Hog Crush Margins
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ABSTRACT
The original idea of “crush margin” comes from the soybean processing industry. The term “crush” refers to the crushing of soybeans to produce meal and oil. Market traders use the soybean, soybean meal and soybean oil futures to generate margin numbers to manage for profit opportunities.

In the hog industry, the purchasing of weaned or feeder pigs, corn and soybean meal and the selling of market hogs generates both input and output price risks for hog producers. Therefore by managing the prices of market hogs, weaned or feeder pigs, corn and soybean meal, a margin can be protected.

This paper examines two hog crush margin calculators, The Gross Feed Margin Model and the Hog Margin Tracker.

WHY UTILIZE A CRUSH MARGIN?
Feed, weaned pig and feeder pig prices account for a significant portion of the input costs within a hog operation. These inputs are volatile, increasing a producer’s price risks. Purchasing corn, soybean meal, and weaned or feeder pigs to raise them to market hog weight exposes a producer to both input cost and output revenue price risk. Managing these risks is a challenging process, but necessary and vital to estimate profitability.

Today’s crush margin and historical recorded margin estimates can be used in a quick and time efficient manner to identify times when risk management opportunities exist or when troubled waters lie ahead. This tool provides producers an easy way to monitor feed and hog markets in order to gain greater control over input booking and selling market hogs.

Crush margin calculations only consider corn, soybean meal, and weaned or feeder pigs on the input side of the equation. The remaining fixed and other variable costs need to be subtracted to arrive at a return on profit estimate.

Advantages to using crush margins:
\begin{itemize}
    \item Simple and straightforward strategy for managing price risks.
    \item Allows for a mechanical based risk management plan that further removes emotions from the decision making process.
    \item Margins can be calculated as far out as eighteen months into the future, providing a forward looking market picture to base input cost planning and marketing decisions on.
\end{itemize}
Disadvantages to using crush margins:

- If acceptable margins are not available, an alternative risk management strategy needs to be considered.
- Seasonal price trends that may be present in agricultural commodity markets are not considered when calculating the raw difference between feed and market hog prices.
- Other costs associated with the operation need to be subtracted from the margin estimate. Examples of those costs include barn costs, transportation, marketing, interest, labour and health.

**THE GROSS FEED MARGIN MODEL (GFM)**

The Simpson/Caputo Group of RBC Dominion Securities Inc. in Waterloo have developed a tool to provide their producers with a customized return on feed estimate. They built this tool with the intention of:

- Providing their clients with a simple, straightforward, and time efficient risk management tool.
- Providing their clients with a customized risk management tool, based on their information, which provides them with personalized historical benchmarks.

**The sample snapshot (Figure 1) of the Gross Feed Margin Model is understood as:**

1. This column lists the margins. The numbers show what revenue is left over after taking feed input costs into consideration, referred to as a return on feed. The formula is: \((2 \times \text{lean hog price}) - (\text{corn price converted to total pounds (lb.) fed}) - (\text{wheat price converted to total lb. fed}) - (\text{meal price converted to total short tons fed})\). For example, on 02/21/13 the March estimated return on feed was $86.23. Staying with the March delivery period as an example, the margin calculation here uses the April lean hog futures contract and the March corn, wheat, and meal contracts. Once the March feed contract expires, the margins are calculated using the May feed contracts until the April lean hogs expire.

2. This column lists the 90\textsuperscript{th} percentiles for the corresponding delivery period and margin calculation that is shown under the margin column. The percentile figure is included to use as a benchmark and possible opportunity to hedge margins. The 90\textsuperscript{th} percentile means that 90% of the time, margins have been equal to or lower than the stated value. For example, the March 2013 90\textsuperscript{th} percentile is stated at $107.03. This means that we have only been above this figure 10% of the time since 2007.

3. This bar chart simply displays the gross feed margin figures in chart form.

4. This table is a one pig feed budget and is essential in calculating margins. The table is broken down into sow feed (lb.) and pig feed (lb.) for corn, wheat, and soybean meal. A producer’s personalized feed amounts are listed here and used in the formula to calculate the gross feed margin for each delivery period. Feed amounts are converted to pounds as lean hog futures contracts are traded in 40,000 lb. increments. For example, the snapshot above shows this producer using 451.95 lb. of corn and 103.62 lb. of soybean meal to raise one pig. Also included in this table is the number of hogs marketed on a monthly basis and the percentage of hogs that are to be hedged if a favourable margin is available.

5. This table shows the quantity of futures contracts that need to be traded in order to hedge a margin, based on the information provided in the one pig feed budget. You will notice two
figures for hogs, corn, wheat, and soybean meal. The first is the projected number of contracts to be traded and is based on actual feed usage and hog marketing’s listed in the one pig feed budget. Projected quantities show fractions of futures contracts that would need to be traded, but these fractions cannot be traded. This is a disadvantage to using crush margins for smaller operations or for smaller percentages to hedge and is an issue that needs to be addressed. A producer has numerous options when dealing with this issue. For example, one can use forwards via their feed supplier and futures for hogs. Also, you can test the percentages to hedge to determine acceptable hedging increments that arrive at more even numbers. The second figure shown is the actual quantities; this shows how many futures contracts that would actually be traded.

How margins are calculated:

- The gross feed margin is calculated daily using real time prices and is based on the current ‘best bid’ price for the hog contract and the ‘best offer’ prices for the corn, wheat and soybean meal contracts.
- The formula is: (2 x lean hog price) – (corn price converted to total lb. fed) – (wheat price converted to total lb. fed) – (meal price converted to total short tons fed)
• Hog futures prices are multiplied by 2 to convert them into a 200 lb. carcass price.
• All gross feed margins shown are in US dollars.
• If a producer feels that the projected margin calculated by the model is attractive, then they can execute a package of trades that could protect it. Those trades consist of selling lean hog futures contracts and buying corn and soybean meal contracts in the appropriate quantities.

Model Features
This model is customized to each individual farm operation. Some of the features the model provides are:
• Provides historical gross feed margins for each month going back to the 2007 lean hog futures contract year. This historical data is used to calculate the 90th percentile figures used as personalized benchmarks.
• Margin targets can be set. If a target is reached, parties involved are contacted.
• Reports and tracks prior day’s margins based on closing prices.
• Margins begin tracking once a new hog futures contract month is added to the board, margins are currently tracking 18 months into the future.
• Provides the approximate amount of initial margin required to finance the position.
• A scenario analysis is included to show what the cash-flow risk would be if gross feed margins were to continue higher after a package was executed. Four different scenarios are included, all based on margins increasing and requiring more working capital to finance the position.
  ß Note that initial margin rates are subject to change.
• Provides the approximate amount of commission charged per package, on a round turn basis.
  ß Note that commission rates are subject to change.

THE HOG MARGIN TRACKER
The Hog Margin Tracker (Figure 2) is a weekly marketing tool to demonstrate to producers the potential of using a “Crush Margin” as a decision making tool to manage price risk. Through the margin calculation, by looking at both historical and forward looking margins, it provides a quick indicator of risk management opportunities or challenges. It acts as a monitor of both the current and future markets for the hog and feed markets.

The Hog Margin Tracker is an indicator of the margin after accounting for the variables with the greatest price risk (market hog, feeder pig, corn and soybean meal). The margin is the return to cover all other costs and provide a profit. Margin is simply the market hog value less the feeder pig and feed costs. Once a favourable margin is indicated, pricing opportunities for market hogs and/or feed inputs should be reviewed. Depending on the current market assessment and risk implications for the farm business, the appropriate action should be taken.

Time Periods on Hog Margin Tracker (Figure 2) and Report (Figure 3):
• Actual - Market pigs have been marketed – final result (figures will not change)
• Pigs on Feed - Feeder pigs purchased and on feed in the barn – feeder pig value will not change but projected market hog values, feed costs, and margins will change weekly based on the futures
• Looking Forward - All values are projected and will change weekly based on the futures
• $25 Margin – This is the assumed benchmark margin value needed to cover all other expected costs

Figure 2: 2013 Hog Margin Tracker Trend (C$ per Market Hog) – February 15, 2013.

Margin ($/pig) = Market Hog Value ($/pig) – Feeder Pig Value ($/25 kg pig) – Feed Cost ($/pig):
• Market Hog Value = 101% of weekly base price X 110 index X weekly average dressed weight + $2 premium
• Feeder Pig Value (25 kg) = 70% of the (Market Hog Value (15 weeks out) – Current Weeks’s Feed Cost
• Feed Cost is based on 15 week average using Corn (Avg. of Huron FOB Farm and Western Ontario Feed Corn), Hamilton Soybean Meal plus $20/tonne, commercial premix, and $20 per tonne (handling and mixing), 2.75 feed conversion, growing pig from 25 kg to market weight
• Projected values used for feed (corn and soybean meal) and market hogs are calculated using basis adjusted futures values at the close of the futures market on Thursday each week
• The Expected Margin (right hand column of Figure 3) is the estimated margin the week the feeder pig is placed on feed. This figure will not change and is a benchmark figure to
compare the realized margin with . It is based on the initial calculated values for market hog, feeder pig, and feed. This calculation is done fifteen (15) weeks prior to the indicated date of the sale week.

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Figure 3. Hog Margin Tracker Report – February 15, 2013.

Putting a hog crush margin into action!

Now that you have gained an understanding on how a hog crush functions and its role in managing risk, it is time to put one into action. The steps are:

1. Develop a feed budget for your swine operation
2. Determine what a good margin is for your swine operation. This means looking at all the other costs associated with raising pigs that are not included in the crush margin calculation.

3. Implement your crush margin based on your farm data. If you can determine some historical margins they can be used as benchmark data when looking at forwarding looking margins.

4. If an attractive margin is available, it should be hedged. Consider the various price risk management tools available with the forward and/or futures markets.

5. If an attractive margin is not available, look at alternative hedge strategies. This could mean separating the hog and feed price risks and hedging them at different times.

6. Use the marketing resources and information available to assist in making your decisions.

REFERENCES
McFadden, Shane and Roberts, Daniel. 2010. Lean Hogs Hedge Model and Crush Margin Calculator, University of Minnesota

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