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New implications for packer contracts

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Introduction

According to mandatory price reporting statistics approximately 11% percent of market hogs were procured under spot market or negotiated conditions. The spot market is defined as a negotiated price at the specific exchange time for the hogs. Approximately 89% are either packer owned or procured under a marketing contract. This level of contracting has raised issues of the economic performance of market contracts as well as the legal aspects of market contracts. Following is a general overview of long-term contracts and their implications.

Why have marketing contracts emerged?

Packer motivations

Supply assurance

Historically, the hog industry exhibits large supply variability. This is evidenced by the cyclical nature of swine production as well as seasonal variation in production. Large-scale U.S. packing plants face high short-term fixed costs. These can include labor costs as well as traditional overhead costs of facilities, depreciation, and interest. In an attempt to reduce exposure to the risk of supply shortages or capacity shortages, packers have an incentive to coordinate supply via forward scheduling of hogs for slaughter. A means to accomplish this has been marketing contracts.

Quality assurance

A related factor is the narrowing of attribute demands for quality characteristics of deliverable hogs. So far, this quality distribution has been defined by the lean/fat characteristics of hogs and carcass size; increasingly it will focus on other meat quality attributes such as color, water holding capacity of pork products, taste, and tenderness. Requirements that producers be PQA III certified is one manifestation of this desire. In an effort to further ensure quality specifications, packers have an incentive to pre-source hogs. Particular quality specifications have the effect of narrowing the effective supply of hogs to those that meet those standards, so packers try to “capture” this particular supply through forward contracts. Quantity and quality incentives are closely related as the

relevant market is defined by the quantity of hogs within a specific quality type.

Price risk shifting

Just as it does for producers, price variation has adverse effects on packer profitability. It can disrupt cash flows and credit acquisition or costs. For this reason, contracts may have pricing mechanisms that seek to reduce price variation, although no contract we have observed enhances market price even though many producers believe this is the case (Grimes et al.). Reduction in price variability can be beneficial for both packers and producers, but may have the undesirable consequence of disproportionately shifting risk from one party to the other.

Regional supply changes

Investment in packing capacity is long-term. The midwest United States has traditionally had the greatest share of packing capacity. Since the late 1980s and continuing into the 1990s, hog supplies in the midwest have declined while they have increased in the southeast and southwest regions—outside the procurement range of most midwest packers. Midwestern meat packers will often cite their desire to assist producers in their region remain viable by offering risk-protecting market contracts that helped stimulate investment and reduced short-term cash flow risk exposure. This strategy is in the self-interest of packers to maintain supplies in regions where they have large fixed investments.

Grower motivations

Price risk shifting and capital access

Since most contracts reduce market price variation when compared with traditional marketing alternatives, the growers’ income tends to be more stable over time. Of course, such income stability may result in the grower losing some market flexibility and potential for increased income. Reduced market risk may also allow the grower greater access to capital or preferred interest rates. However, where ledgers accumulate the difference between spot prices and prices paid on contracts producers usually substitute financial risk for price risk.

Market assurance

Growers may face the risk of not having a buyer for delivery or more likely in scheduling delivery times consistent with their production system. The latter can be particularly risky for growers with all-in—all-out (AIAO) production systems where delivery is more likely dictated by time rather than market weights. A market contract provides assurance that a specified quality and quantity of hogs may be delivered at scheduled times.

Reduced marketing management

With multi-year marketing contracts, it is likely that time contributed to marketing management will be reduced when compared with other market risk management strategies (such as the futures market or short-term forward contracts). This can free time for production or other financial management activities that may have higher returns.

What are the various types of marketing contracts?

Futures hedge

Use of a futures hedge does not require the involvement of a packer. In a simple hedge, a hog producer would simply sell the lean hog futures contract nearest the date when he or she expects to deliver the hogs. This does not eliminate all future price risk as there is still basis risk. Basis is the difference between the cash price and the futures price. In general, the net price received by the producer will be lower if the basis widens (the difference between the cash and the futures price increases). Using futures hedges does not address market access issues since it does not involve the packer. In addition, producers must be aware of the potential for margin calls if the futures price moves against their position (in this case, if the futures price rises). In such a situation, the hedge likely is also locking the producer out of profitable price increases. Futures hedges should only be undertaken with the aid of a trusted broker and with support of your lender.

Options hedge

The options hedge again involves the use of the futures market. However, in this case instead of selling the actual futures contract, the producer would buy the *right* to sell the futures contract (lean hogs) at a certain price. This would be a put option and the purchase price of the put option is the premium. Put options can be expensive, but the main advantage is that they protect against price declines but do not limit the upside potential if prices rise in the future. In addition, the premium (plus brokerage commissions) is all the put option will ever cost—there are no margin calls or other financial requirements. Again, market access is not addressed.

Fixed price

These agreements determine the actual price hogs will be delivered in the future. Typically, these will be very short-term (e.g., 1-2 months) because as the length of time to delivery increases the risk of establishing a fixed price becomes greater. The exchange price offered is likely related to the futures market, which allows the packer to hedge the risk of fixing a price. Although this assures short-term plant access, it does little to assure long-term access.

Fixed basis

As the name implies, the basis price is offered rather than the actual exchange price. The expectation is that the producer can then fix a price relative to the futures market plus or minus the basis difference. The producer may be given the option of never establishing the price if delivery at the going market price is advantageous. To utilize these agreements, producers must have access to basis data to determine if the basis figures offered are reasonable and acceptable. Fixed basis contracts may be offered over the life of futures contracts so they may extend slightly over a year. Plant access is assured only over the life of the agreement.

Formula price

Formula prices are used as a mechanism to establish prices when large quantities of hogs are forward contracted with a packer and there is some concern about the ability to establish a price. The formula price is based off a “price determining market,” one in which there are enough buyers and sellers to effectively establish a price). Formula prices for example will be calculated as Iowa/S. Minnesota 47–49% lean hogs, plus or minus a price differential or premium based on market differences such as location or overall quality of hogs. Formula prices do not provide price protection as they will fluctuate along with the market they’re based on. Formula pricing may or may not provide market access; however, in most cases the formula price mechanism is a result of contracting for quantities.

Cost-plus

This is a formula price based on feed costs, which comprise the greatest single cost of production. However, this price is also used to set a minimum price level, so that it is a risk protection contract in addition to quantity assurance and market access. These contracts may have a balancing clause where payments made to producers when market prices are below the contract floor price must be paid back when the contract base price exceeds the cost-plus formula price of the contract. Lengths of these contracts range from 4–7 years. Cost-plus contracts have clearly fallen from favor in the swine industry. This seems primarily due to the complexity of contracts, and the difficulty in verifying prices and formulae.

Price window

These contracts are very similar to the cost-plus contract, other than the pricing mechanism—in general a ceiling and floor price are set. When a predetermined market hog price falls within the ceiling and the floor, the hogs are exchanged at the market price. When the market price reaches a point above the ceiling or below the floor price, the packer and producer split the difference between the two prices. Other terms are fairly similar.

Price floor

As implied by the terminology a price floor contract sets a minimum price. To compensate the packer for this protection, the producer places a portion of the hog price above predetermined ceiling levels in an account to carry through the low price periods. Hence, the producer draws on this account during low price periods. The performance of these contracts will resemble a long-term put option.

Cost allocation agreements

These rarely exist in the swine industry, but are fairly common in the beef industry especially between commercial feedlots and packers. In general, both parties agree to share cost of production information. Then the final cut-out value of the animal is allocated according to cost shares contributed. One potential issue is verifying costs, and a second is determining what fair shares of contributions are, particularly as there is a move towards quality values versus cost-based production.

What price should be used?

Every marketing contract has a pricing provision that states the primary market reported prices that will be used for the calculation of a formula price. In my experience, this is the single most important sentence in the contract, although attorneys may disagree. This is so because many people are not familiar with the intricacies of price reporting, which dramatically affects prices. Likewise, without extensive historical data it's not possible to quickly compare minor differences in wording that can create major differences in revenue over an extended period of marketings. A specific statement from an early contract follows:

The daily "market price" shall mean the daily bulk top plant-delivered price per live 100 pounds at the mid-session of the market for Iowa/Southern Minnesota #1-3 barrows and gilts for 220-260 pound butcher hogs as reported by the U.S.D.A. Market News Service at 10:30 a.m. or any replacement thereof or successor thereto for the day of delivery.

Any errors or miscommunication in interpreting this primary pricing statement lead to many subsequent disputes. Following is a dissection of this line, with comments regarding the key pitfalls and issues.

Market price

"Market price" is the price established by a secondary negotiated market that can be observed by both parties. This is frequently different from either the "plant price" or "base price," which is likely to be formulae as well as plant-specific negotiated prices. The market price should be easily observed, relatively stable in its definition for comparisons through time, and part of a market which has enough trade volume to be unaffected by market idiosyncrasies or manipulation.

Daily bulk top

"Daily bulk top" is a bit more complicated. Prior to mandatory price reporting, USDA Agricultural Marketing Service, Market News Service reported "practical tops" or "bulk tops" and occasionally "absolute tops." Practical or bulk tops were defined as lots of animals that were not subject to some atypical pricing event (e.g., one or two hogs bid at extreme prices at an auction). Typically this included the top 20 percent of the market to avoid the "one or two" hog phenomenon. Absolute tops were the very highest price paid without regard to volumes. The problem is that the application of practical or absolute top definition was a subjective decision of the market news reporter. In thin markets (e.g., auctions or voluntary individual reports), a large number of hogs may be involved in a market top, but not enough to meet the 20 percent rule. Alternatively there may be a large bimodal spread (top 15% at \$50/cwt and next 5% at \$40/cwt.) that would clearly reduce the mean of the top when in fact more would have been sold at the top if they were available (particularly if top established late in the day). However, it's important to note that consistency is the issue here. If the same method is applied consistently, the 'true' value would likely on average be found.

With the implementation of USDA's Mandatory Price Reporting Program in April 2001, the definition of tops and bottoms or daily highs and lows became more precise—as the highest price paid for a given lot and quality of market hogs that day. The following table illustrates price differences between highs (tops), lows, and weighted averages. Although not all the variation is explained simply by the change in mandatory price reporting, the high price to weighted average price spread (last column) narrowed by more than \$2/cwt. Therefore, if a producer agreed to the top price, which then narrows relative to the average, any perceived advantage becomes less. This also illustrates the difficulty of making comparisons across time as price reporting methods and definitions change. You must always be aware of these definitional changes when negotiating prices.

Plant delivered

"Plant delivered" simply refers to the prices reported for hogs that are directly delivered to a processing plant. This

Table 1. Comparisons of hog pre- and post-mandatory price reporting

	Daily low	Daily top	Daily weighted average	High-low spread	High-wtd. avg. spread
ISM pre-mandatory price ^a	\$42.76/cwt	\$52.84/cwt.	\$49.32/cwt.	\$10.08/cwt.	\$3.53/cwt.
ISM mandatory price ^b	\$44.18/cwt	\$52.78/cwt.	\$51.43/cwt.	\$8.64/cwt.	\$1.35/cwt.

^a Iowa-Southern Minnesota Carcass Price reported November 1998–April 2001

^b Iowa-Southern Minnesota Mandatory Price Reported Series, Prior Day Report, April 2001–October 2003

excludes auction or “country markets.” Typically plant delivered hogs carry a slightly higher price because there is no transportation adjustment implicit in the pricing.

Mid-session and 10:30 a.m. market report

“Mid-session and 10:30 a.m. market report” refers to the time of day hogs are priced according to AMS. There are reported price differences between the 9:30 a.m. mandatory price report (often referred to as the morning report), the 1:30 p.m. mandatory price report (often referred to as the afternoon report), and the prior day report. The morning report averaged \$0.30 below the afternoon reported prices from the inception of the report through 2003. Although this is subject to many unexplained factors, this might suggest that the time of the day of the report specified may affect the market price for the contract. Finally, note that the 10:30 a.m. term is now irrelevant as that was the time of the report prior to mandatory price reporting.

Iowa-Southern Minnesota

“Iowa-Southern Minnesota” refers to the region of the hog market reported for the prices. Currently there are “Eastern Cornbelt” and “Western Cornbelt” regional prices as well. Typically contracts will include the region in which the hogs are raised or slaughtered, although national processors may use the same region in all price negotiations and then adjust prices to the regional base. Since the adoption of mandatory price reported, the weighted average Iowa-Southern Minnesota price has averaged \$51.43/cwt, while the Western Cornbelt price has averaged \$51.48/cwt. However, historically there have been greater differences. USDA also reports a national hog price. This price can be useful for hedging and other futures markets transactions because it also serves as the base price for the CME Lean Hog Index.

#1–3 barrows and gilts and 220–260 pound butcher hogs

“#1-3 barrows and gilts and 220–260 pound butcher hogs” refers to the base grade specification of the hogs to be

delivered. This is clearly a pre-carcass pricing contract since the grades specified are no longer relevant. With mandatory price reporting, the base market hog will be defined as a 185-pound carcass, with 0.9–1.1 inches of back-fat, and a 6 square inch loin with 2 inch depth. This again is simply a base price for USDA. Packers may define a lighter or heavier hog than the base price, but normally the contracts adjust from the base by applying their quality matrix. Alternatively, USDA now reports breakdowns of prices by weight and quality and it may be possible to price from the different grade—the major issue to consider in this case is that these may be ‘thin’ reports (i.e., very few hogs establishing the particular quality value price).

To this point, which price to use has been confined to the specific live/carcass hog value. This illustrates how seemingly minor wording or definitional changes can dramatically affect price levels. However, a broader issue includes whether to use slaughter hog prices at all, or to choose other market prices such as carcass prices or corn/soybean prices as proxies. The pork carcass cut-out value is one increasingly popular alternative. The logic is that this price is the value of the carcass to the packer and hence reflects a more accurate pass-through of the value to the producer. However, there are three issues regarding reporting. First, the pork carcass cutout value is a calculated series that uses primal value prices to which USDA applies a yield formula. Any changes in the yield formula or reporting of sub-primal prices affects this series—therefore, it is somewhat more complicated to ensure the series is unchanged. Secondly, while this series can be adjusted to very accurately track live hog price series, the calculation must be done and unless data on both series is available it can be difficult to check the adjustment value. Third, over time the margin between the cutout value and the lean hog carcass price has converged (see the following figure). The implication is that most formulae using carcass cutout values employ fixed conversions to a base price (e.g., 92% of carcass cutout value) and if the lean hog price and the carcass cutout prices are converging

over time the CPC 92% value will gradually pay less than the lean hog carcass value. The reason for the convergence is not clear, I hypothesize that it is related to increased coordination and treatment of cut and kill as a cost center. However, the point is it raises an additional level of complexity. Similar issues exist with other secondary market prices.

The bottom line is that the first best price is going to be a market discovered price directly applied to the sale. Any attempts at variance reduction or otherwise runs the risk of altering prices in an inequitable fashion since both parties face a zero sum game (i.e., if one benefits unexpectedly, the other is by definition worse off by an equal amount). As a second best, prices should meet four criteria:

1. They should have a long and consistent definition that allows easy historical and horizontal market comparison.
2. The price used should be as close to the actual product delivered as possible to keep conversions to a minimum.
3. The price should be observed easily, in real time, by all parties.
4. It may be worth defining a fall-back series pre-benchmarked to the market price series which can be used to calibrate the payment series to a common basis if there is a change in the primary series.

What are the lessons to date of contracts on the spot markets for hogs?

Lesson #1: Marketing contracts' objectives are not risk management or profitability

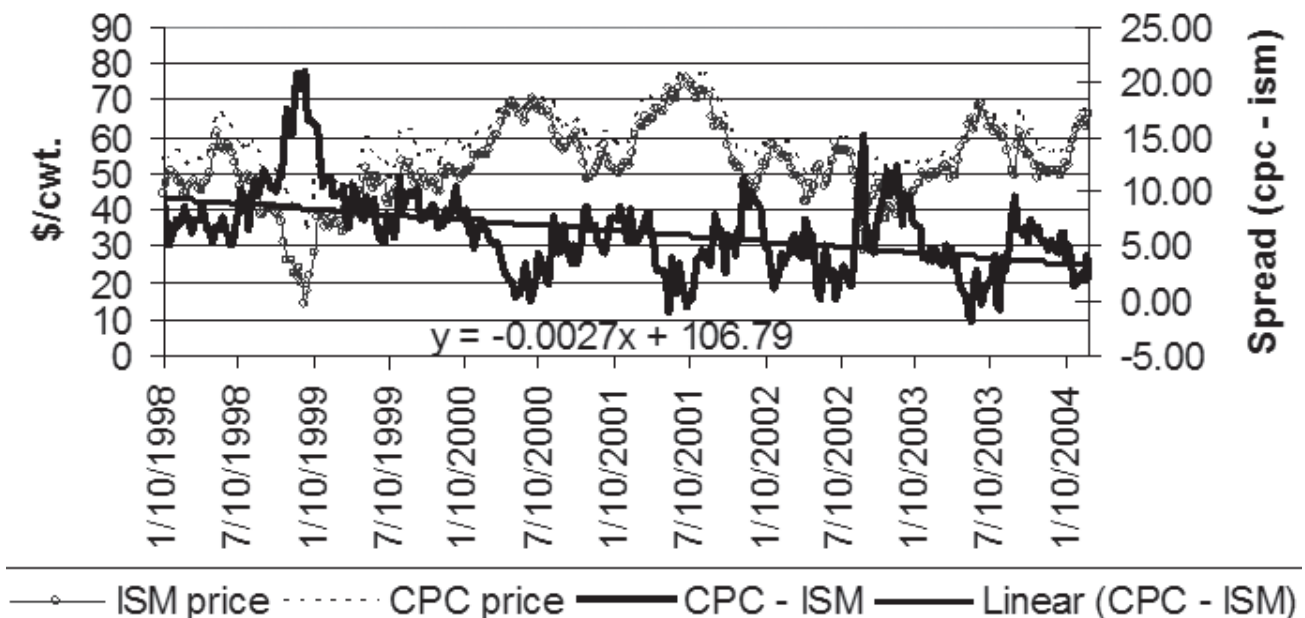
Like many contracts an adjustment account or ledger keeps track of differences between the contract and market prices paid during the life of the contract. When the adjustment account balance is accounted for by the value "net average contract price" (long-term), the contract returns the average market price for the period, offering no long-term risk protection.

Similar results hold for nearly all variations of long-term marketing contracts with adjustment accounts. No contract will pay an above market price for a long period of time and no contract will reduce price risk without a fee or price discount (consider premiums on futures options as example). Producers should generally avoid ledger provisions or set them to begin only when prices under the contract payment scheme fall well below reasonable costs of production (for instance, only accept ledgers when prices are \$10/cwt below cost of production, otherwise accept the contract price and adjust costs).

Lesson #2: Marketing contracts' objectives are supply assurance

The pricing formula feature of all contracts is necessary to achieve the primary objective: The assurance of supplies. All contracts have specific provisions on qualities and quantities of hogs to be delivered. Hence, market prices and market quantities are de-coupled in multi-year contracts. The price formulae still adjust according to pre-

Figure 1. CPC/ISM Spread 1998-2004



defined market prices, but individual quantities are fixed (with some random variation but not specific to overall market price response) to assure supply.

In an individual case, this doesn't create a market problem because other producers are not under contract and they cut back on production so that prices increase and the contract producer begins to pay off the ledger with higher prices. However, at some point the market 'tips' from few enough hogs contracted to maintain supply and price response, and too many hogs contracted to get supply and price response. Removal of quantity response distorts the hog market and compromises price discovery as the share of hogs under contract increases.

Lesson #3: Capital markets and price contracts are a volatile mix

Even without long-term risk impacts (lesson #1), lenders have used marketing contracts for lending decisions based on a "cash-flow assistance" strategy for start-up phases of operations. While contracts shift price risk to a later date, they do not fundamentally alter the long-term profitability of a project *or warrant additional capital*. As in lesson #2, this becomes an issue only in a market context as the influence of lenders on credit creates a new vicious cycle.

As more lenders demand contracts to improve credit scoring, producers seek more contracts and lenders make more loans based on contracts. Hog production increases but with no downside supply response (lesson #2), prices decrease and lenders require more contracts, and so on. The bottom line becomes that producers are virtually guaranteed to owe a ledger or have received lower prices due to the credit combination with the *supply assurance requirements* of contracts.

Lesson # 4: It is impossible to create a price formula that predicts future market conditions—especially when there may be a feedback loop

Some multi-year price formulae are based on feed prices; some are based on reported hog market prices including live prices, carcass prices, and regional markets; and others are based on pork carcass cutout values. All of these prices are closely related to pork production, so it's generally possible to use them to create a formula that will track the market hog price. However, this creates another vicious cycle. As more hogs are formula priced, fewer hogs are available to determine the market price and the market price becomes less reliable so the formula price appears more stable, even though the formula is compromised by the change in the underlying market price. This cycle can be exaggerated by quality differences between contract and market hogs and by things as simple as changes in market price reporting. The use of formulae

directly reliant on hog market prices erodes the effectiveness of price discovery.

Lesson #5: Marketing contracts change behavior

This is the most fundamental of all lessons: Individual behaviors create markets and markets aggregate behavior into prices, which in turn affect individuals' behavior. Multi-year marketing contracts distort this behavior/price/quantity virtuous cycle.

A packer described the best example of self-defeating behavioral changes. The packer noted that when market prices were low (contract prices higher and ledger accruing owed to packer), producers tend to deliver the most possible hogs under the contract and at heavier weights. When market prices became higher, producers delivered fewer hogs at lower weights. The result is the producer gained short run benefits, at the one-for-one expense of a long-term ledger "hole" they were digging. Their behavior was exactly 180 degrees from what it should have been with market prices! This is consistent with behavioral experiments conducted by Daniel Kahneman, the 2002 Nobel Laureate in Economics (along with a co-author Tversky) showing that people tend to prefer overly small current payments to much larger future payments (as much as 25%—well beyond normal returns on investment from the current payment).

Applying these experimental lessons to contracts suggests that growers over-discount the ledger account that represents a future cost or are overly optimistic in the belief that markets might erase the ledgers through higher prices, particularly in light of the market feedback loops described earlier. The contracts altered perceptions and behaviors, which then affected economic outcomes.

Lesson # 6: "Synthetic vertical integration" is also inferior to vertical integration

Competitive models of pork production that rely on supply chain management from farm through processing have resulted in the integration of the intermediate market of hogs. Multi-year contracts are essentially a mechanism for creating "synthetic vertical integration." Such contracts may capture some reduction in open market transactions costs (supply assurance) but, owing to the price/quantity behavior cited, they are a poor substitute for vertical integration. Packer ownership laws in midwestern states have played a role in the creation of multi-year contracts, but the ultimate method to reduce incentives for vertical integration is to improve the efficiency of the open market (i.e., reduce transactions costs and improve information). Perhaps the best hope for such a change lies in improved information technology systems to help monitor and assure production, although these systems are expensive and may not adequately replicate integration either.

Where do we go from here?

Swine industry participants are already aware of these lessons because producers, packers, and lenders have suggested remedies including the use of different formulae, different formula prices, and the elimination of ledgers as possible responses.

The certain remedy is to voluntarily eliminate the use of multi-year marketing contracts. However, eliminating such contracts does not address the demand for risk management and quantity and quality assurance in the swine industry. So, what can be done without multi-year marketing contracts?

Use the futures market for risk management

Participants argue futures don't work because of design flaws in the lean hog futures contract, including a lack of convergence of cash and futures prices, basis unpredictability, a lack of consecutive maturity months, the inability to create multi-year risk management strategies, and the existence of multi-year forward contracts.

If there are fundamental problems in futures markets, efforts should be directed toward trying to fix futures contracts—the one true market mechanism for risk management. In addition, producers may wish to focus on using futures to manage input cost risk where contract definitions and basis relationships are far more predictable and clear.

Forward price contracts should have a life no longer than the related futures contract

Short-term forward contracts have been used extensively in grain marketing for risk management and procurement (e.g., see Cargill AgHorizons on the web at <http://www.cargillaghorizons.com/aghorizons/performancemarketing/us.htm>). The one-year life of the futures contract gives a reasonable planning horizon for supply assurance purposes and doesn't create the illusion of safety or control over market conditions for multiple years.

Lenders should focus on capital and credit markets and packers should focus on hog markets

The fundamental question remains: Is there some reason capital markets are not efficiently allocating investment decisions in the swine industry? If so, efforts should be directed to gaining access to cost effective capital in the swine industry rather than distorting capital markets through the coupling of marketing contracts to credit. In particular, it is time to revisit corporate farm laws and their impacts on credit costs to the farm sector and acknowledging that in fact they to restrict capital access to farms and increase the costs of capital.

Avoid government intervention directly affecting market quantities and prices or capital allocation

Mandatory government policies (e.g., 30% of hogs procured in the open market) will distort market signals just as multi-year contracts do. Similarly capital access and ownership restrictions in agriculture have affected regional competitiveness. Government policy efforts should focus on assuring the proper functioning of markets—better information on market conditions, realistic capital market regulations and assurances of fair and competitive practices.

Summary

Swine marketing contracts have emerged from a combination of incentives including a desire to better coordinate supplies between producers and packers, a desire to share or reduce price risk exposure and an attempt to assure quality of supply prior to delivery. Market contracts exhibit elements of long-term price discovery as they evolve over time in response to changing market conditions as well as performance of previous contracts.

Producers seeking to enter contracts should carefully consider their motivations for entering contract production. If their motive is purely one of price risk protection, the futures market and options on futures contracts offer an alternative to achieve price risk management objectives. Alternatively, if market access is of strategic importance, the long-term marketing contracts may be a more appropriate option. Currently, as more packers seek either to vertically integrate into swine production or contract and pre-source hogs for slaughter, the issue of market access will become greater.

Contract performance provisions will be as critical as the payout mechanisms in determining how well the contract performs for any given circumstance. Producers should always carefully read and understand both the pricing structures to be used and other performance clauses. In most cases, contracts should be reviewed with an attorney and lender before making a commitment.

