Swine Profitability Conference

Sponsored by
Department of Animal Sciences and Industry
K-State Research and Extension
Kansas State University, Manhattan
SWINE PROFITABILITY CONFERENCE

Sponsored by

Department of Animal Sciences and Industry and
K-State Research and Extension Service of
KANSAS STATE UNIVERSITY

Co-sponsored by

Kansas Pork Association
College of Veterinary Medicine, KSU
ADM
Elanco Animal Health
Fourth and Pomeroy Associates
Hubbard Feeds
Intervet
Lextron Animal Health
Midwest Livestock Systems
National Pork Board
Novus
Suther Feeds

Tuesday, February 2, 2010
Forum Hall, K-State Union
SWINE PROFITABILITY CONFERENCE

KSU Forum Hall
K-State Union
Tuesday, February 2, 2010

Program Agenda

Morning Program

9:15 a.m.  Registration

9:30 a.m.  Jack and Pat Anderson Lecture in Swine Health Management: Right Sizing the U.S. Swine Industry — What I’ve Done with My Clients During These Challenging Times  
Dr. Joe Connor, Carthage Veterinary Service, Carthage, IL

10:30 a.m. Risk Management — A Producer Perspective  
Rob Brenneman, Pork Producer, Washington, IA

11:15 a.m. What Does the Future Hold for the U.S. Swine Industry?  
Steve Meyer, Paragon Economics, Des Moines, IA

Noon  Lunch

Afternoon Program

1:15 p.m.  Recent Breakthroughs in Lowering Cost of Production and Improving Margin Over Feed  
K-State Swine Team

2:00 p.m.  Restoring Confidence After a Stressful Period  
John Currie, Athletic Director, Kansas State University

3:00 p.m.  Adjourn
Table of Contents

Jack and Pat Anderson Lecture in Swine Health Management:
Right Sizing the U.S. Swine Industry – What I’ve Done with My Clients During These Challenging Times ............................................................................................................................. 1
   Dr. Joe Connor, Carthage Veterinary Service, Carthage, IL

Risk Management – A Producer Perspective ................................................................. 9
   Rob Brenneman, Pork Producer, Washington, IA

What Does the Future Hold for the U.S. Swine Industry? ........................................... 35
   Steve Meyer, Paragon Economics, Des Moines, IA

Recent Breakthroughs in Lowering Cost of Production and Improving Margin Over Feed .... 55
   K-State Swine Team

APPENDIX:

Sow Production: Where We’ve Been, Where We’re Going ........................................ 71
   Steve Dritz, Kansas State University

Rachitic Rosaries and Rib Nodules ........................................................................... 79
   Steve Dritz and Jerome Nietfeld, Kansas State University

Iodine Value and Impact on Pork Quality:
What is Iodine Value and Why Should We Be Concerned ....................................... 85
   Joel DeRouche, Mike Tokach, Steve Dritz, Bob Goodband, and Jim Nelssen
   Kansas State University Swine Team
SWINE PROFITABILITY
CONFERENCE

February 2, 2010

Jack and Pat Anderson Lecture in Swine Health Management:
“Right Sizing the U.S. Swine Industry –
What I’ve Done with My Clients During These Challenging Times”

by

Dr. Joe Connor
Carthage Veterinary Service
Carthage, IL
In preparing for this paper, I read and suggest you read as well “Only The Paranoid Survive” by Andrew S. Grove, Chairman of the Board of Intel Corporation. He references six forces in classical competitive strategy analysis that determine how competitive a company is. These are illustrated in the following chart.

He notes that when some elements of one’s business becomes a magnitude of larger than what the business is accustomed to, chaos reigns. If there is a very large change in any one of the six forces, you lose control of your destiny. He suggests that to manage a business in the face of a “10X” change is very, very difficult. The business responds differently to managerial actions than it did before and the period of transition is particularly confusing and treacherous. Grove refers to this as the inflection point, which is when the balances of the forces shift from the old structure to the new. Eventually a new equilibrium in the industry will be reached. How a business manages this transition determines its future. This is our swine business!

As the world comes to and passes 7 billion population, it is hard for us to understand how we can be in a low cost food production system and not be profitable. We face critical questions regarding the mechanism by which food production distribution involves to meet the needs of the people. Staggering rates of population growth over the next two decades promises a large increase in the demand for food. This is a positive factor for agriculture,
but may be less so for meat producers. First world mission countries are considering taking individual and group policy actions with the intent to slow the future growth of their economies. These actions are being taken to conserve scarce global resources available to meet the rapidly growing future demand and to slow the advance of global warming while alternative technologies for energy, production, and consumption are developed. Studies have shown that there is nearly a perfect correlation between increased global wheat consumption and rising global per capita income, but if slow growth policies are successfully adopted in a coordinated fashion, global per capita incomes will slow as well as the demand for meat production. It is frustrating to be involved in an industry that can be a world leader with respect to cost, but yet unable to sustain growing industry on exports because of the volatility and other dynamic factors. Our industry has to be smaller to return to profitability. Our industry will continue to be challenged with the corn and soybean meal cost as we balance between stock use ratios and energy policies that pay a greater premium for fuel at the expense of food.

It is likely that meat consumption per capta will decline in the developed countries even as it is increasing in the underdeveloped countries. Several of our key trading partners will try to increase their own production and reduce reliance on imports. Animal protein prices eventually reflect higher feed cost, increasing animal welfare regulations, increasing environmental issues, global warming, lack of human capital, and continual pressure to manage the increasing human waste line. In an industry that has excess production and processing capacity there will need to be difficult decisions. Downsizing the industry is a combat among existing farms. It is extremely difficult to accept that an industry that has the land base for the major inputs of grain and soybeans and the land base to utilize the waste nutrients must constrict in order to return to profitability.

Producers in this conference are in the high productivity group – but as we have learned during the past three years high productivity will not return us to profitability. We are all aware that the fundamental forces of the last three years involve a combination of several factors; 1) a fundamental shift in the corn/hog price balances, 2) the world economic recession, 3) the novel H1N1, 4) huge reliance of exports, 5) improving breed-to-wean and wean-to-finish productivity, and 6) failure of expansion restrain.

Swine operations in the 70s and 80s were land based. Since 1990, the industry has been driven by the ability to add value into the chain by employing new technology in production that lowers cost. Returns were good and because of inefficiencies in sow and wean-to-finish productivity massive capitalization occurred. Swine enterprises were driven by economy of scale of facilities and flow. Our industry has experienced a tremendous year on year improvement in pigs weaned per inventory sow and carcass harvested per inventory sow. Producers increased facility size to manage construction cost and increased sow populations to increase the number of pigs produced per week to capture the flow advantages of rapid wean-to-finish fill time, which has directly lowered cost by improving record capture, diet budgeting, diet transportation cost, harvest transportation cost, and health. We lowered wean-to-finish costs by finishing pigs in the grain dense areas and decreasing harvest transportation cost by locating pigs in the slaughter plant dense areas, but in many cases compromised health.
Because returns were greater in a swine operation, this enterprise grew much more rapidly than land ownership changing the traditional land equity to swine facility or operating equity. To compete producers grew and/or aligned in breed-to-wean and/or wean-to-finish systems. This shifts some of the assets from a central farm and gives up some day to day control, but usually advantages outweigh disadvantages. The new technology that was incorporated in the early 1990s, the scale of economies and coordination has largely been gained and captured by remaining producers. There will be additional gains from genetics both in sow productivity and wean-to-finish feed per gain, average daily gain. However, these gains will continue to improve efficiencies and lower cost, but the gains will be incremental. The huge financial values that we realized by industrializing the pork sector have been captured and the question is, what is the model that will sustain us into the future?

What do you do when all of the available models that you can foresee are not satisfactory to return us to profitability? It is extremely frustrating that we have not achieved a model that would balance the risk from the various stake holders within the industry. There remains lack of transparency even in a coordinated system and there remains lack of good faith negotiations and understanding on how to balance the risk with each of these stakeholders. The business model for success has both a short and long term component. In the short term, you must work for survival at the same time as we are evaluating our financial capacity and desire to remain in the business. We must continue to use new technology and particularly focus on technology that lowers cost and improves efficiencies. We have to implement daily all the technology that we have. Benchmarking data still illustrates a wide difference in productivity and cost of production highly driven by people and health. Survival will include sales of existing facilities, which will make those facilities and systems more cost competitive, and thus further challenge existing that must think every day about risk management. However, production systems are very inflexible due to the immense capital requirements and the biological lag in the production cycle. Pork production will be characterized by dramatically increased financial risk especially among nations that export pork.

Producers have to correctly analyze the condition of their present enterprises and that they should look within themselves and say, “Is this a business that I want to compete? Can I tolerate the day to day volatility and decision making?” We only have to look around this room and see the toll that it is taking. If you decide to remain within this industry you must continue to drive toward cost effective improvements. We are all under the same competitive pressures. This will mean increasing alliances and partnerships as a method to manage the risk. It will mean greater transparency of cost and much higher scrutiny from a number of outside sources. The new values will come from product differentiation and access to growing markets.

The current system must evolve to one which is capable of sufficient average profits while lowering the profitability variance. Producers must measure, understand, and control the variance of production costs and revenue. Without tracking variance, farms are missing large opportunities to increase the value of their final output, reduce its costs, and stabilizes
future outcome. Disease remains a number one cause of variation in production, and thus profitability. Predictability of prevalence, and thus disease outcomes and interventions will be necessary.

It is useful to use the DuPont equation to evaluate your current business and to direct strategy. The DuPont equation breaks ROE into three parts which are asset management, expense management, and debt management.

Using this model one can use the ROE to link financial, biological, and market risk as a predictive tool. The intuitive strength of the ROE tree is that each of three major drivers can be expanded to understand factors affecting ROE and one can quantify the impact of various levels of variation. The goal is to maximize ROA by effectively managing and balancing profit margin and asset turnover. To improve ROA, farm needs to improve margin, turnover, or both. Margin can be improved by cutting cost both variable and fixed and increase in per unit sale price, i.e. quality, quantity premium, and futures. Turnover can be increased by increase in sales volume, disposing of needed inventory, disposing of unused fixed assets, speeding up of collection receivables, and maximizing credit terms. In swine, the commodity risk tends to dictate. Financial leverage needs to be low to keep the risk to the lender satisfactory without causing the lender to require a premium. If a producer implements proper risk management, the risk to the lender is reduced and the lender can allow higher leverage.
Managing all three of these areas well tends to maximize the value of the business. What happens when one or more of the components could not be controlled? Historically, most common eliminating factor is under employment of existing resources. Assets already purchased are often ineffectively used to generate sales. Asset turnover for a well run farrow-to-finish owned farm will be 0.8 – 0.9 range. Variables to review include sow herd mortality, non-productive sow days, preweaning mortality, wean-to-finish mortality, average daily gain, pigs weaned per litter, harvest weight, farrowing rate, and parity distribution.

The second component of the DuPont equation is net profit margin. The key for most farms in this component is expense control. Good long term average net profit margins as defined in the DuPont equation for owned farrow-to-finish operations are 69 percent. The key subcomponents are feed expense per unit of gain, feed conversion, labor, interest, utilities, and appreciation. On the income side, market price, percent lean, percent full value pigs in the optimum category are key determinants of net profit and components of feed cost per ton, feed efficiency, and average daily gain.

Take the DuPont ROE model and work through each variable. Note that there are still tremendous opportunities to improve costs and revenues and that on both the expense and revenue side health is a major driver. Drive your business on implementing a high percentage of the basics day after day, week after week. These are areas that come to mind:

Expenses
Variable
Health Costs
Medications –

1. Continually review your health program and strategies. These are unique to your herd or system. We are embarking on continuous diagnostic profiling that will more effectively manage each group of pigs. It will take a very close working relationship with your veterinarian, but the rewards will be huge.
2. Genetics – work to understand the genetics X health interactions to determine sire and dam lines.

<table>
<thead>
<tr>
<th>Net Profit Margin</th>
<th>Items</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>Manage risk</td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ADG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wean weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wean age</td>
<td></td>
</tr>
<tr>
<td>Pigs weaned/sow</td>
<td>LSY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lactation length</td>
<td></td>
</tr>
</tbody>
</table>
## Expenses

<table>
<thead>
<tr>
<th>Feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Feed Efficiency

<table>
<thead>
<tr>
<th>Quality Control</th>
<th>Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle size</td>
<td></td>
</tr>
<tr>
<td>ADFI</td>
<td>Health</td>
</tr>
<tr>
<td></td>
<td>Nutrient balance</td>
</tr>
<tr>
<td>Management</td>
<td>Feed adjustment</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
</tr>
<tr>
<td></td>
<td>Individual pig care</td>
</tr>
<tr>
<td></td>
<td>Animal density</td>
</tr>
<tr>
<td>Health</td>
<td>Pathogen management</td>
</tr>
<tr>
<td></td>
<td>Vaccine compliance</td>
</tr>
<tr>
<td></td>
<td>Individual pig care</td>
</tr>
<tr>
<td></td>
<td>Therapeutic compliance</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
</tr>
</tbody>
</table>

## Fixed

<table>
<thead>
<tr>
<th>Contract payment</th>
<th>Competitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest</td>
<td>Refinance</td>
</tr>
</tbody>
</table>

In summary, our industry has had an inflection point. Thoroughly review your business and use the DuPont model as a template to evaluate opportunities. Many of you are in the most sustainable business model because you are land based, excellent producers that are aligning in both the input and revenue side of the model. The industry will not be easy. It will require more alignment and more decisions, but those of you that develop your staff on the basic components of production will be sustainable.

### References


Fuchs, Lee; Reeves, David; Morrison, Bob. "Using the return on equity (ROE) tree to help manage a business." 1999 Allen D. Leman Swine Conference: Track II - Production.

SWINE PROFITABILITY CONFERENCE

February 2, 2010

“Risk Management – A Producer Perspective”

by

Rob Brenneman
Pork Producer
Washington, IA
Risk Management – A Producer Perspective

Rob Brenneman
Pork Producer, Washington, IA

Brenneman Pork Perspective

Risk Management!
February 2, 2010

Rob & Char Brenneman
Owners
Brenneman Pork Inc. & TJAC Pork L.L.P.

Brenneman Pork Inc.

- Family Farm Operation in Washington, Iowa
- BPI feeds approx. 400,000 pigs/year
- Owns & Operates 5,400 head sow farm
- We nursery all pigs
- BP Mill – all feed is milled internally
- Row Crop 3,000 acres

Brenneman Pork Inc.

Approach to Risk Management
1. Market - No control
2. Health - Some control
3. People - Total control

Marketing Breakdown
- Lean Hogs
- Corn
- Soybean Meal
- Basis - Hogs, Corn, SBM

Do What, When, How, with Who?
So many options!!

- Long Puts
- Short Puts
- Long Calls
- Short Calls
- Short Futures
- Long Futures
- Packer Contracts
- Collars
- Spreads
- Actual Basis
- Fixed Basis

Lenders

- **Caution**: Lenders are on board until capital get tight
  - Can limit the tools available

BPI’s Risk Management

- Hog Options & Futures
  - Purchased hog puts $2-3 under market
  - Sold hog calls $10-12 over market
  - Exchanged options for CME with packer as market rallied
Input Risk Management

- **Corn**
  - Purchased call options 10-20 cents over market
  - Sold calls $1 over long call
  - Sold puts $1 under long call
  - Total cost $0!

  Allow market participation up $1 in raising market
  Allows physical purchase in falling market to $1 down before margin required

Soybean Meal

- Hog Options in place
- Corn Options in place
- SBM- Priced physical based on margin calculator
  - Purchased Put options to protect from falling prices

Margin Calculator

<table>
<thead>
<tr>
<th>Profit Margin</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hog Options</td>
<td></td>
</tr>
<tr>
<td>Corn Options</td>
<td></td>
</tr>
<tr>
<td>SBM- Priced</td>
<td></td>
</tr>
<tr>
<td>Hog Options</td>
<td></td>
</tr>
<tr>
<td>Corn Options</td>
<td></td>
</tr>
<tr>
<td>SBM- Priced</td>
<td></td>
</tr>
</tbody>
</table>
Margin

- Again…..can’t control the market
- Can control margin or exposure!

Health Risk Breakdown

- Vaccines - Your control
  - Prrs, Myco, Ileitis, Salmonella, ect.
- Genetics – Your control
  - Sire lines, female, company
- Illness- No control
  - Air bone, bio-security failure, vaccine choice or not
- Bio-security – Your control
  - So easy, but yet so hard!
WHY DO I HAVE BIRDS IN MY BUILDING?

WHAT IF SUPPLIES WERE STOLEN?
People Risk Breakdown

- Growers
- Feed Delivery
- Trucking Movements
- Supervisors

Affect of People

3 P's Risk-
- People Risk
- Production Risk
- Performance Risk
- We try to manage the 3 P's everyday.

Production Risk!
Feed is largest production cost!

Q: How do you manage FEED?
A: Manage PRODUCTION!
   - Improve ADG, F/C, marketed subs, death loss
   - Market more lbs/ft²/year with same space & same time!
Everyday we must……

- FEED
  - Correct/timely reporting of bin levels
  - Feeder adjustments
- WATER
  - Fix leaking nipples/waters
  - Monitor usage
- AIR
  - Inlets functioning properly
  - Pit, wall, stir fans working properly
- SEE EVERY PIG
  - Get every pig up everyday
  - Treat and sort everyday

Performance Risk!

- What affects performance?
  - Temperature
Why are the pigs cold?

Performance Risk!
- What affects performance?
  - Temperature
  - Feeder settings

Too Tight...
Too Loose...

Performance Risk!
- What affects performance?
  - Temperature
  - Feeder settings
  - Empty or hung up bulk bins

Target Setting....
Performance Risk!

- What affects performance?
  - Temperature
  - Feeder settings
  - Empty bulk bins
  - Pig treatments
Performance Risk!

- What affects performance?
  - Temperature
  - Feeder settings
  - Empty bulk bins
  - Pig treatments
  - Junk Hogs
Junk Hogs

Performance Risk!

- What affects performance?
  - Temperature
  - Feeder settings
  - Empty bulk bins
  - Pig treatments
  - Junk Hogs

Who is responsible for all of the above?
- It’s the PEOPLE!

People Risk!
Manage the People….

**Performance Reviews**
- Growers need to know where they stand!
  - One-on-One reviews
  - Compare to recent closeouts by flow
  - Compare to past personal performance
  - Compare to same period prior year

People Risk!

- On-Site Follow Up
  - Supervisors work with grower to improve
  - Photo documentation
  - Text Message alerts/reminders

- Do your supervisors have enough information to make necessary changes?

Keep People from being People!

- Don’t let the minimum daily requirement become the maximum amount of effort your willing to put forth!

- It doesn’t require much more effort to do it RIGHT, then it does to do it WRONG.
Know your Business…
- Detailed cost
- Know & Compare Growers
- Know the Pigs

Meta Farms & FBS Transaction Plus

Always margin to gain on every Site!
- Compare Good, Bad & Great
- **YOU** can **CONTROL** what happens on site

Cost of Feed Conversion
- What is the difference between 2.20 FC to 2.30 FC???
- Let’s look at margin calculator!
### Margin Calculator

<table>
<thead>
<tr>
<th>INPUT DATA</th>
<th>EXPENSE / PIG</th>
<th>INCOME / PIG</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Purchased</td>
<td>July 13, 2009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase</td>
<td>$37.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean price</td>
<td>$138.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pigs purchased</td>
<td>2400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed</td>
<td>$69.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade add</td>
<td>$11.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig price</td>
<td>$37.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig space</td>
<td>$17.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross revenue</td>
<td>$149.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig weight in (14 death &amp; cull)</td>
<td>$4.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig weight out (280)</td>
<td>$1.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net return / Pig</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average daily gain</td>
<td>1.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other variable</td>
<td>$6.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profit / pig</td>
<td>$15.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed conversion</td>
<td>2.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Expense / Pig</td>
<td>$134.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profit / group</td>
<td>$36,280.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost / cwt live</td>
<td>$47.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual return to facility</td>
<td>$77,797.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn price / bushel</td>
<td>$4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost / cwt lean</td>
<td>$63.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on investment</td>
<td>11.28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bean meal / ton</td>
<td>$290.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDGS / ton</td>
<td>$115.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat / ton</td>
<td>$550.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig Group Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premix / ton complete feed</td>
<td>$30.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingredients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pigs / fill</td>
<td>2400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed drug / ton</td>
<td>$4.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Corn / ton</td>
<td>59.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pigs death &amp; cull</td>
<td>91.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grind mix &amp; deliver / ton</td>
<td>$12.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% SBM / ton</td>
<td>19.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pigs marketed</td>
<td>2308.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed cost per pig space</td>
<td>$38.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% DDGS / ton</td>
<td>14.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pounds of gain / pig</td>
<td>266</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% death &amp; cull</td>
<td>3.82%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Fat / ton</td>
<td>4.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days to market</td>
<td>165</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinary / pig</td>
<td>$3.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Premix / ton</td>
<td>2.30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turns / year / pig space</td>
<td>2.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest rate</td>
<td>0.0475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tons of complete feed</td>
<td>675.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of lean futures contracts</td>
<td>12.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight in</td>
<td>$1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bushels of corn</td>
<td>14,376.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight out</td>
<td>$1.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tons of SBM</td>
<td>133.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Insurance</td>
<td>$0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tons of DDGS</td>
<td>96.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEW ALL OUT 12/25/2009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check off / Vol PPC</td>
<td>$0.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LRP Insurance quote</td>
<td>$0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Futures price / cwt.</td>
<td>$70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed cost / ton</td>
<td>$228.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Futures Basis / cwt.</td>
<td>$4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed cost / lb of gain</td>
<td>$0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPITAL NEEDED</td>
<td>$321,731.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected G&amp;Y Prem / cwt</td>
<td>$5.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted Lean Price</td>
<td>$71.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>purchase price @ 55%</td>
<td>$38.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$71.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted Live Price</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tyson breakeven + $10</td>
<td>$68.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$75.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACKER Tyson breakeven + $10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$69.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$74.49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cost of Average Daily Gain

- What is the difference between 1.60 to 1.50 ADG??
### Margin Calculator

#### INPUT DATA

- **Date Purchased:** July 13, 2009  
- **Purchase Price:** $37.00  
- **Lean Price:** $138.60

- **Number of Pigs Purchased:** 2,400  
- **Feed Cost:** $69.77  
- **Grade Add:** $11.17

- **Pig Price:** $37.00  
- **Pig Space Cost:** $17.72  
- **Gross Revenue:** $149.77

- **Pig Weight In:**  
- **Death & Cull Weight:** $4.80

- **Pig Weight Out:**  
- **Interest Expense:** $1.71

- **Net Return Per Pig:** 
- **Average Daily Gain:** 1.61

- **Other Variable Costs:** $6.29  
- **Profit Per Pig:** $12.53

- **Feed Conversion Ratio:** 2.30

- **Total Expense Per Pig:** $137.24  
- **Profit Per Group:** $28,928.21

- **Cost Per Cwt Live:** $49.01  
- **Annual Return To Facility:** $62,031.24

- **Corn Price Per Bushel:** $4.00  
- **Cost Per Cwt Lean:** $64.49  
- **Return On Investment:** 8.78%

- **Bean Meal Price Per Ton:** $290.00  
- **DDGS Price Per Ton:** $115.00  
- **Fat Price Per Ton:** $550.00

- **Premix Price Per Ton:** $30.00  
- **Ingredients:**  
  - **Number of Pigs Fill:** 2,400

- **Feed Drug Cost Per Ton:** $4.80  
- **% Corn Per Ton:** 59.6%  
- **% SBM Per Ton:** 19.7%

- **Grind Mix & Deliver Cost Per Ton:** $12.00  
- **% DDGS Per Ton:** 14.3%  
- **Pounds of Gain Per Pig:** 266

- **% Death & Cull:** 3.82%  
- **% Fat Per Ton:** 4.1%  
- **Days To Market:** 165

- **Veterinary Cost Per Pig:** $3.15  
- **% Premix Per Ton:** 2.30%  
- **Tons Of Complete Feed:** 706.12

- **Fixed Cost Per Pig Space:** $38.00  
- **% Death & Cull:** 3.82%  
- **% Fat Per Ton:** 4.1%  
- **Tons Of Complete Feed:** 706.12

- **Veterinary Total Cost Per Pig:** $11.00  
- **% Premix Per Ton:** 2.30%  
- **Tons Of Complete Feed:** 706.12

- **Freight In Cost:** $1.00  
- **Bushels Of Corn:** 15,030.16  
- **SEW 21 WEEKS 12/7/2009**

- **Freight Out Cost:** $1.50  
- **Tons Of SBM:** 139.10  
- **SEW ALL OUT BY 24 WEEKS 12/28/2009**

- **Freight Insurance Cost:** $0.00  
- **Tons Of DDGS:** 100.97  
- **SEW ALL OUT 12/25/2009**

- **Check Off/Vol PPC Cost:** $0.64  
- **SEW By Days To Market & ADG:** December 25, 2009

- **LRP Insurance Quote:** $0.00  
- **Feed Cost:**

- **Futures Price Per Cwt:** $70.00  
- **Feed Cost Per Ton:** $228.07

- **Futures Basis Per Cwt:** $4.00  
- **Feed Cost Per Pound Of Gain:** $0.262

- **Capital Needed:** $329,375.65  
- **Expected G&Y Prem Per Cwt:** $5.32

- **Adjusted Lean Price:** $71.32

- **Adjusted Live Price:** $54.20  
- **Breakeven + $5:** $66.99  
- **Breakeven + $10:** $74.49

- **PACKER Tyson Breakeven:** $76.99

### Production Opportunity

- Decrease FC by .1
- Increase ADG by .1
- Decrease Mortality & Culls by 1%
Don’t wait for the market to move!

- Move your people!
- Affect performance!
- Affect production!

Margin Calculator

<table>
<thead>
<tr>
<th>Profit Margin</th>
<th>Calculated per Pig</th>
<th>Calculated per Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Purchased</td>
<td>July 13, 2009</td>
<td>Purchase $37.00</td>
</tr>
<tr>
<td>Number of pigs purchased</td>
<td>2400</td>
<td>Feed $66.73 Grade add $11.17</td>
</tr>
<tr>
<td>Pig price</td>
<td>$37.00</td>
<td>Pig space $17.83</td>
</tr>
<tr>
<td>Gross revenue</td>
<td>$149.77</td>
<td>Pig weight in 14 death &amp; cull $4.64</td>
</tr>
<tr>
<td>Pig weight out 280</td>
<td></td>
<td>Interest expense $1.67</td>
</tr>
<tr>
<td>Net return</td>
<td>$15.61</td>
<td>Average daily gain 1.60</td>
</tr>
<tr>
<td>Other variable</td>
<td>$6.29</td>
<td>Feed conversion 2.20</td>
</tr>
<tr>
<td>Total Expense</td>
<td>$134.17</td>
<td>profit / group $36,023.02</td>
</tr>
<tr>
<td>Cost/cwt live</td>
<td>$47.92</td>
<td>annual return to facility $76,778.99</td>
</tr>
<tr>
<td>Corn price</td>
<td>$4.00</td>
<td>Cost/cwt lean $63.05</td>
</tr>
<tr>
<td>Bean meal</td>
<td>$290.00</td>
<td>return on investment 11.19%</td>
</tr>
<tr>
<td>DDGS</td>
<td>$115.00</td>
<td>Fat $ / ton $550.00</td>
</tr>
<tr>
<td>Premix</td>
<td>$30.00</td>
<td>Ingredients  Number of pigs / fill 2400</td>
</tr>
<tr>
<td>Feed drug</td>
<td>$4.80</td>
<td>% Corn / ton 59.6%</td>
</tr>
<tr>
<td>Grind mix &amp; deliver</td>
<td>$12.00</td>
<td>% SBM / ton 19.7%</td>
</tr>
<tr>
<td>Fixed cost per pig space</td>
<td>$38.00</td>
<td>% DDGS / Ton 14.3%</td>
</tr>
<tr>
<td>Veterinary</td>
<td>$3.15</td>
<td>% Premix / ton 2.30%</td>
</tr>
<tr>
<td>Interest rate</td>
<td>0.0475</td>
<td>Turns / year / pig space 2.13</td>
</tr>
<tr>
<td>Freight in</td>
<td>$1.00</td>
<td>Bushels of corn 14,376.68</td>
</tr>
<tr>
<td>Freight out</td>
<td>$1.50</td>
<td>Tons of SBM 133.06</td>
</tr>
<tr>
<td>Freight Insurance</td>
<td>$0.00</td>
<td>Tons of DDGS 96.58</td>
</tr>
<tr>
<td>Check off/ Vol PPC</td>
<td>$0.64</td>
<td>SEW by days to market &amp; ADG December 26, 2009</td>
</tr>
<tr>
<td>LRP Insurance quote</td>
<td>$0.00</td>
<td>feed cost</td>
</tr>
<tr>
<td>Futures price/cwt.</td>
<td>$70.00</td>
<td>feed cost/ton $228.07</td>
</tr>
<tr>
<td>Futures Basis/cwt.</td>
<td>$4.00</td>
<td>feed cost/lb. of gain $0.25</td>
</tr>
<tr>
<td>CAPITAL NEEDED</td>
<td>$321,999.04</td>
<td>Expected G&amp;Y Prem/cwt $5.32</td>
</tr>
<tr>
<td>Adjusted Lean Price</td>
<td>$71.32</td>
<td>Adjusted Live Price $54.20</td>
</tr>
<tr>
<td>Adjusted Live Price</td>
<td>$71.32</td>
<td>Capital Needed $335,536.58</td>
</tr>
</tbody>
</table>

$5/hd in production/performance gains

Don’t wait for the market to move! 
Margin Calculator

- Adjust current market cost
  - Lean Hogs
  - Corn
  - SBM
  - DDGS
  - Fat

- Adjust for your systems performance
  - Death loss
  - ADO
  - FC
  - Wean Pig Price
  - Grade & Yield Premium
  - Basis
Margin Opportunity

- Always opportunity to improve your margin in performance and production if you…

  Focus on the **PEOPLE!!**

Product Promotion!!!

- Start local- Pork Producers
- Get involved

THANK YOU
SWINE PROFITABILITY CONFERENCE

February 2, 2010

“What Does the Future Hold for the U.S. Swine Industry?”

by

Steve Meyer
Paragon Economics
Des Moines, IA
What Does the Future Hold for the U.S. Swine Industry?

Steve Meyer
Paragon Economics, Des Moines, IA

First – The Morrell-Sioux City closure
- Effective April 20
- Current capacity: 14,000 head/day but have been killing around 10,000/day
- Plant was built in 1959 - relatively old but far from the oldest in the U.S.
- LIMITED PROCESSING – primarily a kill-cut facility
- Location is no longer a positive for Sioux City - especially without the stockyards
- COMPLETELY FORESEEABLE!!!!!

2009: Max weekly kill was below capacity
... For the industry as a whole

U.S. WEEKLY SLAUGHTER CAPACITY
(Assumes an average of 5.4 days/week)
Not good BUT NOTHING LIKE 1998!!!

... Note the drop in capacity utilization in '09

U.S. WEEKLY SLAUGHTER CAPACITY & AVERAGE SLAUGHTER

Capacity could still get a bit tight in Q4

FI HOG SLAUGHTER, WEEKLY
Based on USDA Hogs & Pigs Report, December '09

Impacts?

- One less plant is not the same as one less buyer or one less company
- Still many selling opportunities in the SD-Minn-IA-Neb area
- Morrell say it will still honor marketing contracts – freight???
- Negligible price impact
- MUST BE CAREFUL ABOUT OUTPUT!!!!
- Why did this happen? Costs and MCOOL
255 days @ 10k/day = 2.5 million hogs

U.S. COMMERCIAL HOG SLAUGHTER, YEAR/YEAR CHANGE

This closure is MORE of the long-run impact

- For each 1 million head fewer market hogs produced in the U.S., there will be
  - 331 fewer jobs in pork production
  - 681 fewer jobs in pork processing
  - 1,142 fewer jobs in the rest of agriculture
  - 2,154 fewer jobs - mostly rural!

- And we are in the process of reducing output by about 10 million head
  - 21,540 fewer jobs - mainly in rural areas

To paraphrase the Clinton campaign:

“IT’S STILL COSTS, STUPID!”
Corn usage for ethanol up to 4.2 bil. bu. ...  
...+14.3% vs. ’08; +525 mil. bu. more in ’10

U.S. CORN PRODUCTION & USAGE BY CATEGORY

USDA now says we have a record corn crop...

Record-high availability, price down 19% ...  
... but still near $3.50/bu per USDA
Cash corn remains in a new “normal” range... But moved to the upper half since harvest

CASH CORN PRICE, OMAHA, WEEKLY

Feed cost – lowest since September

CORN-SOY COST, 16% CR. PROTEIN DIET

Hog production costs, though below 2008... +23% from historical levels through 2010

ACTUAL & PREDICTED HOG PRODUCTION COSTS*

*Based on relationship between ISU Estimated Costs & Returns data and historic Omaha corn and Decatur soybean meal prices

Average Cost, 1999-2006: $52.76/cwt
Average Cost, 1/10 - 12/10: $64.77/cwt
Average Cost, 1/10 - 12/10: $55.75/cwt

Actual Costs per Cwt
Predicted/Forecast Costs - Carcass

Average Cost: 1/10 - 12/10: $44.75/cwt
We would have seen NO LOSSES thru ‘09 . . .

ACTUAL & PREDICTED HOG
PRODUCTION COSTS* AND PRICES

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs per ISU</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>Predicted/Forecast Costs - Carcass</td>
<td>18</td>
<td>22</td>
<td>26</td>
<td>30</td>
<td>34</td>
<td>38</td>
<td>42</td>
<td>46</td>
<td>50</td>
<td>54</td>
<td>58</td>
<td>62</td>
<td>66</td>
<td>70</td>
</tr>
<tr>
<td>Cash Hog Price</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>29</td>
<td>31</td>
<td>33</td>
<td>35</td>
<td>37</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td>Futures-Implied IA-MN Price</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>29</td>
<td>31</td>
<td>33</td>
<td>35</td>
<td>37</td>
<td>39</td>
</tr>
</tbody>
</table>

*Based on relationship between ISU Estimated Costs & Returns data and historic Omaha corn and Decatur soybean meal prices

With 30% higher costs, we would have seen no losses through 2009. However, if not for these higher costs, we would have seen profits.

Corn-oil relationship implies $4.00 to $4.20

CASH CORN VS. CASH CRUDE

y = 2.4653e0.0065x
R² = 0.7054

0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00
Crude, $/bbl

0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00
Corn, $/bu.

March Crude = $74.00
Feb '11 Crude = $79.79

MarchCorn = $7.40
Feb '11 Corn = $7.65

Wisner's Minnesota Cost Line

Positive ethanol margins will drive corn bids

Corn & oil relationship implies $4.00 to $4.20

. . . So there is yet upside potential for corn

Positive ethanol margins will drive corn bids

From information, knowledge
**Ethanol production capacity is still growing**

- As of January 19, 2010 per RFA:
  - 191 plants operating -- capacity of 13.08 bil. gal./yr.
  - 13 plants expanding or under construction -- capacity of 1.43 bil. gal./yr.
- Current plants could use 4.65 bil. bushels
  - All plants would use 5.2 bil. bushels
- Already have enough to exceed E10 for all U.S. gasoline -- thus the push for E15
  - RFS has promised more than the market can deliver!

**We can’t “unring” the ethanol bell**

- FAPRI/TAMU study – looked at 2011-2018
  - Removing the BTC lowers corn price 0.6%
  - Removing the tariff lowers corn price 2.8%
  - Removing the RFS lowers corn price 4.6%
  - Removing all three lowers corn price 13.1%
  - Will BTC & tariff be allowed to expire in ‘10?
- Bottom Line: The plants are in place -- they will be operated by someone
- STILL NEED – an automatic RFS trigger for drought, especially if oil is cheap

**We are in the process of reducing supply . . .**

. . . Not just Q supplied -- the entire line!
We are in the midst of that process now

- Chicken production is down 3.3% for '09
- Turkey production is down 6.0% for '09
- Pork production is down 1.8% for '09
- Beef production is down 2.7% for '09
- Chicken reductions are slowing and turkey will, too - shorter reaction time
- Pork reduction will get larger -- ??
- Beef reduction may not get larger but will last MUCH longer

So what can producers do about costs?

- Efficiency, efficiency, efficiency - Even higher incentives for productivity growth!
- Manage feed ingredient costs
  - Corn near $3 will be CHEAP for next 5-8 yrs.
  - Ditto for meal <$280 or $290
- Backward integrate into grain production
  - go from specialized hogs to diversified
- Carry a “strategic reserve”
  - 2-3 months of corn to get through Aug & Sept some year - soon?
  - Soybean meal?

Domestic pork demand has grown in '09 . . .

... But more important: The trends are BAD!

U.S. CONSUMER DEMAND INDEXES

January-November '09

Beef: Down 2.1%

Pork: Up 3.1%

Broilers: Down 3.2%
Have we found the saturation point for meat?

U.S. RED MEAT & POULTRY CONSUMPTION
Per Capita, Retail Weight, Annual

<table>
<thead>
<tr>
<th>Year</th>
<th>Turkey</th>
<th>Total</th>
<th>Chicken</th>
<th>Pork</th>
<th>Beef</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2008 exports: A confluence of positives...

- Record-low U.S. dollar made U.S. product relatively cheap
- China/Hong Kong was the driver
  - Booming economy and rising middle class
  - Death losses in 2006-07 due to disease, earthquake, harsh winters = pork shortage
  - Olympic games
- Economic growth in other countries
- Strong Canadian dollar

Remarksably strong 2009 exports...

...Given the obstacles we have faced!!!
From information, knowledge Paragon Economics, Inc.

'09 exports pulled HOG demand down vs. '08

HOG & PORK DEMAND INDEXES

Index, '85=100

January-November '09:
- Pork -- Up 3.1%
- Hogs -- Down 4.4%

Source: University of Missouri

Supply: Frozen stocks have fallen sharply!

MEAT IN COLD STORAGE

Million Lbs., Product Weight

FP and MH imports are down sharply . . .

. . . But are equal to the levels I expected

LIVE HOG IMPORTS FROM CANADA

2009
- MH: -67%
- FP: -25%
- SB: -0.5%
- All: -30%
Sept Hogs & Pigs was about as expected... 

...Evidence of turning the corner?

USDA Quarterly Hogs and Pigs Report
September 25, 2009

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventories on September 7 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hogs and pigs</td>
<td>68,196</td>
<td>66,626</td>
<td>97.7</td>
<td>98.2</td>
<td>-0.5</td>
</tr>
<tr>
<td>Kept for breeding</td>
<td>6,097</td>
<td>5,874</td>
<td>96.9</td>
<td>97.4</td>
<td>-0.5</td>
</tr>
<tr>
<td>Kept for market</td>
<td>62,109</td>
<td>60,752</td>
<td>97.8</td>
<td>98.3</td>
<td>-0.5</td>
</tr>
<tr>
<td>Under 50 lbs.</td>
<td>23,063</td>
<td>21,837</td>
<td>96.3</td>
<td>96.3</td>
<td>-0.0</td>
</tr>
<tr>
<td>60-119 lbs.</td>
<td>15,397</td>
<td>15,078</td>
<td>97.9</td>
<td>96.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>120-179 lbs.</td>
<td>12,855</td>
<td>12,674</td>
<td>98.6</td>
<td>98.8</td>
<td>-0.2</td>
</tr>
<tr>
<td>180 lbs. and over</td>
<td>11,201</td>
<td>11,163</td>
<td>99.7</td>
<td>99.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Farrowings2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June-Aug sows farrowed</td>
<td>3,075</td>
<td>2,966</td>
<td>96.5</td>
<td>96.8</td>
<td>-0.3</td>
</tr>
<tr>
<td>Sep-Nov Intentions</td>
<td>3,028</td>
<td>2,935</td>
<td>96.9</td>
<td>97.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>Dec-Feb Intentions</td>
<td>3,024</td>
<td>2,935</td>
<td>96.9</td>
<td>97.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>June-Aug Pig Crop 1</td>
<td>29,240</td>
<td>28,772</td>
<td>98.4</td>
<td>98.1</td>
<td>0.3</td>
</tr>
<tr>
<td>June-Aug pig saved per litter</td>
<td>9.53</td>
<td>9.70</td>
<td>102.0</td>
<td>101.4</td>
<td>0.6</td>
</tr>
</tbody>
</table>


Then came December's report...

USDA Quarterly Hogs and Pigs Report
December 30, 2009

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventories on December 1 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hogs and pigs</td>
<td>67,146</td>
<td>65,807</td>
<td>98.0</td>
<td>97.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Kept for breeding</td>
<td>6,062</td>
<td>5,850</td>
<td>96.5</td>
<td>96.6</td>
<td>-0.1</td>
</tr>
<tr>
<td>Kept for market</td>
<td>61,087</td>
<td>59,957</td>
<td>98.2</td>
<td>97.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Under 50 lbs.</td>
<td>19,428</td>
<td>19,085</td>
<td>98.2</td>
<td>98.1</td>
<td>0.1</td>
</tr>
<tr>
<td>50-119 lbs.</td>
<td>14,986</td>
<td>14,562</td>
<td>98.2</td>
<td>98.1</td>
<td>0.1</td>
</tr>
<tr>
<td>120-179 lbs.</td>
<td>12,731</td>
<td>12,529</td>
<td>98.4</td>
<td>97.7</td>
<td>0.7</td>
</tr>
<tr>
<td>180 lbs. and over</td>
<td>11,533</td>
<td>11,252</td>
<td>97.8</td>
<td>97.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Farrowings2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sep-Nov sows farrowed</td>
<td>3,028</td>
<td>2,974</td>
<td>96.9</td>
<td>96.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Dec-Feb Intentions</td>
<td>3,024</td>
<td>2,935</td>
<td>96.9</td>
<td>96.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Mar-May Intentions</td>
<td>3,018</td>
<td>2,935</td>
<td>97.2</td>
<td>97.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Sep-Nov Pig Crop 1</td>
<td>28,771</td>
<td>28,833</td>
<td>100.2</td>
<td>98.8</td>
<td>1.4</td>
</tr>
<tr>
<td>Sep-Nov pig saved per litter</td>
<td>9.55</td>
<td>9.70</td>
<td>102.1</td>
<td>101.9</td>
<td>0.2</td>
</tr>
</tbody>
</table>

1 Thousand head 2 Thousand litters

How long can productivity growth continue?

Average Growth Rate, Q3-'07 thru Q4-'09 = 2.15%
Average Growth Rate, Q3-'07 thru Q4-'09 = 1.7%
Average Growth Rate, Q2-'07 thru Q2-'08 = 0.9%
September H&P says '10 supplies ... 
... Will be VERY close to '09 supplies

FI HOG SLAUGHTER, WEEKLY
Based on USDA Hogs & Pigs Report, December '09

Weekly Capacity w/o Sioux City and assuming 5.4 days/week = 2.327 million head

FI CARCASS WEIGHTS, HOGS

Pounds

0.9% lower

FI PORK PRODUCTION, WEEKLY

Mil. lbs. carc.

-1.0%

-7%
First cutout rally in Oct-Nov since '98 . . .

. . . A gain of nearly $18/cwt in Q4-09!

51-52% LEAN, PORK CUTOUT VALUE

![Graph showing cutout value trends]

New packer discipline (??) means . . .

. . . Hog price changes have matched cutout

NATIONAL WTD. AVG. NET PRICE
ALL PURCHASE METHODS

![Graph showing hog price trends]

Packer margins: Very good since December . . .

. . . And should support higher hog prices

PORK PACKERS’ EST'D GROSS MARGIN

![Graph showing packer margins trends]
Sow slaughter back below 70k/wk.

...Though a higher percent are U.S. sows

U.S. SOW SLAUGHTER

<table>
<thead>
<tr>
<th>Thousand Hdl.</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>Feb</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
</tr>
<tr>
<td>Mar</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>95</td>
</tr>
</tbody>
</table>

U.S. herd reduction sped up a bit in Dec...

SWINE BREEDING HERDS -- US & Canada

Pct Chng, Yr-Yr

<table>
<thead>
<tr>
<th>Canada</th>
<th>U.S.</th>
<th>Can-Am</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>-10%</td>
<td>-8%</td>
</tr>
<tr>
<td>1998</td>
<td>-8%</td>
<td>-6%</td>
</tr>
<tr>
<td>1999</td>
<td>-6%</td>
<td>-4%</td>
</tr>
<tr>
<td>2000</td>
<td>-4%</td>
<td>-2%</td>
</tr>
<tr>
<td>2001</td>
<td>-2%</td>
<td>0%</td>
</tr>
<tr>
<td>2002</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>2003</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>2004</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>2005</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>2006</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>2007</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>2008</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>2009</td>
<td>16%</td>
<td>18%</td>
</tr>
<tr>
<td>2010</td>
<td>18%</td>
<td>20%</td>
</tr>
</tbody>
</table>

How much of a reduction do we need?

- We have to make up for:
  - ~7-8% productivity increase of circo vac’s
  - 20-30% higher costs.
- Need a 12% reduction of the US/Canada sow herd from Oct '07 peak of 7.752 mil.
  - Would put US/Canada at 6.82 million head
  - Canada is already at 1.38 million and will cut farther – to 1.2 mil. or so
  - U.S. needs to go to **5.5 to 5.6 million**
- Dec 1: 5.856 million, down 6.1% vs. ‘07
Why such a slow reaction?

- Producers WANT to be in this business – it has been good to them!
- Producers believed 2008 was the new reality???

Producer equity was record high in '07 . . .

... but is now down by 81%

**ACCUMULATED PROFITS**
IOWA Farrow-to-Finish OPERATIONS
(Sum of the profits from selling one pig per month since January 1991)

<table>
<thead>
<tr>
<th>Year</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>91</td>
<td>-</td>
</tr>
<tr>
<td>92</td>
<td>-</td>
</tr>
<tr>
<td>93</td>
<td>-</td>
</tr>
<tr>
<td>94</td>
<td>-</td>
</tr>
<tr>
<td>95</td>
<td>-</td>
</tr>
<tr>
<td>96</td>
<td>-</td>
</tr>
<tr>
<td>97</td>
<td>-</td>
</tr>
<tr>
<td>98</td>
<td>-</td>
</tr>
<tr>
<td>99</td>
<td>-</td>
</tr>
<tr>
<td>00</td>
<td>-</td>
</tr>
<tr>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>02</td>
<td>-</td>
</tr>
<tr>
<td>03</td>
<td>-</td>
</tr>
<tr>
<td>04</td>
<td>-</td>
</tr>
<tr>
<td>05</td>
<td>-</td>
</tr>
<tr>
<td>06</td>
<td>-</td>
</tr>
<tr>
<td>07</td>
<td>$786.87</td>
</tr>
<tr>
<td>08</td>
<td>-</td>
</tr>
<tr>
<td>09</td>
<td>-</td>
</tr>
</tbody>
</table>

First December 2009
Here lost $504.47
81% off peak amount

Peak in Sept '07 = $1196.87

Dedc '09 = $152.40
8 years

Source: Paragon Economics, Inc. using data from Estimated Costs and Returns, Dr. John Lawrence, Department of Economics, Iowa State University

Futures: $10-$15 advantage many weeks . . .

... and OMF (feed prices) had advantage, too

**MARKET HOG PRICES BY PRICING METHOD**
The LH futures “carrot” is good again!
... Though not as good as 2 weeks ago!

U.S. HOG PRICES, WEEKLY

Prices have been close to AVC . . .
... Except in Q4-08 and Aug-Nov ‘09

HOG PRICE VS. AVG. VARIABLE COSTS

Supply forecasts

December 2009 Commercial Slaughter Forecasts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mil. Ht</td>
<td>% Chng</td>
<td>Mil. Ht</td>
<td>% Chng</td>
<td>Mil. Ht</td>
<td>% Chng</td>
</tr>
<tr>
<td>2009</td>
<td>Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>28.465</td>
<td>-3.8%</td>
<td>28.465</td>
<td>-3.8%</td>
<td>28.465</td>
</tr>
<tr>
<td>Q2</td>
<td>27.063</td>
<td>-3.1%</td>
<td>27.063</td>
<td>-3.1%</td>
<td>27.063</td>
</tr>
<tr>
<td>Q3</td>
<td>26.419</td>
<td>-1.5%</td>
<td>26.419</td>
<td>-1.5%</td>
<td>26.419</td>
</tr>
<tr>
<td>Q4</td>
<td>25.870</td>
<td>-1.3%</td>
<td>25.870</td>
<td>-1.3%</td>
<td>25.870</td>
</tr>
<tr>
<td>Year</td>
<td>112.882</td>
<td>-2.4%</td>
<td>112.882</td>
<td>-2.4%</td>
<td>112.882</td>
</tr>
<tr>
<td>2010</td>
<td>Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>27.775</td>
<td>-2.5%</td>
<td>27.775</td>
<td>-2.5%</td>
<td>27.775</td>
</tr>
<tr>
<td>Q2</td>
<td>26.520</td>
<td>-2.0%</td>
<td>26.520</td>
<td>-2.0%</td>
<td>26.520</td>
</tr>
<tr>
<td>Q3</td>
<td>27.850</td>
<td>-2.0%</td>
<td>27.850</td>
<td>-2.0%</td>
<td>27.850</td>
</tr>
<tr>
<td>Q4</td>
<td>28.900</td>
<td>-1.9%</td>
<td>28.900</td>
<td>-1.9%</td>
<td>28.900</td>
</tr>
<tr>
<td>Year</td>
<td>111.828</td>
<td>-1.4%</td>
<td>111.828</td>
<td>-1.4%</td>
<td>111.828</td>
</tr>
</tbody>
</table>

Green figures are actual data from USDA. Red figures are based on partial USDA data.
### Price forecasts – Look at futures!

#### December 2009 Hogs & Pigs Price Forecasts

<table>
<thead>
<tr>
<th></th>
<th>Missouri</th>
<th>ISU</th>
<th>LMC</th>
<th>Meyer</th>
<th>CME</th>
<th>CME Lean Hog Futures</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-52% Lean, Live Price</td>
<td>56.15</td>
<td>56.69</td>
<td>58.61</td>
<td>57.72</td>
<td>$58.14**</td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>57.67</td>
<td>58.48</td>
<td>59.45</td>
<td>58.18</td>
<td>$59.03**</td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>53.84</td>
<td>58.93</td>
<td>54.01</td>
<td>52.39</td>
<td>$54.18**</td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>53.56*</td>
<td>53.56*</td>
<td>56.61**</td>
<td>55.54*</td>
<td>$56.27***</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>55.95*</td>
<td>57.04*</td>
<td>57.04*</td>
<td>55.83*</td>
<td>$56.91**</td>
<td></td>
</tr>
</tbody>
</table>

2010:

<table>
<thead>
<tr>
<th></th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>59</td>
<td>63</td>
<td>66</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Q2</td>
<td>63</td>
<td>70</td>
<td>69</td>
<td>61</td>
<td>66</td>
</tr>
<tr>
<td>Q3</td>
<td>66</td>
<td>73</td>
<td>65</td>
<td>63</td>
<td>66</td>
</tr>
<tr>
<td>Q4</td>
<td>61</td>
<td>62</td>
<td>64</td>
<td>61</td>
<td>66</td>
</tr>
<tr>
<td>Year</td>
<td>62</td>
<td>66</td>
<td>66</td>
<td>61</td>
<td>67</td>
</tr>
</tbody>
</table>

1Converted to carcass using a yield of 75% *Partial USDA data **Average of CME Lean Hog Index

### How do producers survive and prosper?

- Manage their MARGIN!
  - Feed costs
  - Hog prices
- Manage risk relative to your risk-bearing capacity
  - Right now – probably not high=hedge!
  - Future – maybe you can take more risk
- Most cannot afford to gamble on getting the highest price or margin!
- Financial management - Cash & credit

### What does all of this mean for the future?
Where will we be in 2011 and beyond?

- The U.S. animal protein business will be smaller – a logical, predictable consequence of policy decisions.
  - Fewer processors needed – I had thought we might NOT lose a plant in 2010, but . .
  - Fewer suppliers
  - Fewer support service providers
- More scrutinized and regulated
- More dependent on international markets

After the dust settles . . .

- There will be viable, competitive U.S. animal protein sectors – they will NOT disappear!
- They will be smaller than before ’07
- Participants will have to be VERY good!
- Many operational choices will be limited – higher costs
- U.S. consumers will be forced to pay more for animal proteins in particular and food in general - Will they stand for it?

Two other sources for my work:

CME’s Daily Livestock Report
www.dailylivestockreport.com

National Hog Farmer’s Weekly Preview
www.nationalhogfarmer.com
SWINE PROFITABILITY
CONFERENCE

February 2, 2010

“Recent Breakthroughs in Lowering Cost of Production and Improving Margin Over Feed”

by

K-State Swine Team
Recent Breakthroughs in Lowering Cost of Production and Improving Margin Over Feed

Mike Tokach, Jim Nelssen, Bob Goodband, Joel DeRouchey, and Steve Dritz
K-State Swine Team

Welcome to the 2010 Swine Profitability Conference

Lowering cost of production and improving margin over feed

Needed for low cost and optimal margin

- Productivity
  - reproduction x genetics x health
- Health
- Pig care
- Feed cost (F/G x ingredient purchase)
- Marketing (weight x plan)
Needed for low cost and optimal margin

- Productivity
  - reproduction x genetics x health
- Health
- Pig care
- Feed cost (F/G x ingredient purchase)
- Marketing (weight x plan)

Pig Care

- Daily chores
- Timely treatments
- Timely euthanasia
Needed for low cost and optimal margin

- Productivity
  - reproduction x genetics x health
- Health
- Pig care
- Feed cost (F/G x ingredient purchase)
- Marketing (weight x plan)

Feed cost

- DDGS (seasonality in Kansas)
  - Vomitoxin, IV (Triumph) - calculator
- Other opportunities (milo, wheat midds, etc)
- Particle size
- Don’t include products without solid data
- Do what we do well in Kansas – aggressively control costs of all ingredients
- Feeder adjustment and space

DDGS calculators

- Simple calculator
  - Data/DDGS Economic calculator.xls
- Step-down calculator
  - Data/DDGS calculator Step Down.xlsx
Mycotoxins and New Crop Corn

- Observations of black mold on corn in Kansas and surrounding states
  - Most test results have shown limited mycotoxin contamination
  - Deoxynivalenol (DON), also commonly known as vomitoxin, has been the most common this year
    - > 1 ppm may reduce feed intake and rate of gain
    - > 5 ppm may result in feed refusal
    - > 10 ppm may result in vomiting
- DDGS – 3 times the level of original corn level

Mycotoxins – What can we do?

- Collect a good sample to test if suspected
- Screen/clean the grain – molds are in the dust and stressed small kernels
- Blend contaminated grain with clean grain to get below a maximum threshold for feeding
- Separate contaminated grain and feed higher levels to finishing pigs or sell for cattle feed
- Binders – generally do not help with vomitoxin
  - Balance binder cost with other alternatives

Use synthetic amino acids continue to be used economically in finishing diets

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Low Protein Amino Acid Price Calculator</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Corn</td>
<td>3.5 $/bu</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Soybean meal</td>
<td>300 $/ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L-Lysine</td>
<td>1.05 $/lb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>DL-Methionine</td>
<td>2.2 $/lb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>L-Threonine</td>
<td>1.6 $/lb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><strong>Savings per pig with AA fortified diet, $</strong></td>
<td>$0.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

www.KSUswine.org

Low Protein Amino Acid Price Calculator

Corn 3.5 $/bu Soybean meal 300 $/ton L-Lysine 1.05 $/lb DL-Methionine 2.2 $/lb L-Threonine 1.6 $/lb

Savings per pig with AA fortified diet, $ $0.28
Sorghum vs corn

- 10 experiments before 1985 (Cromwell, 1985)
- 9 experiments after 1985 (Sulabo, 2010)

<table>
<thead>
<tr>
<th>Sorghum value relative to corn</th>
<th>Cromwell</th>
<th>Sulabo</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG</td>
<td>98%</td>
<td>103%</td>
</tr>
<tr>
<td>ADFI</td>
<td>102%</td>
<td>106%</td>
</tr>
<tr>
<td>G/F</td>
<td>97%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Effect of DDGS and wheat midds on pig performance (100 to 295 lb)

- Wheat midds linear $P < 0.01$

<table>
<thead>
<tr>
<th>Wheat Midds (%) in 30% DDGS diets</th>
<th>ADG, lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>2.32</td>
</tr>
<tr>
<td>10.0%</td>
<td>2.29</td>
</tr>
<tr>
<td>20.0%</td>
<td>2.22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wheat Midds (%) in 30% DDGS diets</th>
<th>F/G</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>3.00</td>
</tr>
<tr>
<td>10.0%</td>
<td>3.09</td>
</tr>
<tr>
<td>20.0%</td>
<td>3.11</td>
</tr>
</tbody>
</table>

Barnes et al., 2010
Effect of DDGS and wheat midds on hot carcass weight

<table>
<thead>
<tr>
<th>Wheat Midds (%) in 30% DDGS diets</th>
<th>Corn-soy</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>220.7</td>
<td>216.3</td>
<td>210.0</td>
<td>206.4</td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wheat midds linear P < 0.01

Barnes et al., 2010

Effect of DDGS and wheat midds on jowl iodine value

<table>
<thead>
<tr>
<th>Wheat Midds (%) in 30% DDGS diets</th>
<th>Corn-soy</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>71.0</td>
<td>76.7</td>
<td>75.8</td>
<td>77.0</td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DDGS P < 0.01

Barnes et al., 2010

Every 100 microns - T/C increases by 1.2%
Must test routinely and drive as low as possible!
Do what we do well in Kansas

- Don’t include ingredients that are not proven to be economically beneficial
  - Lots of products on the market, make sure there is solid data to back their use

- Aggressively control costs of all ingredients

---

Marketing

- Optimal market weight (spreadsheets) – summer prices
  - Paylean, energy, ADFI (quality ingredients, health, etc), days to buy gain

- Pig removal (topping)

- Crush (spreadsheet?)

---

Proper Finishing Feeder Adjustment

Target feed pan coverage is 40 to 50% without feed accumulating in the corners.

2 inches of length per pig placed (25 pigs = 50”)
Optimal market weight for loads of pigs

<table>
<thead>
<tr>
<th>Processor</th>
<th>$60/cwt; $160/ton</th>
<th>$70/cwt; $160/ton</th>
<th>$80/cwt $160/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmland</td>
<td>262 to 282</td>
<td>268 to 285</td>
<td>274 to 290</td>
</tr>
<tr>
<td>Excel</td>
<td>262 to 280</td>
<td>267 to 285</td>
<td>272 to 290</td>
</tr>
<tr>
<td>Tyson</td>
<td>268 to 295</td>
<td>275 to 300</td>
<td>&gt; 285</td>
</tr>
<tr>
<td>Triumph</td>
<td>&gt; 280 (300)</td>
<td>&gt; 280 (320)</td>
<td>&gt; 280 (330)</td>
</tr>
</tbody>
</table>

Seasonal Influence on Market Weight

- 70 to 80% of profit in 3 months
- Buying gain:
  - Paylean, energy, ADFI
  - DAYS (need 7 to 10 d more in summer)
Impact of pen unloading on feed efficiency and average daily gain

Pigs/Pen | 25 | 25 | 25
---|---|---|---
Pigs Removed | 0 | 2 | 4
Space/pig (square feet) | 7.2 | 7.8 | 8.6
Pen Start Weight, lb | 241 | 242 | 242
Residual Weight, lb | 241 | 239 | 237
Final Weight (lb) | 275 | 277 | 276
Removed lb | 0 | 544 | 1,068
Removed Ave Weight | 0 | 272 | 267
Marginal Days on Feed | 15 | 15 | 15
Marginal ADG, lb | 2.26 | 2.52 | 2.58
Marginal F/G | 2.81 | 2.67 | 2.52
Total lb/pen | 6,876 | 6,911 | 6,855
Low Rev-HighFeed, $/pen | 2.786 | 2.807 | 2.817
High Rev-LowFeed, $/pen | 3.885 | 3.912 | 3.906

Boyd et al., 2008

Jacela, 2008
Impact of pen unloading on feed efficiency and average daily gain

<table>
<thead>
<tr>
<th>Pigs/Pen</th>
<th>25</th>
<th>25</th>
<th>25</th>
<th>25</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removed –d 0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Removed – d 10</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Space/pig (sq ft)</td>
<td>7.2</td>
<td>7.8</td>
<td>8.6</td>
<td>9.5</td>
<td>10.6</td>
</tr>
<tr>
<td>ADG, lb</td>
<td>2.02</td>
<td>2.23</td>
<td>2.30</td>
<td>2.34</td>
<td>2.44</td>
</tr>
<tr>
<td>ADFI, lb</td>
<td>5.82</td>
<td>6.04</td>
<td>6.27</td>
<td>6.44</td>
<td>6.44</td>
</tr>
<tr>
<td>F/G</td>
<td>2.88</td>
<td>2.71</td>
<td>2.73</td>
<td>2.75</td>
<td>2.64</td>
</tr>
<tr>
<td>Total pen gain, lb</td>
<td>1,010</td>
<td>1,027</td>
<td>1,012</td>
<td>983</td>
<td>975</td>
</tr>
<tr>
<td>Total pen feed, lb</td>
<td>2,910</td>
<td>2,780</td>
<td>2,757</td>
<td>2,703</td>
<td>2,575</td>
</tr>
</tbody>
</table>

Jacela, 2008

Marketing strategy – Barn messages

- Get the heavy pigs on the first load!
  - Pigs over 340 lb “fall off the cliff” in terms of penalty.
  - Pull pigs from ALL pens when topping
    - Increases growth of other pigs in pen
    - Avoids problems of only pulling pigs near the door
    - Don’t sort by weight when filling barns

- Hold lightest pigs for last cleanout load
  - A surprising number of lighter pigs make it onto the initial load from a barn.

Marketing strategy – Management messages

- Minimize age spread within a barn to minimize variation
- Determine optimal weight for your market
  - Understand impact of market price and feed cost on optimal weight
- Top barns aggressively when weight bypasses optimum
  - Low market price, winter
- Less topping when weights are below optimum
  - High market price, summer
Marketing plan

- Not our area of expertise!
- Must know your costs
- Monitor Crush
- Work with multiple experts
- Make a plan!

Crush spreadsheet example

\Data\Crush margin example.xlsx

Needed for low cost and optimal margin

- Productivity
  - reproduction x genetics x health
- Health
- Pig care
- Feed cost (F/G x ingredient purchase)
- Marketing (weight x plan)
Thank You!

Kansas State University, Research and Extension
“Sow Production: Where We’ve Been, Where We’re Going”

by
Steve Dritz
Kansas State University
The productivity of the sow herd is certainly a key driver of profitability in pork production. Industry level sow productivity has been on an upward march for several decades in the US. For example pork production was over 5 times greater last year compared to 1930 while the size of the sow herd was less than half. Also, this productivity growth has accelerated from a growth of 2% per year prior to 1980 to 2.8% per year from 1980 to present.

Table 1. Components of US sow herd productivity growth.

<table>
<thead>
<tr>
<th>Item</th>
<th>1930-80</th>
<th>1980-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litters/sow/year</td>
<td>0.5%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Pigs/litter</td>
<td>0.4%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Livability</td>
<td>0.5%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>Slaughter weight</td>
<td>0.6%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Trade impact</td>
<td>0.0%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Total</td>
<td>2.0%</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

Adapted from data provided by Dr. Ron Plain, University of Missouri.

Note that the acceleration of productivity growth has been the result of an increase in productivity from two main factors: pigs per litter and litters per sow. The productivity for these two factors have doubled while livability productivity has decreased and slaughter weight remained static. Since pigs per litter and litters per sow per year are the two major components of pigs per sow per year, this indicates that the relative rate of change in sow productivity has been the result of improvements in pigs per sow per year relative to the other factors.

How has productivity changed overtime within a production system? The longest continuous data base available for our analysis extends back to 1989 with yearly data through 2007. The total number of farms was 30 in 1990 with an average herd size of 190 sows. In contrast, the data from 2007 consists of 64 farms with an average herd size of 2,375 sows. This data represents a transition from primarily farrow to finish farms at the beginning of the period to multi site farrow to wean sow farms. This transition is evident in a plot of weaning age (Figure 1). Average weaning age declined from 23.9 d to 15.5 days. Gradually, as the importance of increasing weaning age on finishing performance has been recognized the average age has risen to 19.1 d.
With the transition to earlier weaning ages, there was an increase in litter per sow per year (Figure 2). However, subsequently litters per sow have remained relatively constant at approximately 2.4 for a large portion of the time period. Interestingly, if the industry wide 1.1% improvement in litters per sow per year were to continue in these herds their litters per sow per year would be greater than the biological maximum of 2.6 litters per sow (115 d of gestation + 20 d lactation + 5 d Wean to Service)/365=2.61). Thus, future sow productivity improvements will have to be derived from litter size and livability improvements. Also, this seems to indicate that the industry wide improvements have been as a result of attrition of poorly managed farms in contrast to consistent improvement within farms for litter size.
Pigs born alive per litter increased rapidly in the transition from farrow to finisher herds (Figure 3). It appears that this was probably due to implementation of maternal line sows with increased heterosis. Then there is a relatively stable period with fluctuations around an average of 10.1 pigs per litter. However, over the last four years there appears to be a significant change with a dramatic improvement in live born litter size. Certainly, improvements in live born litter size can be lost with off-setting increases in prewean mortality. Note that prewean mortality has trended lower over time (Figure 4). Also, it is encouraging that the increase in live born litter size over the last four years has been accompanied by minimal increases in prewean mortality. The increase in live born litter size and trend downward in prewean mortality over time has resulted in an increase in pigs weaned per sow per year (Figure 5). Certainly while pigs per sow per year is a key driver we need to keep in mind that quality of weaned pigs as exhibited by their post weaning performance needs to be taken into account when measuring sow farm productivity. Another encouraging trend within this production system is the recent improvement in sow mortality (Figure 6). After rapidly increasing in the 1990’s, sow mortality has been consistently decreasing in recent years.

Figure 3. Changes in live born litter size from one US swine production system.
Figure 4. Changes in prewean mortality from one US swine production system.

![Prewean Mortality Graph]

Figure 5. Changes in pigs weaned per mated female from one US swine production system.

![Pigs Weaned per Mated Female Graph]
The volatility in feed costs over the last two years has forced us to reexamine all aspects of our nutritional programs. During this exercise, one thing we have had to relearn is the importance in the sow herd that productivity is a key driver for lowering weaned pig feed costs. For example, in one analysis conducted recently for our Kansas producers indicates that the relative range from using different ingredients such as milo or dried distillers grains was projected to reduce gestation feed cost about $0.65 per weaned. However, in the same analysis we projected increasing productivity from 20 to 22.5 pigs weaned per inventoried sow would decrease weaned pig feed cost by $1.10 per weaned pigs. Certainly, we want to capture both opportunities but it illustrates that an increase in 2.5 pigs weaned per sow is over 1.5 times greater than the impact of changing ingredient economics.

Another area of opportunity that we have spent little time characterizing is gilt development feed costs. For example, with the recent increases in feed ingredient prices the feed cost per gilt in a 60 day isolation period can exceed $50 per gilt. Conversely, delaying the age at first mating by 30 days can increase feed cost by $25 per gilt or $.50 or more per weaned pig. Challenges in characterizing gilt development costs occur many times since gilts are developed in continuous flow facilities. An additional area of opportunity to increase financial productivity of the sow herd is to increase pigs weaned per lifetime per sow. Not only will this decrease genetic costs but it will decrease gilt development feed cost per weaned pig produced. For example, if total feed cost for developing a gilt to their first breeding is $90 then increasing their lifetime productivity from 35 pigs to 50 pigs will reduce gilt development feed cost by over $0.90 per weaned pig.
As an aggregate, the US swine industry continues a relentless increase in productivity. Over long periods of time the productivity incremental gains of 2 to 3% per year result in significant gains in productivity. Also, sow farm productivity is a key driver for reducing costs such as feed costs. Opportunities for biologic improvement will revolve around increases in litter size that result in an increased number of pigs sold with increased productivity. Additionally, there appears to be significant opportunities in improving financial productivity from creatively capturing and monitoring costs or parameters that have not been traditional indicators of sow farm productivity. Examples include gilt development feed cost per weaned pig and the impact of lifetime productivity on feed costs.
References

SWINE PROFITABILITY
CONFERENCE

February 2, 2010

“Rachitic Rosaries and Rib Nodules”

by
Steve S. Dritz and Jerome C. Nietfield
Kansas State University
Rachitic Rosaries and Rib Nodules

Steve S. Dritz, DVM PhD and Jerome C. Nietfeld, DVM PhD Diplomat ACVP
Kansas State University

Nutrition problems associated with calcium and phosphorus metabolism is the most common metabolic nutritional disease we encounter. Typically, these problems are associated with gross errors in diet formulation or feed manufacturing. For example, cases we have encountered include lack of vitamin D included in the vitamin premix, erosion of a hole in the salt storage bin into the monocalcium phosphate bin, and lack of providing supplemental inorganic phosphorus when switching from a base mix to a premix program. Also, we have encountered vertebral breakage associated with stunning that did not appear to affect production parameters and appeared to have been caused by feeding a withdrawal diet lacking an inorganic phosphorus source (Dritz et al., 2000).

Recently, the higher cost of vitamins and inorganic phosphorus sources has lead to lowering of nutrient margins of safety in many swine diet formulations. Also, this has driven the use of higher levels of the supplemental enzyme phytase in diets to increase the availability of phosphorus. With the use of dried distiller’s grains and phytase, many grow finish diets currently lack supplemental inorganic phosphorus supplementation. Since phytase is an enzyme, it is susceptible to inactivation and degradation overtime if exposed environmental conditions such as heat and humidity during extended storage times. Finally, due to the expression of phytase activities that vary across sources there is a greater potential of errors in premix or diet formulation. Therefore, the risk of calcium and phosphorus nutritional disorders has increased in the past few years.

Case Description

This case is based on an email provided to us that was sent to all producers supplying pigs to a US packing plant. Excerpt from the email:

Subject: Rachitic Rosaries (Rib Nodules) & Nutrient Deficiencies

........ We have several carcasses everyday with rachitic rosaries, which are abnormal nodules that occur on the rib bones when moderate deficiencies of calcium, phosphorous and vitamin D3 occur in the diets. Pictures are attached that show these rachitic rosaries (rib nodules).

This past week we have been monitoring carcasses with rachitic rosaries .... Rachitic rosaries are indicative of decreases in growth rates and feed conversion, and they also result in a substantial loss in carcass value due to the damage that occurs to the ribs and belly when these rib bone nodules are removed. Check the formulation of your swine diets to make sure that adequate levels of calcium, phosphorus and vitamin D3 are present in all diet phases....
Since we were unfamiliar with the term rachitic rosaries, we did a brief literature search and found that the term is a description of rickets lesion from the human literature. The term is based on a clinical presentation of multiple enlarged ends of the ribs at the costochondral junction (Nield et al., 2006). Thus, the enlarged ends provide a beaded (rosary) type appearance of the costochondral junction on palpation or radiographs.

A brief review of the pathology of rickets indicated that rickets is a disorder of the developing skeleton with macroscopic lesions most prominent at sites of rapid growth, especially the growth plates of long bones and costochondral junctions of the large middle ribs (Maxie, 2007). These lesions form as a result of defective mineralization of cartilage matrix at the growth plates and in newly formed osteoid. The cartilage matrix continues to proliferate with the lack of mineralization and leading to the beaded nodular appearance. This reference indicated that the lesions are best appreciated on radiographs and that lesions may vary considerably within the same animal. Therefore, since we were unable to discern if the costochondral junction was involved, we requested samples from several carcasses be sent to the KSU Veterinary Diagnostic Laboratory. A radiographic, gross and histopathologic evaluation of these samples was performed.
Gross and radiographic evaluation of representative rib samples from pigs with rib nodules.

**KSU Radiologist Comments:**

Note that all lesions are mid shaft, suggestive of compressive forces causing a fracture. Additionally, there is no evidence that these lesions are infected or any kind of infective process associated with them. All of these lesions are suggestive of bony callus formation associated with fracture healing. Especially, with poor stability of the fracture, the callus size will be increased. Finally, bone density appears normal and there is even some evidence of
calcification in the cartilaginous portion of the ribs. Metabolic disease associated with diet would be expected to be more diffusely distributed.

Next, several ribs were dissected and split using a band saw, with care taken to include the nodular lesions and the costochondral junction.

As indicated, none of the bony nodules are associated with the costochondral junction. Also, there is a clear demarcation of the mineralization zone for the cartilaginous matrix at the growth plate. Finally, in agreement with radiographic evaluation, the cortical bone thickness appears normal.

**Microscopic evaluation:**

Sections of costochondral junction consist of normal cartilage that gives rise to bony spicules that form the primary spongiosa adjacent to the growth plate. The primary spongiosa is normally remodeled and the secondary spongiosa is formed normally. In the cartilage portion of the costochondral junction, the resting chondrocytes give rise to proliferating chondrocytes which become arranged into rows that progress and mature as they progress towards the costochondral junction. The mature chondrocytes then become normally mineralized to form the primary spongiosa.
The nodules involving the ossified portion of the bone contain areas where the continuity of the bone spicules is disrupted and fibrous connective tissue fills the space between the bone spicules. The fibrous tissue and the bone on either side of the fibrous tissue are disorganized and sometimes contain small nodules of disorganized cartilage. These areas represent calluses and are the result of a previous fracture that is in the process of healing.

Due to the lack of costochondral junction involvement and microscopic indications of normal growth plate development at the costochondral junction our assessment was that these nodules are not associated with rickets. We believe a likely cause is a traumatic event a number of weeks prior to slaughter is responsible for these lesions. Although, we cannot fully rule out a marginal calcium or phosphorus deficiency that may have lead to osteoporosis and bone weakness during a prior period of growth. In marginal cases of deficiency, bones or areas that consist predominately of cancellous bone, rather than trabecular bone are first affected. Thus, the first signs are often seen in vertebrae, ribs, and other flat bones. Due to the preferential mobilization from specific bones serving as a reservoir to mitigate these marginal deficiencies, they may not have an impact on production parameters similar to the case we have observed previously with the vertebral fractures.

**Literature Cited**


“Iodine Value and Impact on Pork Quality: What is Iodine Value and Why Should We Be Concerned?”

by

Joel DeRouchey, Mike Tokach, Steve Dritz,
Bob Goodband, and Jim Nelssen
Kansas State University Swine Team
Iodine Value and Impact on Pork Quality: 
What is Iodine Value and Why Should We Be Concerned?

Joel DeRouchey, Mike Tokach, Steve Dritz, Bob Goodband, and Jim Nelssen 
Kansas State University

Introduction

The term “Pork Quality” is used in a very general sense when describing various attributes of a pig carcass. Historically, loin pH and sensory traits, drip loss, and color scores have been most widely used to describe “Pork Quality.” At the same time, fat depot composition and color received less emphasis compared to loin attributes. More recently however, processors have put more emphasis on carcass fat quality as a measure of “Pork Quality.” Some of the reasons for this include export market acceptance which require ideal color and firmness, fresh pork shelf life, and the slice ability of bellies for bacon, which are affected negatively if the carcass fat becomes too unsaturated or “soft.” In order to quantify “Pork Quality” as it relates to carcass fat composition, researchers and processors have focused on determining the iodine value of carcass fat.

What is iodine value?

Iodine value is a measurement to estimate the amount of unsaturation present in the fatty acids present in carcass fat. Since unsaturated fatty acids are “softer” or less firm, iodine value can be used as indicator of overall carcass fat firmness. Iodine value can be measured by three different methods. First, direct laboratory analysis that involves iodine binding to unsaturated or double bonds in fatty acids; thus a greater amount of iodine will bind to a sample that has a greater proportion of unsaturated fatty acids (AOCS, 1998). This process is the true chemical analysis procedure for determining iodine value. However, due to the skill and time required to complete the lab analysis, this procedure has not been widely used. The results of iodine value are reported on a g / 100 g basis, with a lower value indicating a more saturated fatty acid composition, which is considered more ideal. Second, iodine value can be calculated from a fatty acid analysis where iodine value = [C16:1] × 0.95 + [C18:1] × 0.86 + [C18:2] × 1.732 + [C18:3] × 2.616 + [C20:1] × 0.785 + [C22:1] × 0.723, where the brackets indicate concentration (percentage) of the fatty acid (AOCS, 1998). This approach has been widely used by researchers to determine carcass fat iodine and can be done easily after the fatty acid composition has been determined for a fat depot. Finally, near-infrared analysis (NIR) can be used to determine iodine value. Some processors are utilizing this method as it is the most rapid method for determining iodine value results. However, the precise calibration of the NIR machine is essential to accurately determine the iodine value of the carcass fat sampled.
What is an acceptable carcass fat iodine value?

A limited amount of research has indicated that the maximum acceptable iodine value should be 70 g/100 g (Barton-Gade, 1987; Madsen et al., 1992) or 75 g/100 g (Boyd et al., 1997). The true concern of swine processors regarding “softer” carcasses do vary in the United States which impacts the ideal iodine value for different producers. Currently, some packing plants have set their maximum iodine value at 73 g/100 g. Other plants do not specify a maximum iodine value; rather have specific recommendations for maximum use of certain ingredients, such as a maximum DDGS in late finishing diets. Thus, dietary strategies that different producers can utilize will vary depending on the processing plant pigs are marketed.

How can carcass fat iodine value be altered?

When fatty acids are absorbed from the diet, especially polyunsaturated fatty acids, they specifically inhibit endogenous synthesis of fatty acids. This effect then inflates the effect of dietary fat composition influencing body fat composition. Therefore, it is possible to manipulate the composition of body fat quite dramatically by selection of dietary fats (Pettigrew and Esnaola, 2001). Because most common dietary fats are more unsaturated than the triglycerides the pig synthesizes endogenously, this can also lead to increased softness of carcass fat.

It is well documented that carcass fat composition is affected by the dietary ingredients and the composition of fatty acids that are fed (Averette Gatlin et al., 2002; Benz, 2008; Apple et al., 2009). Formulating diets that contain more unsaturated fat from fat sources, such as soy oil, yellow grease or animal-vegetable blends or from ingredients such as DDGS, bakery, or full fat soybean meal, will increase the unsaturation of the carcass fat. When carcass fat becomes more unsaturated, it becomes more flexible and termed “softer.” Also, feeding more saturated fat sources, such as choice white grease will also increase iodine value, but at a much smaller degree.

In the review of feeding DDGS to swine, Stein and Shurson (2009) summarized data from 8 trials that evaluated carcass fat iodine value, in which 7 trials showed an increase in iodine value and 1 trial reported no change in iodine value. As a rule of thumb based on available data, carcass fat iodine value increases 2 g /100 g for every 10% DDGS that is fed throughout finishing. Thus, if the baseline of a herd fed a corn-soybean meal based diet has an iodine value of 66 g/100 g, pigs fed 30% DDGS would have an estimated carcass fat iodine value of 72 g/ 100 g.

Also, to determine the effect of different added fat sources, Benz (2008) fed pigs either a control corn-soybean meal diet, or diets with 5% choice white grease or soybean oil from 97 to 285 lb, and reported jowl fat iodine values of 63.3, 68.8, and 84.3 g/100 g, respectively. Apple et al. (2009) evaluated feeding a control diet, or diets with 5% tallow, poultry fat or soybean oil from 62 to 250 lb. They reported carcass iodine values of 65.2, 64.7, 69.0, and 78.8 g/100 g, respectively. These data further demonstrate the impact of dietary fat source and its impact on carcass fatty acid composition.
Research has also shown that cereal grain type can alter the carcass iodine value. Lampe et al. (2006) reported that pigs fed barley had reduced iodine values compared to pigs fed corn (58.7 vs. 61.8). Furthermore, Benz (2008) reported that pigs fed milo had reduced carcass fat iodine values than pigs fed corn (68.3 vs. 70.3 g/100 g). Pigs fed Paylean at 9 g/ton 35 d prior to slaughter have been shown to have increased backfat iodine value than pigs not fed Paylean (Apple et al., 2009; 75.5 vs. 72.7 g/ 100 g). However, Duttlinger et al. (2009) reported that pigs fed Paylean at 6.75 g/ton for 28 d prior to slaughter did not have different backfat iodine values than pigs not fed Paylean (68.4 vs. 68.1 g/100 g). Reasons for this conflict of data may be due to higher feeding levels and longer durations by Apple et al. (2009) compared to Duttlinger et al. (2009).

**Does iodine value change based on fat depot location on the carcass?**

The iodine value of carcass fat does change by depot location. Benz (2008) reported in three separate experiments that jowl fat was 4.5, 1.1 and 2.4 g/ 100 g higher than found in backfat. Thus, location of where the fat depot is selected for analysis can influence the iodine value reported. Currently, most packers are utilizing fat from the jowl as the point of measurement due to ease of collection and prevention of loin damage from trimming backfat.

**What factors other than dietary composition affect the iodine value?**

Research evaluating gender differences has been inconsistent in demonstrating differences in iodine value. Benz (2008) reported in two studies that gilts had a 1.5 and 0.7 g/ 100 g increase in carcass iodine value in jowl fat compared to barrows, but in a third study found that gilts had a decreased jowl iodine value of 0.40 g /100 g compared to contemporary barrows.

While no data is available on pig health status, fields observations have reported that health challenged pigs will have higher iodine values than contemporary healthy pigs. The mechanism for this observation effect is unknown and needs research to determine the true effect of health on final carcass iodine value.

**Can iodine values be predicted by dietray compositon?**

Madsen (1992) and Boyd et al. (1997) developed equations to predict backfat iodine from calculating a dietary iodine value product (IVP). Iodine value product is calculated as:

\[
(\text{IV of the dietary lipids}) \times (\text{percentage dietary lipid}) \times 0.10
\]

However, Benz (2008) was unable to validate the dietary iodine value product with the actual carcass iodine values when using these equations when they fed various diets that were formulated with different fat and ingredient sources in combination. More research needs to be completed to accurately predict dietary feeding levels and duration of feeding various ingredients to predict final carcass fat iodine value.
However, nutritionists are becoming more comfortable with setting ingredient levels to match the required carcass fat iodine value. The key to predicting the iodine value accurately is having the actual farm baseline fed known diets throughout finishing and the resulting carcass fat iodine value. Once this is known, changes to dietary ingredients can be used to alter the value with some degree of confidence.

**Summary**

Iodine value is an indirect measure of carcass fat firmness and is directly impacted by the level of unsaturated fatty acids in the diet. More research is needed to accurately predict carcass iodine value when using various dietary ingredients containing different levels of saturated and unsaturated fatty acids. Also, depending on specific packer specifications, some producers must monitor carcass iodine values, while others who market to processors who do not measure or monitor iodine values are not impacted.

**References**


