

제2발표논문(영어본)

Organic Swine Production and Marketing in the Central United States

- Present Situation and Farm Level Decision Factors -

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ABSTRACT

A major challenge in the transition from conventional to organic production in a grain intensive region such as the Corn Belt region of the U.S.A. is how to profitably select and manage a crop rotation. The opportunity cost of forgoing grain production for forage and green manure crops is significant. Many organic researchers and writers emphasize the need to bring an animal enterprise into the farming system for diversification and enhanced labor utilization. Livestock also add value to grain and forage crops to offset decreased grain production and can recapture nutrients used in crop production that can be recycled through manure. In grain intensive regions, organic farmers should consider swine production as a natural fit for the farming system. Swine are very efficient and adaptable animals that can add value to both grain and forage crops.

While somewhat lacking, there is a reasonable body of literature on organic and sustainable swine production. However, there is relatively little specific information available to organic farmers to assist in the initial decision to enter organic swine production and to evaluate marketing alternatives. The primary focus of this paper is to give some background on organic animal production(emphasis on swine) in the Central United States and outline production and marketing decisions and considerations, relative to market trends, demographics and standards(U.S.). At the farm level, decisions must be made regarding resources, such as land, labor, financial and social capital, all relative to opportunities, all in the context of the standards and market

forces beyond the farm. At the personal level the farmer must also make decisions about convictions regarding organic or environmentally friendly agriculture, willingness to change, impacts on lifestyle and family, and the transition to organic methods within the planning horizon of the farmer and the family business.

I . Introduction

Organic agriculture in the U.S. is still in its infancy, but is showing signs of rapid growth in recent years. A market study by Emerich (1995) is often cited, reporting that the organic food industry in the U.S. has gone more than 20% per year starting in the late 1980s. This statistic, like many, can be somewhat misleading. The growth in organics varies greatly between farming enterprises. In fact, growth in some organic enterprises has been negative over recent periods. Furthermore, slower growth in higher value crops may be of greater economic significance than faster growth in lower value enterprises. Some organic markets, such as fruits and vegetables, have been developing for decades, while small market, recently emerging organic enterprises may expand rapidly but for only a short period into the future.

Organic meat animal production has been quite slow to develop in the U.S., certainly well below the often-cited U.S. organic industry growth rate. The lack of growth in this sector appears to due to a number of factors. Understanding the development pattern in U.S. organic meat animal production is critical for existing and potential organic crop and livestock producers, organic processors and retailers in the U.S. Background on the factors driving the development or lack of development in the U.S. organic meat sector should also be of value to farmers, processors, retailers, policy makers and researchers in other countries as well, particularly outside of Europe where organic growth and development is at similar stages as that in the U.S.

II . Organic Animal Production

Organic livestock production, according to many authors, is a natural fit in the organic farming system. As stated by Honeyman(1991): The advantages of crop-livestock farming include: year-round employment for the farmer; diversification and

integration of crop and livestock production ; value-added livestock as the farms major output ; and nutrient cycling through manuring. Livestock production is the classic complement to feed-grain production, forming the traditional mixed farming cycle (Figure 1). Organic crop farmers must typically use multiple crop rotations of grains, legumes and forage crops to maintain soil fertility and manage pests and weeds. In many respects livestock would seem a natural fit for Central U.S. organic farming systems. In the Central U.S., corn and soybeans are the predominate crops, which are also the primary components in the diets of millions of conventionally produced swine in the region. Furthermore farms in the region typically have a combination of cropland and pasture land. Livestock production would be a logical approach to space and forage utilization of these non-crop acres.

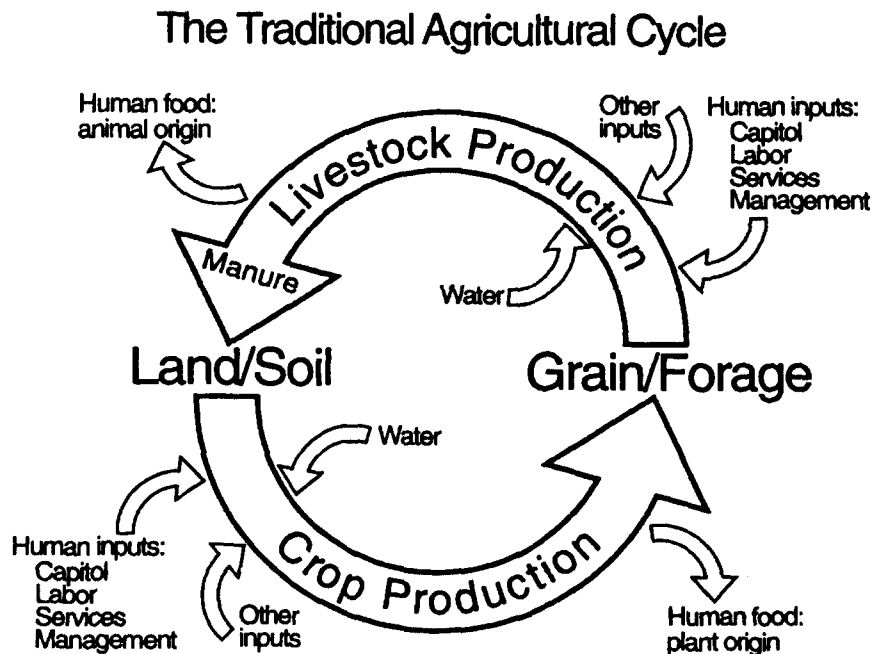


Figure 1.(Honeyman)

From a marketing perspective, organic pork production would seem to offer strong possibilities. In a study by Kinsey, Senauer, and Jonk(1993), 11 percent of consumers were concerned about chemicals in meats and only 19 percent reported being concerned

with prices. Misra, Grotegut, and Clem(1997) found that 67.4 percent of consumers expressed extreme concern with the presence of pesticides and chemicals in conventionally produced pork and over 60 percent were extremely concerned with the presence of synthetic hormones in pork.

Govindasamy, Italia, and Liptak(1999) found that 71 percent of consumers were somewhat or very interested in buying environmentally friendly foods. Using experimental auctions, Kliebenstien and Hurly(1999) found that the most environmentally friendly produced pork chops sold for a 22% premium over then current prices for conventionally produced prok chops.

In reality however, there has been very little organic hog production in the U.S. in total and according to United States Department of Agriculture(USDA) statistics, in 1997, there was no reported organic swine production in the Central U.S. The first section of this paper attempts to identify factors contributing to the slow development in organic swine production in the U.S. While development has been slow, there has been increased interest in organic pork production as a number of organic meat firms and restaurant chains have recently begun marketing organic pork. The last section addresses four primary considerations in the decision to produce organic swine.

III. Slow Development in Organic Meat

Table 1 provides the most recently available statistics on organic crop, pasture and livestock production. Cropland and pasture acres have shown tremendous growth in recent years, however the percent of the total crop acres in the U.S. that are certified organic is still well under one percent. Change in organic animal production is perhaps most interesting topic in the evolution of U.S. organic agriculture. There has been extraordinary growth in organic dairy and egg production, while meat animal production fell from 1992 to 1997. Considering that there are approximately 100 million head of swine produced conventionally each year in the U.S., the number of certified organic swine in the country was effectively zero in 1997.

Perhaps the factor easiest to identify as contributing to the slow development of organic meat animal production in the U.S. has been the prohibition of labeling red meat and poultry meat as organic until February 1999. Thus over the period of the statistics, there was considerable uncertainty on the part of producers, processors and

retailers as to how the final regulations would unfold. Without the ability to label meat as organic, processors and retailers were likely uncertain as to their ability to fully capture premium prices that organic food consumers might be willing to pay. Producers would be unlikely to undergo the process of certification without detailed knowledge of what would be required to meet organic labeling requirements. Meat labeling policy is under the jurisdiction of the United States Department of Agriculture, while non-meat animal foods(dairy & eggs) are regulated by the U.S. Food and Drug Administration. This latter point is noteworthy as over the same period that organic certification of meat animals was declining, organic dairy and egg production increased markedly in the absence labeling restrictions.

There also continues to be considerable uncertainty with regard to standards in the environmental and animal welfare area. Animal space requirements, housing and handling practices have not been clearly defined in the U.S. The environmental protection laws in the U.S. are also undergoing significant changes. While environmental rules currently only effect the largest swine farms, movements to protect surface water quality near all livestock production facilities are almost certainly causing farmers to be unsure of regulatory compliance issues under all production systems.

The trends in the overall evolution of food supply chains in the U.S. would appear to be incompatible with fragmented efforts to establish independent organic producers. The retail food sector, while less concentrated than in many other countries, is rapidly consolidating. In response, the food processors industry is consolidating as well. The overall trend is for larger processors and retailers seek lower transaction costs by having fewer supplier relationships. This facilitates high volume transactions with very strict quality and or consistency standards. It seems that over the last decade, the food supply chain model and the organic production model has greatly diverged. In the absence of the decision of a national retailer to pursue organic meat sales, the inability to access this food system, has and will continue to hinder the development of the organic meat production industry.

Government intervention in the organic industry has also been a factor in the slow development of the entire U.S. organic industry. To date the primary role of the federal government has been focused on developing organic standards. This contrasts with many countries in the Europe where governments have actively encouraged farmers to adopt organic practices and provide certification services and income support during the transition period. Some state governments in the U.S. have taken a more aggressive

approach by offering organic certification services. However, these efforts have been predominately in crop certification. In 1997 only four states offered organic livestock certification and less than half of private certifying firms offered organic livestock certification.

Government intervention in conventional grain farming is also likely to have a negative impact on growth in the organic swine industry. For many corn and soybean farmers, the opportunity cost of switching to organic production is high in light of the yield based subsidies and marketing loans that would be lost in the conversion to organic production. The low level of organic feed grains to feed to meat animals has consequently not grown to the degree it might have in the absence of production based income support payments. The lower supply of organic grain would increase the cost of feed, thus lowering the profitability of organic production.

Another factor that may impact the development of organic swine production in the U.S. is the dramatic decline in the number of farms in the U.S. with swine production as an enterprise. According to the U.S. Census of Agriculture, there were approximately 2.09 million farms in 1987 with approximately 243,000 farms having swine production. In 1997, there were 1.91 million farms but only 110,000 had swine production. Thus while the number of farms decreased by approximately 8.5%, the number of swine farms decreased by more than 55%. It is likely that the smallest swine farms could most easily make a transition to organic production as they likely have a lower investment in conventional facilities and would already have a grain-livestock farming system. However, small scale swine producers have been exiting production even faster than swine farmers in general. In 1997, farms marketing less than 1,000 animals per year, produced only 5 percent of all swine marketed, down from 32 percent in 1988, a decrease in market share of almost 85 percent. The trend increasing specialization and scale and the exit of small-scale swine producers has greatly decreased the level of animal husbandry expertise in the U.S. farming sector.

It is also likely that consolidation and the pursuit of economies of scale in the food processing industry in the U.S. has also been a limiting factor for organic swine production. In the U.S. six firms slaughter nearly 80% of the swine produced annually. Most of the swine slaughter capacity in the U.S. is made of a small number of very large slaughter plants where hundreds of animals are process per hour. These large scale facilities can not run at peak efficiency if production lines are stopped or slowed in order to segregate and process small numbers of organic animals.

Table 1. U.S. certified organic farmland acreage and livestock numbers, 1992~97

ITEM	1992	1993	1994	1995	1996	1997	Change	
							1992~97	1995~97
Hectares							Percent	
U.S. certified farmland :								
Total	378,577	386,752	401,241	371,472		544,952	44	47
Pasture/range land	215,321	198,647	175,924	113,071		200,887	-7	78
Cropland	163,256	188,105	225,317	258,401		344,065	111	33
Number							Percent	
U.S. certified animals :								
Beef cows	6,796	9,222	3,300			4,429	-35	
Milk cows	2,265	2,846	6,100			12,897	469	
Hogs&pigs	1,365	1,499	2,100			482	-65	
Sheep and Lambs	1,221	1,186	1,600			705	-42	
Layer hens	43,981	20,625	47,700			537,826	1,123	
Broilers	17,382	26,331	110,500			38,285	120	
Unclassified/other	-	-	- i ©			226,105	- i ©	
Number							Percent	
Certified Growers	3,587	3,536	4,060	4,856	-	5,021	40	3
Total certified growers	3,587	3,536	4,060	4,856		5,021	40	3

Numbers may not add due to rounding.

Sources : 1992~94, Agricultural Marketing Service, USDA ; 1995(including revisions of 1992~94 farmland), Agrisystems International ; 1997, Economic Research Service, USDA.

IV. Farm Level Decision Factors

The decision to start an Organic livestock enterprise involves many considerations. The following sections will identify and address some areas requiring critical understanding and decisions. The discussion is not exhaustive but is meant to identify areas for research and analysis at the farm level and at the national level.

There are many factors that should influence a farmers decision as to whether or not organic production is a viable alternative for their situation. The following are critical for the decision process related to organic production.

1. A complete understanding of applicable organic standards.
2. Thorough evaluation of marketing alternatives
3. Assessment of personal and cooperative resources.
4. A feasible production system plan.

1. Organic Standards

The first step in the organic decision process is a thorough understanding of national and international organic standards. These rules define what is organic pork and serve as the rules of the game in production and marketing. Not understanding the standards could lead to significant mistakes in the decision process.

Knowing what is required to gain the organic certification will be critical for determining if the production process is feasible on your farm. The standards will be the major determinate of how animals are fed, housed, handled, treated for health problems and how end product meat is labeled.

Lance Gegner of the U.S. National Center for Appropriate Technology which operates the Appropriate Technology Transfer for Rural Areas program(www.attra.org) has recently published useful guide on organic pork production. Gegner has excerpted a number of provisions from the recent organic standards released by the U.S. Department of Agriculture which can be viewed in their entirety at

[http : //www.ams.usda.gov/nop/nop2000/nop2/finalrulepages/finalrulemap.htm](http://www.ams.usda.gov/nop/nop2000/nop2/finalrulepages/finalrulemap.htm)

Among other rules, the following is a sample from the emerging organic U.S. standards :

1) 205.238 Livestock health care practice standard.

- (3) Establishment of appropriate housing, pasture conditions, and sanitation practices to minimize the occurrence and spread of diseases and parasites
- (4) Provision of conditions which allow exercise, freedom of movement, and reduction of stress appropriate to the species :

2) 205.239 Livestock living conditions.

- (a) The producer of an organic livestock operation must establish and maintain livestock living conditions which accommodate the health and natural behavior of animals, including :
 - (1) Access to the outdoors, shade, shelter, exercise areas, fresh air, and direct sunlight suitable to species, its stage of production, the climate, and the environment ;
 - (4) Shelter designed to allow for :

- (i) Natural maintenance, comfort behaviors, and opportunity to exercise ;
 - (ii) Temperature level, ventilation, and air circulation suitable to the species ; and
 - (iii) Reduction of potential for livestock injury ;
- (b) The producer of an organic livestock operation may provide temporary confinement for an animal because of :
- (1) Inclement weather ;
 - (2) The animal's stage of production ;
 - (3) Conditions under which the health, safety, or well being of the animals could be jeopardized ; or
 - (4) Risk to soil or water quality.
- (c) The producer of an organic livestock operation must manage manure in a manner that does not contribute to contamination of crops, soil, or water by nutrients, heavy metals, or pathogenic organisms and optimizes recycling of nutrients.

The pertinent organic standards also dictate the types of feed that can be fed to breeding and slaughter livestock. For example, in the U.S., 95% of the feedstuffs used must be certified organic. With this in mind, the farmer must then make the decisions regarding what feed sources can be grown on the farm or purchased from another organic farmer. Most organic standards for swine require that animals have bedding or litter for rooting and nesting, as hogs will eat such materials, the bedding may also need to be of organic origin.

The option to produce feed on farm will require completion of the organic certification process. This process typically takes two to three years with certification and inspection fees. For example, the Organic Crop Improvement Association(OCIA)(www.ocia.org) requires that a field or pasture may be certified organic if there has been no use of unacceptable materials(as defined by these standards) for 36 months prior to the first certifiable harvest and this is documented and can be verified. The OCIA certification process is not unlike most internationally recognized certifying entities. The certification process must be understood as it will obviously have a significant impact on the decision to produce organically and how the transition will be managed.

When evaluating organic production, farmers must form expectations of both near term and long-term feasibility. Organic standards, while serving as assurance to

consumers, also act as barriers to entry to other farmers. Some farmers will not want to incur expenses and forgo the income likely to be lost during the certification process. Strict standards are more difficult to meet and those farmers willing and able to meet the requirements may enjoy higher profits for a longer time. Others will not be confident they can manage the challenges with crop rotations, pests or weeds without chemical inputs and not enter organic production. If standards are relatively easy to meet, and demand is not increasing enough, more farmers will enter the business of organic production and premiums and thus profitability of organic production would likely fall quickly. The extent that standards will serve as barriers to entry to other producers is also affected by the monitoring and enforcement mechanisms for organic standards. Farmers should gain an appreciation for the likelihood that unscrupulous farmers may cheat, resulting in increased supply and lower prices.

Another important reason to thoroughly understand the local, national and international standards is that is critical for understanding and researching market opportunities. Exporting may require different or additional certification and expenses.

2. Marketing Alternatives

With a good understanding of the applicable organic standards, farmers should then determine if they can sell what they might produce organically. The question often arises whether production decisions or marketing decisions should be the first focus. Farmers should first focus on the general production and marketing possibilities. What do university or organic producer networks estimate as the cost of production? For example, in the U.S., estimates of organic swine production costs range from 23 cents to 28 cents per kilogram live weight as compared to perhaps 15 cents to 18 cents per kilogram for conventionally produced swine. At the same time farmers can quickly identify marketing options. Is there a local or regional buyer of live organically produced animals? Is there a local meat market that might buy carcasses if slaughter can be arranged? Is there an opportunity to market directly to consumers? If there are established channels for live animals or carcasses, estimates of break-even production costs can be compared to market prices.

The absence of an established, efficient market channel for live animals or carcasses will likely indicate that the farmer will need to sell directly to consumers. Direct marketing involves arranging for the slaughter and processing and delivering to local consumers or shipping frozen meat via a rapid parcel carrier. Clearly in many economies

this will simply not work. In the U.S. many consumers have some amount of frozen food storage space. In countries where consumers buy meat for a meal or two at a time, the transaction costs of this type of marketing would likely be too high, unless the family farm had significant excess labor. This strategy is not feasible for many farmers who might be good farm managers but not good marketers or do not enjoy dealing with customers on a daily basis. Marketing can be a significant distraction from the management of the farm

In the U.S. a small but growing number of farmers are direct marketing to consumers. The challenges of this strategy are many. One of the biggest challenges these farmers face is that this type of enterprise is not very scalable. On the sales side, getting beyond the most local market can be a major obstacle for growth. On the processing side, local slaughter, processing and packaging facilities are often unable to handle growth in volume. Large-scale processing facilities are not interested in a relatively small volume such efforts generate. A second issue many direct marketers often face in the U.S. is that higher income consumers are most likely to purchase organic meat, and typically these consumers prefer the best cuts of meat(e.g. loin). This often results in a surplus of lower value cuts(e.g. shoulder) or cuts that are traditionally purchased in a further processed form(e.g. ham and bacon). Direct marketers are then faced with trying to price the best cuts high enough to compensate for the difficulties related to selling the lower value or processed cuts. A transition or entry into organic production while also needing to simultaneously create demand is a higher risk approach.

It is also important for farmers to verify that their local market, where they may have an affinity with customers, truly resembles the consumer subjects of university or private market research. Personally conducting the most basic local market research or working with university or private researchers will be time and money well spent. Often national research appears very promising. Given this type of research, farmers must do their best to determine if their local market demographic is similar. If the local market is similar, then some level of local marketing should be explored. If the local market is different, for example because of age, household income, ethnic differences, some regional or national marketing channel will be required.

3. Assessment of Resources

The process of identifying resources involves more than the obvious concern with

financial resources. The resource evaluation should also include an honest assessment managerial ability, labor availability of both the farmer and hired labor, land, livestock and equipment. Another set of resources to consider is often referred to as social capital which includes relationships with buyers, retailers, other organic farmers and free and paid consultants such as university extension personnel.

Financial capital is perhaps the easiest to measure in such an exercise. Farmers must know exactly what is available from savings to cover possible decreases in income during the certification or transition period. The sensitivity of cash flow from other operations or employment in light of time and labor demands from any new ventures should be analyzed. It is likely that while new expenses will arise from the transition to organic production, other expenses will likely fall as less chemical and inorganic inputs are purchased. Farmers should not assume that credit will be available for the organic enterprise as many agricultural lenders are not comfortable with the real or perceived risk of the unproven enterprise.

Land and equipment currently owned may dictate what is the most likely production strategy. The best plan may call for a different line of equipment but a more feasible approach might be to develop a second best plan around existing assets. The type of land owned and rented will dictate what crops and livestock systems are feasible.

Organic farmers should explore ways to cooperate in terms of minimizing capital expenditures through machinery sharing or cooperative processing and storage.

Managerial capability is a resource that many farmers may feel is lacking if the shift to organic practices is a major departure from their current operation. If there are government or university training or extension programs available, this may be a cost effective way to build management expertise. Again, this is an area where cooperative efforts may be very economical, if a group of farmers worked together to hire a temporary or retained consultant.

Social capital could be the most important resource requirement in a move to an organic enterprise. There are obvious relationships that could be invaluable to a new organic farmer, such as people, groups or firms that have or control market access. Farmer networks can be a productive approach to increase the speed of learning new practices and help avoid making mistakes that other farmers have already made. An example of farmer networking is Practical Farmers of Iowa (<http://www.pfi.iastate.edu/>). This group works together on sharing individual knowledge and skills, conducts on farm research and develops educational activities and information exchange.

4. Feasible Production System

At the most basic level, a feasible production system will be determined by the exact enterprise choice, such as farrowing, finishing or farrow-to-finish swine enterprise. A second major determinate will be the organic standards under which production will occur. The extent of organic crop operations on the farm will also affect the system choice. The climate, topography and geology of the farm location will also impact the production system, as will local environmental regulations. Finally, the production and farming system will be greatly shaped by the resource constraints faced by the farmer. In short, it is very difficult to generalize about production or farming systems that would be feasible over a wide range of conditions, however this section will discuss some of the most important consideration.

Facilities and equipment decisions are perhaps the most expensive and least reversible decision related to a production system. As much as possible capital expenditure on items such as permanent pens, housing, feeding and manure handling structures or equipment represent decisions that must be right the first time.

Clearly, as mentioned above, farmers must thoroughly understand the organic standards under which they will operate. For example, some organic buyers and certification entities require conformance with the American Humane Association(AHA) Welfare Standards for Pigs(www.freefarmed.org). The AHA standards prohibit conventional farrowing crates and require that sows be farrowed in an environment that is bedded and allows the sow to turn around. Farrowing pens must be at least 1.52 X 2.13 meters. Turn-around crates and outdoor pasture farrowing huts are acceptable. The USDA organic rules do not stipulate space requirements and thus there will be uncertainty surrounding housing decisions for the foreseeable future.

Another major consideration is environmental regulation. This area of concern in the U.S. is a major source of uncertainty.

Currently, the most strict regulations do not apply to small producers. However, regulations requiring manure management will eventually affect all producers as it is anticipated that all animal feeding operations will be required to file documentation with regulators as to why the operation is not subject to manure management regulations. Outdoor pens of any size where animals are allowed to denude the ground of vegetative cover are likely to be of concern to environmental regulators as a threat to surface water quality. Some organic certification entities require that animals have access to the outdoors. Exposed pens, will again require runoff consideration and management.

A common facility in European organic production consists of deep-straw bedding (approximately $\frac{1}{3}$ to $\frac{1}{2}$ meters deep) often in hoop structures (see www.attra.org/attra-pub/hooped.html) which can be modified inside for farrowing, nursery or finishing activities. Straw bedding is cleaned out between groups of animals then composted before application to fields. There is considerable information on environmentally friendly production systems, including a description of the Swedish deep-straw system in the University of Minnesota Extension book, *Hogs Your Way : Choosing a Hog Production System in the Upper Midwest* which can be viewed at www.extension.umn.edu/distribution/livestocksystems/D17641.html. The National Center for Appropriate Technology offers a new publication, *Considerations In Organic Hog Production* available from ATTRA (www.attra.org). This publication is perhaps the most up-to-date in terms of references and resources for organic swine production systems.

V. Summary and Conclusions

The U.S. organic swine industry is in its infancy. Market development, production methods and organic research in the U.S. are years behind many other countries. Organic producers in the U.S are only beginning to develop a measurable presence in the U.S. food system. The structure of the U.S food supply chains and structure of farm income support programs are also a likely hindrance to the development of the organic meat animal sector.

As their numbers increase, organic farmers in the U.S. will need to be far more organized and cooperative than small conventional farmers have been in the past. Real growth in organic swine production will occur when major retailers and organic producers work together and cooperate with processors and suppliers in the food supply chain. Michelsen (1996) provides a good discussion of farmer cooperation between themselves and with processors and mainstream retailers to greatly expand the organic food market in Denmark.

Relative to other countries, the government and university system in the U.S. has not engaged in significant support of the development of organic agriculture.

Farmers need to communicate the need for assistance from university and governmental organizations not only for improved understanding of organic standards but to participate in the process of shaping organic standards. Policy, researchers and

farmers must consider what is demanded by consumers and importing countries but also consider feasibility at the farm level. The slow development of national standards and labeling regulation have likely hindered the organic meat industry. More coordinated research and information regarding the size of the organic market as well as information on marketing organic products is critical to the decisions of farmers to produce organic livestock.

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