

PURDUE AGRICULTURAL ECONOMICS REPORT

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JUNE 2016

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OUR NEW AG ECONOMY BAROMETER

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Recently Purdue’s Center for Commercial Agriculture, in a partnership with the CME Group, launched the *Purdue-CME Group Ag Economy Barometer*. The *Ag Economy Barometer* is designed to fill an information void regarding the overall health of the U.S. farm economy and is analogous to publicly available indices focused on the broad U.S. economy, such as the University of Michigan’s *Consumer Sentiment Index*.

The Barometer is based on a monthly telephone survey of 400 U.S. agricultural producers and is designed to learn

more about farmers’ attitudes and sentiments regarding the status of the U.S. farm economy. Farmers across a broad spectrum of agricultural enterprises are surveyed. Their responses are weighted based upon the USDA’s Census of Agriculture to ensure that survey responses are representative of the entire farm sector.

The key agricultural enterprises in each month’s survey include the following: corn/soybeans, wheat, cotton, beef cattle, dairy, and hogs. These enterprises collectively account for two-thirds of all U.S. agricultural production.

In each survey, we target a distribution of farms across these key enterprises. Then we ensure a portion of responses come from each production enterprise. Those survey portions are 53% corn/soybeans, 14% wheat, 3% cotton, 19% beef cattle, 5% dairy, and 6% hogs.

Specifically, responses to five questions are used to generate the *Ag Economy Barometer* value each month. The questions are:

1. Would you say that your operation today is financially better off, worse off, or about the same compared to a year ago?
2. Looking ahead, do you think that a year from now your operation will be better off financially, worse off, or just about the same as now?
3. Turning to the general agricultural economy as a whole, do you think that during the next twelve months there will be good times financially, or bad times?
4. Looking ahead, which would you say is more likely; U.S. agriculture during the next five years will have widespread good times or widespread bad times?
5. Thinking about large farm investments – like buildings and machinery -- generally speaking, do you think now is a good time or bad time to buy such items?

INTERPRETING THE AG ECONOMY BAROMETER VALUES

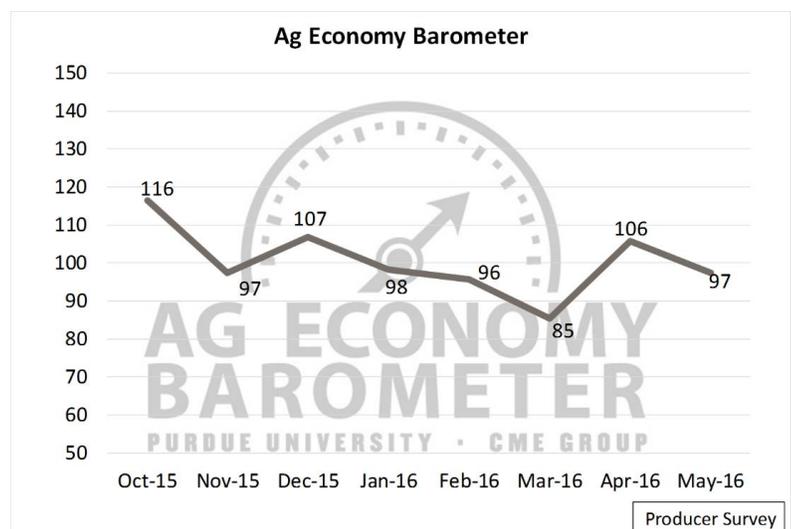
Responses to these five questions are used to calculate the index value each month. Data was collected monthly from October 2015 through March 2016 to establish a base period for the Barometer and each month the Barometer value provides a comparison of farm sector economic conditions with the six-month base period. For example, a Barometer value of 100 implies conditions were unchanged compared to the base period whereas values greater than or less than

100 indicate an improvement or deterioration in farmers' sentiment, respectively, compared to the October 2015-March 2016 base period

EARLY RESULTS FROM THE AG ECONOMY BAROMETER

Data collected from October through March revealed that farmer sentiment regarding the Ag economy was declining, with the index reaching a low of 85 in March. But sentiment among agricultural producers improved markedly in early spring as the index rose to 106 in April before backing down in May to a value of 97, which put the index back in line with readings provided by producers in January (98) and February (96) of this year.

Digging into the components of the *Ag Economy Barometer*, producers' perspective regarding both current and future conditions declined in May relative to April, but remained above the late winter lows. Each month's Index of Current Conditions is derived from producers' responses to questions focused on current financial conditions and their thoughts about making large investments today. Recent shifts in farmers' assessment of current economic conditions appear to be the driving force behind changes in the *Ag Economy Barometer*. The Index of Current Conditions reached a low of 77 in March and improved to 105 in April, before dropping back in May to 83. In contrast, the May Index of Future



Expectations retained most of the gain observed in April, suggesting that farmers' longer-term view of the agricultural economy was still significantly more positive than in late winter.

COMMODITY PRICES AND THE BAROMETER

Responses to questions used to compute the Index of Current Conditions seem to reflect changes in commodity prices. When grain and oilseed prices declined over the winter, farmers' assessment of current conditions drifted lower. However, when these same commodity prices rallied during late March and April, farmers' assessment of current conditions improved markedly. May's decline in farmers' assessment of current conditions appears to be correlated more closely with livestock price weakness. In particular, both feeder cattle and live cattle futures prices declined sharply during late April and early May, resulting in diminished profit prospects for both cattle feeders and cow-calf producers.

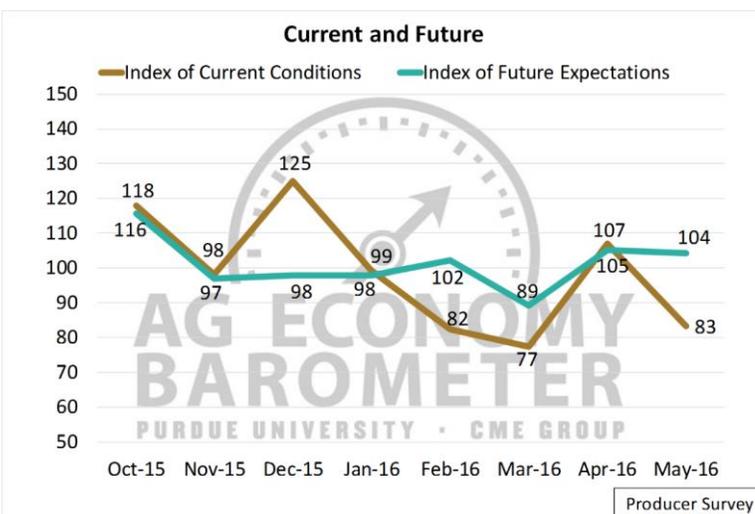
ARE LOWER FARMLAND VALUES ON THE HORIZON?

For the May survey, producers were also asked whether they expect farmland values to increase, decrease or

remain about the same over the next 12 months. We asked this same question last November, as well as February and March of this year. Examining the results over time provides an interesting perspective into producers' views regarding farmland. The percentage of producers that expect farmland prices to increase in the next year has been quite small, but remarkably stable going back to last fall, consistently falling in a range of 13% to 15%. In contrast, the percentage of producers expecting farmland prices to decline over the next year has fluctuated much more. Producers were most pessimistic regarding farmland prices in November and March, when 46% expected a decline and noticeably less pessimistic in May when 33% of respondents reported that they expect farmland prices to decline over the next year. The reduction in pessimism regarding near-term farmland prices is likely attributable to the improvement in crop prices the last couple of months.

FARMLAND STILL GENERALLY VIEWED AS A FAVORABLE INVESTMENT

While a small percentage of survey respondents, just 15% in May 2016, reported that they expect farmland prices to be higher in May 2017, a majority of producers still view farmland as a favorable investment. When asked to evaluate farmland as an investment on a scale of 1 to 9 (1 being 'extremely poor' and 9 being 'extremely good'), 52% of respondents scored farmland favorably (a score greater than 5) and nearly one-quarter of survey respondents provided a neutral rating (a score equal to 5) for farmland as an investment. Conversely 23% of the farmers viewed farmland as a poor investment (a score below 5). While it might seem paradoxical that a majority of farmers continue to view farmland as a good investment when so few producers expect farmland values to increase over the next 12 months, it's likely attributable to the time horizon. Although most farmers do not view the short-run prospects for farmland prices favorably, their long-run perspective continues to be relatively positive.



SHADOWS STILL LINGER OVER THE AG ECONOMY

Overall, the general agricultural outlook is still problematic and our *Ag Economy Barometer* is currently reflecting these concerns. When asked about expectations for their farm's financial situation in recent months, more than 70% of producer reported that their expectations regarding the broad agricultural economy over the next twelve months were for "bad times" financially. In short, although economic conditions in

agriculture improved in early spring compared to late winter, a large majority of farmers continue to think the outlook of the Ag economy remains very challenging.

The *Ag Economy Barometer* will be published the first Tuesday of each month. If you are interested in learning more about the *Ag Economy Barometer*, visit our website, www.purdue.edu/agbarometer where you can also register for email updates when the *Ag Economy Barometer* is published.

THE IMPORTANCE OF SOCIAL RESPONSIBILITY IN PURCHASE DECISIONS: A PURDUE STUDENT PERSPECTIVE

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Between tuition, books, food, and fun, the university experience requires making a variety of purchase decisions. Some of those purchases may have societal consequences like buying coffee from a shop that uses recyclable "to-go" cups, or asking whether the company that sells class supplies donates to charity, or whether the local burrito place buys meat from farms that treat animals a certain way.

The broad ideas of recycling, charitable donations, and animal welfare could be important attributes to consider when making purchases, especially if the student values social responsibility. The university setting also has some unique food spending options such as campus meal plans.

Where does the money come from to make purchases? For some students, summer and academic year jobs provide a source of income. In order to gain more insight into these questions, Purdue University students were asked about earnings, food spending, campus meal plans, and if they consider social responsibility issues in some specific purchasing decisions.

WHAT 550 STUDENTS TOLD US!

Between August 24 and August 27, 2015, a single-page paper survey was distributed to Purdue University students. The survey locations were at five high-traffic campus locations: the Purdue Memorial Union, the Beering Hall Loeb Fountain area, the Cordova Co-recreational Sports Center lobby, Wiley Dining Court, and the Engineering Fountain area. The survey was distributed and collected by graduate student researchers. Student respondents were not offered incentives or compensation for their participation and no identifying information was collected.

Students were asked to report demographic information such as gender, student classification (upperclassmen, lowerclassmen, graduate student), if they lived on or off campus, had a campus meal plan, dollars spent on food, and if they had a summer and/or academic year job. In addition, respondents were asked three questions about social responsibility in their personal purchasing practices.

Table 1. Sample Demographics (n=550, % of respondents)

Variable Description	% of Respondents
Gender	
Female	56
Male	44
Classification	
Lowerclassmen (Freshmen/Sophomores)	61
Upperclassmen (Juniors/Seniors)	35
Graduate students (Masters or Doctoral)	4
I live:	
On-campus	60
Off-campus	40
I have a campus meal plan:	
Yes	53
No	47
I have a summer job:	
Yes	68
No	32
I have an academic-year job:	
Yes	28
No	72

A total of 550 students completed the survey (Table 1). Fifty-six percent were female, 61% were lowerclassmen (freshmen and sophomores), 35% were upperclassmen (juniors and seniors) and 4% were graduate students. A majority of students (60%) lived on-campus, and a majority (53%) had a campus meal plan, the remaining 40% lived off-campus, and 47% did not have a campus meal plan.

Sixty-eight percent reported having a summer job, while only 28% reported having a job during the academic year. Respondents having a summer job reported average weekly earnings of \$369.07 per week. Those with an academic year job had average earnings of just \$191.50 per week (Table 2). It is interesting to note that the weekly earnings during the summer was nearly double the weekly earnings during the academic year, and the number of students holding a job during the academic year was less than half of those with summer jobs.

Though this is not surprising since they likely have more time to work in the summer.

The 53% of respondents having a meal plan were also asked to report additional money spent on food. The average additional spending reported was \$23.02 per week. The 47% of students who reported having no campus meal plan spent an average of \$71.89 per week on food. Remember, students living on campus, primarily lowerclassmen, generally have little food storage capacity and limited access to food preparation facilities, which may make campus meal plans attractive to them. For perspective, the suggested meal plan that Purdue University offered as the “best deal” costs around \$160 per academic week and provides three meals a day plus snacks and guest meal options.¹ The most limited plan provides only one campus meal a day and costs around \$88 per academic week.² Even with the amenities of campus meal plans, students often reported spending additional money for food outside the plan.

DO STUDENTS CONSIDER SOCIAL RESPONSIBILITY IN PURCHASES?

Students responded to three statements about socially responsible purchasing: *I try to buy products that can be recycled*; *I try to purchase from companies that make donations to charity*; and *I do not buy meat products from farms that do not allow their cattle access to pasture*. Respondents rated their own behavior as: Always, Most of the time, Sometimes, or Never. These were regrouped into two categories, Always or Most of the time, and Sometimes or Never.

In response to, *I try to buy products that can be recycled*, 45% of respondents selected Always or Most of the time. For the remaining two statements, *I try to purchase from companies that make donations to charity* and *I do not buy meat products from farms that do not allow their cattle access*

¹ Purdue University Dining and Catering. *Meal Plans* accessed May 5, 2016.

<https://dining.purdue.edu/ResidentialDining/mealplans/>
² *Ibid.*

Table 2. Earning and Spending

Variable Description	Mean (\$/week)
Earning	
Summer job (n=329)	369.07
Academic year job (n=149)	191.50
Spending	
If yes to meal plan, additional money spent on food (n=283)	23.02
If no to meal plan, money spend on food (n=232)	71.89

to pasture 21% and 23% of respondents replied Always or Most of the time respectively. This means that more than 20% of Purdue students surveyed responded affirmatively in describing their buying behavior for all three socially responsible issues.

SUMMARY

We surveyed 550 Purdue students to learn more about their work and their earnings. We also gained insights into how they spend money for food during the academic year and we were particularly interested in whether they consider social responsibility in some specific purchase decisions.

Among the respondents, 68% had summer jobs but only 28% had jobs during the academic year. On average, weekly earnings in the summer was \$369, nearly double the weekly earnings during the school year.

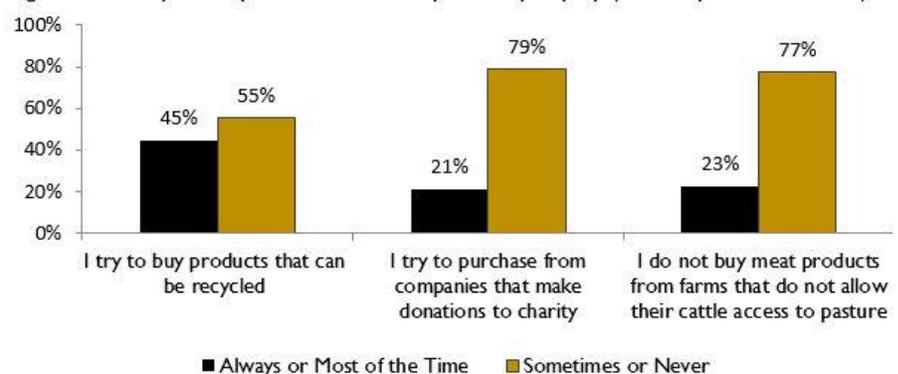
Of those students in our survey, 60% lived on campus and 53% had a campus meal plan. Campus meal plans may not be the lowest cost option for the total dollars spent on food, but grocery food access is limited, as are food storage and preparation facilities in some on-campus housing units. In addition, time for preparation and cleanup can be personally costly as well.

This Purdue student sample would fall within the millennial generation, who may consider the social implications of their consumption decisions more than older generations. We found evidence this was true on some specific issues for some proportions of respondents. Students were asked if they tried to buy products that could be recycled and 45%

said that either always or most of the time this was true. Buying from companies that make donations to charity yielded 21% of the students answering affirmatively, and 23% indicated affirmation of a question on purchases related to animal welfare.

Purdue students have likely grown up hearing about recycling, so it is not surprising that a large percentage consider that issue when making purchase decision. Businesses donating a portion of their sales to charity and animal welfare issues are more recent, yet more than 20% of surveyed students indicated these were important influences on their consumption decisions. In future research it will be interesting to see if social responsibility in purchase decisions continues to become more important, also to identify which products are most affected, and to measure how much consumers are willing to pay for socially responsible attributes.

Figure 1. Participant responses to social responsibility inquiry (% of respondents, n=550)



COMMUNICATING WITH OUR CONSUMERS: WHAT DO PORK CONSUMERS WANT? ARE AGRITOURISTS MORE SUPPORTIVE OF AGRICULTURE?

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What do consumers want? Today they have quick and easy access to information from a wide breadth of sources across many subjects. This change occurred over the past two decades as technological innovations in communications exploded. The internet, smart phones and widespread use of computers revolutionized how and where people gained knowledge and shaped their opinions.

This change has boosted the power of the consumer voice in purchasing decisions as well as the flow of information around different products. In turn, agriculture's need to understand consumers and their motivations when it comes to product selection has increased. Given their improved access to information, many factors come into play when consumers make decisions about what to buy. They want to know about the product and, when it comes to livestock, some want to know about the quality of life the animal had among other considerations.

Increased consumer interest in their food sources is a relatively new phenomenon, occurring roughly in tandem with the communications technology revolution. Both an increased interest in food, and increased access to information, has made communication with consumers an increasingly recognized priority across food and agricultural industries today.

One of the first steps toward efficient and productive communication is an understanding of the audience with whom you are communicating. This article provides reviews of two of our studies into consumers' attitudes. In the first, we report on consumers attribute

preferences for pork and in the second, we explore how consumer participation in agritourism affects their perceptions of the livestock industry

UNDERSTANDING CONSUMER PORK ATTRIBUTE PREFERENCES

Consumers make tradeoffs in attributes, consciously or subconsciously, when making decisions about what to buy. In the recently published study *Understanding Consumer Pork Attribute Preference*³, the researchers conducted a U.S. consumer survey of 1004 individuals targeted to be representative of age, gender, income and region. The objective of the analysis was to examine which pork attributes were influential to consumers in their purchase decisions.

Seven different pork attributes were studied, and in order of preference they were: pork/food safety, taste, animal welfare, price, environmental impact, locally raised/farmed pigs and locally processed pork. As can be seen in Figure 1, food safety was the most important attribute by a wide margin (41%), followed by taste (21%) and shortly after that by considerations of animal welfare (15%). Food safety and taste are unsurprising top selections, yet animal welfare comes in third with a solid margin lead over price (10%).

In this light, animal welfare from a consumer perspective is an element that needs to be better understood. Some consumers see the production system in which the animal is raised and processed as an important attribute. What this same study revealed are certain demographics

³ Cummins, Ann M., Nicole J. Olynk Widmar, Candace C. Croney, and Joan R. Fulton. "Understanding Consumer Pork Attribute

Preferences." *Theoretical Economics Letters* TEL 06.02 (2016): 166-77. Web.

which were found to be determinants of the relative ranking of importance of pork attributes. For example, analysis revealed that men were less influenced by animal welfare issues than were women. Those who had purchased pork in the past 12 months also placed less importance on animal welfare.

Individuals who owned a cat or a dog placed a higher value on animal welfare attributes. In addition, those who indicated they had a source of animal welfare information placed a higher value on animal welfare in their purchase decisions. These findings surrounding pet ownership and access to animal welfare information support previous studies that have found similar relationships.⁴

EXPLORING AGRITOURISM EXPERIENCES AND PERCEPTIONS OF PORK PRODUCTION

Communicating with interested consumers can take many shapes and forms. Livestock producers today are interacting in a variety of ways, such as how their products are displayed in stores, how they choose to market their product, their interaction with their communities and by inviting people onto their farms. Transparency is a critical component of trust-building, a necessary component for breaking down communication barriers and fostering informed decision making.⁵

Inviting people to visit farm operations, or agritourism, is a potential way to build transparency with the public. The purpose of agritourism is often to show people what happens on the farm so they can become better informed about farming practices and activities. The underlying assumption of this practice is

often that as people learn about the farm, they will have less concern about the production process as a whole. This research sought to explore who visited livestock farms and especially to answer whether consumers who participate in agritourism actually have reduced concerns about agricultural industries.

This section captures the findings of a new study, *Exploring Agritourism Experience and Perceptions of Pork Production*⁶. This article looks at the characteristics of people who visit agricultural locations and their preferences. The authors conducted an online survey with 857 respondents representative of the U.S. population. Of those surveyed, 69% of the respondents had visited a livestock operation (dairy farm, pig farm and/or horse farm).

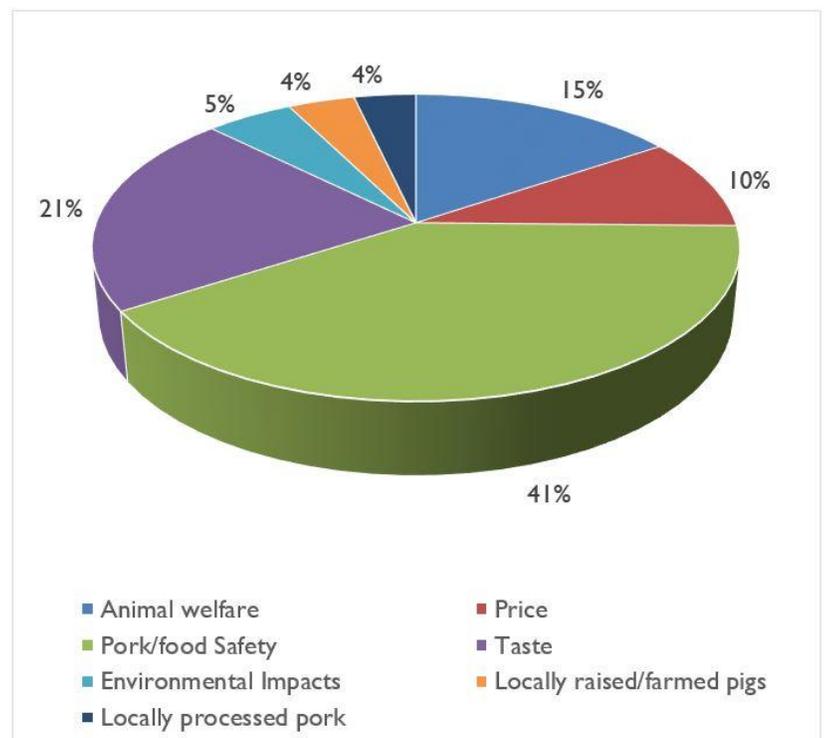


Figure 1. Estimated preference shares for pork attributes. Adapted from Cummins et al. (2016)²

⁴ For additional information, see McKendree, M.G.S., Croney, C.C. and Widmar, N.J.O. (2014) Effects of Demographic Factors and Information Sources on United States Consumer Perception of Animal Welfare. *Journal of Animal Science*, **92**, 3161-3173. <http://dx.doi.org/10.2527/jas.2014-6874>

⁵ "2015 Consumer Trust Research: A Clear View of Transparency." *Center for Food Integrity* (2015).

⁶ Cummins, Ann M., Nicole J. Olynk Widmar, Candace C. Croney, and Joan R. Fulton. "Exploring Agritourism Experience and Perceptions of Pork Production." *Agricultural Sciences AS 07.04* (2016): 239-49. Web.

Key findings of this study revealed several items of note. First, being a tourist in one area was correlated with being a tourist at another farm attraction as well. Those who had participated in agritourism once were likely to have engaged in it a second or third time. Second, the results did not differ in terms of gender, age or region. However, they did differ in terms of income level. Those who reported a high income level were more likely to have visited a farm. It is likely that findings related to income level are generalizable beyond agritourism, to tourism and travel in general. Given that travel is costly in terms of money (and time), it is to be expected that those who travel more are likely those with higher income levels.

Results generally support the hypothesis that those who visit animal operations were more supportive of livestock industries. Importantly, the majority of people surveyed agreed that livestock agriculture was an important industry in their state. This was true of those who had not visited a farm, yet those who had visited a livestock operation agreed more strongly with that statement. In a similar result, both groups were generally supportive of livestock industry growth in their county, but those who had visited a livestock farm were significantly more supportive. When asked if they opposed new livestock buildings in their county, both groups generally disagreed with that statement, but those who had visited a livestock operation disagreed more strongly.

In turn, those who have visited a farm demonstrated a more critical eye towards agriculture in some cases. For instance, those who had visited livestock operations more frequently were more concerned with the impacts of local water quality issues from livestock operations. These results generally show that those who have visited livestock farms are more supportive and interested in livestock agriculture. However, while agritourists tend to support the livestock industry and believe it is important they may still ask critical questions. In fact, those who visit through agritourism are likely to be better informed about the issues and concerns in the industry.

SUMMARY

Lines of communication have become more open between food consumers and producers in the past two decades. Consumers today are more demanding about the way their food is produced, processed, packaged, and delivered.

This article reviewed two studies related to the livestock industries. The first was a survey that identified the attributes most important to U.S. pork consumers. The most important attribute was that the pork be safe to consume with an estimated preference share of 41%. This was followed by the attribute of taste 21%, animals treated in a humane manner 15%, and price 10%. That study also explored which consumers were more concerned about animal welfare issues and included women, pet owners, and those who had access to animal welfare information.

One way farmers have increased communications with consumers and informed them about agricultural production is through agritourism. The second study helped identify which consumers have visited a livestock farm through agritourism and whether those who had visited a livestock farm were supportive of the livestock industry. In general those who had visited a livestock farm were found to be more supportive of the livestock industry than those who had not visited a farm. However, there were also indications that those who had visited farms were more aware of the issues and problems in the livestock industry.

These studies underscore yet again the importance of strong communication starting from a place of active listening. Understanding who consumers are and what they value can go a long way to creating understanding and trust, and it gives producers greater insights into their customers and a greater ability to respond appropriately.

GENETIC TESTING FOR FEEDLOTS: IS IT PROFITABLE?

NATHAN THOMPSON, AGRICULTURAL ECONOMICS PROFESSOR

Genetic tests for a variety of economically-relevant beef cattle traits have become commercially available. Cattle producers collect a hair sample or tissue sample from an ear tag application; samples are sent to a lab where each animal’s DNA is sequenced; and results characterizing an animal’s individual genetic potential for traits of interest are provided. For an example of the results, see Figure 1 (Igenity, 2016). Independent research has found many of these tests are good measures of the traits they are designed to predict.

While genetic test can provide a remarkable amount of data about potential feedlot performance, economists have only considered a few of these tests and estimated their value to producers. This is important because producers will only adopt this technology if the value of genetic information is greater than the current cost of the test which is about \$40 per head. This article briefly summarizes our recent research designed to estimate the value of genetic testing in the U.S. beef industry, specifically focusing on the value of this information to the feedlot sector.

In the first study (Thompson et al., 2014), the value of genetic information is estimated for seven economically-relevant beef cattle traits (average daily gain, hot-carcass weight, yield grade, rib-eye area, marbling, tenderness, and days-on-feed) for two scenarios of value. How could genetic information be used? First, genetic information could be used to select which cattle would be selected for placement in the feedlot. This is known as “marker-assisted selection.” In other words, feedlot managers would use the information to determine how much more or less animals with superior or inferior genetics are worth

compared to their contemporaries.

Not surprisingly, results indicate that the values to the feedlot of animals with different genetic profiles differ significantly. The value of marker-assisted selection ranged from \$3-\$22 per head depending on the trait being evaluated (Figure 2). These values represent the additional revenue above all costs except for the cost of the genetic test. Unfortunately, the value generated from genetic information is not enough to pay for the current cost of the genetic tissue test.

Never the less, it is important to note that average daily gain (\$22 per head) and marbling (\$21 per head) were identified as the most economically-relevant feedlot cattle traits. This makes sense given that animals with higher average daily gain will result in heavier finished weights and/or fewer days-on-feed, both of which increase profitability. In addition, the current structure of the grid heavily rewards more favorable quality grade, or marbling outcomes. It is also important to point out that these values are sub-additive. That is, selecting cattle based on average daily gain and marbling generates a value of \$30 per head and not \$43 per head.

A second use of genetic information could be to sort cattle that are already owned by a feedlot into management groups that are most likely to perform similarly. We call this “marker-assisted management.” Specifically, this first study focused on the value of using genetic information to choose cattle for the optimal days-on-feed. That is, what is the economic benefit of being

Average Daily Gain (ADG)	Igenity Score	Genetic Effect	Description
Animal A	8	0.27 lbs.	Animal A is expected to produce progeny that will gain 0.19 pounds more per day than progeny of Animal B, and therefore weigh 28.50 pounds more after 150 days on feed.
Animal B	3	0.08 lbs.	
		0.19 lbs. per day	

Figure 1. Example test results for genetic test characterizing average daily gain, Source: Igenity, 2016.

able to feed cattle with differing genetics for different numbers of days-on-feed? Again, estimating the value of genetic information as the additional revenue above all costs except for the cost of the genetic test, the value of marker-assisted management was less than \$1 per head for each of the traits. This of course means it would not be profitable to use genetic testing to sort cattle by days-on-feed (Figure 3).

In general, these low values were the result of limited differences (a small variation) in optimal days-on-feed for the best and worst performing animals for any given trait. Still, there remains potential for using the information derived from genetic testing to improve other feedlot management decisions, including how animals are fed, how technologies such as implants and beta agonists are used, and how cattle are marketed.

In the second study (Thompson et al., 2016); we use the same data to estimate the value of a marker-assisted management scenario in which genetic information is used to sort and selectively target cattle to different marketing methods: live weight, dressed weight, or grid pricing. For example, animals with higher genetic potential for marbling could be fed longer, allowing them to deposit fat, and then be targeted to grid pricing to

capture the premiums associated with more favorable quality grade outcomes. Results indicate that sorting cattle into marketing groups based on genetic information for yield grade and marbling generated up to \$13 per head of value defined as the additional revenue above all costs except for the cost of the test. Therefore, extending the definition of marker-assisted management to include marketing decisions increased the value of genetic information. However, this value was still not enough to pay for the cost of testing.

SUMMARY

Today, tissue test for various genetic markers can generate a surprising amount of information including estimates of feedlot performance for individual cattle. So, the economic question we explored was whether the returns of using the information exceeded the costs of the test. One way the information could be used was in determining which animals had the greatest value in the feedlot. This is known as “marker-assisted selection.”

A second way this genetic information could be used would be to sort animals into homogenous groups after they are purchased and come into the feedlot. The objective would be to reduce the performance variability within pens of cattle. This is called “marker-assisted management.”

Our results found that using genetic information to select cattle or to sort feedlot cattle into management groups based on optimal days-on-feed or marketing method is not profitable given the current cost of genetic testing of about \$40 per head.

The potential for using these genetic tissue test in the future remains. As genomic testing

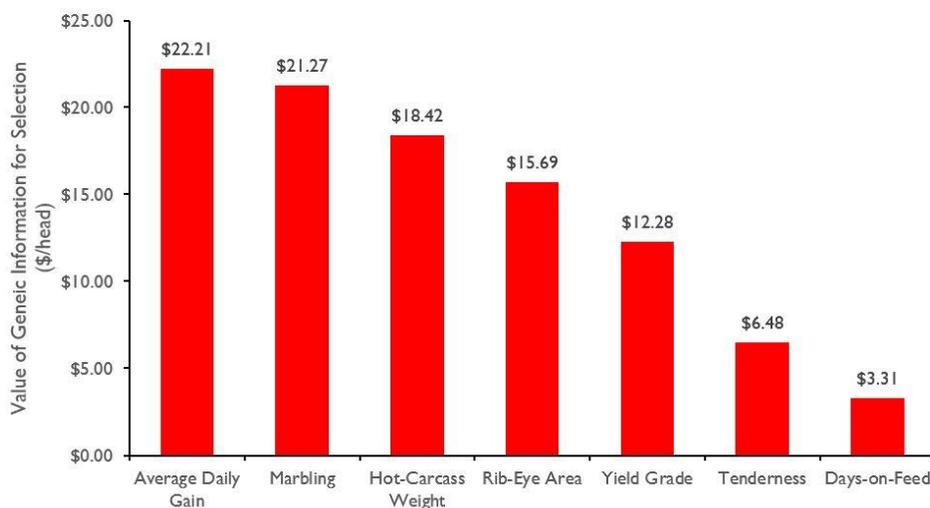


Figure 2. The value (additional revenue above all costs except for the cost of genetic testing) of genetic information for selecting feeder cattle for placement in the feedlot for seven economically-relevant beef cattle traits.

technology continues to advance, the potential for declining testing costs and the development of tests for other important feedlot profit drivers, such as disease resistance and feed efficiency, may lead to cost-effective genetic testing.

Until then, the primary value of genetic information in the U.S. beef industry will continue to come from the ability to improve the genetic makeup of cattle entering the feedlot. These improvements will need to take place in the industry's breeding sector where cow/calf operations are able to impact the genetic makeup of their herds. However, selecting breeding stock for traits that are valuable in the feedlot sector may, or may not, be advantageous in other sectors of the beef industry. Although beyond the scope of this research, the impacts of these feedlot traits on other sectors must also be considered.

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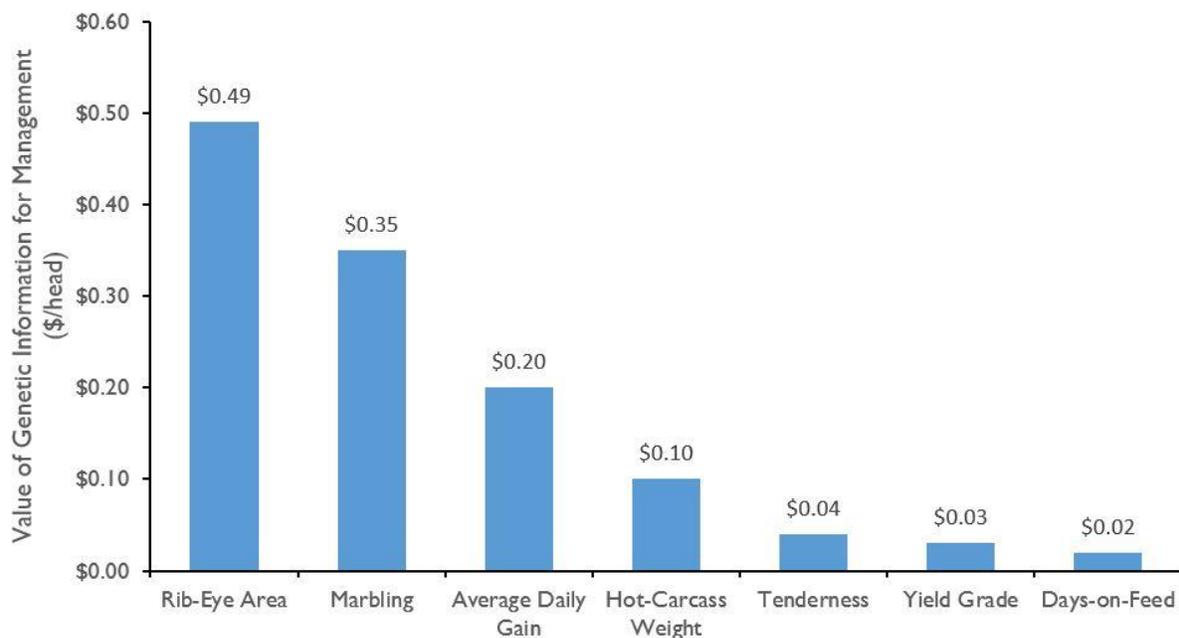


Figure 3. The value (additional revenue above all costs except for the cost of genetic testing) of genetic information for sorting feedlot cattle into management groups by optimal days-on-feed for seven economically-relevant beef cattle traits.

DOUBLING INDIANA PORK PRODUCTION BY 2025: AN UPDATE

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In May of 2005, the newly formed Indiana State Department of Agriculture released its first strategic plan titled, *Possibilities Unbound: The Plan for 2025*. Among seven initiatives outlined, one focused on the opportunity for growth of the state’s pork industry. The report suggested that the size of the Indiana pork industry could double between 2005 and 2025. Now, ten years into that 20-year planning horizon we provide an update of the growth that has actually occurred.

U.S. pork production went through revolutionary changes in the past 25 years. That revolution included the way hogs were produced, where they were produced, the size of operations, and who owned the hogs. This transition can be characterized as moving from primarily

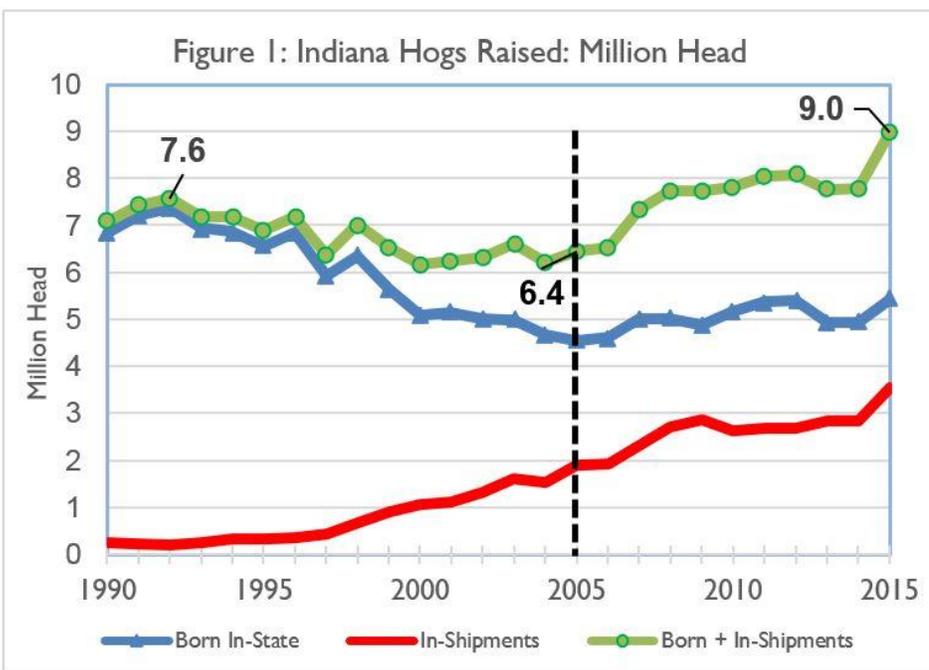
a small-scale family owned production system to a large-scale industrial model.

Indiana was no exception to the national trends in the way hogs were raised. In Figure 1 we show how some of these changes affected the way hogs were raised in Indiana. On the left side of the figure, you will note that most hogs were born in the state and fed to market weights in the state. This was the traditional family farm “farrow-to-finish” production system. The second source of hog production is young pigs that are born in other areas and then shipped into Indiana and fed to market weights in Indiana.

One of the revolutionary production technologies of the early 1990s was multiple-site, all-in-all-out production that was adopted to enhance herd health. Multi-site production meant that farrowing operations could be geographically separated from the finishing operation.

Geographic separation of farrowing and finishing meant that each phase could move to the location with the most favorable economic cost structure. Farrowing expanded rapidly in North Carolina, Oklahoma, and even the Canadian Prairie Provinces where disease incidence was low. Young pigs are small thus can be moved hundreds of miles at low costs.

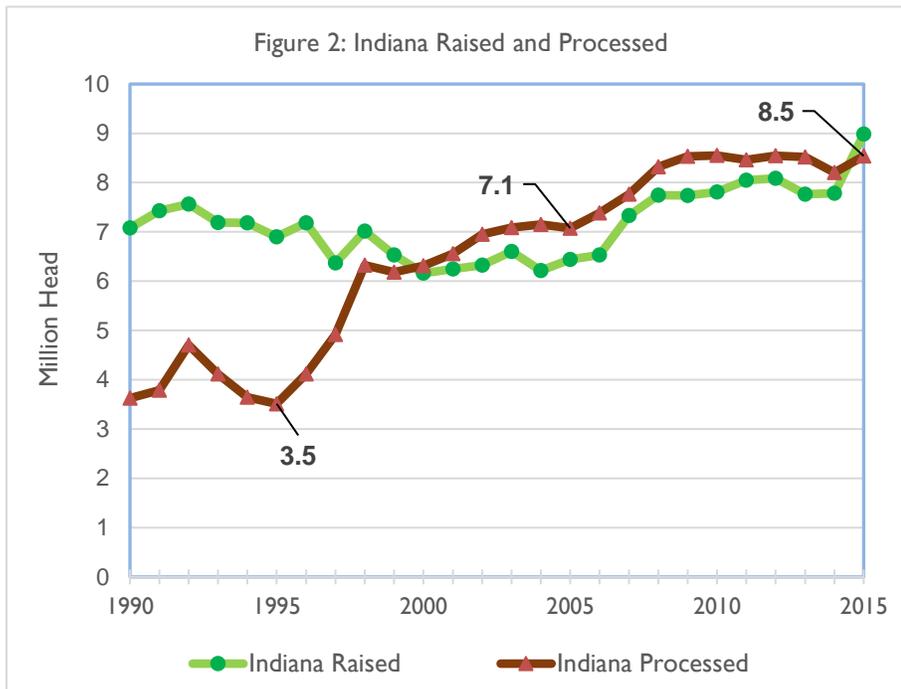
The costs of finishing hogs, on the other hand is driven by feed costs, so locations near abundant and cheap



feed grains and protein meals are strongly advantageous. Proximity to processing is also a necessity since transportation costs for large hogs is costly.

The number of hogs born in Indiana and raised to market weight was generally in decline from the early 1990s to 2005, the point at which the Indiana State Department of

So, how much has the industry grown since 2005? For this estimate we use the number of head produced in Indiana as composed of those born in the state plus the in-shipments that are born outside the state and finished to market weights here in Indiana. This number is shown in Figure 1 and increased from about 6.4 million head in 2005 to near 9 million head in 2015, representing an increase of about 40% over the ten years.



Agriculture strategic initiative was developed. From 2005 to 2015, the number of pigs born and raised in the state has increased from 4.5 million to 5.4 million head, a 19% increase.

However, the largest growth in the state’s pork production industry since 2005 is due to rising “in-shipments” of young pigs then finished to market weights in Indiana. Over the 25 years covered in Figure 1, in-shipments have increased from a few hundred thousand to 3.6 million head in 2015. The Indiana Board of Animal Health reports in-shipments of hogs with the majority being young pigs brought into the state from other locations. In 2015, the top origins of young pigs were 1.1 million head from North Carolina and about 500,000 from Oklahoma. Neighboring states are important as well with roughly 437,000 from Illinois, 381,000 from Michigan, and 321,000 from Ohio. Some travel long distances with nearly 176,000 from Wyoming and about 157,000 from Canada.

PROCESSING GROWTH AS WELL

The Indiana pork industry is more than the production of hogs. It is also the processing, packaging, and transportation needed to get pork products to consumers in this country and around the globe.

Indiana has an interesting history of processing since 1990. In the mid-1990s, Indiana was the state that shipped the most hogs out-of-state for processing. In 1995 as an example, about 7 million hogs were produced in the state but only half of those were processed in the state (3.5 million head). Many hogs were raised here, but not processed here.

This led to a concerted effort of the state’s pork producers, state government agencies and Purdue University to highlight this fact and to seek additional investments in pork processing. That effort was fruitful as new investments were made in existing facilities and a major new plant located in the state. By 2005, the number processed in the state had risen to 7.1 million head and has moved upward to a record 8.5 million head in 2015. From the Strategic Plan year of 2005 to 2015, the number of head processed increased by 20%.

SUMMARY

The number of hogs produced in the state had been on the decrease in the 1990s and early 2000’s. In 2005, the Indiana State Department of Agriculture highlighted hog

production as an opportunity for both downtrend reversal and ultimate growth, suggesting a doubling of the industry in 20 years by 2025. Because of environmental concerns over CAFO's (concentrated animal feeding operations) at that time, it was a bold move for state officials to invite hog production into the state.

The first 10 years of that 20-year horizon has now passed. A reading of the state's industry shows that the number of animals raised in the state has increased by about 40%. About one-third of this growth was due to more pigs born in the state and about two-thirds was due to more in-shipments of young pigs to be finished in the state. Growth has also occurred in the processing sector as the number processed in the state has expanded by about 20% over the past 10 years.

Prospects for future growth are positive as well! A new processing plant is being built in Coldwater Michigan, about 60 miles north of Ft. Wayne Indiana. That plant is scheduled to initially process about 2.5 million head per year. It will likely source the majority of hogs from Michigan, Indiana, and Ohio. Indiana's production is the largest of the three and represents around one-half of

the three state total. This provides an opportunity for Indiana production to expand by about 500,000 head or more depending on how the new plant affects capacity utilization of competitors in the region.

Indiana state officials took a bold step in promoting pork production a decade ago by suggesting a doubling in 20 years, at the 10-year point the number of hogs raised has increased about 40%. Most importantly, the industry has had to maintain high standards in meeting environmental regulations and in proving they can be good neighbors. If they can continue to do this, then more growth appears to be on the way.

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