Using Futures and Options to Manage Hog Price Volatility

Larry Martin, Ph. D.

Agrifood Management Excellence and Dr. Larry Martin &Associates, Inc.
Ph: 519 623 8622, dlm@xplornet.com

Introduction and Objectives

I work with a few grain and livestock farmers as well as agribusinesses across Canada on a regular basis. We develop potential pricing strategies for their products or major inputs. Each session starts out with the "bull bag" and the "bear bag". As any market-watcher knows, there is always new information each day, some of which comes out of the bull bag, which can take prices higher. However, there is also some information escaping from the bear bag that can take prices lower.

There's nothing strange about this: it's what causes a market to function, and causes one trader to sell to another who buys when they agree on a price. The information is combined in the futures market to form an expected future cash price based on traders' collective assessments of what comes out of the bull and bear bags.

This situation is particularly interesting in the pork and beef sectors at the current time. The bear bag says we should be concerned about falling prices because supplies are higher than last year. But the bull bag shows that domestic and,

especially, export demand is particularly strong thereby giving upward pressure to prices. In addition, we are in the midst of seemingly irrational, and most certainly, uncertain outcomes of NAFTA and TPP. These and other factors result in volatile exchange rates. All of these lead to uncertainty about the direction of price changes over the next few months and years. In turn, they lead to huge questions about long term planning.

In my experience, one of the most frequently asked questions is, “what do you think these hog (beef, corn, soybean, canola, wheat) prices are going to do.” My standard answer is, if I knew what they were going to do, would I be standing here talking to you, or would I be trading? At no time in my career has that been truer than now. Depending on the outcomes of a number of these factors, we could see a general uptrend in prices or a major disaster.

In this paper, I want to try and do three things:

- Characterize the conditions that give rise to the current uncertainty.
- Define some methods of reading charts that can help change the question from “where do I think prices are headed?” to “where should I take action”?
- Suggest some trading rules for deciding when and what actions to take.

The paper is written with the assumption of a basic knowledge of basis, trading futures, and trading options.

What's Going On in the Pork Market?

Let's start with the ***bear bag***.

The most recent supply side information available at the time this was written is the USDA's September 2017 report. It contained (compared to the previous year) 2% more hogs, 1% more breeding stock and 3% more market hogs in the inventory, based on a sample of 7560 US farms. Since the report, hog slaughter is up, with kills being fairly current, suggesting that slaughter and carcass weights may rise a little going forward. USDA reports that October's red meat product hit a new monthly record, with hog slaughter up 5% at the same weights as last year, and with an extra day in the month.

Perhaps more interesting is the fact that the trend in production has been on a constant incline since 2013/2014. All US pigs were at 66 million in September of 2014, vs 73.5 million this year. Sows farrowed rose from just under 2.9 million in September 2013 to 3.1 million this year. With pigs per litter rising constantly, we clearly have seen a four-year rise in supply. Before this year, the record US slaughter was 450,000 per day, now 460,000 is common.

Figure 1 shows what happened to nearby December futures after that report. September 28 is in the middle of the chart. That day futures closed at U$58.275. On the 29th, the market had a tug of war about whether the report was bullish or bearish. The bulls won at U$59.95 and then futures followed cash up to the new

life of contract high of U$68.00. Cash and futures then dropped in December to around $60 before a rally to the recent high of U$65.

Figure 1: December 2017 Lean Hog Futures to Dec 1, 2017
Source: Thomson Reuters Eikon

Most analysts argue that these hog prices, combined with relatively low feed prices, will continue to spur expansion going forward. Dennis Smith in a recent article noted a number of factors that appear to support this perception including:

- Reports from across the US confirm continued expansion
- Weights are rising with some weeks' averages up four pounds
- The US has projected record corn stocks suggesting producers will expand numbers and feed to heavier weights

All this will be clearer before this paper is presented as the USDA will release its next Hogs and Pigs report two weeks before the conference, but overall, the short and long run implications of the supply side is bearish. With constant demand, the supply side information would argue for downward pressure on prices at the time this paper was written.

One additional factor in the bear bag is the position of funds in lean hog futures. The so-called hedge funds went from 28,000 contracts net long in mid-September, to 60,000 in mid-November. It may seem ironic that a growing net long position is bearish, but a study of funds' positions leads to the conclusion that while they often add liquidity that aids a trend, they often stay too long. Then when the trend reverses, they run for cover to either crystallize profits or reduce losses thereby feeding the scope and speed of the trend reversal. If the fundamentals point downward, then the longs will get out. This means selling pressure.

Now for the ***bull bag.***

Why did prices rise after a bearish report? The bull bag contains the things that are much harder to forecast, and they mainly relate to demand. There are three factors that have contributed to increased demand.

First, the US has two new hog plants in Iowa, so there is more capacity and more competition for hogs. Second, domestic demand for red meat with a relatively strong economy is vibrant; and pork demand seems to be gaining a bit on chicken and beef. That buoyancy is contributing to the strong prices. Thirdly, and I believe most importantly, is the growth in export demand. Bill Even of the US National Pork Board points out that the US moved from a net import position to 27% of production being exported this year. As we know, Canada exports either as meat or live hogs approximately 65% of our hogs most years. So far this year, Canada's exports of pork to the US is down almost three percent, but up 4.75% to other destinations. Non-US destinations are bigger.

Much of the export demand growth is to China where demand is growing rapidly, as the world's leading consumer of pork, and where incomes have grown at a compound rate of over 6% for several years. In addition, small producers and processors are being closed down near cities for environmental reasons. Wan Long, head of WH Industries predicts that, with China's limited land base, demand growth will be greater than domestic supply can keep up with. This is despite the fact that considerable expansion is taking place in the Northeast. Long points out that Smithfield's exports to China increased from 70,000 tonnes three years ago to 300,000 tonnes last year.

With this rosy picture, we should all remember that China has shut off imports in the past because of "disease" with little scientific evidence to support the decision, though that might not be so easy now that WH owns Smithfield.

The Political Uncertainties

The wise leader of the United States does not like international trade agreements. The US is threatening to pull out of NAFTA and asking for the moon and seven stars to stay in. If NAFTA is aborted, the major uncertainties to the pork industry are what happens to US and Canadian access to the Mexican market and, of course, what happens to Canadian access to the US market. Loss of access to Mexico or stiff tariffs on pork would likely undermine the US price pressure because Mexico is a major customer of both countries. Currently, it is hard to see any other outcome to the NAFTA negotiations because the positions are so far apart and many reports from Mexico suggest that Mexico is prepared to move on.

Furthermore, the wise leader of the US withdrew from the TPP negotiations. However, because the other countries wanted to continue, this seems like a great opportunity for Canada. What could be better for Canadian agriculture with its immense resource base than improved access to, especially, the Japanese and Vietnamese markets without competition from the US? All of the analyses of TPP concluded that the Canadian and US agriculture sectors, in general, would be the largest beneficiaries of TPP. The red meat sector would be by far the largest.

Without US competition, what could be better than TPP for Canada? It is not outside the realm of possibility that we could even see the Canadian basis for pork go to a currency adjusted premium over nearby futures if the export demand grew enough. (Maybe we would even have to consider a country of origin labelling policy to keep US pork from being transshipped through Canada!).

However, to prove that US has no corner on wise leadership, at the time this is written, Canada has reduced progress on TPP after introducing new demands into what was already agreed. The teeth of this gift horse apparently need to be inspected.

So, we head into 2018 with four years of steady growth in pork supply, putting downward pressure on prices; but relatively strong domestic and quite strong export demand are having the opposite effect and appear to be set to continue growing. There are no guarantees of this continuation, especially in export growth,

partly because there are no trade agreements that give clear rules of access to foreign markets.

Some Chart Concepts

So, with all this uncertainty, where do we think prices are going to go in 2018? (If I knew the answer to that question…!)

So, let's address the right question. Where should we take action?

To answer this, we will first define a small number of technical tools used by traders in commodity and stock markets to try and read charts and to develop disciplined trading rules. There are many. There are six I like and use. I have shown slides from my futures and options course which we are offering in February with input from the Simpson Caputo Group at RBC Securities.

Before starting with that, it may be useful to show the volatility this industry has dealt with over the past 20 years. Figure 2 shows monthly nearby futures prices for lean hog futures. These are very close to actual cash prices. The volatility of the series is likely a little overstated because in months (Feb, Apr, May, June, July, Aug, Oct, Dec) when contracts mature the "nearby" is the maturing month (e.g. Aug) until the last day of trading (e.g. Aug 10). Thereafter, it is the following month (in this case Oct.). So some of the within-month volatility represents the actual seasonal patterns in the hog market.

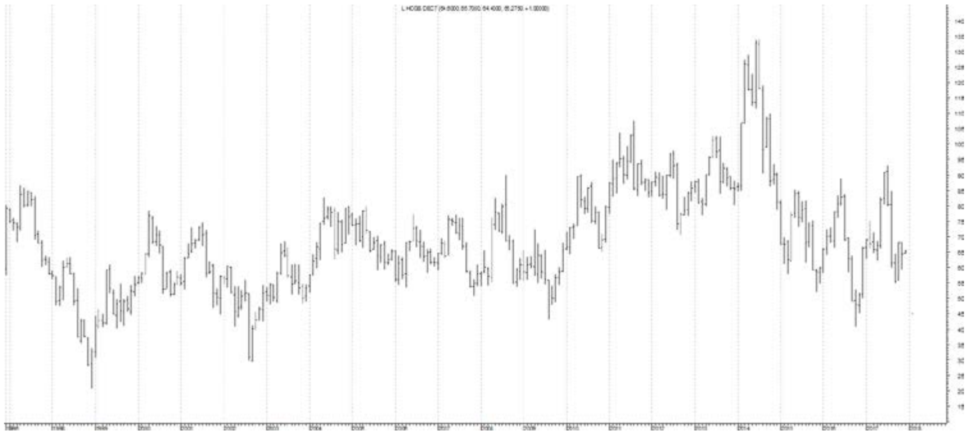

Figure 2. Monthly Continuation Chart, Lean Hogs, 1996-2017

The chart shows that the range was from the U$20.70 low in 1998 to the U$133.80 high in 2014, and back down to a U$40.70 low in 2016. There are swings of over $40/cwt within years and over $30 within a few months. Every year had a relatively profitable upper range that could have been sold (except maybe 1998 and 2008 (because of feed costs).

Corn, as probably the largest feed cost for hogs, has been even more volatile (Figure 3). The range here is from U$1.74 in 2000, to U$8.43¾ in 2012, and back down to U$3.06 in 2016. There is large within year and within month variation, and each year has a lower component of the market where pricing could have occurred to contribute to profits.

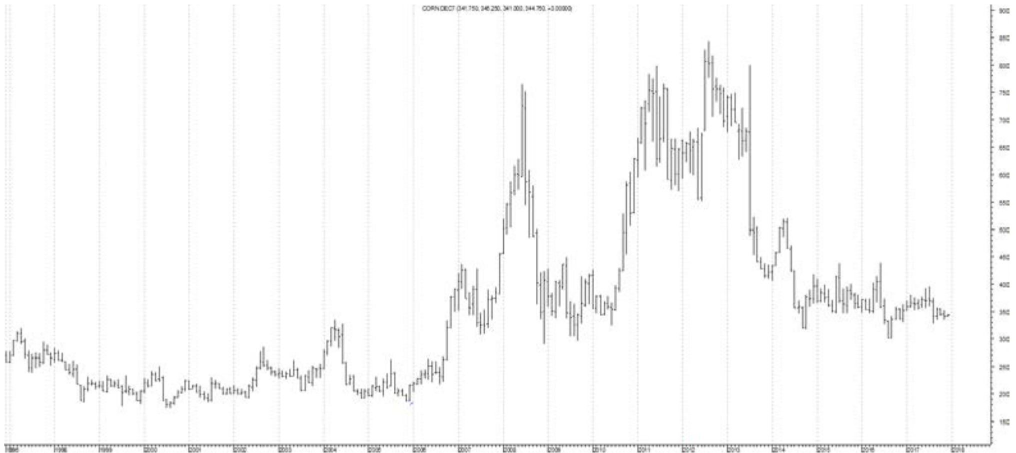

Figure 3. Monthly Continuation Chart, Corn, 1996-2017

Now to the chart patterns.

Resistance and Support Planes

Potential resistance and support planes are relatively easy to spot: they occur where markets spike up or down and then stop – i.e. they have resisted going higher, or are supported from going lower (Figure 4).

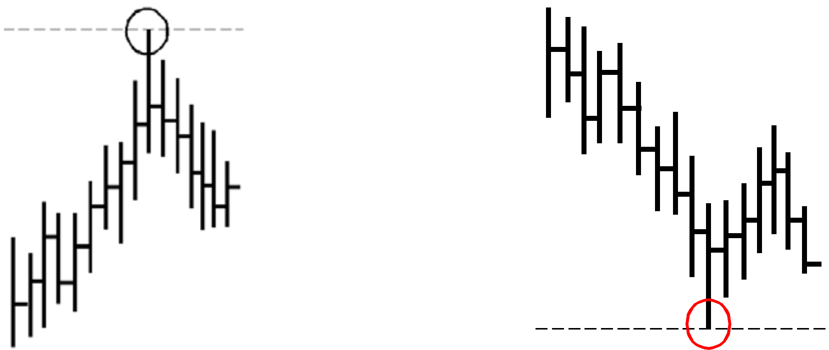

Figure 4. Stylized Resistance and Support at Contract Highs and Lows

Resistance and support are *particularly significant when they occur at a double or triple top or bottom, at a life of contract high or low, and particularly so when the contract high or low is made on a key reversal, or it is consistent with a Fibonacci retracement line* (defined below).

The two charts in Figure 4 could be life of contract highs or lows. If so, resistance or support at those levels would be significant. If they are just spikes in the middle of the chart, they may have little meaning unless prices subsequently stop there again.

A stylized double top is shown in Figure 5. Double bottoms look the same except upside down.

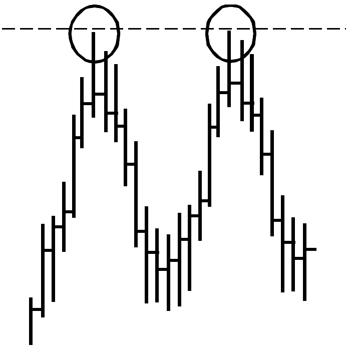

Figure 5. Stylized double top

When a resistance or support plane has been on a chart for a long period of time, it has economic meaning. Look at the March Spring Wheat chart in Figure 6 below.

Figure 6. March Spring Wheat Futures

March fell below U$6.70 in late August, rallied up to U$6.67 on September 8 and fell to U$6.20 on October 2. Both $6.67 and $6.20 have been tested several times since then with resistance and support holding. These are significant resistance and support planes. They tell me that no matter what supply and demand information the market received between late August and early December, traders couldn't find a reason to trade outside that range. So, as long as there are no major changes in the market fundamentals, the Minneapolis cash price in March will likely be in this range.

It also implies that the highest a seller can expect is around $6.67, and the lowest a buyer will be able to pay is around $6.20. When lots of speculators see a channel like this on a chart, they put in buy orders just above $6.20 and sell orders just below $6.67. If only one side of the channel is apparent, they'll place orders either just above or below and use some other technique for deciding when to take

profits/losses. If the fundamentals don't change, these buy and sell orders provide support and resistance. To some degree, the planes are self-fulfilling, again, as long as the fundamentals don't change.

Key Reversals

Key reversals occur very occasionally at life of contract highs and lows. They are illustrated in Figure 7. A bearish reversal occurs on a day making a life-of contract high, with a lower low and lower close than the previous day. They are the most reliable indicators that the market is going to move down, especially when the close is near the bottom of the daily range, and occur with high trading volume. This usually means that those with long positions who have been riding the upward trend decide the trend has gone too far and decide to take profits by selling their long positions.

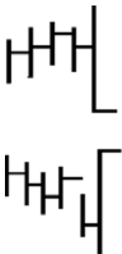

Figure 7. Bearish and Bullish Key Reversals

A bullish key reversal is the opposite: a new contract low, higher high and higher close. Again, a more reliable indicator of a move up when the close is near the top

with high volume. When these formations occur, there's a high probability that their tops or bottoms will be significant resistance or support planes.

Fibonacci Retracements

Space and time are too limited to explain this and the next two technical indicators in depth. Suffice it to say that Fibonacci's occur frequently. After a strong trend, the next move is simply a counter trend if it goes back, 38.2%, 50%, or 61.8% of how far it moved during the trend (Figure 8). The Fibonacci series also includes a 23.6% retracement that is not shown on the drawing below.

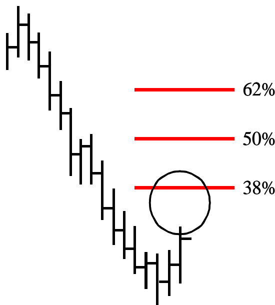

Figure 8. Fibonacci Retracements

The retracements are useful because they are easy to employ on most charting packages and many people do. Again they become self-fulfilling prophecies if the underlying fundamentals don't change. We use them to help confirm significant resistance and support planes. If after a strong trend, a potentially significant resistance or support plane is on the chart, and if it occurs at a Fibonacci line, that helps confirm its significance. It gives comfort that the line can be used to make pricing decisions.

Relative Strength Index (RSI) and Moving Average Convergence Divergence (MACD)

These are two widely used mathematical technical indicators, often regarded as oscillators. RSI is calculated from the past 14 days of prices, while MACD comes from a much longer series. RSI is an index, while MACD is a variable value. We use them as measures of momentum, because of their different lengths of data, RSI is short term momentum, while MACD is much longer. They are very useful in helping to confirm tops and bottoms. Figure 9 illustrates this with the RSI.

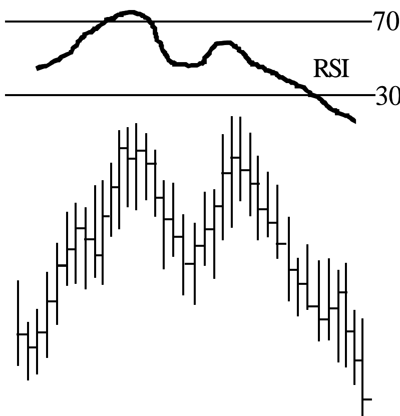

Figure 9. Relative Strength Index with Failure Swing

The RSI is an index of momentum of the futures market with values between 0 and 100. If the RSI is 50, it means that during the past 14 days, there is no momentum. Futures don't have a trend. Above 50, they have a positive trend and the higher the index the higher the positive momentum: at 90 futures have moved up strongly. Below 50, they have a downward trend and the lower the number the stronger the trend.

Where this helps is illustrated in the figure. Here we see the market came up and made a top, maybe a life of contract high. We will see below, that this is a sell signal for producers if the market rallies back to that point again. What the RSI is telling us is that the second time it comes up, it is coming up with less momentum. So, the RSI is ***diverging*** from the bar chart: the resistance plane on the bar chart is flat, while the trend on the tops of the RSI are downward sloping.

Of course if we are looking at bottoms, then the divergence would go in the opposite direction: flat bottom, ascending slope to the RSI chart.

When this occurs, it helps confirm that the second time up is likely going to be a high, and therefore a good place to sell. If divergence occurs on both the RSI and MACD, this is even greater confirmation that we have reached a top.

Returning to the Spring Wheat contract, we can see a number of these things coming together (Figure 10). As before, we see the resistance and support planes at U$6.67 and U$6.20. In addition, using the downtrend from the contract high of U$8.16 to the $6.20 low, we see that $6.67 is at the 23.6 Fibonacci point, thereby making it more significant, along with the multiple tops. Also note that as the market has tested the $6.20 support several times, both the RSI and MACD have been trending upward, positively diverging from the direction of trend on the bar chart. All of this helps to confirm that the channel is a good place to make some pricing decisions.

Figure 10. March 2018 Spring with Fibonacci, RSI and MACD

To complete this discussion, the obvious question is whether these patterns now determine what will happen to prices going forward? The answer is, of course not. As emphasized above, the channel is a clear indication of where cash prices will end up if the underlying fundamentals don't change. However, if they change, so will the pattern.

Break Outs

Once a significant resistance or support plane is on the chart, then a change in price due to the change in fundamentals will be reflected in a break out of the resistance or support plane. In the Spring Wheat example, that would likely be a break out to the upside because of continued poor weather in South America or poor weather in Russia/Ukraine, or the Spring Wheat growing area of the US and Canada. Excellent weather could have the opposite effect of causing a breakout below $6.20.

The reason for the change may be obvious at the time it occurs or it may not show up in the news until after the fact. In any circumstance, it will show up on the chart. The question is how to interpret it. Notice on the wheat chart that there is one day, November 28, when the price dropped to $6.15, but it closed above the $6.20 support plane at $6.22. It tried to break out, but the support plane held.

Markets will often send little false signals like this. We have adopted a rule that says we don't believe it's a breakout until the market has ***two consecutively lower closes below support.*** So, we would have to see a day when the market closes below $6.20, say $6.18, once. Then it would have to close lower than $6.18 the second day.

Similarly, for bullish break outs, we want to see ***two consecutively higher closes above the resistance plane.*** Even with these rules, markets don't always do what you want, but these decision rules help develop a disciplined pricing strategy as we will see in the final section.

Finally, note that if the wheat market breaks out above the resistance plane, each of the other Fibonacci retracements go back to areas of support or resistance, thereby giving clues to how far the next move might go. This illustrates why so many people pay so much attention to Fibs.

Pricing Decisions

We can use the material above to make some pricing decisions. Recall that the long term chart reveals that in most years there were periods of time when pricing could be done at favourable levels. The objective of our pricing rules is to get us priced near tops, when possible, while avoiding getting priced too early in a rising market. To illustrate this we use the July 2018 lean hog futures on December 4, 2017 shown in Figure 11.

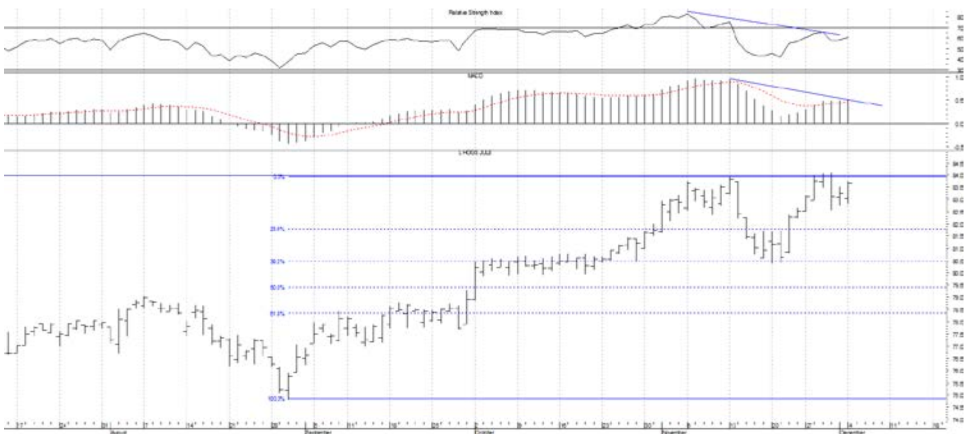

Figure 11. July '18 Lean Hogs, 041217

The chart shows that we have a multiple top at U$84.10. There is actually a weak key reversal on Nov 30; it meets the definition, but didn't close at the bottom and wasn't made on high volume. Also note, that on the second rally toward the top, both the RSI and MACD show bearish divergence from the bar chart, thereby tending to confirm that we are near the top. Again, note that after the first rally to the top, the market backed off to the 38.2% retracement at $80.50, which was an

old resistance plane. Finally, note that the 61.8% retracement is at another old resistance at $78.50.

Here are four alternatives a producer can do today with this chart. It qualifies as a significant top for me.

- Alternative 1. Do nothing because the bull bag says the market is going to go higher! We'll see by the time we meet in January.
- Alternative 2. If you like the basis your packer offers, do a forward contract on some of your pigs and be assured of a good price without having to worry about the trappings of futures and options.
- Alternative 2A. The risk of getting contracted here is that export demand will expand and you priced too low. So, you can lock in your contract price at a relatively high level and try to take advantage of a rally by buying Calls. We have a rule that Puts and Calls are cheap insurance if their premium is 3% or less of the strike price. The 38% Fibonacci projection from $84 would suggest an $88 Call, which is currently trading for $2.30. So, if you want to risk that on the ground the price will continue to rise, you can buy it. This would give you a price floor of your forward contract price less $2.30.
- Alternative 3. Sell futures now. If the market goes down, you have locked in a good price and the futures will cover some or all of the decline from here. As with the forward contract strategy, your risk is that you will get priced too low and the market will continue to rise. This can be addressed by using the breakout rule discussed above – i.e. have a buy stop on your

short position at two consecutively higher closes than $84.10. It essentially does the same thing as Alternative 2A, except it will cost nothing if in fact this is the high and futures drop. If they breakout, it may or may not be less costly than the option strategy depending on where the second close is. If you do get stopped out, you need a re-entry rule.

- Place a floor under the price. This can be done by buying a Put. The 38% retracement would suggest an $80 Put. It's not trading today, but settled at $3.325 yesterday. It will be a little lower at the moment because the futures market is higher, but still likely more than 3%, so you could move down to a $78 Put, which is trading at about $2.50. This would give you a $75.50 floor and let you speculate that the cash market will go higher.

Concluding Comments

The first part of this paper points out that there is considerable uncertainty around where hog prices will go in 2018 and that, even without the current uncertainty, history reveals that hog futures prices have been extremely volatile, though most years provided opportunities to price at relatively profitable levels.

The second part provides some common techniques to help assess whether prices are near tops or bottoms. As it happens, these techniques suggest the July '18 contract is near the top. None of us know whether this is true (that's why there's uncertainty), but we do know the chart is pointing to that possibility.

Part three gives some rules that can either get you priced at the current top, get you priced near the top, but give you the opportunity to take advantage of any further price appreciation that might occur, and/or to do so with a floor under your prices. Of course, you always have the alternative of speculating in the cash market.

Which of these you choose depends on your strategy and objectives. Part of developing a strategy may be affected by your inclination and ability to manage the cash flow implications of futures margin calls. That's why we include forward contracting and options alternatives. It is interesting to note that the bottom line is that an understanding of how to read the futures charts is basic to any of the alternatives except speculating in cash prices.

References

Smith, Dennis, With Excellent Demand for Pork, What's the Worry? National Hog Farmer, November 27, 2017

Sites, Arnie, US Has Record Pork Exports, Brownfield Agricultural News, November 30, 2017

USDA, National Agricultural Statistics Service, Quarterly Hogs and Pigs Report: Executive Briefing, September 28, 2017

USDA, National Agricultural Statistics Service, Livestock Slaughter, November 22, 2017

Wan Long, China's Demand for Imported Pork to Rise as Beijing Closes Small Domestic Producers, South China Morning Post, December 2, 2017