

# PURDUE AGRICULTURAL ECONOMICS REPORT

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## Assessing the Opportunities for U.S. Pork in China

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**T**he emergence of China onto the world economic stage has many implications for U.S. hog producers. As China makes its transition from a developing economy to a developed one, the world will notice that 20% of its population is becoming wealthier, demanding more goods, and eating more high quality food. Pork, being the primary meat in Chinese diets, will face a demand surge, which will need to be met by increasing supply and an efficient supply-chain. Although U.S. pork exports to China have been stagnant, recent events and negotiations have made progress in an uncharted territory.

### A New Super Power

Since its admission into the World Trade Organization in 2001, China has captured the world's attention. With an increasing population, rapid urbanization, and rising incomes, China is making its case to become the world's next economic superpower. China's average gross domestic product (GDP) growth since 1990 is an astounding 9.82%; the U.S. 2.94%, and the European Union 2.10%. If China, the U.S, and Europe were to keep these average growth rates into the future, the Chinese economy will surpass the E.U. in approximately 14 years and the U.S. economy in about 24 years. Such high level of growth has boosted

Chinese citizen's income and standard of living tremendously.

Urban sprawl has been a hot topic within China. Farmland around large cities has been turned into condominium complexes, and many farmers have migrated to cities in search of new jobs and the prospect of a better life. Such a high degree of urbanization and growth combined with a decrease in agricultural land has posed a very simple but serious question for China: is China able to provide high quality food for its people with its limited land and water resources?

Based on the latest arable land and population data from the World Bank, China must feed 9.1 persons for each hectare of arable land, whereas the United States needs to feed only 1.7 persons. China is home to roughly 20% of the world's people, but only possesses 7% of all arable land. In addition, with a population increase of approximately 10 million annually, equivalent to the entire population of Portugal, China's current and future generations will demand food far beyond what their land can provide. With farmland facing rapid industrialization and farmers migrating to cities, China, on the brink of a Malthusian crisis (Figure 1), will have to look outside of its borders for food supply.

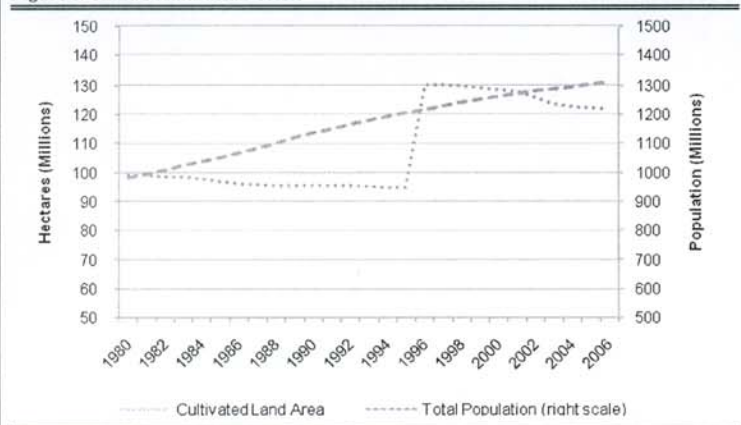
### The Chinese Diet & Pork Demand

Pork has historically been the primary animal protein source in Chinese diets, and its consumption level has tripled between 1980 and 2003. Chinese consumers are earning higher incomes and shifting consumption away from grains and legumes toward meats and animal proteins (Figure 2), a variation of Bennett's Law, which states that as incomes increase, the source of calories shifts from carbohydrates to animal proteins; a phenomenon observed in many developing countries. Chinese per capita income has increased over 759% between 1980 and 2006. During that same period, daily per capita consumption of cereals and starchy roots in China decreased 16%, while per capita meat consumption increased 274%. In 2003, the average Chinese citizen consumed approximately

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**Figure 1. China's Malthusian Crisis**



Source: USDA Economic Research Service (2008) and Food and Agricultural Organization (FAO) of the United Nations (2008).

Note: The sharp increase in cultivated land area from 1995-1996 is due to a change in measurement technique and data analysis implemented by the Chinese government.

35.3 kilograms of pork, compared to 12.0 kilograms in 1980. Today, per capita pork consumption is estimated to be much higher as pork continues to be the primary meat consumed in China.

There are several differences in the type of pork demanded by

\* Per capita GDP was projected using an exponential function, while cereal and starch, meat and pork consumption was predicted using linear functions.

consumers in China and the U.S. Chinese consumers tend to place higher value on the less desirable U.S./European cuts. For example, internal organs (offal) sell at a premium compared to lean muscle meat in the same market. A second difference deals with the amount of external fat present on the meat. Chinese consumers prefer pork with a certain fat content as opposed to U.S./European consumers who are

drawn to lean cuts. This fat content preference arises from the taste and texture found in Chinese cuisine, and is supported by the fact that the majority of Chinese pork comes from "backyard production," which results in high external fat. During a May 2008 visit, we collected market prices for different pork cuts in supermarkets in Beijing and Shanghai, as well as local markets and a wholesale market in Beijing. These market prices show the relative high price of pig offal compared to the more traditional U.S. pork cuts, such as loin and ground pork. From the point of view of the American hog producer, overall Chinese pork demand is, for the most part, complementary to that of U.S. consumer demand. U.S. consumers prefer lean muscle meat, while Chinese consumers welcome fatty meat cuts, neck and back bones, ears, feet and tails.

Using historical data, projections can be made regarding pork and total meat consumption (Figure 2).<sup>\*</sup> From these predictions one can roughly project 2015 per capita pork consumption to be 48.4 kilograms. Using a predicted population figure for 2015 of 1.40 billion, projected total pork demand for human consumption for the year 2015 is estimated to be around 68 million metric tons. Compared to 2003, 45 million metric tons, this is over a 50% increase. These numbers raise another very interesting question: where will all this pork come from?

### Chinese Pork Production & Supply

Chinese pork production grew rapidly after 1985 when the government removed state procurement quotas and price controls (Figure 3). Today, about 80% of pork raised in China comes from local backyard production (Wang et al., 1998). The average pork producing household grows between one and five hogs. This type of backyard farming is more prominent in western, non-coastal areas such as Sichuan Province, the largest pork producing region in China. Unlike the U.S. and Europe, the local backyard producer is a key player in the pork-processing sector, often cutting, processing, and selling

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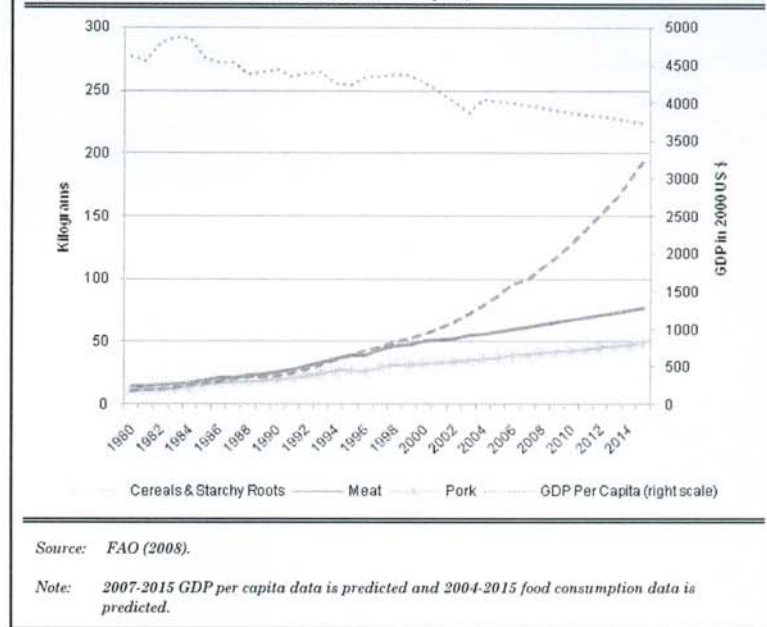
their own pork. Because of a lack of refrigeration and poor transportation and distribution systems, many manufacturers focus solely on regional markets.

To keep up with surging demand, China has recently begun to implement the Western model of consolidating and industrializing livestock production. Dozens of large hog operations have emerged outside major cities, raising 1,000 + animals. Economic growth in China is driving the consolidation and commercialization of pork production. However, this rapid transition has posed serious obstacles to the industry. Confinement of hogs combined with low sanitation standards has provided suitable breeding grounds for disease.

In May, June, and July of 2008, Reuters, Bloomberg, and other reputable news organizations published articles revealing the damage caused by the spread of porcine reproductive and respiratory syndrome virus, more commonly known as PRRS or "blue ear pig disease." This disease has created a huge dent on China's pork production. As of early 2008, this virus was found in 25 of China's 33 provinces and regions, generating widespread panic for Chinese hog producers. A New York Times article states that approx. 25 million pigs die every year in China due to the disease (The New York Times, 2007). Figure 3 shows a 10.8% decrease in pork production between 2005 and 2008, which most U.S. agricultural economists attribute it to the PRRS outbreak. Although this 6 million metric ton decrease does not appear significant given China's massive production capability, it is equal to more than half of the United State's 2008 pork supply. This epidemic raises serious concerns about the short-run pork supply in China. This shortage in the domestic market will have to be filled by either increased imports or reduced exports.

Although the Chinese government is trying hard to encourage more investments in hog production, it remains a challenge in the long-run for domestic pork supply to meet the rapidly increasing demand. This is due to the current high world feed

Figure 2. Chinese Diet & Income to 2015 (Per Capita)



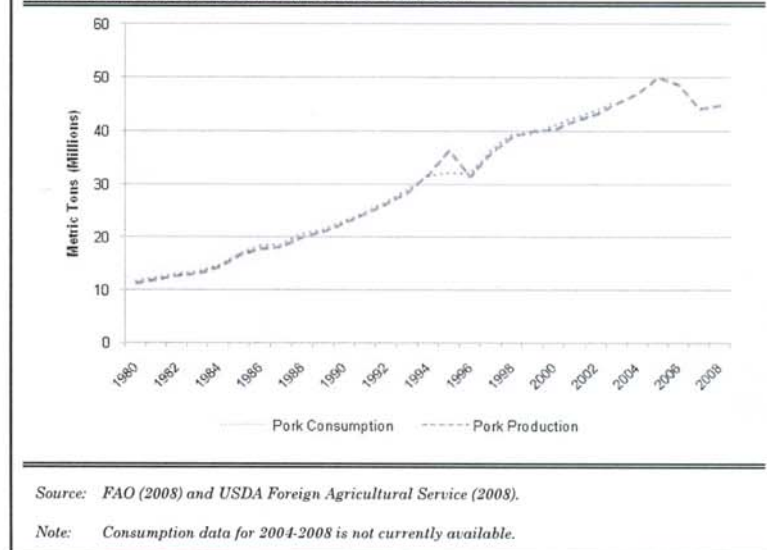
Source: FAO (2008).

Note: 2007-2015 GDP per capita data is predicted and 2004-2015 food consumption data is predicted.

costs and limited Chinese arable land which restricts domestic feed production. In the past, China

has been cautious on importing food and feed grain (except for oilseeds), and it seems unlikely that

Figure 3. Chinese Pork Consumption and Production



Source: FAO (2008) and USDA Foreign Agricultural Service (2008).

Note: Consumption data for 2004-2008 is not currently available.

China will import a lot of feed grain to support large-scale hog production.

#### U.S. Pork Exports to China

It goes without mentioning that the speed with which China begins to import U.S. pork depends on the politics and negotiations between the two countries. In the recent past, China has successfully prevented the importation of U.S. pork due to the use of Ractopamine (RAC), a feed additive that promotes lean meat production which is readily used in the U.S. Rising costs of animal feed, veterinary supplies, fuel and food inflation, are putting increasing pressure on the Chinese government to negotiate trade deals with the U.S. and other countries. Last September, Smithfield Foods Inc., the world's largest pork producer and processor based in Virginia, negotiated a first of its kind deal to sell 60 million pounds of pork to China. More recently on July 1st, 2008, COFCO (the Cereals, Oils and Food Corporation of China) agreed to buy 7 million shares, or 4.95% of Smithfield Foods Inc.'s stock, paving the way for a strategic alliance between the world's largest pork processor and consumer.

In a May 2008 interview conducted by us, a COFCO market analyst provided a closer look at the COFCO-Smithfield relationship.

COFCO operates under the Chinese Ministry of Commerce (MOC) and was authorized by the government to import pork from the U.S. for the first time in recent history. This market analyst made reference to a 1997 COFCO delegation visit to the U.S. headed by Vice Minister Gao Hucheng to begin talks on this issue. After further negotiation, a pork import agreement was reached that included wheat and soybeans, as compensation for the U.S. trade deficit with China.

Under the import contract, China requires that U.S. producers exporting pork to China withdraw the use of RAC three months before slaughter. The imported pork has to pass a 0% RAC standard test at Chinese ports. The Chinese government working with Smithfield Foods and Chinese inspectors in the U.S. helped assure that the pork raised in the U.S. met the import standards of the agreement. Although using RAC is prohibited during a large portion of the hog's weight-gaining stage, the impact on cost is not necessarily negative given the whole carcasses are exported to Chinese markets, which welcome a higher fat content.

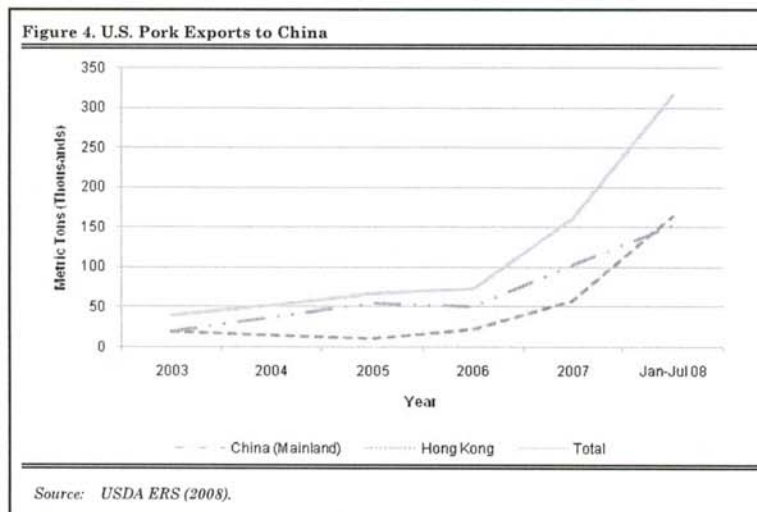
Recent trade data between the U.S. and China show a drastic increase in U.S. pork exports to China (Figure 4). January-July 2008

pork exports to mainland China were 152 thousand metric tons, a 3-fold increase from the previous year. More astonishing are the trade figures with Hong Kong, which show pork exports at 164 thousand metric tons for January-July 2008, a 9-fold increase over the same period in 2007. It is important to note that Hong Kong and mainland China pork markets are quite integrated because China has been the major pork supplier to Hong Kong. The PRRS outbreak in the mainland is the primary reason that Hong Kong increased its import from the U.S. and other countries (Silva, 2007). Hong Kong also serves as a transshipment point for pork going to mainland China. It is estimated that unofficial transshipments and smuggling of pork products into China through Hong Kong are seven times greater than official imports (Fuell et al., 1997). From January through July 2008, China shipments (including Hong Kong) made up 24% of all pork export from the U.S., second only to Japan (27%).

China's recent pork price surge has contributed to the increase in U.S. pork exports to China. China's average retail pork price for January-June 2008 was 21,021 RMB (US 3,047) per ton, a 63% increase over the same period the previous year. Many analysts believe that Chinese domestic pork prices will remain high through the end of 2008 because of rising feed costs, which accounts for 70% of total swine production costs in China (Zhang & Beckman, 2008).

Another factor contributing to the surge in pork exports to China is the decrease seen in China's strategic pork reserves due to production shocks caused by the PRRS outbreak and the Sichuan earthquake, which destroyed 4-5 million hogs. These supply shocks have forced the government to increase their frozen meat reserves, which are composed mostly of U.S. pork, specifically from Smithfield, Inc. (Zhang & Beckman, 2008).

COFCO, having little experience in the slaughtering and processing of hogs, wants to play a larger role in the Chinese pork sector. Many economists see COFCO's recent





purchase of 7 million shares of Smithfield Foods as a strategic move that will shift Smithfield closer to a relatively untapped meat market.

### Market Competition

Competition is anticipated in Chinese pork markets. First, domestic production is expected to recover a little from the PRRS outbreak, and recent high domestic pork prices are expected to fuel investments in hog production. The Chinese purchasing of Smithfield stocks could signal the beginning of U.S. technology adoption with regards to PRRS control. In addition, large companies such as COFCO and Smithfield have the potential to invest and directly manage large hog operations, smoothing out production over the next year or two. However, as discussed earlier, the feed and land constraints will prevent the domestic hog supply from growing at the same speed as demand.

Other world pork exporters such as Denmark, Canada and Brazil may increase their market share in China. However, the weak U.S. dollar, and the newly established relationship between China and Smithfield will make U.S. pork more competitive relative to these countries.

The Chinese government's trade protection policies will continue to encourage domestic production; however, China is expected to become more open to U.S. imports in an effort to balance trade. Alongside energy and technology, agricultural commodities are high on the list of consumption goods that China is willing to import. Different from basic food grains, which are more sensitive to food security issues, pork has not yet become a necessity. Just like China is importing soybeans for edible oil use, pork can become another commodity that China is willing to import.

Although weekly shipments of U.S. pork to China are still a long way away, China has more reasons than ever to speed up pork negotiations with the U.S. With decreasing farm land, a rising middle class, a dented pork supply and pork consumption at an all-time high with no signs of slowing down, the stage is set for the U.S. to become a strategic partner in the Chinese pork sector.

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## Farmers and the Indiana Sales Tax\*

*George F. Patrick, Professor and Extension Economist*

**T**ax increases, like the recent increase in the Indiana sales/use tax from 6% to 7%, attract the attention of many individuals. According to the Indiana

\* This article draws heavily on the Indiana Department of Revenue Information Bulletin #9, *Sales Tax, "Agricultural Production Exemptions," January 2003*, which is available at <http://www.in.gov/dor/reference/files/sib52.pdf>; *Sales Tax Information Bulletin #52, "Wholesalers," September 1994*, <http://www.in.gov/dor/reference/files/sib09.pdf>, and Chapter 45 of the Indiana Administrative Code, [http://www.in.gov/legislative/iac/iac\\_title?iacl=45](http://www.in.gov/legislative/iac/iac_title?iacl=45). Appreciation is expressed to Alan Miller for helpful comments on earlier versions.

Code, the person who acquires tangible personal property in a retail transaction is liable for the tax on the transaction and shall pay the tax to the retail merchant as a separate, added dollar amount. The retail merchant shall collect the tax as agent for the state. Thus, an Indiana farmer may encounter the Indiana sales/use tax in two ways:

- 1.) As a purchaser of property subject to tax.
- 2.) As an individual making sales of property subject to tax.

Only retail sales of tangible personal property are subject to tax. Intangibles, services, and real estate

are not subject to tax. Certain foods and medicines are also not subject to tax. Furthermore, there are a number of exemptions, some specific for farmers and agricultural production, which can be confusing to both buyers and sellers.

### Purchases

The general rule for the application of sales or use tax is that a purchase of tangible personal property to be used in Indiana is subject to tax unless a specific exemption is available. Sales tax applies to purchases in Indiana, while the use tax applies to Indiana sales where sales tax was not charged at the time of purchase or out-of-state purchases which were not subject to sales tax or which



were subject to a lower rate of sales tax than in Indiana. For example, an Indiana use tax of 2% would be due on an out-of-state purchase on or after April 1, 2008 which had been taxed at a sales tax rate of 5% by another state. Individuals report these purchases on the Form IT-40 and pay the tax due with their Indiana income tax return.

Sales Tax Information Bulletin #9 says there are "several exemptions from sales and use tax relating to agricultural production. The exemptions are limited to purchases of animals, feed, seed, plants, fertilizers, insecticides, fungicides, and other tangible personal property; and agricultural machinery, tools, and equipment *directly used in direct production of food or commodities that are sold for human consumption or for further food or commodity production.*" (emphasis added) Property purchased must be integral and essential to the production process of food or commodities. In addition to directly using the property in direct production ("the double direct test"), the person acquiring the property must be a farmer. A "farmer" is one who is occupationally engaged in the commercial production of food or agricultural commodities for sale or further use in producing food or commodities for sale. Persons who do not intend to operate at a profit or who produce food and agricultural commodities as a hobby are not occupationally engaged in farming and their purchases are subject to tax.

Operations similar to pony farms, riding stables, or the production and raising of dogs and pets are not classified as farms for sales tax purposes. Information Bulletin #9 gives an example of an operation which raises animals to be used in laboratory research. Because the animals are not intended for nor are sold for human consumption, the operation cannot purchase animal feed exempt from tax. A second example involves the purchase of horses to be used as riding animals. Such a purchase would be taxable because the animals are not directly used in the direct production of food or agricultural commodities. Purchase of animals used for sporting purposes (e.g.,

racing and gaming horses) and their feed and other inputs are not exempt from sales tax under the agricultural exemptions.

There are a number of items which, although used in agriculture, are not directly used in direct production and do not qualify for the agricultural exemption. Wearing apparel, appliances, hand and power tools, lawn or garden equipment and any motor vehicle required to be licensed for highway use are some examples. Fencing materials and building materials are gray areas. Fencing materials are taxable if the fence is used only as partition fence between adjoining landowners or to keep wildlife, stray animals, or trespassers from entering cropland or farm premise. However, fencing materials are exempt if used to confine livestock during breeding, gestation, farrowing, calving, nursing, or finishing. Building materials are taxable if used in the construction or repair of non-exempt buildings. Confinement livestock buildings which serve a breeding, gestation, farrowing, nursing, or finishing function are generally exempt.

Utilities, like electricity and gas used to dry grains and forages or power equipment (e.g., egg incubator and milking machines) are considered to be directly used in direct production and would be exempt from sales tax. If exempt use of electricity is the predominant use (more than 50%) of electricity on a meter, the purchase of electricity is exempt. If the use of electricity is not predominantly exempt (50% or less), the sales tax is paid to the utility and a claim for refund for the percentage of exempt use is filed with the Indiana Department of Revenue. The taxpayer must file Form ST-200 and submit it to the Department, and the Department then issues either an exemption letter if exempt use is 50% or less to file a claim for refund or a Form ST-109 if exempt use is over 50%.

Questions have been raised whether the seed, fertilizer, pesticides and other inputs directly used in the direct production of corn to be used for the production of ethanol would

qualify as being nontaxable under the agricultural exemptions. Clearly ethanol is a product of agricultural origin, but it is not intended for human consumption as food. However, production of ethanol from corn involves a joint product, distiller's dried grains (DDGS), which is used for as an animal feed. Thus, that portion of inputs which went into the production of DDGS would be exempt under the agricultural exemption. Although the portion of inputs going the production of ethanol may not qualify for the agricultural exemption, the purchase of tangible personal property for its direct consumption in direct production would be exempt under the "manufacturing" exemption of 45 IAC 2.2-4-4. This is discussed in more detail in the next section.

#### Sales

In general, the sales tax applies only to retail sales. Many of the sales made by farmers are "wholesale sales" rather than retail sales, and thus are not subject to sales tax. Wholesale sales, according to Sales Tax Information Bulletin #52 (September 1994), include sales of:

- 1.) Tangible personal property, other than capital assets and depreciable property, to a person who purchases the property for the purpose of reselling it without changing its form. Sales of grain to grain merchandisers or sales of hay, other forages and some market livestock to dealers would be in this purchase for resale category of wholesale sales.
- 2.) Tangible personal property for direct consumption as a material in the direct production of other tangible personal property produced by the buyer in their business of manufacturing, processing, refining, repairing, mining, agriculture, or horticulture. Sales of corn, soybeans, and other grains and livestock to processors (including ethanol producers), would qualify. Sales of grains and forages as feed to a qualifying farmer, would



be other examples of this type of wholesale sale.

- 3.) Tangible personal property to a person who purchases the property for incorporation as a material or integral part of tangible personal property produced by the buyer in their business of manufacturing, assembling, constructing, refining, or processing is also a wholesale sale. This would include sales of some livestock and other agricultural products for processing.

Farmers making exempt sales are not required to register as Retail Merchants under the Indiana Department of Revenue's current policy. Although sales of corn to an ethanol producer do not qualify for an agricultural exemption from sales tax, such sales are exempt from sales tax under the manufacturing/processing exemption. The Department does not require farmers to register as Retail Merchants, if the only reason for doing so is because of corn sales to an ethanol producer.

If an Indiana farmer does make retail sales to purchasers who are not qualified for the agricultural exemption or the other exemptions discussed above, that farmer is required to collect and remit the sales tax to the Indiana Department of Revenue. These farmers are considered to be Indiana Retail

Merchants and must register with the Indiana Department of Revenue. Registration requires completion of Form BT-1 and an initial application fee of \$25. Registration must be renewed every two years, but the new certificate is generated automatically if no tax is due and no returns are missing. For further information, go to <https://secure.in.gov/apps/dor/bt1/>.

All retail sales of tangible personal property for delivery in Indiana are presumed to be subject to sales tax unless proven otherwise. The burden of proof is on the buyer and also on the seller, unless the seller receives an exemption certificate (45 IAC 2.2-8-12). Typically a buyer qualifying for the agricultural exemption would provide Form ST-105, General Sales Tax Exemption Certificate, with the appropriate box checked to the seller. (Farmers are allowed to use their Social Security number in lieu of an Indiana number for the sales tax exemption.)

The seller is required to collect and remit sales tax unless the seller has received a properly completed exemption certificate or is able to prove that the purchaser actually used the item for an exempt purpose. Failure to comply may lead to penalties and interest charges for the producer. For further information on complying with the sales tax collection, reporting, and deposit requirements go to <https://www.intax.in.gov/Web/> or contact the

Indiana Department of Revenue at 317-233-4015.

### Conclusions

Many of the inputs and machinery purchased by Indiana farmers are exempt from sales tax if two conditions are met. First, the tangible personal property must be directly used in direct production of food or commodities or commodities which are sold for human consumption or for further food or commodity production. Second, the producer must be occupationally engaged in the production. Individuals who do not intend to operate at a profit or produce as a hobby are not eligible for the agricultural exemptions from sales tax.

Sales by Indiana farmers are often wholesale sales which are not subject to sales tax. Other sales may qualify for the agricultural exemption and the seller should receive an exemption certificate, Form ST-105, from the purchaser. However, some sales may be made to purchasers who fail to meet the conditions for the agricultural exemptions discussed above. Such sales are subject to sales tax and it is the seller's responsibility to collect the tax from the purchaser and remit it to the Indiana Department of Revenue. Failure to comply with Indiana sales tax law can cause serious difficulties for producers.

## Farmers' Cost Recovery Alternatives for 2008\*

*George F. Patrick, Professor and Extension Economist*

**T**he 2008 incomes of many farmers are at record levels. Because of potentially high taxable income, year-end tax planning is critical in 2008. For many farmers this should entail estimating taxable income while adjustments can still be made. Because most farmers

are cash-basis taxpayers, flexibility is increased by planning before year-end. Farmers should also understand basic choices available under the Modified Accelerated Cost Recovery System (MACRS). They should also be aware of the 50-percent additional first-year depreciation and expanded Section 179 expensing for 2008. Decisions with respect to which of these cost recovery alternatives to use can be made when the 2008 tax return is being prepared. Because the provisions of Section 179 expensing and 50-percent additional first-year

depreciation are different, taxpayers can manage their 2008 deductions by choosing which tool to use with specific assets. This gives farmers greater flexibility in managing their deductions and taxable incomes.

### Depreciation

Farmers can recover the cost of assets which last more than a year through depreciation. Depreciable assets are placed in classes and the 150-percent declining-balance method with a shift later in life to straight-line depreciation, to maximize the

\* This publication is intended for general educational purposes only. For information on specific tax situations, consult a competent tax advisor. Thanks to Alan Miller for his helpful comments.



depreciation deduction, applies to most tangible personal property used in farming. The MACRS classes with examples of property used in farming are:

*Three-year MACRS property* includes breeding hogs and the tractor units of semi-trailers for over-the-road use.

*Five-year MACRS property* includes cattle held for breeding or dairy purposes, computers, and some construction equipment. Congress specifically included automobiles, pickups, and other trucks in the five-year class. Special depreciation limitations and recordkeeping requirements, not discussed in this article, apply to passenger vehicles.

*Seven-year MACRS property* includes most agricultural machinery and equipment. Grain bins, fences, and general office equipment are also included in this seven-year class.

*10-year MACRS property* includes single-purpose agricultural and horticultural structures placed in service after 1988, fruit trees, and vineyards.

*15-year MACRS property* includes depreciable land improvements, such as field drainage tile, water wells and paved lots.

*20-year MACRS property* includes farm buildings, such as general-purpose barns and machinery sheds.

For the fastest cost recovery, farmers can use the 150-percent declining-balance method with the mid-year convention indicated in Table 1 for selected classes of assets used in farming. A \$10,000 asset in the 7-year MACRS class would have cost recovery of (\$10,000 X 10.71%) or \$1,071 in the year it is placed in

service and (\$10,000 X 19.13%) or \$1,913 in the second year.

Farmers have considerable initial flexibility with respect to depreciation. Once a farmer begins depreciating an asset using a specific method, that method must be continued for the life of the asset. However, decisions with respect to depreciation methods are made when the asset is placed in service. For example, a 7-year MACRS asset could be depreciated using the percentages in Table 1, the straight-line method over the seven-year life, or straight-line method over the 10-year life for the Alternative Depreciation System. The slower depreciation methods would generally be used by farmers who expect to have higher incomes in future years.

#### Section 179 Expensing

The I.R.C. Section 179 expensing has been increased almost annually by Congress. Most recently, the Economic Stimulus Act (ESA) of 2008 increased the Section 179 expensing limit to \$250,000 for tax years beginning in 2008. Farmers and others in an active trade or business can elect to treat the cost of up to \$250,000 of qualifying property purchased during 2008 as an expense (rather than as a depreciable capital expenditure). The higher limit of \$250,000 applies to 2008 only and will drop back to \$125,000 (with indexing) for 2009.

To qualify for Section 179 expensing, all of following requirements must be met:

1. The property must be tangible personal property used in a trade or business. Farm machinery and equipment; livestock used for draft, breeding, or dairy purposes; grain storage; single purpose livestock/horticultural structures; and field tile all qualify for Section 179 expensing. General-purpose farm buildings, such as machinery sheds or hay barns, are not eligible for Section 179 expensing. Real estate is not eligible for Section 179 expensing. Landowners who rent their land generally do not qualify for Section 179 expensing.

2. The property must be purchased, but both new and used property can be expensed under Section 179. Inherited property or property acquired from a related party (spouse, ancestors, or lineal descendants) is *not* eligible for Section 179 expensing.

3. For property acquired in a like-kind exchange (swap or trade), only the boot portion paid is eligible for Section 179 expensing.

*Example 1:* Sara Farmer trades an old tractor with an adjusted basis of \$35,000 for another used tractor and \$50,000 boot. Only the \$50,000 is eligible for Section 179 expensing.

4. The Section 179 expensing election is phased out on a dollar-for-dollar basis if over \$800,000 of qualified property is placed in service during 2008.

*Example 2:* Luc Farmer buys \$825,000 of machinery in 2008. Luc's maximum Section 179 expensing allowed would be reduced by \$25,000 (\$825,000 - \$800,000), making Luc's limit \$225,000. An individual is not allowed to elect the full \$250,000 and carryover the \$25,000 excess.

Only the boot portion on like-kind trades is considered for the \$800,000

**Table 1. Cost Recovery Percentages Using 150-Percent Declining Balance Method with Mid-Year Convention**

Year	3-Year MACRS	5-Year MACRS	7-Year MACRS	20-Year MACRS
1	25.00%	15.00%	10.71%	3.750%
2	37.50	25.50	19.13	7.219
3	25.00	17.85	15.03	6.677
4	12.50	16.66	12.25	6.177
5		16.66	12.25	5.173
6		8.33	12.25	5.285
7			12.25	4.888
8			6.13	4.522



limit. Thus, if the \$825,000 purchase in Example 2 was a like-kind exchange and the boot portion was \$775,000, then the full \$250,000 expensing could be elected.

5. The expensing deduction is limited to the taxable income from any active trade or business before any Section 179 expensing. A farmer's and/or spouse's off-farm wage or business income can be combined with Form 1040 Schedule F for aggregate taxable income. This could permit a Section 179 expense for an asset acquired by a farm business with a loss on Schedule F. Gains or losses from the sale of livestock, machinery, and other business assets reported on Form 4797 are also included in taxable income for purposes of applying this taxable income limitation.
6. The entire Section 179 expensing election can be taken on one large item, reducing the basis for cost recovery. Alternatively, several small items can be completely written off in the year of purchase. Less than the full \$250,000 expensing election can also be claimed. The amounts expensed are treated the same as depreciation when the property is sold or traded and for depreciation recapture purposes. If a Section 179 expensing election is made, notations regarding the specific allocations should be made on the depreciation schedule. If no allocations are specified, IRS prorates the expensing election among all eligible assets. Generally, it will be more advantageous to allocate the expensing deduction to longer-lived assets and to assets that are likely to be kept in the business for their entire depreciable life.

#### **Additional First-Year Depreciation**

The ESA of 2008 provides for an additional first-year depreciation deduction equal to 50 percent of the adjusted basis of qualifying property placed in service after December 31, 2007 and before

January 1, 2009. This additional first-year depreciation is allowed for both regular tax and Alternative Minimum Tax (AMT) purposes.

To qualify for the additional first-year depreciation, the property must meet all five of the following requirements:

1. The original use of the property must start with the taxpayer (property must be new). The tractor acquired in Example 1 would not qualify for the additional first-year depreciation.
2. The property must be MACRS property with a recovery period of not more than 20 years.
3. The taxpayer must purchase the property or enter into a binding contract to purchase the property in 2008. If there was a binding contract to acquire the property before 2008, the property does not qualify.
4. The property generally must be placed in service in calendar year 2008. The deadline is extended for some property with a recovery period of 10 years or more, but only the portion of the basis attributable to expenditures in calendar year 2008 qualify.
5. The taxpayer is not required to use the Alternative Depreciation System (ADS) for the property. A producer with orchards, vineyards or groves who elected not to capitalize pre-production expenses is generally required to use ADS.

*Example 3:* In July 2008, Able Farmer trades his old tractor with an adjusted basis of \$35,000 for a new tractor and he pays \$40,000 boot and uses the tractor during harvest. The tractor is new, 7-year MACRS property, purchased and placed in service in 2008. Because the tractor is qualifying property, the additional first-year depreciation deduction is 50 percent of the \$75,000 initial basis of the tractor or \$37,500.

Able can also take regular MACRS of 10.71 percent of the remaining \$37,500 basis in the new tractor or an additional \$4,016. Total depreciation on the new tractor in 2008 would be \$41,516.

An election not to take the 50 percent additional first-year depreciation can be made by a taxpayer on a MACRS class basis. A statement identifying the classes of property for which the election is made and indicating that the taxpayer is electing not to take the additional first-year depreciation on all of the qualifying assets in the MACRS class is attached to the tax return. Note that the election is "all or nothing" by MACRS class of assets. Unlike the Section 179 deduction, a taxpayer cannot claim only a portion of the additional first-year depreciation on an asset.

*Example 4:* Meg Farmer purchases a \$10,000 farm office computer (5-year MACRS property) and \$200,000 tractor (7-year MACRS property). Both are new and placed in service in 2008. Additional first-year depreciation would be \$5,000 on computer and \$100,000 on the tractor. Meg could take \$0, \$5,000, \$100,000 or \$105,000 of additional first-year depreciation depending on her elections.

#### **Planning 2008 Cost Recovery**

For assets acquired before 2008, the method of cost recovery and Section 179 expensing, if any, would generally have been determined when the assets were placed in service. Cost recovery in 2008 on these assets would be determined by multiplying the appropriate cost recovery percentage from Table 1 by the depreciable basis of the asset. Thus, there are essentially no tax management options with existing assets.

Because the provisions of the Section 179 expensing and additional first-year depreciation are different, taxpayers can manage their 2008 deductions by choosing which tool to use with specific assets. For example, as discussed previously, the 50



percent additional first-year depreciation applies only to new assets whose original use starts with the taxpayer. Because the "all or nothing" aspect of the additional first-year depreciation, a taxpayer may elect not to take the additional first-year depreciation and use Section 179 expensing instead.

*Example 5:* Harry Farmer purchased a new tractor for \$80,000 and traded a planter with an adjusted basis of \$10,000 and \$20,000 boot for a new planter in 2008. Both the new tractor and new planter would be eligible for additional first-year depreciation of \$40,000 and \$15,000, respectively. The \$80,000 tractor and \$20,000 boot on the planter would also be eligible for Section 179 expensing. Depending on his income, Harry might elect to forgo the additional first-year depreciation on the tractor. Because the tractor and planter are both 7-year MACRS property, Harry would also have to forgo the additional first-year depreciation on the planter. However, Harry could take up to \$100,000 in Section 179 expensing on the tractor and planter to manage his taxable income.

Both additional first-year depreciation and Section 179 expensing represent an acceleration of cost recovery and are treated as depreciation. Taking these deductions on assets with longer recovery periods would generally increase the present value of the tax savings. At a 6 percent discount rate, the present value of \$100 received in five years is \$74.40 and \$55.80 in ten years.

Some assets, such as machinery sheds, shops and general purpose barns, are eligible for the additional first year depreciation, but do not qualify for Section 179. For like-kind exchanges, only the boot portion is eligible for Section 179 expensing, but the entire basis of the new asset is eligible for the additional first year depreciation.

*Example 6:* Sally Farmer has a machinery shed and shop built for \$80,000 in 2008. The machinery shed is not eligible for Section 179 expensing, but as 20-year MACRS property is eligible for \$40,000 of additional first-year depreciation and \$1,500 (\$40,000 X 3.75%) of MACRS depreciation for a total of \$41,500 in cost recovery.

Section 179 expensing deduction is limited to the income from active trades or businesses as discussed in item 5 under the Section 179 expensing deduction. If the expensing election exceeds the taxable income limitation, the excess election amount is carried forward and can be deducted, subject to the Section 179 dollar and taxable income limitations, in the next tax year. In contrast, an additional first-year depreciation deduction in excess of taxable income creates a net operating loss (NOL). A farmer can carry the NOL back 5 years and then carry the NOL forward up to 20 years. Alternatively, the farmer can elect to forgo the NOL carry back period. Good tax management will generally avoid carry forward and NOL situations.

The additional first-year depreciation and Section 179 expensing, combined with regular MACRS depreciation, provide many tax management options for 2008. There are trade-offs between the present value of tax-savings in one year due to rapid write-offs versus tax-savings being spread over several years. These tax management tools can be used after the end of the tax year and can help farmers achieve their tax management objectives.

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## The Valuation of Bull Characteristics

*Jenna Smith, Graduate Student and Ken Foster,  
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**B**eef producers depend heavily on their bulls when making genetic improvements in their herds. Bulls account for more rapid improvements in heritable traits in cattle than do cows, because a single bull sires multiple offspring each year. For example, Ron Lemenager (2005), professor in the department of animal science at Purdue University states, 85-90% of the genetics within a herd comes from bulls used in the last three generations assuming that replacement heifers are kept each year. That is why the selection of a new herd bull is an important aspect

of beef production. A variety of factors are driving renewed emphasis on genetic progress in beef cattle production. Increased feed costs are placing pressure on cattlemen to improve productive traits like rate of gain and feed efficiency. At the same time, consumer attitudes toward beef continue to evolve placing pressure on producers to address meat quality traits when making breeding stock decisions.

### Changes in Beef Consumption

When selecting a new herd bull, beef producers evaluate different bulls looking for desirable characteristics

that will be passed on to offspring hoping their selection will result in a more profitable herd. This is of even more concern because per capita consumption of retail beef declined by 11.5 pounds per person between 1980 and 2003 (United States, Food, 2006). During the demand decline, there was a shift in the beef industry towards the promotion of differentiated and value added products, such as Certified Angus Beef, Laura's Lean, and organic beef, where quality standards are set in order to be included in that product line. Producers of these specialty products



place greater emphasis on bull selection in order to meet the certified beef program requirements. Consumer demand also seems to have changed with greater emphasis on lower fat and cholesterol intake. This, in turn, creates an incentive for cattle producers to pay more attention to the consumptive traits of the meat derived from the animals they produce. One of the problems faced by both, the breeders who supply bulls and the purchasers of bulls, is that the attributes of bulls come bundled together so that it is difficult to determine what the value of specific improvements in a bull might be worth. Consequently, it is difficult for them to make sound economic decisions concerning trade-offs between competing genetic improvements.

#### The Price of a Bull

A value for a specific attribute of a bull can be found within the bundled price through the use of hedonic pricing. This approach allows one to estimate the values that beef producers implicitly place on particular characteristics, such as consumptive\* and productive\*\* traits, when deciding which bull will maximize the profit of their farm. By knowing what traits producers value most, a bull producer would then be able to focus his/her efforts on producing bulls that are of greater value to the buyer. In addition, buyers of bulls might be able to use this information to avoid overpaying or to avoid offering a price that is too low and miss an opportunity.

Hedonic pricing posits that the price of a good is the combination of the values of the individual characteristics that make up that good. Therefore, a good is a collection of characteristics that are sold as one basic unit for one observed price. The overall price of the good consists of the sum of the values of the individual characteristics. These

\* Consumptive traits are those traits which deal with the edible beef product.

\*\* Productive traits are those traits that deal with growth and performance of the animal.

Figure 1. Summary of Statistics for Bull Price and Characteristics Included in the Hedonic Pricing Model

Variable	Mean	Minimum	Maximum
Sale Price (\$)	1838.36	1000	7200
Productive Traits			
Birth Weight (lbs)	83.78	45	116
365-day Weight (lbs)	1273.87	892	1601
Average Daily Gain (lbs per day)	3.94	2.68	5.37
Consumptive Traits			
Ribeye Area (in <sup>2</sup> )	13.23	9.3	19.4
Rib Fat (in)	0.29	0.08	0.67
Intramuscular Fat (%)	3.05	1.26	6.98

unobservable values of characteristics are often referred to as implicit prices. While the values of attributes that bulls possess are not directly observed, comparing the observed prices paid for bulls that possess different attributes allows estimation of the implicit prices that buyers were willing to pay and sellers are willing to accept for the various attributes. Beef producers (the buyers of bulls) respond to prices and premiums that reflect the derived demand for cattle in the packing industry and deduce the values of consumptive traits such as ribeye area.

In the case of productive traits, a producer would be able to recognize the value of the desired traits through lower cost of production. For example, if it takes less feed to

get cattle to market weight, then producers would recognize the decrease in feed cost due to more rapid rate of gain and better feed conversion. To the extent that the use of a bull improves such performance among its offspring, the producer would pay a marginally higher price for this greater profit potential.

#### Background Information and Data

We used various productive and consumptive traits of bulls sold in the biannual Indiana Beef Evaluation Program (IBEP) sale to estimate specific implicit prices for the selected traits. Sale information collected from the fall 1998 to the fall 2005 were analyzed. These sales included 1,145 bulls of Angus, Charolais, Simmental, Hereford, Chiangus,

Figure 2. Implicit Price of Ribeye Area

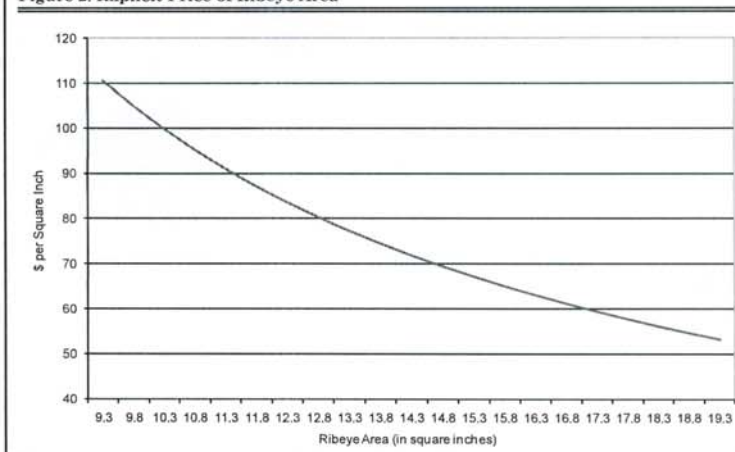


Figure 3. Implicit Price of Rib Fat

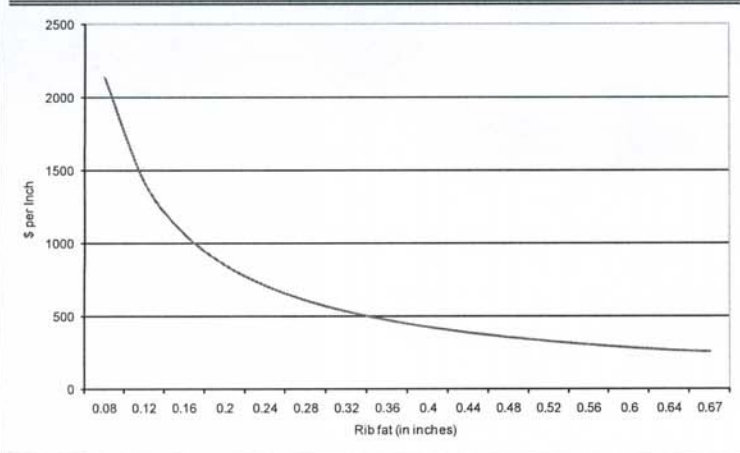


Figure 4. Implicit Price of Intramuscular Fat

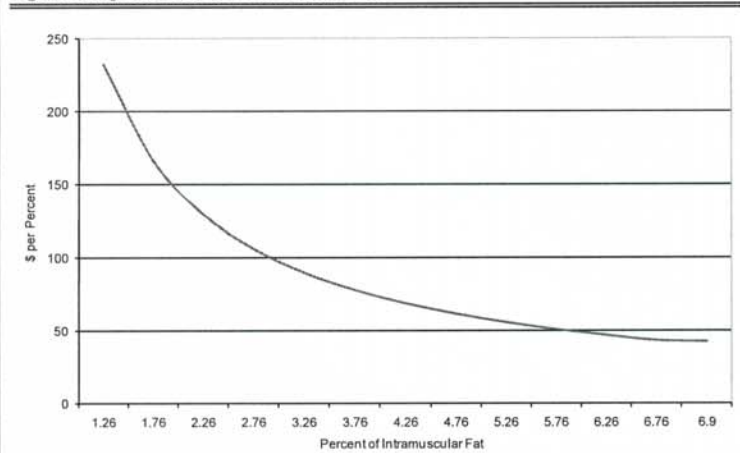
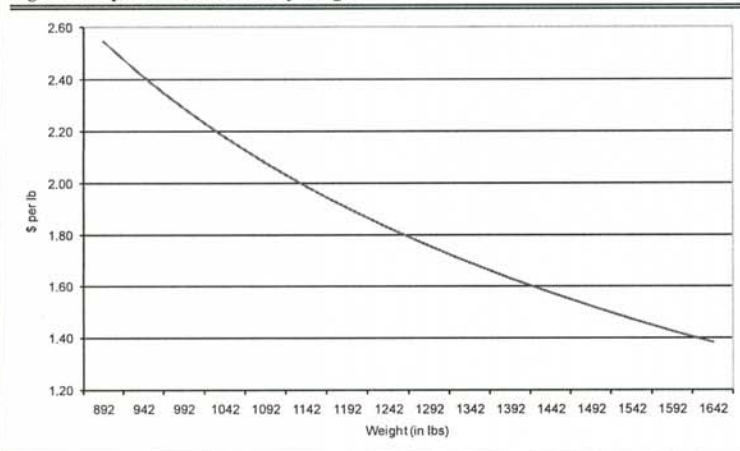


Figure 5. Implicit Price of 365-Day Weight



Limousin, Maine Anjou, Red Angus, Gelbvieh, Salers, Gelbvieh Balancer, Shorthorn, and crossbred Angus genetics sold in an auction format. Productive traits included in the analysis were 365-day weight, birth weight, and average daily gain while consumptive traits consisted of intramuscular fat, ribeye area, and rib fat. Information about the productive and consumptive traits analyzed was given to buyers at the IBEP program sales along with information about breed averages for specific traits in the IBEP sale catalog. Information on the minimum, maximum, and mean values for the various attributes appear in figure 1.

#### Valuation of Bull Characteristics

As one might expect, the results on ribeye area suggest that buyers value a larger ribeye area more than a smaller one. Figure 2 shows a graph of the implicit price of ribeye area that reveals the value a buyer would be willing to pay for an additional square inch of ribeye area at the mean sale price of \$1,838.36 for the bull. Interpreting it for a specific value such as a 12.8 square inch ribeye reveals that a buyer would be willing to pay an additional \$80.39 for a bull with an additional square inch of ribeye area. As the plot in figure 2 shows, if the bull possessed a smaller ribeye, a buyer would be willing to pay more for an additional square inch, everything else equal. Likewise, if a bull possessed a larger ribeye, a buyer would be willing to pay less for the additional square inch. It is important to note that the implicit price should only be calculated for the values that fall within the range of ribeye areas that are included in the analysis. Anything outside this range should not be used to calculate the implicit price of ribeye area because it may not be accurately depicted by this analysis.

The rib fat variable is estimated by ultrasound at the 12th rib and adjusted based on the breed. Figure 3 is a graph of the implicit price of rib fat varying from 0.08 to 0.67 inches at the mean sale price. A surprising result revealed by the graph is that buyers value a bull that has some rib fat because there is over \$2,000



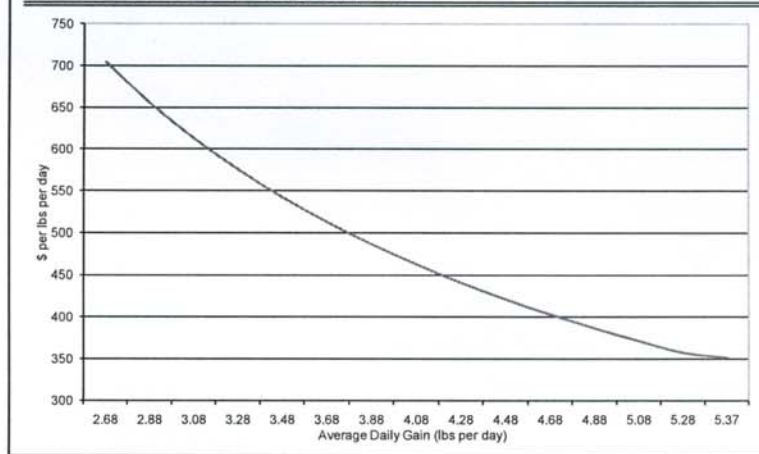
given to an additional inch of rib fat if the bull only has 0.08 inches at the mean sale price. This indicates that buyers recognize a need for a minimum amount of “finish” on all animals regardless of the demand for leaner beef because of the flavor imparting and moisture enhancing characteristics of fat.

The measurement for the percent of intramuscular fat is done by ultrasound and then adjusted to 365 days of age. It is a measure of the marbling in the carcass, thus ultimately influencing the carcass quality grade. The graph of the implicit price of intramuscular fat, at the mean sale price, appears in figure 4. The results are consistent with the notion that buyers want a bull that possesses some intramuscular fat but do not want one with too much; again with a likely emphasis on flavor and texture of the cooked meat product.

The 365-day weight is a productive trait that is associated with the end test weight adjusted to 365 days of age and for the age of the dam. The results associated with the implicit price of 365-day weight, at the mean sale price, are revealed in figure 5. Results indicate that the greater the 365-day weight, the less a buyer is willing to spend on an additional pound of weight. This represents the diminishing return to this productive trait as more of it is supplied in a single animal.

The productive trait of average daily gain is based on the daily weight gain the bull had during the 125-day test. It allows a buyer to identify a bull that could pass on traits that would result in faster growing offspring. The estimated implicit price of average daily gain is illustrated in figure 6. The results on average daily gain demonstrate the importance of a hedonic pricing approach. Notice that the value of a marginal improvement in average daily gain declines as the bull's average daily gain increases. This is because the bull represents a bundle of traits that trade off with each other to establish value. As the average daily gain increases, it reaches a point where an improvement in some other characteristic generates more

Figure 6. Implicit Price of Average Daily Gain



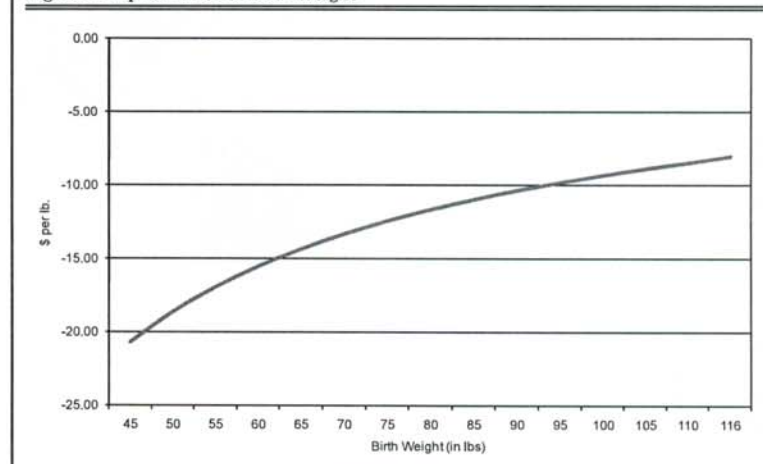
net value to the producer instigating a decline in his/her willingness to pay for more improvement. Thus, buyers would be willing to pay more for an additional pound per day if the bull were slow grower.

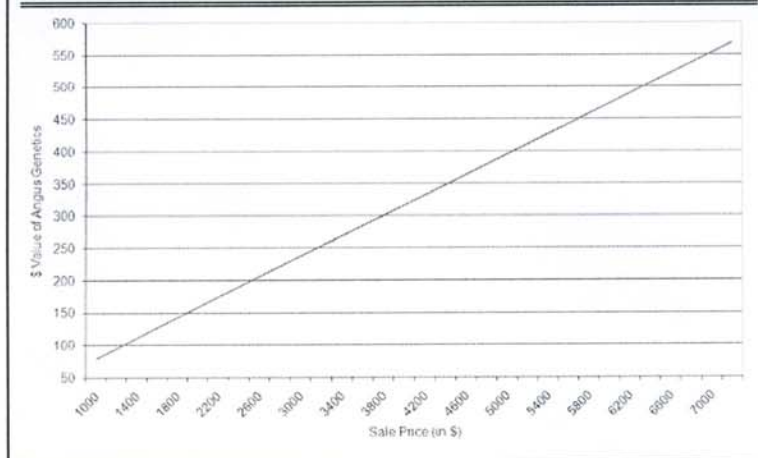
The results of the implicit price of the birth weight variable at the mean sale price, shown in figure 7, are interesting because they reveal that buyers prefer a smaller birth weight. The smaller birth weight is desired due to its association with calving ease. However, a buyer does not want a calf that is so light that its potential to survive is jeopardized

so we see in figure 7 that the discount for birth weight increases for lighter birth weight bulls.

The results on the implicit price of Angus genetics suggest that producers value a bull with Angus genetics more than one that is of different breeding. Figure 8 shows a graph of the implicit price of Angus genetics for different base bull prices. As the graph shows, the more a buyer is paying for a bull, the more they would be willing to pay for the bull to be of Angus genetics. This could be an artifact of the Certified Angus Beef programs and also may

Figure 7. Implicit Price of Birth Weight



**Figure 8. Implicit Price of Angus Genetics**


represent a propensity for those with high willingness to pay for bulls to prefer Angus for a variety of personal reasons. A linear relationship for Angus genetics exists because the presence of Angus genetics does not change at a scale rate, but instead the bull is either has Angus genetics or it doesn't. Traits such as ribeye area have a curvilinear relationship due to the differences in size of ribeye areas the bulls possessed.

#### Implications for Cattle Producers

The estimated implicit prices provide an incentive for producers of bulls to focus on improving the genetic makeup of their bulls that they offer for sale. A bull producer with an estimate of his or her marginal cost for producing a unit increase of a bull trait can compare this to the implicit price for that trait for bulls of the type that they produce.

Successive comparisons across traits will lead to a strategy for the bull producer of allocating scarce resources to those traits where the marginal revenue for an attribute (its implicit price) most greatly exceeds the marginal cost of making the improvement.

Both the buyers and the sellers of the bulls can use the information provided to improve the genetic base of the cattle being produced. By purchasing bulls that possess a specified trait, cattle producers will see the improvement made in the area of that trait over time in their offspring. Bull producers can use the information to determine what traits would be beneficial to focus on improving in order to produce higher valued bulls.

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