



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



An international perspective on environmental regulation and competitiveness in the Hog Industry

by John Beghin and Mark Metcalfe

Since 1994, the United States has been a net exporter of pork. Annual exports for 1999 and beyond will probably exceed 600,000 tons. The expected continued expansion of the pork industry has made the United States a threat to its European competitors (USDA-FAS). Traditionally, the United States has under exploited its comparative advantage in hog production. Despite its low feed and labor costs, heterogeneous genetic stock and small-scale production handicapped competitiveness. Recently, however, the industry achieved new scale economies in production and has taken advantage of information coordination. New, larger production units facilitate more competitive hog-processing technologies, reduce transportation costs, and systematically produce attributes valuable in the export market.

In some U.S. states, however, this new industrial organization is accompanied by a geographical concentration of production, raising environmental concerns. Even so, the challenge for producers in Northern Europe to comply with tough domestic environmental regulations may further enhance the comparative advantage of pork production in the United States (Beghin and Metcalfe).

This article assesses the extent of recent environmental regulation affecting hog industry competitiveness in the European Union (Belgium, Denmark, the Netherlands), Poland, Taiwan and 25 individual U.S. states. We emphasize the heterogeneous and evolving nature of environmental regulation, which varies dramatically from state to state and across countries. Despite the geographical disparity in regulations, there is everywhere a common trend toward introducing more stringent and new policy instruments. These policies respond to public environmental concerns and anticorporate farming sentiments, although "large farm" means something different in each country and state.

Rising environmental concerns and heterogeneous regulatory response

Worldwide, environmental concerns linked to hog production are increasing. In the European Union (EU), especially in the Netherlands, Belgium, and Scandinavia, concerns about waste disposal are forcing producers to adopt costly waste management techniques, or to scale back their production capacity. The 1991 European Community Nitrate Directive, the central legislation regulating European water quality, prescribes that nitrate concentration in water should not exceed 50 parts per million and that nitrogen applications (after plant intake) should not exceed a standard of 170 kilograms of residual nitrogen per hectare per year. Most hog producing regions in Northern Europe are declared "vulnerable" because they do not meet these nitrogen and other standards. More drastic policies will progressively bring these regions into compliance. The new policies increasingly limit output and export expansion.

In the Netherlands, for example, manure production rights (MPRs) regulate phosphate emissions. Manure rights owned by the farm cap its phosphate production. Historical farm production (based on 1987 pig herd size) and available land determine each farm's manure quota and prevent the scale of existing farms from expanding. The government reduced the historical MPRs by 30 percent in 1995. Farms may purchase MPRs from other farms, but each transaction reduces the MPRs by 25 percent. Farms can trade their MPRs within regions and sell MPRs from manure-surplus regions to manure-deficit regions, but not vice versa. Surplus regions correspond to the traditional hog and cattle producing regions of the Netherlands. Additional restrictions on MPRs limit trade across livestock activities, further constraining hog production.

Ammonia quotas further limit hog production in some Dutch regions. Farms must not exceed a maximum concentration limit for ammonia, which varies by location. Farms in excess can buy ammonia quotas from deficit farms, but only from within the county. A well-established market facilitates ammonia quota trades.

The current direct cost of environmental regulation (waste handling and treatment, manure production rights, ammonia reduction) in the Netherlands is significant and rising. Den Ouden of Wageningen Agricultural University estimates the direct cost of regulation to be between 5 and 10 percent of the average total cost of hog production, but he estimates costs could go much higher (up to 24 percent of the average cost per hog) if new regulations prohibit nitrogen and phosphate emissions. Dutch policy makers imposed a drastic 10 percent reduction of all farm herds in 1998-'99 and plan further decreases, with a minimum of a 20 percent decrease from 1998 levels to be achieved by 2000.

Denmark, too, faces constraints, but ones less onerous. Land-use requirements (manure/land ratio) and operation permits constrain expansion of Denmark's hog production. Permits typically require concrete manure storage facilities with a one-year capacity and stipulate various setbacks from water sources. Hog farmers can spread manure in concentration that

does not exceed 170 kilograms of nitrogen per hectare per year. This standard does not account for nitrogen intake by plants and hence, exceeds the EU standard. Manure spreading must meet seasonal restrictions based on the form of the manure (solid or liquid) and the types of crops to which it is applied. Manure must be directly incorporated into the land.

Danish farmers unable to meet the manure/land requirement can spread waste on farmland belonging to mineral-deficit farms. The transfer from surplus to deficit farms must be documented, but in practice it is hard to monitor. Since 1990, grain production must be followed by a cover crop to take up nitrogen. Sixty-five percent of the land on each farm must be covered in winter with a crop. As in the Netherlands, and since 1994, farmers are required to maintain nutrient balance sheets and fertilizer management plans based on animal waste and fertilizer use. The balances must be sent to the Danish Ministry of the Environment. Fines are levied on farms that produce excess nitrogen. Finally, new regulations prohibit the creation of operations larger than 15,000 head. In the long

run, the Danish government plans ambitiously to reduce nitrate emissions by 100,000 tons per year, about half of Danish agricultural emissions.

While environmental regulations have significantly affected hog production in the Netherlands and Denmark, it is premature to know their impact on competitiveness in the other countries surveyed. Belgium, with its profitable and well-organized hog industry, appears the least ready of the three EU countries examined to seriously tackle its water quality problem. Nutrient standards in the Belgian Flanders allow for up to 400 Kilograms of nitrogen from all sources per hectare



Feeder pigs in Indiana. The United States has more land and lower manure concentrations, both important environmental assets, giving the U.S. pork industry a competitive advantage over its European counterparts.

per year. Still, according to work by Lauwers, van Hylenbroeck, and Martens, current regulations induce an estimated cost increase of \$1.92 to \$5.27 per hog. Regulations planned for 2002 would increase this cost up to \$17.75 per hog. For now, Belgian regulators have resisted enacting direct reductions in hog production. Since 1997, in an effort to preserve the family farm, small Belgian hog producers (800 hogs per year or less) face more lenient environmental regulation than do large-scale operations. Larger farms must process and ship their manure long distances.

The U.S. hog industry also faces regulatory pressure, but relative abundance of land mitigates some of the cost associated with waste management. Investors can build new, large hog operations in locations better able to absorb manure waste, and new operations comply with regulations at a lower cost than older established operations when the latter require retrofitting.

Many U.S. states have their own sets of environmental regulations which affect hog production. These regulations often include setbacks, approvals for facility design and

Photo courtesy the authors.



Growing hog wild. New, larger production units facilitate more competitive hog-processing technologies, reduce transportation costs and produce attributes valuable to the export market.

waste systems, and nutrient standards. The severity of regulation varies from state to state, as does the rate of change in regulation. For example, North Carolina and South Dakota had “lax” regulation in 1994 but were among strictly regulated states by 1998. By the end of 1998, three-fifths of the U.S. states we reviewed had proposed further regulatory legislation (NACPTF).

As in the other countries, U.S. regulations discriminate between large and small operations.

New regulatory tools have emerged, such as bonding and moratoria on new operations. Bonding requires a farm to show financial responsibility in the event of a waste lagoon spill or closure (closing or abandonment) through insurance, security bond, letter of credit or participation in a state’s waste facility closure program. In 1994, both tools were almost unheard of outside Mississippi, but by 1998, eleven states used either bonding (Illinois) or moratoria at the state level (North Carolina) or county level (Colorado).

As in the other countries, U.S. regulations discriminate between large and small operations. Colorado’s Confined Animal Feeding Operations Control Regulation of 1992 distinguishes between animal feeding operations and concentrated animal feeding operations (5,000 head or more). Concentrated feeding operations cannot discharge manure into waters of the state. In Oklahoma, operations exceeding 2,000 head face stricter setback requirements.

Taiwan has limited regulation of hog waste. The 1991 National Water Pollution Control Act Amendments set emissions standards for livestock operations larger than 200 head. The standards limit biological oxygen demand, chemical oxygen demand, and suspend solids. The average cost of complying with these standards decreases with farm size and is estimated to be nearly 7 percent of total cost for operations with less than a 1,000 hog capacity, down to about 3 percent for large farms of 5,000 head or more (Taiwan Livestock Research Institute). With their rising affluence, Taiwanese consumers increasingly value water quality. New zoning regulations are emerging to limit the number of hog farms in the watershed of rivers used for

drinking water (USDA-FAS).

Poland, the last country reviewed, is emerging from its transition to a market economy. Its acute environmental problems, however, do not originate in agriculture, and the link between water quality and livestock waste is currently not scrutinized. If Poland joins the EU as projected, it must eventually comply with EU regulations. The EU has explicitly acknowledged more flexible enforcement of environmental regulations for future members, such as Poland, to account for their lower income levels.

The accompanying table summarizes and ranks the importance of environmental regulations in the countries and states reviewed.

Environmental regulation for hog producers uneven among locations but increasing

Strict environmental regulations faced by EU producers increasingly compromise their long-run competitiveness. The United States has more land and lower manure concentration, both important environmental assets, giving the U.S. pork industry a competitive advantage over its European counterparts. Still, some states and local authorities have introduced moratoria and other regulations which curtail their pork industry.

We also noted biases in environmental regulations against large operations. The Netherlands taxes scale expansion through manure production rights. Belgium, Taiwan, and the United States grant exemptions from storage requirements, permits, and other standards to smaller producers. In the United States, Iowa, Missouri, and Nebraska grant exemptions to small farms, but so, too, do new producing states, such as Colorado. Countries use a variety of policy

instruments to mitigate environmental damage from hog operations. The Netherlands grants tradable ammonia and manure rights. Some U.S. states require bonding. Commonly used instruments include setbacks and approval facility design and waste systems.

Finally, we note that environmental considerations increasingly affect trade agreements. For pork trade, EU producers would likely support an "upwardly leveled playing field" in environmental regulation for livestock production. However, negotiated international regulations would most likely not be binding for them, and the variety of policy instruments would render such negotiations tedious. ■

■ For More Information

Beghin, J.C., and M.R. Metcalfe. "Environmental Regulation and Competitiveness in the Hog Industry: An International Perspective." Working paper, Iowa State University, Ames, 1998.

Copeland, J.D. *Environmental Laws Impacting Livestock Production*. Fayetteville AR: National Center for Agricultural Law Research and Information, 1994.

Den Ouden, M. "Economic Modelling of Pork Production-Marketing Chains." *Mansholt Studies* No. 4, Wageningen Agricultural University, 1997.

Lauwers, L.H., G. van Huylenbroeck, and L. Martens. "A System Approach to Analyze the Effects of Flemish Manure Policy on Struc-

tural Changes and Cost Abatement in Pig Farming." *Agr. Systems* 56, no.2(1998):167—83.

Mo, Y., and C.W. Abdalla. "Analysis of Swine Industry Expansion in the U.S.: The Effect of Environmental Regulation." Staff Paper 316, Department of Agricultural Economics, The Pennsylvania State University, State College, March 1998.

National Animal Confinement Policy Task Force (NACPTF). "National Survey of Animal Confinement Policies." Technical Report, Clemson University, Clemson, 1998.

Taiwan Livestock Research Institute. "Research and Counseling on Livestock Waste Treatment (On-Line)." Available <http://www.tpg.gov.tw/tlri/enpig.html> (March 1998).

U.S. Department of Agriculture, Foreign Agricultural Service (USDA-FAS). "Livestock and Poultry, World Markets and Trade." Washington DC, March 1998.

Without implication the authors thank Bruce Babcock, Ken Foster, Dermot Hayes, L. Louwers, Tom Vukina, Ada Wossink, and Kelly Zerling for providing information and discussions, and the North Carolina Agricultural Research Foundation and Iowa State University for support. The views expressed in this report should not be attributed to Iowa State University or North Carolina State University.

Third annual initiative in executive education tailored to agriculture- related businesses.

This program provides today's senior-level managers and executives with the necessary tools to compete in the 21st century.

JULY 16-21, 2000
Penn State Executive
Education Center
University Park, Pa.

Call now for
more information:
1-800-311-6364

Web site:
www.smeal.psu.edu/psep

Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce.

Agribusiness Executive Program 2000:

*Balancing and managing
the risks in agribusiness
and the food system.*

PENNSTATE



A cooperative program by The Smeal
College of Business Administration and
the College of Agricultural Sciences.

CM