

The Iowa Pork Industry 2008: Patterns and Economic Importance

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Introduction

The Iowa pork industry represents a significant value-added activity in the agricultural economy and a major contributor to the overall Iowa economy. Using data from the most recent USDA *Disposition, Production and Income* report, hog marketings in Iowa totaled \$4.327 billion for the year ending December 2007. However, this production represents only a portion of the economic activity supported by the industry. Although the hog industry in the Iowa has undergone rapid structural changes in recent years, total hog numbers have increased from a decade ago. About 64,000 Iowa jobs are involved in various aspects of the industry ranging from input suppliers to producers, to processors and handlers as well as mainstreet businesses that benefit from purchases by people in these industries. Overall an estimated \$2.55 billion of personal income and \$4.1 billion of gross state product are supported by the hog industry based on 2007 levels of production and long run prices.

This report documents trends in Iowa pork production and examines the current structure of production, input purchasing and processing of the hog industry in the Iowa. The contribution of these activities to the overall economy in terms of employment, income, and value added will also be examined.

Hog Numbers

Despite major changes and restructuring in the pork industry it remains a major value-added agricultural enterprise in the Iowa. Inventories have varied cyclically over time but have trended upward from 15.1 million head in 2000 to 19.8 million head in December of 2008 (Figure 1). Significant economic losses in 1998-1999 and 2002-2003 caused a decline in inventories before rebounding due to favorable economic conditions in 2004-2007. Annual cash receipts from the sale of hogs were \$4.327 billion in 2007, the last year of available data. This figure was based on a pig crop of over 17.7 million born in the Iowa and inshipments from other states and Canada of 20.9 million feeder pigs. The continued growth of the Iowa inventory is feeding a growing pork export market.

Total hog marketings in the Iowa have increased in recent years but the number of farms raising hogs has continued to decline. Since 1999, the number of farms with hogs decreased from 14,500 to 8,500 farms (Figure 2). Meanwhile, the average inventory of hogs has increased from 1062 to 2,282 per farm. Figure 3 illustrates the structure of the Iowa inventory. Sixteen percent of the hogs are on farms with less than a 2,000 head inventory. Thirty percent of the inventory is on farms with 2,000 to 5,000 head, and 54 percent are on farms with more than 5,000 hogs.

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The prominence of the Iowa pork industry and its growth in the global pork export market is no accident. Competitive production of feed grains has supported a multibillion dollar livestock feeding industry in the Iowa. Since this paper is concerned with the impacts and resources used in pork production, the analysis focuses on the value of hogs produced in the Iowa as the critical measure that drives expenditure levels for various hog-related inputs and investments.

Economic Importance of the Iowa Pork Industry

The estimation procedure is based upon 2008 production levels, but prices of hogs and feed costs projected for the 2008-2017 time period by FAPRI. These prices are \$3.90/bu corn, \$235/T soybean meal and \$51/cwt live weight hogs prices. The model is based on the aggregate value of the pork industry at the farm level (Figure 1). In addition to these farm level effects, the backward and forward linkages generate significant additional impacts throughout the Iowa economy. The backward linkages include purchased inputs, supplies and services used by hog producers. The forward linkages include further value-added activities occurring after the farm gate such as meat preparation and processing. Total inputs, including labor, used by the Iowa hog industry are estimated based on aggregated cost of production budgets weighted according to the share of hog production occurring in different types and sizes of production systems.

Different budgets were developed for three production systems: farrow-to-finish, breed-to-wean, and wean-to-finish. The distribution of these systems is based on the relationship between pig crop, in-shipments and out-shipments of pigs reported by USDA and represents a state level measure rather than an average across all farms. Farrow-to-finish operations were further categorized by size because hog production is subject to economies of scale where per unit input use declines as hog operations increase in size. Accordingly, farrow-to-finish systems in the Iowa were classified into one of three size classes: small (150 sow), medium (300 sow) and large (1200 sow) sized farrow-to-finish production facilities. The share of Iowa' pork production estimated to be in each class of facility was based on the percent of inventory in three size groups reported in the USDA *Farms, Land in Farms, and Livestock Operations 2007 Summary*. The three size categories are: less than 2,000 head, 2,000 to 5,000 head, and more than 5,000 head. These percentages are reflected in Figure 3. The breed-to-wean and wean-to-finish systems were not divided by size, but the share of each is reported in Table 1 along with aggregate costs and returns.

The cost of production and input usage was then calculated for each size farrow-to-finish operation based on a set of cost of production budgets originally developed by Professor Chris Hurt of Purdue University (Hurt). These were modified as were the breed-to-wean and wean-to-finish systems to be based on Iowa State University Extension Estimated Livestock Returns. The weighted cost and returns of production and totals of feed use, other direct inputs, annual depreciation on capital investments, labor requirements and returns to management and capital are presented in Table 1 and summarized in Figure 4. These aggregates are also depicted schematically in Figure 5.

Estimating the labor component involved in hog production represents a special challenge. Government sources such as the USDA Hogs and Pigs report estimate that 8,500 farms are involved in hog production, although many of them operate at a scale too small to be counted as fulltime enterprises. Since we are most interested in measuring labor on a comparable per unit basis, a Full Time Equivalent (FTE) of 2,400 hours per year per worker was deemed to be the most appropriate measure of labor. This FTE standard was then applied to the total hog production in each size class in the state and then summed to arrive at a total labor requirement. The rate of labor required per 10,000 hogs raised in farrow-to-finish operations ranged from 5.0 for the small facilities to 3.0 for the medium-scale facilities to 2.88 for the large systems. Although an estimated 8,500 farms are reported to be involved in hog production in 2007, based on the FTE standard of these budgets, an estimated 6,131 workers are required to produce the current volume of hogs in the Iowa (Table 1). Although the FTE numbers are used in our economic impact reports, it is important to recognize the larger number of the Iowa farms involved in some level of pork production.

The lower level of the schematic in Figure 5 represents purchased cash inputs used by producers at the farm level. The prices and values in this section are intended to reflect long-run conditions in the industry and are consistent with projections made by The Food and Agricultural Policy Institute (FAPRI). The estimated total value of direct inputs used in hog production in the Iowa sum to \$2.285 billion. Additional costs for depreciation of fixed assets and facilities total an estimated \$548.3 million. Labor and management expenses add an additional \$200.6 million of costs for a total of \$3.034 billion of aggregate input costs used in hog production in the Iowa. The residual value between inputs and marketings is estimated to total \$108.9 million and can be described as returns to capital.

The largest single category of expenditure is feed costs. With 32.08 million head produced annually, 291.6 million bushels of corn valued at \$1.134 billion are used in the Iowa. Feed supplements and additives represent another \$811.9 million of purchased inputs from suppliers in the Iowa. The use of this scale of feed supplements helps support soybean prices, the soybean processing industry, local elevators and transportation services based in rural areas.

In addition to the backward linkage effects of purchased inputs by pork producers, forward linkages can be traced to the slaughter and processing level for impact on the state's economy. Based on estimates of inter-industry flows used in the state Input-Output model, the cost of live animals represents about 50 percent of the total value of the pork at the slaughtering level and a smaller share at the processor's product. The remaining margin is for other inputs including labor, proprietor's income, and return on investment.

Export Impact

The final demand uses of processed hog products are an estimated 1.6 billion pounds going into foreign markets, a substantial increase in recent years, and 6.46 billion pounds into domestic markets. These estimates are based on prorating the Iowa' production proportionally to total end uses and in 2008, 20 percent of US pork production was exported. Using this export share of 20 percent implies that a comparable share of the economic impacts, or 12,680 jobs and \$511 million of personal income in Iowa result from the exporting pork products to foreign markets.

Impacts to the General Economy

These estimates for the various dimensions of the Iowa pork industry at the producer and processor level represent the direct component of the industry. Production inputs represent the indirect effects. In addition to the direct economic effects and input purchases resulting from pork production, processing and input supply activities, income earned in these agriculturally-related components of the pork industry is spent in the rest of the economy. These expenditures stimulate a wide range of sectors, including consumer-related businesses in urban areas. To identify and estimate these multiplier effects, an Input-Output (IO) model is configured for the Iowa and used in this portion of the study (Lindall and Olson). The I-O model used is based on the IMPLAN system developed initially by the U.S. Forest Service. An I-O model is basically a general accounting system of the transactions taking place between industries, businesses and consumers in an economy. These purchases and sales are then summed to arrive at estimates of total impacts arising from the direct effects of a policy change or scenario.

The basic scenario in this analysis looks at the overall importance and contribution of the pork industry to the Iowa economy based on the 2007 situation and current levels of production in the Iowa pork industry. This perspective is similar to asking what would be the impact of removing the industry from the state's economy. As a result, the full set of linkages of hog production to feed grain production and processing are included as part of the total impacts.

The results of the I-O analysis are presented in Table 2 with estimates of total output, personal income, value-added, and employment presented at a ten-sector level of detail. The table for this baseline scenario presents estimates of the farm level employment and income effects separate from the rest of agriculture while the hog slaughtering and processing effects are included in the manufacturing sector. The key indicators of economic activity reported include total industry output, total income, value-added, and employment.

Total industry output measures total dollars of goods and services produced by an industry, including government and non-government activity. The estimated \$4.3 billion of gross output, from pork production activity is linked directly into the state's hog slaughtering and processing sectors. The total sales from the pork production and

processing sectors support additional input purchases, spending on transportation and other services, as well as the consumer-related purchases worth \$16.1 billion of direct and indirect sales throughout the Iowa economy. This output, or gross sales number should be used with caution because the value of the hog is counted twice at the farm level and as part of the total value of pork products when it is sold from the processor. While much of the impacts are concentrated in the agricultural and input-supply sectors, economic linkages beyond the farm gate capture additional activities such as transportation, handling, processing and the personal consumer spending effects. As a result, the effects of the pork industry are distributed throughout the economy, including the services and trade sectors.

Total personal income is a composite of wage and salary income and return to proprietors. This more comprehensive measure of income is chosen because most farm income is reported as proprietor income. The estimate of \$340.3 million of direct income to pork producers is linked to an additional \$2.2 billion of income throughout the Iowa economy, including the pork-processing sector, for a total impact of \$2.55 billion of personal income. A sizeable portion is in the meat processing sector within manufacturing. Again the service and retailing sectors receive strong stimulus from the initial effect of income earned in the pork sector.

Total value added measures the total gain in economic activity to the economy resulting from production of goods or services. Wages, salaries, taxes, and profits are included in the value-added measure. The value-added measure is a good indicator of net economic activity as only the net incremental value is summed at each transaction to avoid the double counting issue that occurs when using the total industrial output measure. The estimated \$477 million of value added for pork production is linked to \$3.62 billion of additional indirect and induced value-added activity in the state's economy for a total value added of \$4.1 billion.

Employment is based on a per job unit consistent with the definitions used by the U.S. Commerce Department. The employment levels are likely to be nearly fulltime equivalents for the manufacturing and production-oriented jobs. Retail and service sector positions tend to involve many part-time positions. The 6,131 direct jobs in pork producing activities involve farm workers as well as farm proprietors and can be interpreted as fulltime equivalent positions. This number is consistent with the budget estimates developed by Professor Hurt for representative hog enterprises and is aggregated to the total number of hours needed to produce the 32.08 million hogs marketed last year in Iowa. As indicated in Table 2, these 6,131 direct jobs at the farm level along with the 17,500 at the slaughter and processing level generate a chain of economic activity that supports an additional 39,700 jobs throughout the rest of the economy. The distribution of impacts is similar to the pattern for the other indicators in that effects are present in all sectors. The service sector provided the largest number of secondary jobs followed by Finance, Insurance and Real Estate and Retailing (F.I.R.E.). The higher number of jobs in services combined with the lower levels of income suggests that many of these jobs are less than full time.

The impacts to the manufacturing sector in this inclusive scenario include an estimated 17,500 employees in the Iowa hog processing and prepared meats sectors. The direct employment estimates for hog processing in the I-O model are consistent with secondary sources such as County Business Patterns after adjusting for the greater number of hogs slaughtered in the Iowa and the fact that hog slaughtering and processing is more labor intensive than beef-slaughtering activities. An estimated \$507 million of wage and salary income is paid to workers in these sectors. Since hog processing and slaughtering facilities tend to be located near the source of raw materials, this stage of the pork industry has the additional benefit of providing needed jobs in rural labor markets.

Emerging Issues Facing Pork Industry

The pork industry faces significant challenges in the coming years as it works to capture opportunities of increased consumer expectations and an expanding export market for US pork. Perhaps the largest change is the rapid growth of corn-based ethanol production. This new demand for corn is resulting in higher corn prices and higher cost of producing pork. Corn is the largest single cost item in hog production making up nearly one-third of the total cost. Ethanol demand for corn will result in higher cost of pork production and ultimately higher pork prices at the retail counter. Consumers are expected to consume less pork at higher prices leading to a smaller pork sector, all else equal.

Pork producers are evaluating their options in the new bioeconomy. Many farmers raise corn and hogs and may choose to sell corn for ethanol production rather than raising hogs. At the same time the higher energy prices that helped fuel ethanol production is also resulting in higher fertilizer prices making the nutrients in hog manure more valuable to crop producers. Individual farmers sorting out the economics of higher corn and energy prices will move the pork industry to a new equilibrium level of production and prices. The resulting balance between ethanol and pork production will also impact rural communities as there is more labor used to produce hogs than there is ethanol from the same bushel of corn.

The trend to fewer and larger operations continues in agriculture. While size is not the sole determinant of efficiency, issues of pecuniary economics such as volume purchasing and sales, etc., become important. Producers of all sizes are asking if they are large enough. The industry needs to not lose sight of the key success item that of effective management. Regardless of the size or ownership of the enterprise hog and pork production does create economic activity in the state and community where is located. If the firm is not locally owned the profits may not remain in the community. However, major inputs (feed, labor, utilities, trucking, services, property taxes, etc.) will still be provided locally or within the region (Figure 4). Because hog production units are larger on average and more specialized than in the past, total economic activity may be more stable or increase for regions that have production units. Other regions that are losing share of production will lose economic activity.

The changes in pork industry have been and will continue to be driven by emerging technology, markets, information, and skills of producers. Pork producers must secure access to technology and information to be successful in the future. They also need to be on the forefront in identification of new markets and be positioned to produce products for these markets. Effective marketing, financial management, risk management, etc. are becoming necessary ingredients to industry survival.

The environmental impact of pork production continues to be an issue that is not independent of the economic impact of the industry. Because of differences in climate and cropping patterns, uniform federal environmental standards may have differing regional impacts on hog production. In addition, state and county environmental and zoning regulations can greatly alter the competitive position of the local pork industry. Pork producers will need to have environmentally-sound facilities and management practices and be good neighbors in order to remain sustainable. Cost-benefit analysis to evaluate the tradeoffs between restrictions, regulations, or incentives to alter production practices and the competitiveness of individual firms will be important.

Efficient pork producers with well-managed operations will continue to be competitive and survive. Successful swine enterprises in the future will need access to markets, technology, and information. Managers must have the ability to develop and implement effective profitable business plans and analyze ongoing information to determine if the operation is on the chosen path. Sustainable systems are needed. These would be systems that are profitable, environmentally friendly, socially acceptable, and produce products demanded by consumers.

References

Hurt, Chris, Purdue Cooperative Extension Service, Positioning Your Pork Operation for the 21st Century, ID210, 1995.

Lindall, Scott and Doug Olson (2007), Micro IMPLAN Professional 2.0, Database Documentation, Minnesota IMPLAN Group.

Table 1. Cost of Production and Returns Associated with Producing 32.08 Million Hogs in Iowa

	Price	State Total
REVENUE*	\$51.00	\$3,143,164,412
COST		
Corn (\$/bu)	\$3.90	1,137,312,892
Soybean Meal (\$/ton)	\$235.00	478,854,078
Other Feed (\$/cwt)	\$36.00	<u>333,053,534</u>
TOTAL FEED		1,949,220,505
Other Direct cost		<u>336,124,046</u>
TOTAL DIRECT		2,285,344,551
Equipment		221,000,068
Building		225,360,330
Land and Other		101,967,926
Labor and Management		<u>200,556,336</u>
TOTAL INDIRECT		<u>748,884,660</u>
TOTAL COST		3,034,229,211
RETURN TO CAPITAL		108,935,201

ESTIMATED AGGREGATED PRODUCTION SYSTEM

Farrow-to-Finish	Breed-Wean	Wean-Finish
30%	16%	54%

INPUT SUMMARY

Corn	bu	291,618,690
Soy Meal	tons	2,037,677
Other Feed	cwt	9,251,487
Labor & Mgt per Hog	\$/head	\$6.25
Total Labor (FTE)	FTE	6,131

*Revenue excludes the value of pigs purchased from out of state.

Table 2. Economic Value of the Iowa Pork Industry, 2008.

	Total Sales (\$)	Labor Income (\$)	Value added (\$)	Jobs
Hog production	4,327,281,000	340,298,200	477,243,700	6,131
Rest of Agriculture	415,903,896	142,611,592	230,575,372	3,195
Construction	195,770,096	50,851,724	131,633,928	770
Manufacturing	7,617,607,680	819,859,840	1,157,727,616	18,578
Tran.Utilities	439,626,880	170,957,280	228,230,016	3,923
Trade	865,291,456	331,182,368	575,500,544	8,482
Fin.Ins.R.Estate	692,448,960	177,650,944	420,489,472	4,582
Prof. Services	917,340,096	377,933,024	473,235,168	10,151
Other Services	556,231,168	123,706,920	354,488,192	7,231
Government	80,413,904	19,080,222	34,816,804	353
Total	16,107,915,136	2,554,132,114	4,083,940,812	63,395

Source: IMPLAN Model for Iowa

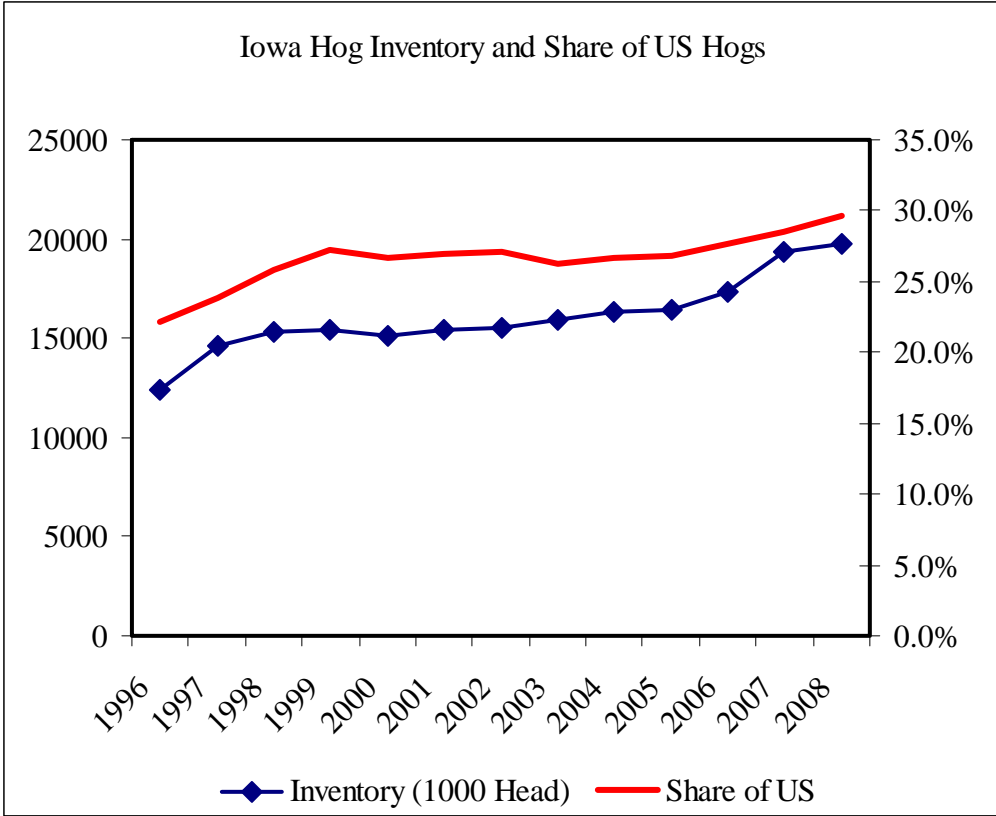


Figure 1

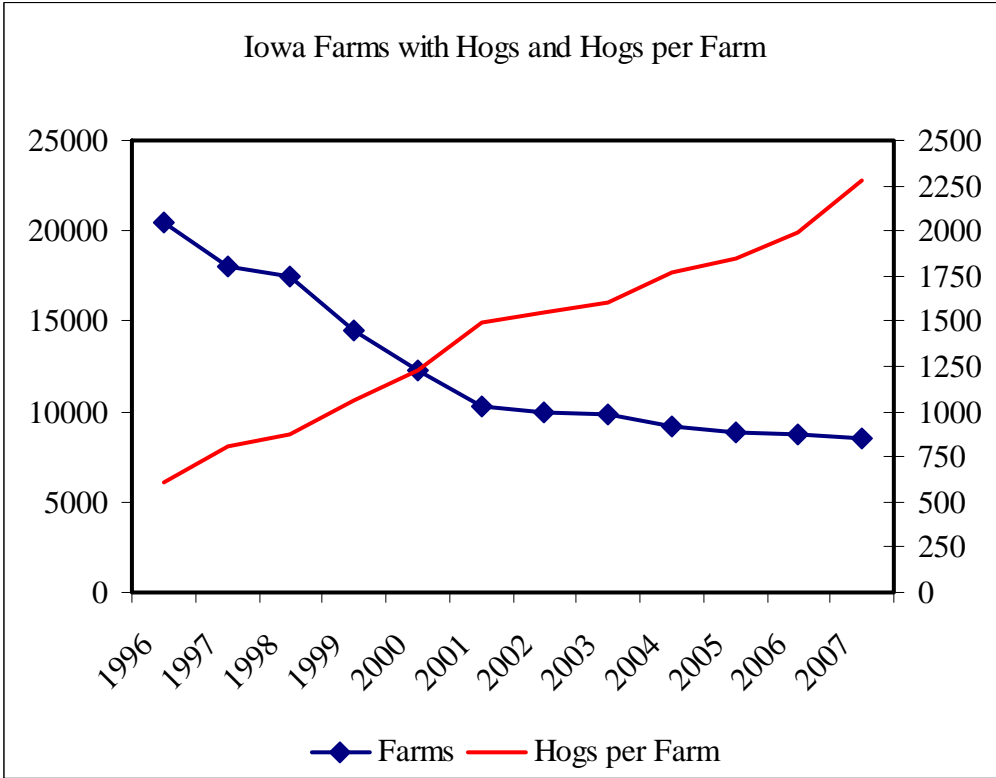


Figure 2

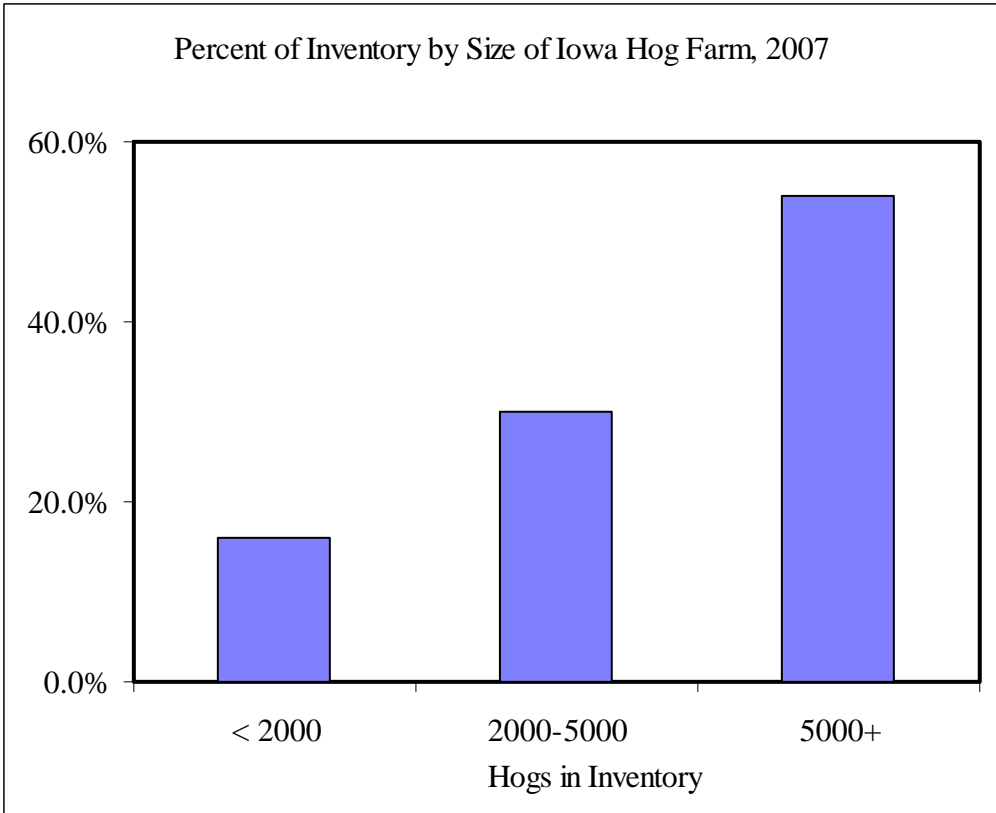


Figure 3

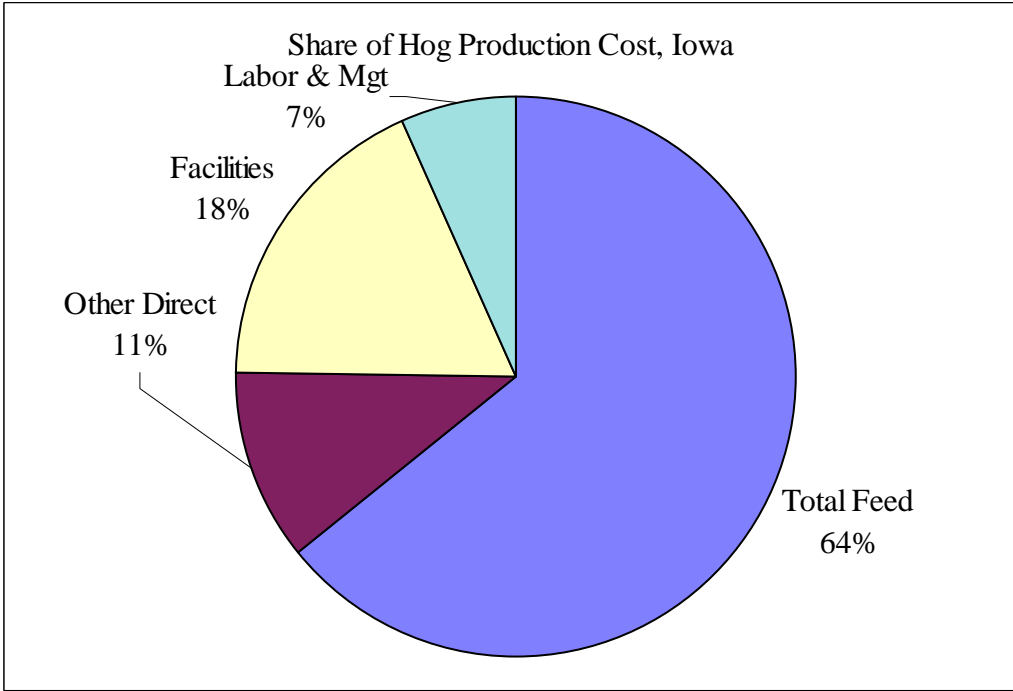


Figure 4

Pork Sector - Iowa 2007 Production Year

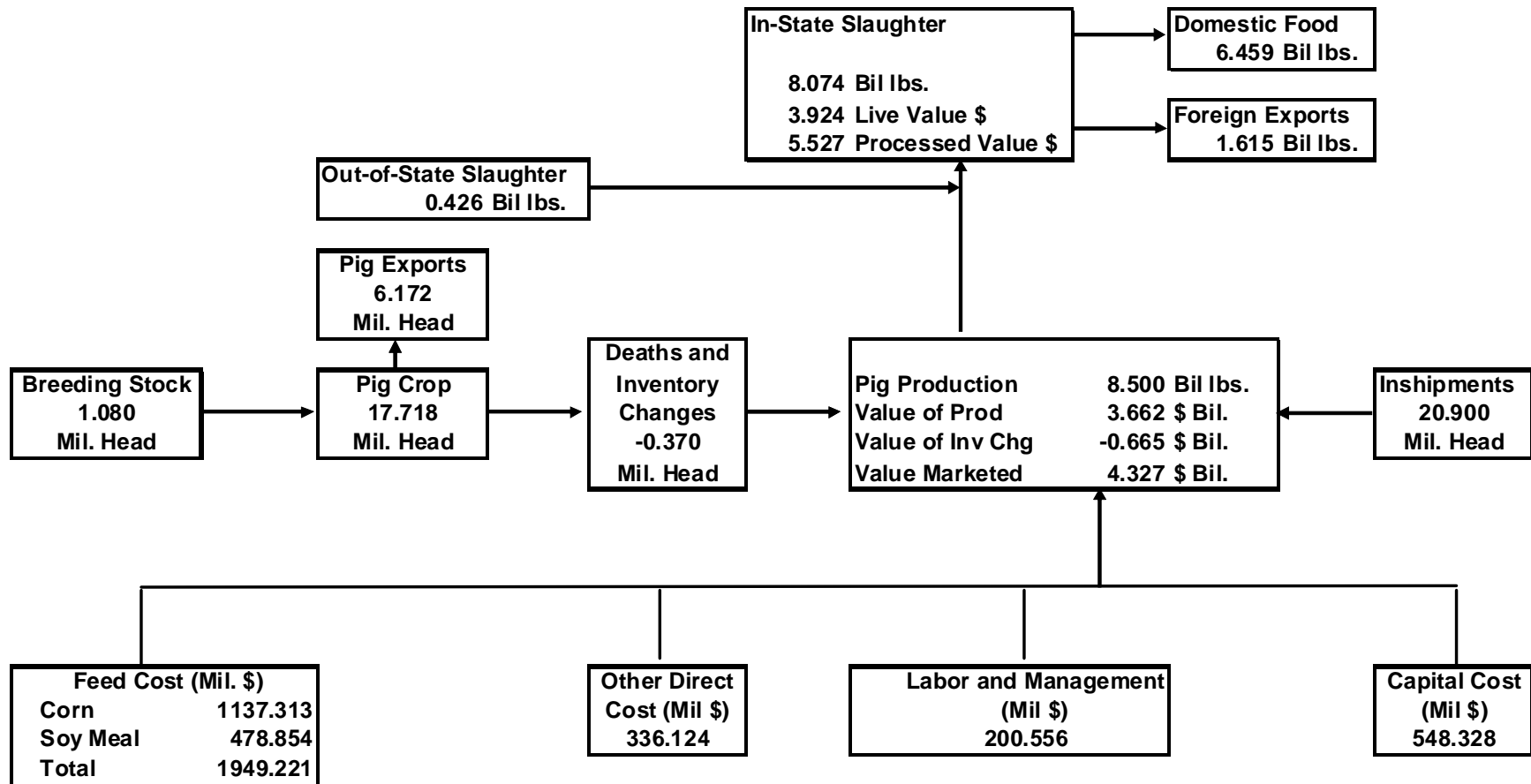


Figure 5