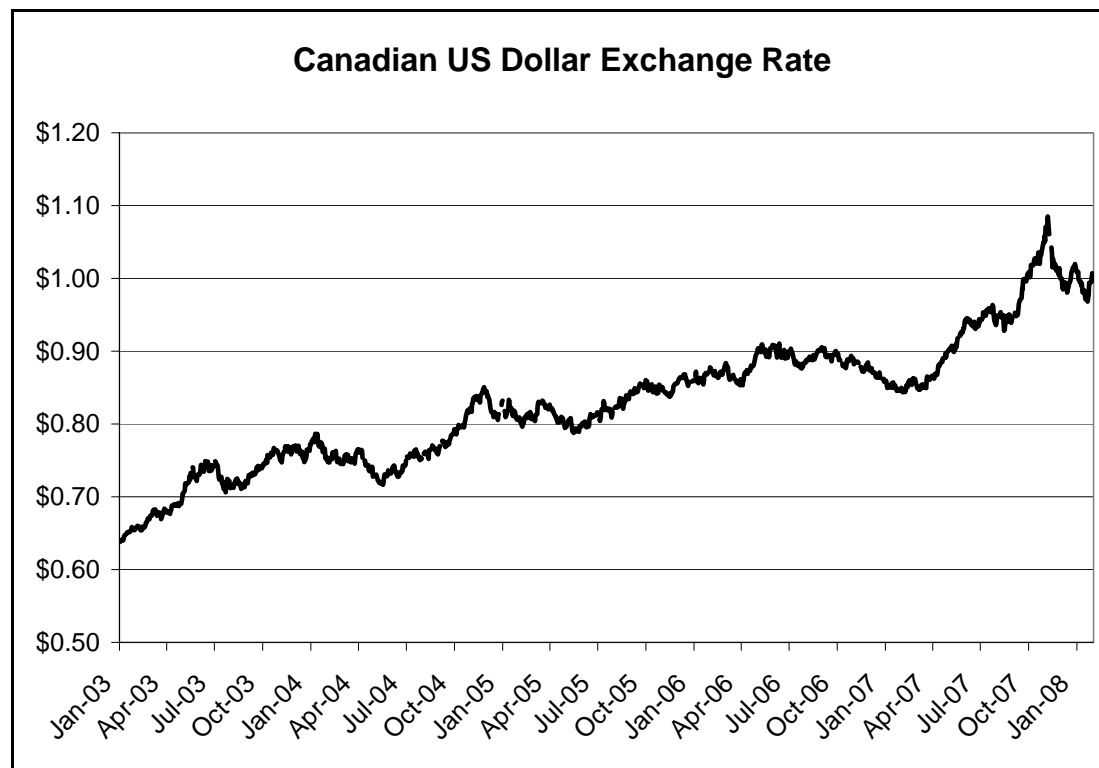
2.1.2 Exchange Rate Risk

The Canadian US dollar exchange rate⁷ has a significant effect on Canadian fertilizer prices. Fertilizer users' risk is that the Canadian dollar will fall relative to the US dollar, because North American fertilizer prices are determined in the US market. In recent years, the Canadian dollar has been moving in the opposite direction (i.e. rising relative to the US dollar). Figure 5 shows the exchange rate from January 1, 2003 to February 1, 2008. As the value of the Canadian dollar rises, the price of imported fertilizer falls, if other things remain constant.

⁶ Sulphur is both used as a fertilizer (e.g. in low-sulphur soils in Alberta) and an input into the production of some other fertilizers such as DAP.

⁷ The exchange rate refers to the value of the Canadian dollar against the US dollar.

Figure 5 Canadian US Dollar Exchange Rate, January 2003 – February 2008



Source: (Bank of Canada, 2008).

2.1.3 Basis Risk

Basis reflects factors such as transportation costs between the location and the delivery point, local supply and demand conditions, and carrying costs (i.e. storage, insurance, and interest on the invested funds) (Daniels Trading, 2008). Basis risk relates to the chance that these costs will increase, resulting in higher local fertilizer prices.

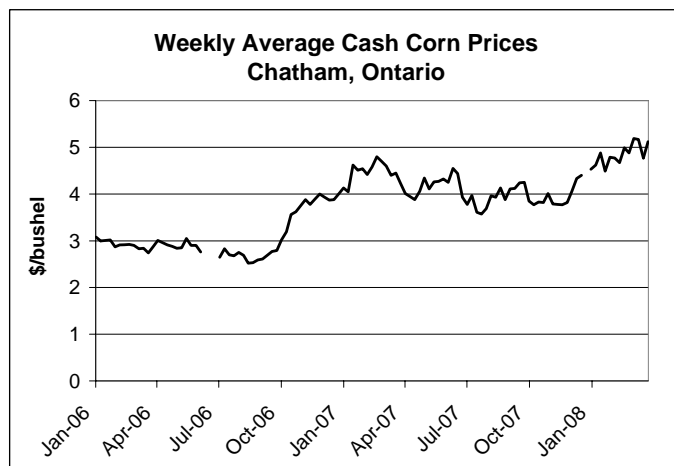
Currently, the primary risk for farmers with respect to basis relates to increasing transportation costs, given rising energy prices. Shipping and distribution costs for fertilizer are rising including ocean freight rates, rail rates, barge rates and truck rates (Vroomen, 2008). Transportation companies may absorb some increases in costs, but eventually the increases in transportation costs will come out of the farmer's pocket, and in times of tight supply of transportation services this will hit the farmer sooner rather than later.

2.2 Gross Margin Risk

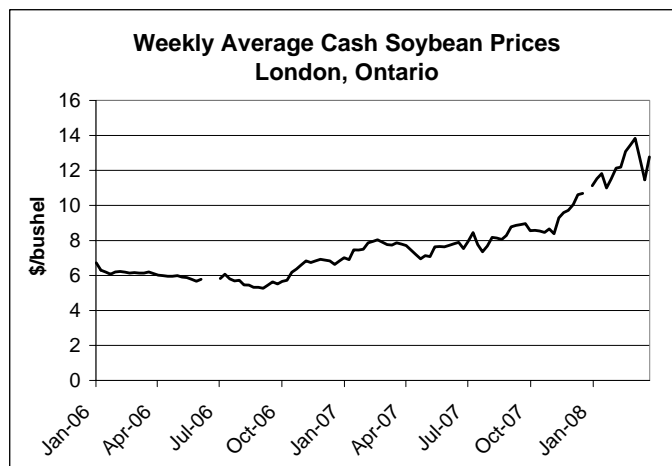
Gross margin is the difference between the selling price and the cost of production. Gross margin risk is the chance that gross margins will be less than expected. For farmers, gross margins for commodities like corn, soybeans and wheat are based on crop revenues and expenses (e.g. seed, fertilizer, custom work, etc.). Therefore, in an environment where fertilizer prices are increasing, there is a risk that gross margins will decrease. Farmers have the financial ability to absorb increases in fertilizer prices if grain prices (and hence revenues) increase by more than the rise in fertilizer costs.

High commodity prices in the current marketplace are helping to reduce gross margin risk. The increase in cash prices for corn, soybeans, wheat and canola from January 2006 to March 2008 is shown in Figure 6. Currently, the primary risks to gross margin are fluctuating crop prices and yield risk.

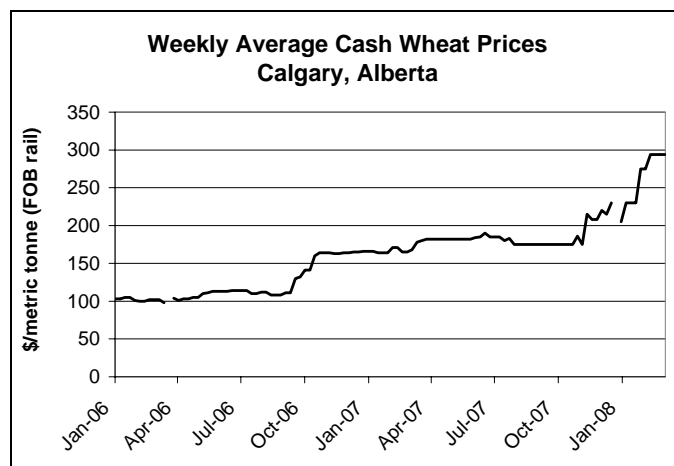
Figure 6 Commodity Cash Prices, January 2006 – March 2008



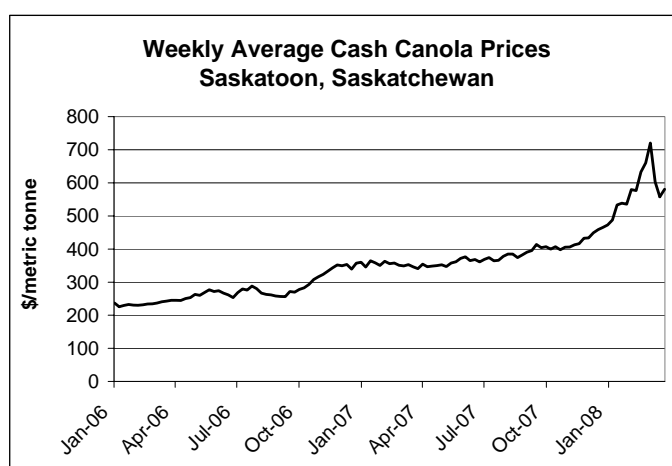
Source: (DTN, 2008).



Source: (DTN, 2008).



Source: (AAFC, 2008a).



Source: (ICE Futures Canada, 2008).

2.3 Cash Flow/Liquidity (Farmer)

The liquidity situation for the farmer will affect the timing of fertilizer purchases. The less flexibility one has with respect to timing, the more one is subject to the fluctuations of the market.

A component of this risk is credit availability. For example, if fertilizer costs double, then the farmer has to double the amount of operating capital available to purchase the fertilizer. In the absence of increased revenues from crop sales, this could require additional operating loans.

2.4 Tax Consequences

Timing of fertilizer purchases is often influenced by tax consequences. For example, after a relatively good harvest in a high grain price year, farmers who realize higher levels of profit may wish to reduce tax liabilities by pre-paying for inputs such as fertilizer (assuming fiscal year is conducive to this strategy). This has the positive effect of locking in a supply of the desired fertilizer at a known price.

Conversely, farmers who earn only a small profit or incur a loss in the current tax year may choose to delay the purchase of fertilizer until the subsequent tax year.

2.5 Interest Rate Risk

For farmers who operate or purchase fertilizer on a line of credit or similar financial instrument, the interest rate is likely tied to the prime rate. Thus, their financing costs will rise or fall with the prime rate. This entails a bit of risk, but the level seems to be small relative to the risks associated with fertilizer price volatility and other risks, particularly given recent decreases in the prime rate in Canada.

2.6 Fertilizer Supply Risk (Farmer)

An important supply risk is the risk that the farmer cannot get the quantity or composition of fertilizer desired. This risk is more likely to be the case in times when total fertilizer supply is tight, such as in the current fertilizer market (Keller, 2007).

Given tight fertilizer supplies, it is conventionally thought that the longer the farmer waits before purchasing fertilizer for the crop year, the more likely it is that the farmer will face difficulties in obtaining the desired quantity and composition of fertilizer. There are no specific data to corroborate/falsify this conventional wisdom.

This year, potash is particularly subject to supply risks. Stocks of potash are low, so supply restrictions (or demand increases) cannot be absorbed by those stocks. This translates into higher prices. As an example, in October 2007, Potash Corp of Saskatchewan suspended new sales of potash because mine flooding in Russia threatened the shipment of potash (Rampton, 2007). Overall, given the tight supply situation, wholesalers and retailers may have some difficulties accessing supply this year as manufacturers are releasing small amounts of potash at a time due to relatively low inventories resulting from the challenges associated with production keeping up with demand.⁸

2.7 Constraints and Issues in Other Segments of the Value Chain

It is important to acknowledge that other segments of the value chain (i.e. manufacturers, wholesalers and retailers) also face constraints and issues related to fertilizer pricing and marketing. Manufacturers face rising input costs such as the costs of natural gas and sulphur. Wholesalers and retailers are subject to increasing international prices for fertilizers. In addition, they must secure products and deal with logistics, paper work, money transfers, unloading locations, scheduling, etc. They are also subject to the seasonal nature of the agricultural industry. In particular, they face challenges due to the overlap in timing between requiring people and trucks to accommodate crop receiving and shipping and fall fertilizer deliveries. This

⁸ Personal communication with Canadian fertilizer wholesaler.

can significantly increase retailer financing requirements and costs. Additionally, in tight markets, retailers will be under pressure to order exactly the right amount of product, and will have limited flexibility to fill large unanticipated orders.

2.8 Summary

The most influential risk factors relating to Canadian fertilizer users appear to be those associated with rising fertilizer prices, increasing prices and volatility for raw materials such as natural gas, potash, and sulphur, and potential fertilizer supply risk as increasing world demands for fertilizer place pressure on supplies. Farmers purchasing at the last minute may have difficulty obtaining the nutrient combination and/or quantity of fertilizer they desire.

3. Mitigating Fertilizer Risk

This section discusses some potential actions relating to fertilizer purchase decisions that can mitigate some risk factors. The primary actions to be taken by farmers (in no particular order) are:

- Forward contracting fertilizer
- Pre-purchasing fertilizer
- Hedging—there are no fertilizer futures, but farmers could hedge currency and natural gas, if their positions are large enough
- Volume discounts, possibly through buying cooperatives. This could also provide the size necessary for some types of hedging.
- Maintaining dealer relationships
- Fertilizer management and use of beneficial management practices

These mitigating actions are discussed within the context of the risks described in section 2. We note that not all farmers will or should engage in all risk-mitigating actions. Some tools will be more valuable to some farmers; other tools will be more valuable to other farmers. It is important to note that application of risk-mitigating tools may be time-consuming and/or costly.

3.1 Fertilizer Price Risk

There are a number of ways to manage fertilizer price risk. These various ways will have different appeal to different producers.

3.1.1 Forward Contracting and Pre-purchasing Fertilizer

Forward contracting could be used to lock in fertilizer prices in advance. In Canada, fertilizer prices can typically be locked in 6 to 10 months⁹ in advance of delivery, either through agri-retailers, buying groups, or cooperatives.

Pre-purchasing fertilizer is a special case of contracting, whereby the farmer actually pays for the product in advance.

In many cases, suppliers are willing to provide a better price or more attractive package to those who pre-purchase or forward contract, because it allows the supplier to have certainty about their needs and to pre-arrange the appropriate logistics. However, this approach does not

⁹ Personal communication with not-for-profit buying group.

provide an opportunity to manage longer term risk because contracts rarely allow farmers to purchase fertilizer beyond the next growing season.

3.1.2 Hedging

In the past, hedging fertilizer was theoretically possible because there was a di-ammonium phosphate (DAP) futures contract. However, this contract failed since it was a poor hedging tool and was perceived not to offer benefits (Bollman et al., 2003). What is currently possible is a cross hedge using the natural gas contract or option to protect against nitrogen price increases arising from natural gas price increases. It is important to note that while nitrogen fertilizer prices generally track natural gas prices, the relationship is not a direct correlation. Thus, the outcomes of hedging using a natural gas contract retains significant basis risk.

With respect to the exchange rate, fertilizer users' risk is that the Canadian dollar will fall relative to the US dollar, because North American fertilizer prices are determined in the US market. Therefore, it is possible to sell Canadian dollar futures or to buy Canadian dollar put options to hedge this risk. In recent years, the Canadian dollar has been moving in the opposite direction (i.e. rising relative to the US dollar), resulting in a more favourable position for Canadian purchasers of fertilizers.

Producers' hedging positions in natural gas futures or exchange rates need to be directly related to their fertilizer cost exposure. For example, if one is purchasing C\$30,000 of fertilizer, it is hard to justify a C\$100,000 currency futures contract. Failing to relate hedges to fertilizer cost exposure results in what a farmer thought was a hedging position turning into a speculative position, which can significantly increase risk. It is important to note that a "mini" contract of \$50,000 also exists.

Hedging is thus best suited for large farmers with very sizeable fertilizer demands and/or cooperatives. Even in these cases, it requires specialized knowledge of related input markets since there is no direct fertilizer price hedge.

3.1.3 Volume Purchases

In general, the price and terms of delivery for fertilizer vary from sale to sale depending on timing, the size of the transaction, and other related purchases. However, due to lower per unit transactions costs, purchasers of large volumes of fertilizer may benefit from more competitive prices, more timely delivery or other favourable characteristics. This strategy tends to favour larger, well financed farms. Cooperatives or buying groups are options that farmers use to either increase their buying power or reduce their transactions costs with fertilizer suppliers.¹⁰

3.1.4 Dealer Relationships

Fertilizer retailers act as the link in the value chain between fertilizer manufacturers and farmers. The timing of purchases by farmers and their retailers is an important factor in determining product price. Farmers who forecast fertilizer requirements and submit requests to fertilizer retailers early may benefit from pre-positioning in the marketplace, allowing the retailer to take advantage of price and supply opportunities.

¹⁰ In cases of cooperatives or buying groups, one of the risks that should be noted is credit risk. In the event that one or more members of the group fail to pay for their product, other members of the group may be held responsible.

The better the long-term relationship a purchaser has with a dealer, the lower the likelihood that the purchaser will be left without sufficient supply or with an inappropriate mix of products. Working consistently with a dealer over the long-term may help to meet purchaser needs. Working with the dealer does not exclude negotiating favourable contracts each year, as long as both the farmer and dealer get a fair deal. Farmers who hop from dealer to dealer on the basis of price alone may be among the last in line when supplies fall short.

Timing of fertilizer delivery is also an important aspect of the service provided by retailers.

3.1.5 Beneficial Management Practices and Good Fertilizer Management

As the price of fertilizer rises, the price of improper application techniques and overuse of fertilizer also rises. Thus, it becomes even more critical to think about implementing beneficial management practices such as soil testing, variable rate application, implementing a nutrient management plan, re-evaluating rotations, and balanced application of fertilizer. Most farmers pay attention to these issues but re-evaluation in light of high fertilizer prices is appropriate and timely.

3.2 Gross Margin Risk and Cash Flow Risk

With the current grain and oilseed situation, there appears to be very little gross margin or cash flow risk, especially if the farmer can lock in the fertilizer price. At this time, we make no additional recommendations for specific management of these risks.

3.3 Tax Consequences

In previous times of positive margins, there was a tendency to minimize tax incidence by purchasing land, equipment and inputs to offset profit. In some cases, it is better to pay the tax than to overpay for an unnecessary asset or input. Overpaying for assets raises costs, and places the purchaser in the position of speculating that grain prices will remain high for the life of asset. Additionally, the conventional wisdom is that if the asset wasn't worth purchasing without the tax consideration, it is unlikely to be worth purchasing in any case.

3.4 Interest Rate Risk

Theoretically, interest rate risk can be hedged using interest rate futures. However, the size of the financial instruments available is too large for farmers to deal with. Moreover, with current downward trends in interest rates, we make no additional recommendations for specific management of interest rate risk.

3.5 Fertilizer Supply and Increasing Global Demand

In today's demand-driven global market for fertilizers, there is a very significant risk that farmers could be left short of fertilizer.

Pre-purchasing or contracting fertilizer, as discussed above, is one strategy to lock in volume and nutrient composition.

Establishing and improving a long-term relationship with a dealer is another important strategy. The better the long-term relationship a purchaser has with a dealer, the lower the likelihood that the purchaser will be left without sufficient supply or with an inappropriate mix of products.

3.6 Summary

The risk issues and recommended farmer actions are summarized in Table 4.

Table 4 Fertilizer Risk Issues and Recommended Farmer Actions

Risk Issue	Farmer Action
Fertilizer Price Risk	
Rising fertilizer prices	Forward contracting, BMPs, volume purchases
Volatile fertilizer prices	Pre-purchasing, dealer relationships
Exchange rate risk	Exchange-rate hedges
Gross Margin Risk	No additional action, especially if fertilizer price locked in.
Cash Flow Risk	No additional action, especially if fertilizer price locked in.
Tax Consequences	No action recommended
Interest Rate Risk	No action recommended
Fertilizer Supply Risk	Forward contracting, pre-purchasing, dealer relationships
Increasing Global Demand	Forward contracting, pre-purchasing, dealer relationships

4. Summary and Conclusions

Farmers currently face two major fertilizer risks: rising and volatile fertilizer prices, and growing demand for limited supplies. Rising and volatile Canadian fertilizer prices are caused by rising input prices, exchange rate fluctuations, and increasing global demand for fertilizer. The increases in global demand are caused by increases in the demand for both food and non-food uses of major crops, US demand for corn for ethanol with accompanying demand especially for nitrogen, and increasing use of fertilizer in China and other emerging economies. These risks appear to be persistent over the foreseeable future.

These risks are mitigated by the current high prices for most crops. Additional risk management strategies for farmers include pre-purchasing fertilizer, forward contracting, volume purchases either individually or in groups, and maintaining relationships with dealers based on price, service, and consistency of product. Farmers can also re-evaluate their nutrient management plans, crop rotations and beneficial management practices in light of these significant changes in fertilizer prices.

5. References

AAFC. 2008a. Personal communication.

AAFC. 2008b. *Canada: Farm Fuel and Fertilizer Expenses*. Retrieved Apr. 2, 2008b from: http://www.agr.gc.ca/mad-dam/index_e.php?s1=pubs&s2=bi&s3=php&page=bulletin_21_04_2008-03-28.

Andersen, D. 2008. *Fertilizer Market Characteristics and Pricing Fundamentals*. Westco Fertilizer.

Bank of Canada. 2008. Exchange Rates. Retrieved Mar. 24, 2008 from: <http://www.bank-banque-canada.ca/en/rates/exchange.html>.

Bollman, K. et al. 2003. What Killed the Diammonium Phosphate Futures Contract? *Review of Agricultural Economics* 25 (2): 483-505.

Canadian Fertilizer Institute. 2008. *Global and Canadian Fertilizer Situation*.

Daniels Trading. 2008. Ag Advisory Glossary. Retrieved Feb. 1, 2008 from: <http://www.danielstrading.com/resources/ag-advisory/glossary.php>.

DTN. 2008. Eastern Canadian Grain Markets. Retrieved Mar. 28, 2008 from: <http://online.dtn.com/online/>.

Energy Information Administration. 2007. Natural Gas Prices. Retrieved Jan. 28, 2008 from: http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm.

Heffer, P. 2007. *Medium-Term Outlook for World Agriculture and Fertilizer Demand 2006/07-2011/12*. IFA.

Hursh, K. 2008. Fertilizer Prices Escalate. *Hursh on Agriculture*. Retrieved Jan. 31, 2008 from: http://www.hursh.ca/2008_01_01_archive.asp.

ICE Futures Canada. 2008. *Historical Price Data*. Winnipeg Commodity Exchange. Retrieved Mar. 28, 2008 from: <http://www.wce.ca/ContractsMarketInfo.aspx?first=settlementprices&second=historicaldata>.

Keller, A. 2007. Harvest Season Thoughts Turn to Spring Fertilizer Prices. *Focus on Agriculture*. Retrieved Jan. 29, 2008 from: <http://www.fb.org/index.php?fuseaction=newsroom.focusfocus&year=2007&file=fo1203.html>.

Mastrangelo, E. 2007. *An Analysis of Price Volatility in Natural Gas Markets*. Energy Information Administration, US Department of Energy. Retrieved Jan. 29, 2008 from: http://www.eia.doe.gov/pub/oil_gas/natural_gas/feature_articles/2007/ngprivolatility/ngprivolatility.pdf.

Mohr, P. 2008. Scotiabank Commodity Price Index Eases Back In December. *Scotiabank Economic Report*. Retrieved Mar. 2, 2008 from: <http://micro.newswire.ca/release.cgi?rkey=1601284597&view=40582-0&Start=0>.

Rahm, M. 2008. Personal communication. Vice President, Market & Economic Analysis. The Mosaic Company.

Rampton, R. 2007. Potash Suspends New Sales, Eyes Russia Mine Flood. *Reuters*. Retrieved Jan. 29, 2008 from:
<http://www.reuters.com/article/companyNewsAndPR/idUSN2564297320071025>.

USDA-ERS. 2008. Feed Grains Database: Yearbook Tables. Retrieved Feb. 1, 2008 from:
<http://www.ers.usda.gov/Data/feedgrains/StandardReports/YBtable1.htm>.

Vroomen, H. 2008. *Fertilizer: What's on the Horizon*. The Fertilizer Institute. Retrieved Jan. 29, 2008 from: <http://www.tfi.org/>.