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When Thorn Apple Valley (TAV), the nation's 7th largest pork packer, closed its doors to slaughter in July 1998, Michigan was left without a major hog slaughtering facility. With a daily slaughter capacity of 14,000 head, TAV was a significant player in the Michigan hog market. At the time of its closure, Michigan producers were supplying about half of the four million hogs slaughtered at TAV annually. In fact, survey data suggests that more than half of Michigan producers were using TAV as their primary market.

When TAV shut down its slaughterhouse, they were killing less than 12,000 hogs per day, well under their daily slaughter capacity. One reason for the low slaughter numbers was the lack of local supply. Low hog numbers in the state drove TAV to aggressively bid for live hogs in Michigan and to further locate hogs in neighboring states and Ontario. Many in the industry felt that because of this aggressive bidding, Michigan producers enjoyed relatively higher hog prices than their Eastern Corn Belt (ECB) counterparts (Illinois, Indiana, and Ohio) while TAV's doors were open. After TAV's closure, coffee shop talk indicated that many Michigan producers felt that their price advantage was lost. Anecdotal evidence suggests that pre-TAV Michigan prices were \$2/cwt higher than the rest of the ECB and that post-TAV Michigan prices were \$2/cwt under the rest of the ECB. This suggests that the basis between Michigan and the rest of the ECB declined by \$4/cwt after the slaughterhouse closure. If this is true, then it certainly has long term implications for the profitability of Michigan pork producers.

In response to these concerns, the authors examined the plant closing's local impact via an investigation of whether prices received by Michigan hog producers decreased relative to hog prices in the Eastern Corn Belt. Specifically, the following

issues were addressed:

- What has been the trend in basis over the last 5 years (1995-2000)?
- Were Michigan's live hog prices really higher than those of ECB counterparts before TAV closed?
- Did Michigan's prices decline relative to those of ECB counterparts after TAV closed? If so, did they remain lower or did they rebound?
- Did the basis between Michigan and the rest of ECB become more variable in the post-TAV closing period?
- Did slaughter capacity utilization in the rest of ECB impact Michigan prices in the post-TAV closing period?

Background and Procedures

The ECB had six major hog packers during the time period studied. From a Michigan perspective, the regional market structure changed abruptly when Thorn Apple Valley exited slaughter.

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The literature suggests that this change in market structure could have two impacts: (1) a change in the basis between the price received by Michigan producers and the price received in the remainder of the Eastern Corn Belt and (2) an increase in the variability

of the basis received by Michigan producers. Also during the study's time period, TAV's major competitor for market hogs,

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IBP's Logansport Indiana plant, added daily slaughter capacity. This plant started operations in 1995 with a daily capacity of 7,000 hogs, but increased capacity to 13,000-14,000 by double shifting beginning in 1997. Logansport's proximity to TAV's Detroit plant put the two plants in direct competition with one another for Michigan hogs during the period when TAV's Detroit slaughter plant was open. Previous studies have shown that, since per head slaughter costs increase significantly as capacity utilization falls, packers are willing to bid significantly higher prices for hogs when capacity utilization is less than 80 to 90 percent. TAV likely faced a disadvantage in buying hogs to meet daily slaughter capacity as compared to plants located in more concentrated production areas—a disadvantage likely made worse by the Logansport plant's presence. Since TAV's exit from hog slaughter, IBP's Logansport plant is no longer in direct competition for Michigan hogs. Michigan producers, as "fringe" suppliers to other packers in the Eastern Corn Belt, possibly became more vulnerable to the daily slaughter needs of Eastern Corn Belt plants after the plant closure. If this is true, it will be reflected in variance of the basis between Michigan live hog prices and

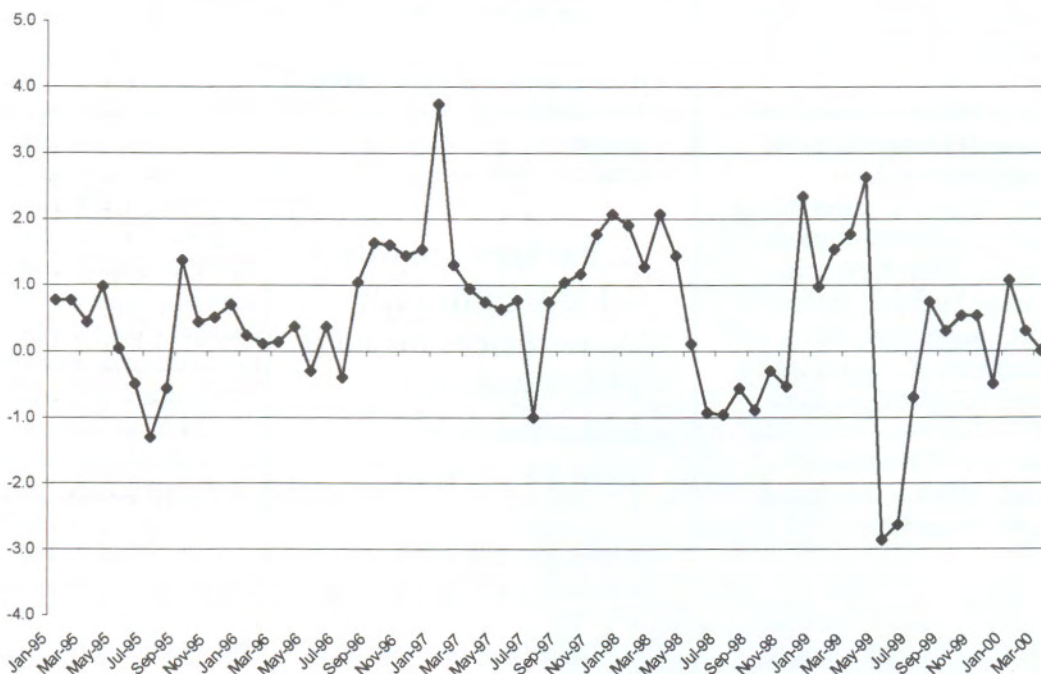
Weights are based on each state's monthly slaughter as a percentage of the region's total monthly slaughter. For example, if Illinois accounted for 42% of the region's monthly slaughter, then the Illinois monthly average price accounted for 42% of P_{ROECB} . The Michigan price, P_{MI} , is the monthly average price reported by Michigan Agricultural Statistics. Next, we defined the basis as the price difference $P_{MI} - P_{ROECB}$. For example, if the price in Michigan is \$46 and the average price in ROECB is \$44, then the basis is \$2. A positive basis would imply that Michigan producers enjoy a price advantage relative to their Eastern Corn Belt counterparts. A negative basis implies a disadvantage for Michigan producers.

Monthly slaughter capacity utilization in the Eastern Corn Belt market, excluding Michigan, is also included in the analysis to determine what impact fluctuations in capacity use may have on the basis between Michigan prices and the ROECB. Capacity utilization is defined as total monthly federally inspected slaughter (head) divided by monthly slaughter capacity (head). Monthly slaughter capacity is defined as daily slaughter capacity times monthly days in operation. A

negative impact implies that Michigan producers have less of a price advantage when ECB packers are slaughtering at or near capacity. A positive impact would imply that Michigan producers enjoy a gain in the basis.

Figure 1

Average Monthly Price Difference: Michigan Live Hog Price - Eastern Cornbelt Live Hog Price (excluding Michigan)



What Did We Find?

Figure 1 charts the basis between P_{MI} and P_{ROECB} from January 1995 to May 2000. Visual inspection reveals that Michigan producers have generally enjoyed a positive basis over the ROECB. The basis appears to be even greater in the period when TAV and IBP-Logansport were directly competing for Michigan hogs (September 1995 to July 1998). The chart also suggests that the basis might indeed have become more variable in the post-TAV closing period.

ECB live hog prices during the post-TAV closing period. To conduct the analysis, the ECB region is divided into two markets: Michigan and the Rest of ECB (ROECB), consisting of Indiana, Illinois and Ohio. Since we are interested in examining the price basis between the two markets, we first constructed two price series. The first, defined as P_{ROECB} , is a weighted average of Indiana, Illinois and Ohio prices as reported by USDA-National Agricultural Statistics Service.

To test whether fluctuations in Michigan price and fluctuations in the basis between Michigan price and ROECB price are in fact greater after TAV's closing, the time series of prices was divided into the pre- and post-TAV closing period. Our statistical test results suggest that Michigan prices are not significantly more variable after TAV's closing. However, results do indicate that basis variance (i.e. fluctuations in the

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Controlling Flour Moths in Gestation Barns

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Flour moths are a common and annoying pests on many swine farms. Moths cause minimal damage to grain products in comparison to beetle and weevil infestations. But, as moths go through their live cycle, they create fibers and silk like masses that foul feed and plug feed delivery systems. It's the plugged feed delivery systems that make flour moths such an annoying pest.

Two types of flour moths are most prevalent in hog barns. The adult Indian Meal moth's forewings are reddish-brown on the outer two thirds, turning to a whitish gray near the body. The adult Indian meal moth will have a 5/8 inch wingspread. The Mediterranean flour moth is slightly bigger with a 1 inch wingspread. The adult is pale gray with wavy black markings that will not be very prominent.

Flour moths do not like whole grain kernels, preferring instead, processed grain products, broken kernels and grains that have been damaged by other pests or rodents. The female moth will lay clusters of eggs on the processed grain. If she happens to lay her eggs on stagnant processed grains, the eggs hatch, pass through the larva/pupae stages and into adult moths. The female Indian moth will lay up to 300 microscopic eggs that will hatch in 4 days to 4 weeks and the life cycle requires about 4 weeks. The female Mediterranean moth will lay up to 700 eggs that hatch in 3 to 6 days with a life cycle of about 10 weeks.

Gestation barns with automatic drop feeders are more prone to moth infestations than other areas of swine production. Drop feeders in gestation barns have ledges and corners where feed will accumulate rather than flush on through. Once introduced into the barn via contaminated feed, eggs or larva will collect on this stagnant feed and mature, introducing the moth population into the barn. If the female lays her eggs in the feed on these ledges and corners, they will be secure, hatch, and the larva will have stagnant processed grain for food. The barn now has a "resident" moth population. As the immature moths process through the larva/pupa stages within the feed unit, they produce the fibrous material that collects and plugs off feed drop tubes.

Flour moth populations may not be totally eliminated, but the number of adult moths can be reduced, and the larva/pupae problems brought under control. A regular program intent on reducing the adult population, while controlling the female moth's access to stagnant grain for egg laying will reduce the problems associated with flour moths.

Steps for controlling flour moths in hog buildings.

1. Start by checking the feed bin. Make sure there are no

adult residents in the feed tank. If the tank has adults living in it, feed coming from the tank is re-infesting the barn. Empty the tank, then clean the stagnant feed from all corners and ledges. Adding diatomaceous earth (DE) to gestation feed (step 4) will help keep the adult population from resurfacing in the bin.

2. Clean all automatic drop feed units and drop tubes. Cleaning the feed units will be a tedious job, but if the stagnant feed with larva and pupae are not removed from the units, the moth population will just continue to re-infest the barn.
3. Once a feed unit is cleaned, plug any holes in the unit and seal it as tight as possible. Make it difficult for any adult female moth to re-enter the unit and lay eggs. All the feed units in the barn do not need to be cleaned and sealed the same day, as long as the cleaning and sealing is done simultaneously.
4. Add diatomaceous earth (DE) to the gestation diet. DE is cheap and is a labeled feed additive. DE will help control larva and adult moth populations, but it won't kill eggs or pupae. DE will work slowly. The best strategy may be to use DE as a routine ingredient in the ration. Certain older DE formulations wear down equipment and decrease grain flow, so be aware of this possibility (less likely with new formulations). There are two types of DE available today, pool grade and food grade. Pool grade DE is used as a filtering agent in swimming pools and food grade DE is labeled to be used in stored grain. Pool grade DE should not be used as a feed ingredient. The DE used for filtering swimming pools is subjected to high heat, dramatically increasing its' crystalline silica content. DE with high crystalline silica content will not help control flour moth populations. Food grade DE is not heat treated and it's' crystalline silica content will be less than 1.5 percent.
5. Trapping adult moths will help keep the moth populations under control. Pheromone traps with sticky surfaces are available for flour moths. Sticky traps may need to be changed frequently. Traps that are covered with adult moths, or have accumulated a layer of dust will not be very effective.
6. Maintain good sanitation. Remember, moth populations are maintaining themselves via the females laying her eggs in processed grain that is stagnant, and not being consumed by the sow. Any feed that is laying in the isle or corners of the building, for any length of time, will serve as a surface for the female to lay her eggs, re-generating the moth population in the building.

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Foot and Mouth Disease

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Foot-and-mouth disease (FMD) is a severe, highly infectious viral disease of cloven-hooved animals including cattle, sheep, swine and goats. FMD is not considered to be a significant health risk for humans although rare cases of mild flu-like symptoms and vesicles (blisters) developing on the hands, feet or mouth have been reported. The United States has been free of FMD since 1929. However, the disease is endemic in many places including countries in Asia, Africa, and South America. Until the recent outbreaks in the United Kingdom, Europe had been considered free of FMD. Foot and mouth disease is not only devastating to the health of affected animals, it also can result in catastrophic economic effects through loss of international markets. Countries where FMD is present are significantly restricted in their ability to participate in international trade of livestock and livestock products. It is estimated that an outbreak of FMD in the United States could cost over 1 billion dollars to control and in lost trade revenue.

The Virus

FMD is caused by a virus that is a member of the *Picornoviridae* family of viruses. The virus is capable of surviving in the environment for days to weeks under favorable conditions. However, it is readily inactivated by heat, UV light, disinfectants or environments where the pH < 6.0 or > 9.0.

Signs of The Disease

In animals, the disease is characterized by fever (104-106° F) and blister-like lesions (vesicles) on the tongue and lips, in the mouth, on the teats, and between the hooves. The vesicles may rupture leaving painful open sores. The vesicles and subsequent erosions result in excessive salivation and significant lameness. Severe cases may result in sloughing of the hoof wall or large areas of tissue on the tongue. Secondary bacterial infections may develop and complicate recovery. Many affected animals recover, but the disease may leave them debilitated by chronic lameness, mastitis and inability to gain and maintain weight efficiently. Affected animals rarely return to their previous level of productivity. FMD is diagnosed by the recognition of common signs and by identifying virus in tissues from affected animals. FMD must be differentiated from other disease of cattle that produce lesions that resemble those of FMD. Any cattle, sheep, goats, or pigs with blister-like lesions or open sores involving the mouth or feet should be brought to the immediate attention of your veterinarian.

Transmission

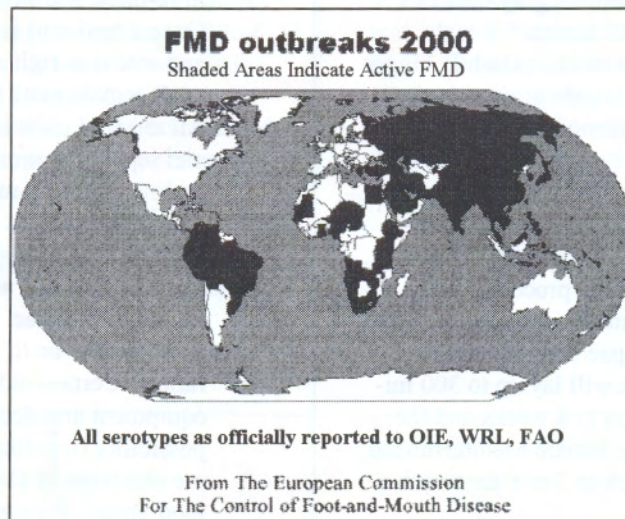
Animals, people, or materials that bring the virus into contact with susceptible animals can spread FMD. Historically, the most common documented source of FMD outbreaks was the feeding of meat scraps contaminated with the virus to susceptible animals, often swine. After infection with the virus, an incubation period of 2-14 days occurs before signs of the disease appear. This facilitates the initial spread of the disease due to movement of animals harboring the virus prior to showing signs of disease. Other reported causes of virus transmission include the following: people wearing contaminated clothes or footwear; contaminated equipment coming in contact with susceptible animals; use of contaminated facilities or vehicles to hold or move susceptible animals; exposure of susceptible animals to materials such as hay, feedstuffs, hides, or water sources contaminated with the virus; vaccines contaminated with live FMD virus; and insemination with semen from an infected animal. Under appropriate conditions, FMD virus can survive in animal derived products such as chilled, frozen or cured meat, unpasteurized milk products, bone meal, and animal

hides. The virus can also survive long enough and in high enough concentrations to be spread through air currents. Spread of the disease up to 62 miles has been documented. Physical spread of the virus by other animals, such as birds, is possible. Animals that recover from foot and mouth disease can become carriers of the virus. FMD virus has been recovered from infected cattle for 50 days, infected sheep for 90 days and infected swine for 300 days after experimental challenge. People exposed to FMD infected animals can carry the virus in their mouth and throat for up to a week and may serve as a source of virus transmission.

Control and Prevention

Eradication, vaccination or a combination of the two are the commonly used to control FMD. In countries where the disease is common, eradication is seldom practical. In countries free of FMD, slaughter of all affected and in-contact susceptible animals is usually carried out if an outbreak occurs.

Vaccines are available as an aid in the control of FMD, however their use is strictly regulated. Although useful in reducing the severity and spread of the disease, current vaccines do not prevent animals from becoming infected or from becoming carriers of FMD. Routine vaccination of susceptible animals is used in countries where FMD is endemic. Ring



vaccination around FMD outbreaks is a strategy that has been employed to aid the control of the disease in countries where FMD is not common. Vaccines against one serotype of FMD have limited activity against other serotypes of FMD.

FMD is one of the most difficult animal infections to control. Because the disease occurs in many parts of the world, there is always a chance of its accidental introduction into the United States. Animals and animal byproducts from areas infected with FMD are prohibited entry into this country.

People traveling from countries infected with FMD are subject to increased scrutiny at ports of entry into the US by custom agents. Livestock producers in the US can take personal responsibility in preventing the accidental spread of the disease to their livestock by adopting simple biosecurity practices. These practices are also useful for reducing the risk of introducing other infectious disease agents that are common in the US.

For more information, go to <http://cvm.msu.edu/extension>

Suggested Disinfectants for Foot-and-Mouth Disease Virus

Product	Dilution	Mixing Instructions	Sources
Sal Soda <i>*reviewed by USDA</i>	10%	5.1 oz/gal H ₂ O	Local POC: Mr. Robert Kiefer Consumer Products Specialty Assoc. 202-872-8110
Sodium Carbonate (soda ash) <i>*reviewed by USDA</i>	4%	1 lb/3 gal H ₂ O (5.33 oz/gal H ₂ O)	
Sodium Hydroxide (lye) <i>*reviewed by USDA</i>	2%	2.7 oz/gal H ₂ O	
Acetic Acid <i>*reviewed by USDA</i>	4 – 5 %	Add 6.5 ounces of glacial acetic acid to 1 gallon of water and mix thoroughly (Household vinegar is 4% acetic acid)	
Oxine Chlorine Dioxide <i>*NVSL tested</i>	500 ppm	3.2 oz/gal H ₂ O plus citric acid activator 0.32 oz/gal	Bio-cide Int'l, Inc. 2845 Broce Dr. Norman, OK 73072 POC: Damon Dickenson 405-329-5556 or 800-323-1398 FAX 405-329-2681
Virkon-S (peroxymonosulfate & sodium chloride) <i>*NVSL tested</i> <i>**Virkon-S is also available in the U.S. as Trifectant and is distributed by Vet'y Products Labs PO Box 34820 Phoenix, AZ 85067-4820 800-241-9545</i>	1%	Follow label directions	Farnum Livestock Products POC: Bob Walber 817-561-7516 Also: Cary McClary 412-370-4821 Home: 724-891-6265 Pittsburg, PA U.S. distributor: Durvet, Inc. PO Box 279 100 S.E. Agellan Drive Blue Springs, MO 64014 816-224-3080 724-891-6265 800-720-0032 ext 3020
NaOCl	0.1%	1 oz/gal H ₂ O	Household Bleach POC at Chlorox Mfg. Co Ted Shapas 925-847-6337
NaOCl For heavily contaminated areas <i>*USAHA Recommended</i>	3%	3 oz/gal H ₂ O Add 2 gallons of bleach (stock solution) to 3 gal of H ₂ O & mix thoroughly	

Title 9, Code of Federal Regulations, Section 95.26 specifies the following disinfectant is effective against the Foot-and-Mouth Disease virus: Sodium Carbonate (4%) mix 1 lb to 3 gallons water, plus sodium silicate (0.1%), 1 lb in 3 gallons of water.

The Napole Gene – Friend or Foe?

By: Dr. Ron O. Bates

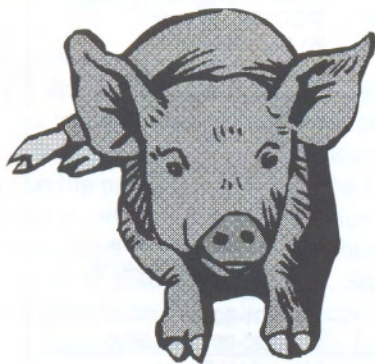
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Over the last 15 years much has been written about the Napole gene and its impact on meat quality. The Napole gene has been referred to by several different names, such as “Acid Meat Gene”, “Technological Yield Gene” and the “Hampshire Effect Gene”. The last name comes from the prominence of this gene within the Hampshire breed, worldwide.

The gene, for the most part is dominant over its normal counterpart. This dominance implies that only one copy of the gene need be present within the animal for change in performance or meat quality to occur.

The effect of the gene is a mixture of good and bad news for seedstock producers. Presence of the gene will improve growth rate, decrease backfat thickness and increase loin muscle area. In a summary of several studies (Sellier, 1998), pigs with one copy of the gene were reported to be 0.05 in. leaner, have .08 in² more loin muscle area and .6% more carcass lean. A subsequent study further reported that pigs with one copy of the Napole gene grew 0.1 lb/day faster than normal pigs (LeRoy et al, 2000).

The bad news often is evident after slaughter. Once slaughtered, muscle pH at 24 hours after slaughter is approximately .2 pH units lower and measures of light reflectance are often 3 units higher, indicating paler meat. In addition, marbling is also typically poorer. Meat from pigs with the Napole gene usually has poorer processing characteristics, which causes the meat to be of less value.



However, two studies (LeRoy et al., 2000; Lundstrom et al., 1996) have reported lower shear force values which indicate that pigs with one Napole gene may have more tender meat, which was verified in one study (LeRoy et al, 2000).

It has been difficult to determine the genotype of pigs for the Napole gene, in order to know if they had 0, 1 or 2 copies of the gene. Previous testing for the Napole gene involved de-

tailed and intensive laboratory testing of a muscle sample to know if the Napole gene was present. Not only has this been very expensive but also required the slaughter of the animal, which circumvents any use for breeding purposes.

However, over the last year, a DNA test has been developed to determine if the pig has 0, 1 or 2 copies of the gene. This test is reliable and allows animals tested to be used for breeding purposes. This allows breeders and breeding organizations to know the status of the gene within their breeding animals and to make decisions how to direct their breeding programs.

Some breeding organizations have eliminated breeds and lines that contained the Napole gene so not to offer terminal sire products whose progeny would carry the gene and subsequently have poorer meat quality after harvest. However, with the advent of the DNA test other breeders and breeding organizations are in the process of eliminating the gene from their herds and will be able to offer Napole gene free terminal sire products.

When considering terminal sire products with a population base that did contain the Napole gene (typically Hampshire) inquire about the Napole status and future direction. Chances are products are or will be available that are Napole gene free. Hampshire and Hampshire based lines should no longer be discriminated solely on Napole gene status.

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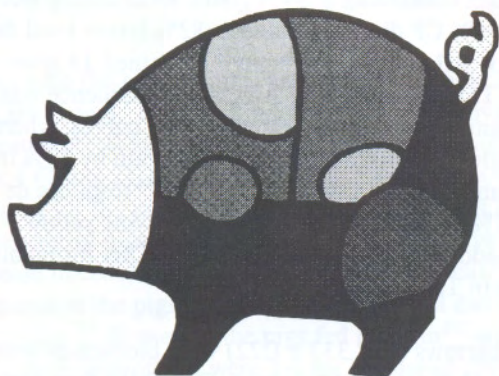
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Paylean™ – Does It Interact With Genetics?

By: Dr. Ron Bates

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Since its release, Paylean™ (Elanco, Inc.) has created much curiosity as well as controversy. The label claim for Paylean states that it is to be fed for the last 90 lbs of finishing (up to 240 lbs) to pigs consuming rations containing at least 16% crude protein for improved weight gain, feed efficiency and carcass leanness. The approved inclusion rates are 4.5, 9 and 18 grams/ton of complete feed. Much of the work that was used to justify this label claim was completed over 10 years ago. During the last ten years, genetic programs, carcass leanness and markets weights have changed dramatically. These changes have made it difficult to determine how best to use this product.



Of the many differences that have occurred during the past ten years, changes in genetic programs and the leanness and muscling of pigs within those programs may be the most challenging in determining the best way to use this product. Particularly, the question often arises, What level works best with which genetic program?

A recent report (Herr et al., 2001) tried to shed further light on that question. In this study, at a beginning weight of 185 lbs, gilts from three different commercial genetic types were fed one of four rations. The rations were; 1) no Paylean as a control, 2) 4.5 grams of Paylean/ton of feed, 3) 9 grams per ton of feed and 4) 18 grams/ton of feed. These rations contained 18.6% crude protein with 1.1% lysine and were fed for 4 weeks.

The three lines did differ for both average daily feed intake (range of 5.4 to 6 lb/day) and average daily gain (range of 2.09 to 2.27 lb/day). However, gilts from these three lines did not differ for percent lean, averaging 54.7%.

This study did not observe a genotype by Paylean interaction across the lines. In other words all three lines changed the same as they consumed rations with Paylean compared to the control ration.

Pigs that consumed Paylean did have higher average daily gain (1.94 vs 2.23 lb/day) and had better feed efficiency (2.5 vs. 3.30 feed/gain) compared to controls. Also pigs fed paylean were leaner (0.65 vs 0.70 in.), had greater loin depth (2.4 vs 2.27 in.) and higher percent lean (55.7 vs 54.7%).

However, higher amounts of Paylean in the ration (9 and 18 grams/ton) had marginal improvements compared to 4.5 grams per ton of complete feed. For the 4 week feeding trial 85% of the improvement in average daily gain and 90% of the improvement in carcass merit was achieved with the 4.5 gram inclusion rate.

This study suggests that lowest level of Paylean may be just as effective as feeding the higher inclusion rates for these three genotypes. However, it should be noted that these three lines were quite good for percent lean. It has been suggested that pigs of lower carcass merit may have better Paylean response than those of higher carcass merit. The carcass merit of the gilts from the three lines in this study appeared to be similar and high enough to only exhibit marginal improvement when fed Paylean.

Producers should evaluate different inclusion rates when feeding Paylean to determine what may work best for them within their genetic program and management system. The Swine AoE Team can assist in developing plans to assist producers when evaluating this production on the farm.

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Effects of Nutritional Level While Feeding Paylean™ to Late-Finishing Swine

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Introduction

Over the last ten years, the swine industry has selected to increase percent lean in pigs in response to consumer demand. In search of technology to improve percent lean, Paylean™ (ractopamine hydrochloride) has been shown to increase carcass leanness while improving growth performance when fed to finishing pigs. It has been documented that average daily gain (ADG) and feed efficiency (F:G) are improved when feeding Paylean™ to finishing hogs, and these improvements increase as the dose of Paylean™ is increased when pigs are fed a constant 16% crude protein (CP) diet. It has also been documented that improvements in carcass leanness are also seen, and these improvements increase as the dose of Paylean™ is increased while feeding a constant 16% CP diet.



With today's leaner genetics, with higher lean accretion rates, the question of a 16% CP diet needs to be re-evaluated as being adequate for today's pigs when being fed Paylean™. In today's swine industry, most pigs are also being phase fed to improve growth rates, leanness, and cost efficiency. A phase feeding program that would match the projected lean accretion curve expected with Paylean™ may yield even greater growth and leanness response compared to the old flat 16% CP diets while feeding Paylean™.

Therefore, a late-finishing study (last six weeks) was conducted to evaluate the effect of feeding a constant dietary protein level or a phase feeding program of varying protein levels, designed to meet the projected lean growth curve (Schinckel et al., 2000), on ADG, average daily feed intake (ADFI), F:G, fat and loin depth, carcass weight, premiums, and percent lean while pigs were being fed Paylean™. This trial was conducted over a six-week period from April to May, 2000.

Experimental Procedure

Four dietary treatments were formulated for this study to be fed over a six-week period; treatments 1-3 were fed throughout the six-week trial, while treatment 4 changed weekly. Treatments were as follows: 1) 16% CP control diet (no Paylean™) with a .82% lysine level; 2) 16% CP diet containing 18 g/ton of Paylean™, with a .82% lysine level; 3) 18% CP diet containing 18 g/ton of Paylean™, with a .97% lysine level; and 4) a phase fed diet sequence containing 18% CP with a 1.08% lysine level during weeks one and four, a 20% CP diet containing 1.22% lysine during weeks two and three, a 16% CP diet containing a .94% lysine level during week five, and a 16% CP diet containing a .82% lysine level during week six. All diets in treatment 4 contained 18 g/ton of Paylean™. This phase feeding (CP, lysine) sequence was designed to match the previous lean accretion curves, where pigs fed Paylean™ increased fat-free lean gain by 50% in weeks two and three and then the Paylean™ response declined to 11% by week six on Paylean™. Swine yellow grease was added to all diets at a 5% level. Diet formulations can be seen in Table 1.

Ninety-six barrows (PIC 337 x C22) were blocked by weight into 24 pens (4 pigs/pen; 10 ft²/pig). One of the four dietary treatments was randomly assigned to each pen within a block. Pigs were weighed and feed intakes were recorded every week for the six-week period to determine ADFI and ADG, from which F:G was calculated. Backfat and loin eye areas were measured weekly on all pigs using real-time ultrasound (Aloka 500). Pigs were marketed when the block average reached 240 lbs, at which time fat and loin depth, carcass length, percent lean, carcass weight, carcass premium, 10th rib loin eye area, fat thickness, and pork quality characteristics were collected at a commercial slaughter facility in Indiana or at the Purdue University meat lab. Fifteen pigs/treatment for treatments 1, 2, and 4 had one side of the carcass frozen for later dissection to determine wholesale and retail cut weights and total lean and fat contents to determine accretion rates.

Statistical analysis of the data collected was performed using the GLM procedure of SAS. Pigs were blocked by initial body weight, and dietary treatment was examined to determine its effect on growth and carcass characteristics.

Results and Discussion

Four and five-week overall performance is shown in Table 2. From 0-4 weeks, ADG and F:G were all improved as the level of CP and % lysine were increased. Phase fed + Paylean™ pigs showed significant improvements ($P < .05$) in

(Continued on page 9)

(Comparison...continued from page 8)

ADG and F:G compared to the control and control + Paylean™ treatments. From 0-5 weeks, significant improvements were not seen in ADG as CP and % lysine levels increased, due to the greatly reduced performance during week 5 by the 18% CP + Paylean™ and phase fed + Paylean™ pigs. However, F:G was still better for the pigs fed 18% CP + Paylean™ and the phase fed feeding program compared to the control and the control + Paylean™ treatments ($P < .05$). A trend was seen in ADG as CP and % lysine levels were increased to 18% CP + Paylean™ or fed the phase fed + Paylean™ diets compared to the control and control + Paylean™ treatments. These four and five week summaries would indicate that significant improvements are made when feeding the phase fed + Paylean™ diet, compared to the other three treatments, during the first four weeks on Paylean™. But, these improvements are lost during the fifth week when Paylean™ is fed in conjunction with this phase feeding program to yield a similar response as the 18% CP + Paylean™ treatment.

Along with the performance data shown in Table 2, cost/lb of gain are shown. Cost/lb of gain did not show any effect due to treatment. When looking at overall cost/lb gain through week 4 (Table 2), an incremental decrease of \$.009/lb was observed for the phase fed + Paylean™ treatment compared to the control pigs. When looking at the week five data, this decrease in cost/lb of gain was lost in the Paylean™-fed pigs compared to the pigs that were on the control diet containing no Paylean™. However, the pigs fed Paylean™ with the phase feeding program were 5.1 lbs heavier in the same amount of time, and were leaner with this similar diet cost per pound of gain.

Pigs that were fed Paylean™ had reduced 10th rib fat depth ($P < .05$) and increased % lean ($P < .05$; Table 3). LEA and % yield were significantly higher ($P < .05$) in those pigs that were fed the phase fed treatment containing Paylean™ when compared to the control treatment. Paylean™-fed pigs also showed no change in pork quality measurements (loin eye color, firmness, and marbling) compared to the control treatment. A subset (15 pigs/treatment) of the control, control + Paylean™, and phase fed + Paylean™ treatments had loin pH, drip loss, and Hunter color values determined (Table 4). Dietary treatment had no effect on any of these loin characteristics.

This data would indicate that the improvement seen in ADG and F:G while pigs are fed Paylean™ compensates for the increase in the cost of these high CP and % lysine diets, and that improvements in carcass characteristics are predicted to be able to compensate for the cost of Paylean™ in the diet. Table 5 shows feed cost for the last 90 lbs of gain during a five-week period and the premiums received for the pigs on test. HCW was calculated using the % yield observed in all four treatments, and these values were applied to a 240 lb market animal. All pigs which were fed Paylean™ showed a

lower feed cost for the last 90 lbs of gain. Due to the decrease in performance of the phase fed treatment during week five, these pigs had a higher feed cost calculated when compared to the other two treatments that were fed Paylean™, but this was still cheaper than the controls. In addition, all pigs fed Paylean™ yielded a higher premium/cwt of carcass, thus resulting in a higher premium/pig. Pigs which were fed the 16 and 18% CP diets containing Paylean™ returned approximately \$2.00/pig more over the control treatment, and the animals that were on the phase fed treatment containing Paylean™ returned nearly \$3.00/pig more than the control animals in total carcass premiums.

Application

Results from this trial would indicate that a four-week late-finishing program feeding Paylean™ in conjunction with the phase fed treatment would yield the best return on investment. Performance improvements during these four weeks would compensate for the higher diet costs and result in a lower cost/lb of gain, compared to the control pigs. The increase in carcass premium/pig of nearly \$3.00 would then be expected to pay for the Paylean™ added to the diet.

References

NPPC. 1991. Procedures To Evaluate Market Hogs (3rd Ed.). National Pork Producers Council. Des Moines, IA.
Schinckel, A.P., B.T. Richert, and D.C. Kendall. 2000. Modeling the response to Paylean and dietary lysine requirements. Purdue University Swine Day Report. p. 75.

Adapted from the Purdue University 2000 Swine Day Report.

Table 1. Experimental diets

Diet	16% CP	16% CP+ Paylean™	18% CP+ Paylean™	18% CP+ Paylean™ + Lys ^a	20% CP+ Paylean™ + Lys ^a	16% CP+ Paylean™ + Lys ^a
Ingredient, %						
Corn	71.82	71.70	66.68	66.50	61.48	71.52
SBM, 48%	21.14	21.16	26.24	26.28	31.36	21.19
Fat	5.00	5.00	5.00	5.00	5.00	5.00
Vit/Min	2.05	2.06	1.99	1.99	1.92	2.06
Lysine (HCl)	0.0	0.0	0.0	0.15	0.15	0.15
Paylean ^b	0.0	0.1	0.1	0.1	0.1	0.1
Lys, %	.82	.82	.97	1.08	1.22	.94
ME, Kcal/lb	1618	1616	1616	1614	1614	1614
Ca, %	.55	.55	.55	.55	.55	.55
P, %	.45	.45	.45	.46	.47	.45
Cost ^c , \$/ton	125.33	125.29	132.51	134.09	141.32	126.94

^a Diets used in the phase feeding treatment.

^b 18 g/ton level of Paylean™ was deducted from corn when formulating diets.

^c Ingredient prices used in calculation: Corn, \$.04/lb; SBM, 48%CP, \$.113/lb; Fat, \$.12/lb; Vit/Min, \$3.87; Lysine (HCl), \$.55/lb.

Note: No diet cost was added for Paylean™ as the price has yet to be determined.

Table 2. Overall performance summary for weeks 0-4 and 0-5 for pigs fed Paylean and varying crude protein levels.

Overall	16% CP (Control)	16% CP+ Paylean™	18% CP+ Paylean™	Phase+ Paylean™	Std. Error
Weeks 0-4					
ADG	2.55 ^b	2.54 ^b	2.70 ^{ba}	2.77 ^a	.052
ADFI	6.39 ^a	6.13 ^a	6.03 ^a	5.95 ^a	.124
F:G	2.55 ^a	2.44 ^a	2.26 ^b	2.17 ^b	.034
BW	224.6 ^a	224.2 ^a	229.0 ^a	232.1 ^a	1.81
Cost/lb gain, \$	.1569 ^a	.1515 ^a	.1480 ^a	.1479 ^a	.003
Weeks 0-5					
ADG	2.44 ^a	2.41 ^a	2.53 ^a	2.55 ^a	.052
ADFI	6.38 ^a	6.04 ^a	5.92 ^a	5.94 ^a	.141
F:G	2.68 ^a	2.59 ^a	2.42 ^b	2.45 ^b	.044
BW	238.7 ^a	237.4 ^a	241.9 ^a	243.8 ^a	2.28
Cost/lb gain, \$	.1635 ^a	.1575 ^a	.1552 ^a	.1581 ^a	.003

^{a,b} Means in a row with different superscripts differ (P<.05).

Table 3. Effect of Paylean™ and dietary crude protein on carcass characteristics in late-finishing pigs.

	16 % CP (Control)	16 % CP+ Paylean™	18 % CP+ Paylean™	Phase + Paylean™	Std. Error
Slaughter BW, lbs	248.6 ^b	246.3 ^a	250.5 ^c	251.7 ^d	
HCW*, lbs	188.3 ^b	189.2 ^b	188.9 ^b	192.0 ^a	.927
10 th Rib BF*, in	.78 ^a	.64 ^b	.64 ^b	.59 ^b	.035
LEA*, in	7.02 ^b	7.37 ^{ba}	7.23 ^{ba}	7.56 ^a	.162
% Lean*	54.26 ^b	56.31 ^a	56.09 ^a	57.01 ^a	.575
% Yield	75.5 ^b	75.8 ^b	75.7 ^b	77.0 ^a	.370
Color**	2.7 ^a	2.5 ^a	2.8 ^a	2.8 ^a	.123
Marbling**	1.5 ^a	1.7 ^a	1.7 ^a	1.6 ^a	.120
Firmness**	2.7 ^a	2.8 ^a	3.0 ^a	3.0 ^a	.174

^{a,b} Means in a row with different superscripts differ (P<.05).

* Adjusted for live weight.

** Scores determined on a 1-5 scale (NPPC, 1991).

Table 4. Effect of Paylean™ and dietary crude protein on pork quality in late-finishing pigs.

	16 % CP (Control)	16 % CP+ Paylean™	Phase % CP+ Paylean™	Std. Error
45 min. pH	6.11 ^a	6.06 ^a	6.11 ^a	.045
Drip Loss, %	3.79 ^a	4.45 ^a	3.60 ^a	.396
Hunter Colors				
L*	51.01 ^a	51.94 ^a	50.23 ^a	.528
a*	9.59 ^a	8.97 ^a	9.29 ^a	.376
b*	8.81 ^a	8.72 ^a	8.57 ^a	.191

^a Means in a row with different superscripts differ (P<.05).

Note: Data from 45 pigs, from three treatments, brought in to the Purdue University meat lab for slaughter.

Table 5. Effect of Paylean™ and dietary crude protein on Cost/Premium in late-finishing pigs.

	16 % CP (Control)	16 % CP+ Paylean™	18 % CP+ Paylean™	Phase+ Paylean™	Std. Error
HCW*, lbs	181.20	181.92	181.68	184.80	
Cost/lb gain, \$	.1635 ^a	.1575 ^a	.1552 ^a	.1581 ^a	.003
Feed cost last 90 lbs gain, \$	14.72 ^a	14.18 ^a	13.97 ^a	14.23 ^a	.281
Premium/cwt carcass, \$	4.75 ^a	5.90 ^a	5.61 ^a	6.20 ^a	.509
Premium/pig, \$	8.61	10.73	10.19	11.46	
Value over control	\$0.00	\$2.12	\$1.58	\$2.85	

^{a,b} Means in a row with different superscripts differ (P<.05).

* HCW calculated for all diets by multiplying respective % yields by a constant 240 lbs.

Composting Mortality

By: Dr. Dale W. Rozeboom, Swine Extension Specialist
Michigan State University, East Lansing, MI

The challenge of disposing of dead pigs on the farm continues to increase. With the diminishing access to rendering, the economical and environmental drawbacks of incineration, and the inconvenience of year-round burial, more and more pork producers and producers in the many other animal production industries are using composting to manage on-farm mortalities. Many excellent resources are available to help producers (listed below), providing a great amount of detail about the sizing and operating of composting systems.

- Disposing of swine carcasses and after-birth by composting. Michigan State University, Department of Animal Science Mimeo 19.42.369
- Composting: Economical Alternative to Rendering. National Hog Farmer, March 15, 2001. <http://industryclick.com/magazinearticle.asp?releaseid=5714&magazinearticleid=68726&siteid=5&magazineid=17>
- Dissolving Swine Mortality Problems. Iowa State University, <http://www.ae.iastate.edu/pigsgone/>
- Composting Swine Mortality Principles and Operation. Fact Sheet AEX-711-97, Ohio State University Extension, <http://ohioline.ag.ohio-state.edu/aex-fact/0711.html>
- Swine Composting Facility Design. Fact Sheet AEX-713-97. Ohio State University Extension, <http://ohioline.ag.ohio-state.edu/aex-fact/0713.html>
- Composting Dead Swine. Water Quality Initiative Publication WQ351. University of Missouri Extension, <http://www.muextension.missouri.edu/xplor/waterq/wq0351.htm>
- Composting: A Method of Dead Animal Disposal in Minnesota. Minnesota Department of Agriculture, <http://www.mda.state.mn.us/composting/bahcompost.html>
- Composting. NPPC-04329 (\$15.00) <http://www.nppc.org/catalog/eap.html>
- Cost Analysis of Swine Mortality Composting. Purdue University, <http://www.agecon.purdue.edu/extension/pork/econ/composti.htm>

Rules on composting vary by state, and it is important to be aware of differences. Copies of the Michigan Dead Animal Law (Act 239), the Regulations for this act (including those for composting), and a newly written brochure about composting is available from the Michigan Department of Agriculture by calling Allena Kristler at 517/341-3252. Here is a checklist of critical points for Michigan producers:

- ❑ “Livestock” means any species of animal used for human food or fiber or those species used for service to humans. Livestock includes, but is not limited to: cattle, sheep, new world camelids, bison, captive cervidae, ratites, swine, equine, aquaculture, and rabbits.
- ❑ “Bulking Agent” means any carbon source material added to compost to decrease its bulk density and promote aeration for composting livestock other than poultry for biological decomposition of carcasses including the following materials that are unpainted and do not have additives or preservatives including, but not limited to sawdust, chopped straw, spelt hulls, bean pods, grass clippings, leaves, shredded cardboard or newspaper, chopped cornstalks and finished compost from a secondary compost pile.
- ❑ No person shall operate a composting structure unless all of the following provisions are followed.
 1. The site for construction of a composting structure shall be at least 200 feet from the nearest natural surface water and no closer to a water source than the distance between a septic drain field and a potable water well permitted by public act 399, the state of Michigan safe drinking water act of 1976 and public act 368, the Michigan public health code of 1978, as amended.
 2. The composting structure must be constructed in accordance with the following:
 - (i) built with reinforced concrete floors impervious to moisture and adequate to bear the weight of equipment used to move composted material and capable of supporting static and dynamic frost loads.
 - (ii) a composting structure shall consist of two or more bins, each constructed with at least three side walls built to at least the height of the highest point of any composting material contained within and a roof over any area used to compost dead livestock; thereby preventing seepage, runoff, and windblown movement of compost.
 - (iii) a composting structure and bins shall be constructed of a rot resistant material or materials and the facility construction shall be strong enough to resist mechanical forces generated when turning the pile. Any structural damage to the composting structure shall be repaired before the composting facility is used for any further composting.
 - (iv) a composting structure shall be constructed with a capacity large enough to handle the

volume of material placed in the facility through the endpoint of the composting process.

- ❑ A base of bulking agent one foot deep should be added before any livestock carcass is added for composting.
- ❑ No livestock tissue shall be placed in the pile closer than 6 inches to any bin wall.
- ❑ Dead livestock must be added to the compost pile within 24 hours following death.
- ❑ Afterbirth may be stored in closed impervious containers and added to the pile every 1-3 days.
- ❑ Material added to the pile for composting must be covered by at least 6 inches of bulking agent within 24 hours.
- ❑ A layer of bulking agent that does not contain material added from a secondary compost pile shall cover the compost pile to a depth of at least 3 inches at all times. Total depth of the pile shall not exceed 6 feet.
- ❑ Temperature deep within the primary and secondary compost pile shall be monitored and recorded twice weekly. The compost pile temperature shall reach a minimum of 130° Fahrenheit on two successive readings.
- ❑ The disposition of finished compost may be by direct application to soils, sale, or other transfer of ownership.
- ❑ Water may be added to compost piles in a manner which raises moisture content of the pile to a level of 40-60%, but in no case shall addition of water create or cause run off or leachate which leaves the composting facility.

- ❑ Any bones or hides remaining in a finished compost shall be removed and added to a primary compost pile, or disposed of according to provisions under section 21 of this act (burial or incineration) before the compost may be sold or transferred or applied to cropland.
- ❑ Flies, rodents, pests, vermin and other scavengers or predators shall be controlled so as not to disrupt the compost piles in the composting structure or constitute a risk or health hazard to human or animal populations.
- ❑ Records containing all of the following information shall be kept by the owner or operator of the composting facility for a minimum of a 2-year time period and shall be made available to the director immediately upon request.
 1. The start date of each primary compost pile.
 2. The quantity of livestock or afterbirth added each time an addition is made and the dates such material is added to any compost pile.
 3. The internal temperature of each pile measured twice weekly with a 3 foot probe type thermometer
 4. The date each compost bin is turned and becomes a secondary compost pile.
 5. The final disposition, including method, location, date and volume for the secondary pile.

Specific questions about composting can be addressed to your local Swine AoE Extension Agent or Dale W. Rozeboom (517/355-8398).

(Thornapple Valley's Closure . . . continued from page 2)

Michigan-ROECB basis) has been higher in the post TAV closing period than in the period before the plant closure.

Our econometric study includes the impact of capacity utilization in the ROECB on the basis between Michigan prices and ROECB prices. Results reveal that increases in monthly capacity utilization negatively impacts our producers' basis. This suggests that packers in the ROECB bid higher prices for Michigan hogs when they need hogs to meet daily capacity needs. However, if plants are operating at or near capacity, they will offer lower prices to Michigan producers before they lower prices to those producers closer to their plants. Essentially, for Michigan pork producers who are on the fringe of the packers' buying areas, they are more likely to face increased price fluctuations (high price variability) because of daily slaughter needs than producers who are near the plants.

Conclusions

Our results indicate that Michigan pork producers did enjoy a higher price for market hogs relative to their Eastern Corn Belt counterparts while TAV was still open. When TAV exited slaughter, Michigan's price advantage diminished, yet remained positive. This change in price advantage may well have negative implications for the long-term viability of Michigan's hog industry. The impact of changes in capacity utilization was also examined. Results indicate that increases in monthly capacity utilization rates in the ROECB may lead to decreases in the basis between Michigan prices and ROECB prices—again, a diminishing of Michigan's price advantage. Additionally, the variability of the Michigan price and of the price difference between Michigan and ROECB prices was examined for the pre- and post- TAV closing periods. Our results suggest that Michigan prices have not been significantly more variable after TAV's closing. However, results do indicate that basis variance (i.e. fluctuations in the Michigan-ROECB basis) has in fact been higher in the post TAV closing period, as expected.

Cash or Accrual Income – Does It Really Make a Difference?

By: Dr. Paul Ellinger

University of Illinois, Urbana-Champaign, IL

The Farm Financial Standards Council's (www.ffsc.org) position that income should be reported on an accrual basis is widely accepted. However, many farm and ranch accounting systems provide detailed cash accounting tax records, and borrowers often don't maintain the information needed to produce accrual adjusted profitability statements.

Problems of Timing

On a cash basis, revenue and expenses are composed of the cash actually received or paid irrespective of when the goods are produced or expenses incurred. On an accrual basis, revenue represents the value of items produced during a given period and expenses represent the costs incurred by the business. Timing of the cash sales or cash expenses will not directly affect an accrual income statement. There is little dispute that an accrual statement will provide a more accurate measure of a borrower's historic or projected profitability. Balance sheets that coincide with the start and end of the accounting period for which income is measured are needed for accrual adjustments. Accounting firms and farm business record associations like Illinois Farm Business Farm Management Association (FBFM) help farmers keep accrual records. In many situations, information to make accrual adjustments is unavailable. Lenders often use cash income statements or tax returns as proxies for farm and ranch profitability. Two sets of potential problems can occur with the use of tax returns. The first set relates to specific tax issues. For example, issues related to the reporting of CCC transactions, elections on insurance proceeds or the reporting of purchase costs of livestock can result in differences between accrual income and tax profit.

Measuring Profitability

The absolute percentage differences between cash and accrual measures of income for a sample of farms in the FBFM record keeping system are reported in the table. The median values represent the levels that one-half of the farms exceed. The upper quartile is the value exceeded by one-fourth of the farms in each year. Over the three years measured, the median discrepancy is between 33 and 40 percent. A common argument for using cash income information for lending purposes is that discrepancies average out over time. But the median discrepancy between the three-year average cash income level and the three-year average accrual income level is still 24 percent. Furthermore, one-fourth of the farms have a 44 percent difference between the average measures. Clearly, there are many situations in which cash income does not provide a good measure for profitability. The bottom panel of the table shows the percentage differences between a modified cash income measure and an accrual profitability measure. The cash measure is modified to reflect the accrual adjustments for changes in grain and livestock inventories. The discrepancies between the measures are reduced substantially. But a substantial number of farms still have discrepancies greater than 20 percent. On average, accounting for inventory changes improves the ability of the cash measure to proxy profitability, but a large number of situations still result in large discrepancies. Encourage borrowers to develop accounting records that use accrual based information. One strategy might be to educate them on one or two accrual adjustments per year. Furthermore, as you develop and analyze cash flow projections, take account of the potential effects on profitability in addition to cash flows. Lending decisions are often complex.

Percentage Differences Between Cash and Accrual Measure of Net Farm Income for 1,084 Farms. 1995 – 97.

	1995	1996	1997	Three-Year Average
Percentage Difference Between Cash and Accrual Income				
Upper quartile	67%	66%	68%	44%
Median	34%	40%	33%	24%
Lower quartile	11%	19%	11%	10%
Percentage Difference Between Cash Income Adjusted for Inventory Changes vs. Accrual Income				
Upper quartile	38%	24%	32%	15%
Median	16%	9%	13%	7%
Lower quartile	5%	3%	3%	3%

Source: Illinois Farm Business Farm Management System and the Department of Agricultural and Consumer Economics at University of Illinois, Urbana-Champaign.

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Manure Management Tools Available on the Web

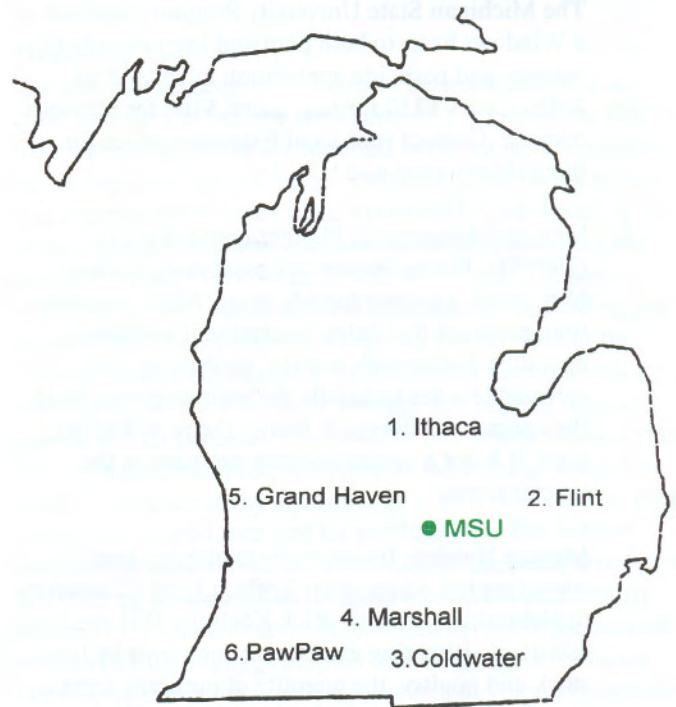
1. **MSU-NM: (Whole Farm Nutrient Balance)** <http://www.egr.msu.edu/age/msunm/index.html>
The Michigan State University Program, updated to a Windows base, to both plan and keep records for manure and pesticide application by individual fields. Cost - \$150 for new users, \$100 for previous owners. Contact your local Extension office for more information and to order.
2. **Manure Management Planner (version 0.12):** (1999/00; Purdue Research Foundation, Purdue): <http://www.agry.purdue.edu/mmp/> MMP is a planning program that helps determine if a livestock operation has enough storage, equipment, and spreadable acres to handle the manure produced by the operation's livestock during the period of the plan. It is not a record keeping program in the stricter sense.
3. **Manure Nutrient Inventory Spreadsheet:** <http://www.ianr.unl.edu/manure/koelsch.html> (University of Nebraska – Lincoln: Rick Koelsch) This product assists in estimating excretion of nutrients by livestock and poultry, the quantity of nutrients remaining after losses, and the land needs for utilizing those nutrients at agronomic rates. It will assist producers in determining if sufficient land is accessible for agronomic utilization of manure nutrients and accumulated nutrients in anaerobic lagoon sludge. **It is not intended for making crop nutrient application recommendations.** It uses Excel 5.0 worksheets and has eight worksheets.
 - a. Start: Opening worksheet for describing purpose and entering name and address.
 - b. Manure: Estimates total manure nutrients excreted by livestock.
 - c. Store Loss: Estimates manure nutrients remaining after losses from storage and treatment.
 - d. Appl. Loss: Estimates manure nitrogen remaining after ammonia losses from land application.
 - e. Nutr. Use: Estimates quantity of manure nutrients used if applied at agronomic rates.
 - f. Appl. Rate: Estimates the average manure application rate based upon a given land base.
 - g. Sludge: Estimates the quantity of sludge nutrients utilized if applied at agronomic rates.
 - h. Summary: Summarizes the results of all previous seven worksheets
4. **Manure Application Rate Calculator (MARC 98):** (Manitoba Agriculture and Food, ca): Free download: <http://www.gov.mb.ca/agriculture/soilwater/manure/man00s01.html> MARC 98 is a livestock manure management planning tool designed to help producers calculate application rates of livestock manure. It has a built in Record keeping feature along with image handling capability. It requires soil test, manure nutrient analysis reports and cropping plans for each field. After entering the total volume of manure to manage, go through the menus to distribute this volume on up to 10 fields or crops.
5. **Manure Application Planner (MAP):** <http://www.cffm.umn.edu/software/Map/default.htm> (University of Minnesota): Cost = \$95.00. Demo version can be downloaded free of charge. The information needed to develop a manure application plan is the amount and analysis of manure on the farm, the fields where manure can be applied and their nutrient requirements, the application or hauling costs of manure, and the cost of commercial fertilizer. Reports generated from MAP include: Manure application methods and rates per acre; Nutrient credits from manure; Commercial fertilizer needs, if any and Excess nutrients applied.

Educational sites:

1. Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen: <http://esa.sdsc.edu/carpenter.htm>
2. NRCS Confined Animal Feeding: <http://www.nhq.nrcs.usda.gov/PROGRAMS/ahcwpd/AFO.html>
3. Manure Matters Archive Files: <http://manure.unl.edu/archive.html>
4. Manure and Odor Education and Research: <http://www.bae.umn.edu/extens/manure/>
5. NCSU Research and Extension activities: <http://www.ces.ncsu.edu/whpaper/REactivities.html>
6. The Resource – Waste Management: <http://www.ianr.unl.edu/pubs/wastemgt/>
7. Composting: http://www.msue.msu.edu/misanet/Composting/composting_operations.htm

All comments and suggestions should be directed to:

1. **Jerry May, North Central Swine Agent**
Farm Records, Production Systems
(517) 875-5233
2. **Joe Kelpinski, Northeast Swine Agent**
Environmental Mgt., Finishing Mgt.
(810) 244-8517
3. **Brian Hines, South Central Swine Agent**
Genetic Evaluation, AI, Facilities
(517) 279-4311
4. **Roger Betz, Southwest District Farm Mgt.**
Finance, Cash Flow, Business Analysis
(616) 781-0784
5. **Tim Johnson, West Central Swine Agent**
Production Records, Software, Confinement
(616) 846-8250
6. **Southwest Swine Agent**
(616) 445-8661



(Comparison...continued from page 3)

These six steps help control flour moths in gestation barns, but will also help control moths in any swine unit that is experiencing flour moth problems.

The key to successfully controlling flour moth populations is to reduce the amount of stagnant feed in the building through a regular cleaning program, while reducing the moths' ability to access any area where stagnant grain may be setting.

Sources for traps and supplies:

Insects Limited
16950 Westfield Park Rd.
Westfield, IN 46074
Phone 800-992-1991
www.insectslimited.com

Phero Tech Inc.
7572 Progress Way
Delta, British Columbia, Canada V4G 1E9
Phone 604-940-9944
www.pherotech.com

Fumigation Service and Supply
10540 Jessup Blvd.
Indianapolis, IN 46280-1451
Phone 800-92-1991

Great Lakes IPM
10220 Church Road
Vestaburg, MI 48891
Phone 800-235-0285

Sources of Diatomaceous Earth (DE):

"Insecto"
Natural INSECTO Products Inc.
PO Box 12138
Costa Mesa, CA 92627
Phone 800-332-2002
www.insecto.com

"Protect-It"
Hedley Technologies
Phone 888-476-4473
www.hedleytech.com

"Dryacide"
Dryacide USA LLC
3536 Emerson St.
San Diego, CA 92106 2548
Phone 619-222-1680

"Perma-Guard"
Phone 800-441-BUGS (2847)
www.biconet.com/crawlers