Industrialized Animal Agriculture, Environmental Quality, and Strategies for Collaborative Problem Solving and Conflict Resolution

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FOREWORD

The recent acceleration in the trend toward a more "industrialized" structure in the U.S. animal agriculture section, especially in areas within the Southern region, has generated substantial concerns on the part of those affected by the changes, and serious conflicts in a number of local areas. Questions are being raised as to how far private rights extend with respect to adoption of production systems that are perceived to generate environmental risks, nuisance impacts on neighbors, and social impacts on rural communities. The concerns, conflicts, and questions have led to a good bit of policy debate and legislative activity at the local and state levels. Agricultural economists have a key role to play in providing information to participants in the issue through their research, teaching and extension activities, with a view to fostering good decisions and conflict resolution.

To facilitate this, the Southern Region Information Exchange Group (SRIEG-10) for Natural Resource Economics held a workshop in Atlanta, Georgia on May 22, 1997. The workshop sought to involve specialists from within and outside the field of agriculture economics who could address various dimensions of the issue. Perspectives were provided on economic, technical, political, and legal dimensions in the four morning presentations. The first afternoon presentation discussed the potential application of strategies for collaborative problem solving and conflict resolution to the issue at hand. This and the other afternoon presentations also outlined general principles and procedures for implementing such strategies to natural resource issues of various sorts. This publication is a compilation of the formal papers resulting from the presentation at that workshop. Brief summaries of each paper follow.

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By

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Introduction

Industrialized agriculture **is one of those terms that is difficult to define, yet nevertheless, is increasingly used to describe the changing structure of agriculture. To some individuals, the term is synonymous with the demise of the family farm and the rise of corporate farming. Still, to others it implies capital intensive production units which utilize specialized technologies to capture scale economies. In this paper, we use the term industrialized agriculture to refer to the concentration of production in small geographic areas with production characterized by large specialized units which employ specialized labor using routine methods (Hamilton, Rhodes.**

As a result of industrialization, animal agriculture industries are becoming increasingly concentrated, both at the farm level as large-scale intensive confinement facilities arise and within a geographic region, as facilities locate in clusters near processing facilities or specialized input suppliers (Thurow). Balancing the economic advantages of industrialized agriculture with environmental sustainability is a challenge facing individuals and rural communities. To frame the relationship between industrialized agriculture and the environment, we examine two animal agriculture industries, broiler chicken and swine. The first industry has a five-decade history of industrialization, while industrialization in the swine industry is a more recent phenomenon.

Analyzing these two sectors provides a unique and informative perspective for researchers, educators and policy makers. To that end, the paper has three objectives. First, to provide a historical context in which to examine industrialized broiler chicken production and the observed changes in the swine industry. Second, to discuss the relationships between industrialized animal agriculture and byproduct and manure nutrient management. The third objective is to address the role of public policy and environmental regulation. Here, the North Carolina pork industry is used as a backdrop for discussing industrialized animal agriculture. The paper concludes with a discussion of the opportunities and challenges facing public policy makers, researchers, and educators for balancing industrialized agriculture and environmental qualit.

Industrialization in the Broiler and Hog Sectors: Historical Context

Broilers and hogs have followed similar, yet distinct paths toward industrialization. Dating back to when most farmers kept at least a few hogs on the farm as "mortgage lifters", pork production has a long history of independent, competitive production with ownership and management decisions centered at the farm-level under the control of the owner-operator. In contrast, the broiler chicken "industry" as known today was virtually nonexistent in the

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first half of the twentieth century. Instead, chickens were kept for home consumption of eggs and meat. Young chickens would be marketed as the "spring hatch" by-product of the laying flocks (Tobin and Arthur).

In the post-World War II period, technological improvements in housing, feeding, breeding, and disease control made possible the large-scale, specialized production of chickens raised solely for meat purposes. By 1952, commercial broiler production surpassed farm chickens as the primary source of chicken meat in the U.S. (Watts and Kennett). However, the highly variable live broiler prices of the period caused many farmers to conclude that the industry provided too many risks given the significant fixed capital investments required for production. In an effort to both stabilize broiler prices and secure a market for their feed, feed dealers offered contracts to growers to produce broiler chickens. This practice is continued today by companies or "integrators" who contract with growers to house and care for their growing birds in exchange for a contractual fee. These companies are typically integrated firms that own feed mills, growing birds, and processing plants.

Because live broilers have limited transportability, broiler farms are typically located within close proximity to the integrator/processor. Consequently, shifts in geographic production regions have occurred to correspond with the clustering in production and processing infrastructure. Much of the shift in broiler production in the post-WWII period has been to the South (figure 1).[2] The relatively less expensive land, labor, and capital provided a major incentive for this shift. In addition, the lack of alternative economic opportunities, the eagerness of feed dealers to extend credit, and the increased social acceptance of contract production in this region due to the history of share cropping made contract broiler production an attractive alternative to traditional farm enterprises.

Today, approximately 90 percent of all broiler chickens are raised by farmers under production contracts, with the remaining broilers fed on integrator-owned farms. Open market transactions have disappeared in commercial broiler production. Over the last five decades, many of the major broiler integrators have also disappeared while others have either expanded or merged. In 1972, the four largest broiler firms accounted for 17 percent of all broilers processed. By 1994, the top four firms (Tyson Foods, Gold Kist, Perdue and ConAgra) processed more than 40 percent of broiler production, with the top 20 firms accounting for 80 percent of processing (Watts and Kennett). The result is a highly concentrated industry, both in a geographical and firm-level context, characterized by specialized, intensive production and processing units.

Pork production may be following a similar course toward industrialization. Historically, hogs have been viewed by farmers as a means to add value to local corn production. Therefore, corn-hog farms tended to dominate in the Cornbelt states. The industry was characterized by many diversified producers with relative ease of entry and exit.

More recently, improved housing facilities and disease control measures, coupled with advances in nutrition and feeding regimes, have permitted large-scale, specialized pork production units to flourish. Fueled by technological change and economic opportunity, the historic patterns of geographic location, farm size, packing plant size and organization of pork production are changing at exceptional rates in the United States (figure 2). The number of swine farms keeps falling, with the majority of those exiting the industry keeping fewer than 1,000 head in inventory. In contrast, total inventory of farms with at least 2000 head in inventory is growing rapidly (from 16.3 million on December 1, 1992 to 28.6 million on December 1, 1996). Forty percent of the growth in this category occurred in North Carolina. Farms with more than 2000 head accounted for 28 percent of U.S. inventory on December 1,

1993 and 51 percent on December 1, 1996. Overall, the impacts of industrialization are dramatic, particularly if one looks at the changes occurring in the South.

Traditionally, hog farms in the South have been smaller than those in the rest of the country and so reductions in the number of farms keeping at least one pig have been more marked in the South. In 1989, the South was home to one-third of the 306,210 farms in the country which kept at least one pig. By December 1996, the South accounted for one-quarter of U.S. farms with at least one pig. The South's share of the national swine inventory has risen dramatically from 15.8 percent in 1989 to 26.7 percent in 1996. Between 1989 and 1996, growth in North Carolina (+6.73 million head), Oklahoma (+1.09 million), Arkansas (+115,000), and Mississippi (+60,000) offset declines in other states to add nearly 6.5 million hogs to the region's inventory (USDA, Hogs and Pigs).

Southern pork production is increasingly characterized by industrialization and contract production. Large hog firms contract with growers to house and care for their growing pigs. Relative to the 90 percent in broiler production, it is estimated that 17 percent of all hogs slaughtered in the U.S. in 1994 were finished on contract (Grimes and Rhodes). However, industry experts suggest a much higher percentage of contract production in the South. This figure would include the more than 80 percent of total production in North Carolina which is estimated to be contract finished.

Changes in the number, size, and location of packing plants are also occurring. Hayenga et al. (1985, Figure 6.1) indicated 12 packing plants in the South that each slaughtered more than half a million hogs in 1982. By December 1996, only nine such plants remained. New large plants opened in Guymon, Oklahoma and Tar Heel, North Carolina while Georgia and Tennessee each had their two plants close. Although hogs can be shipped several hundred miles to market, transportation costs sharply reduce profits. Consequently, swine production is likely to decline in areas that lack packing capacity. Unlike the broiler industry, less than 2 percent of hogs marketed in the country in 1993 were produced by packers (Hayenga et al., 1996). Most contractors in North Carolina sell market hogs to packers under term marketing agreements.

Why has pork production, and in particular large-scale intensive production, shifted to the South? Several factors help to explain this trend. For the most part, pork production in the South was not an economically important commodity prior to the 1970's. The political climate surrounding traditional cash crops (i.e., peanuts and tobacco) left many farmers uncertain as to whether there was a profitable future with these commodities. Given the small farm size and low-yielding soils, individuals recognized the need to search for and develop alternative farm enterprises. In North Carolina, beginning in 1960 (Jones), a concerted effort was made by the state government, land grant university faculty and entrepreneurs to develop a pork industry that could effectively compete on a national level. Because the region did not have significant existing capital and infrastructure, producers and processors were able to adopt the newest technologies and build associated infrastructures in order to capture economies of scale, both internal and external. Even though Southern farmers face higher feed prices than their Midwest counterparts, implementation of such technologies as all-in/all-out production, split-sex feeding and segregated early weaning, coupled with lower labor and land costs, offsets the higher feed expense. Good (1994) found that hog production costs for a large specialized farm in North Carolina were 10.6 percent less than for a traditional hog farm in the Midwest.

New technologies by themselves cannot account for the rapid growth of the South's pork industry. In fact, there are a mosaic of influences that have contributed to the clustering

of pork production outside of the traditional states. The large capital requirement of modern, confined pork production units has led stakeholders to search for alternative methods to deal with risk and financing. In contrast to other regions of the U.S., the South was already familiar with and relatively accepting of production contracts due to their widespread use in broiler production. Recognizing that price and some production risk is shifted to the integrator with production contracts, lending institutions have been more willing to provide financing for construction of new hog units. In addition, environmental regulations, zoning regulations, and anti-corporate farming regulations did not present insurmountable barriers to siting and building production units and processing plants in the region.

Although scale economies and reduced transactions cost from coordinating production-marketing activities have encouraged the movement toward industrialized broiler and pork production, gains from reduced per unit costs have not been without consequences. Focus in the industries has shifted from economies of scale in production and processing, to recognizing the environmental impacts of intensive livestock and poultry production and to searching for methods to sustain production and environmental quality.

<u>Byproduct Management and Environmental Impacts</u>

Increased growth in industrialized broiler and pork production and processing has multiple consequences. There are significant economic benefits to rural communities in the forms of alternative farm income, employment opportunities and increased tax revenues. There are also environmental costs, both perceived and real, involved with intensive production and processing units.

The majority of environmental concerns are associated with manure management and include pollution of air, groundwater, surface water, and soils. Air quality concerns surrounding manure include ammonia volatilization, methane emissions, dust, and most importantly, odor. From a public policy perspective, odor impacts are the most difficult to assess because odor is measured subjectively. In contrast, much of the environmental regulation focus has been on groundwater and surface water issues. These issues predominantly involve the potential risk for large scale nitrogen leaching and runoff from animal facilities, from manure holding or storage structures, and from fields receiving manure. Soil concerns are based on the potential for nutrient buildups in the soil which may be harmful to plant productivity as well as a risk to groundwater and surface water.

Recognizing both the nutrient source and the environmental concerns associated with manure management leads to two questions. First, is manure an associated cost or potential benefit to broiler and pork production? Second, do broiler and swine units face similar environmental risks and constraints in manure nutrient management?

An economic definition of a waste is *any product that costs more to apply (use) than it is worth once applied (used)*. There is no question that all manure has intrinsic value: it contains nitrogen, phosphorus, potassium, and other nutrients essential to plant and animal growth. A problem in using manure (and many other organic byproducts) is that the nutrients are dilute, they are mixed together, they are in relative proportions that are inappropriate for most plant and animal uses, and nutrient content of manure may vary over time and from sample to sample.

The low concentration of nutrients in manure means that costs of storage, transportation and application of manure are high per pound of nutrient compared to commercial fertilizers or other feed ingredients. As an example, a ton of fresh swine manure may contain 12 pounds (0.6%) total N, 9 pounds (0.45%) P_2O_5 , and 9 pounds (0.45%) of K_2O.

In some cases, the low concentration of nutrients means that the cost of application exceeds the value of the nutrients as fertilizer.

The inappropriate mix of nutrients in manure means that the value of manure in use is less than the sum of the value of the nutrients it contains. For example, a bermuda grass hay field receiving 300 pounds of N from anaerobic lagoon effluent may utilize 45 percent of plant available P_2O_5. If the manure is spread over a greater area so that the phosphorus is fully used by the crop, an additional cost of applying the manure is incurred that usually exceeds the value of the additional phosphorus utilized. In addition, a supplemental application of nitrogen is required to meet plant needs, so total application costs may be further increased.

Local conditions also affect the value of manure. Climate, soils, crop selection and yields, extent of other livestock and poultry production, and prices for land, labor, feeds and fertilizer all affect the cost effectiveness of various manure management systems. Manure management systems can have several components including removal from buildings, storage, treatment, transport, and application. Potential revenues and savings from manure management systems include byproduct sales, on-farm use of byproducts, reductions in production costs, and increases in quantity or quality of livestock or poultry produced. Basic costs of manure management systems include interest and depreciation on the initial investment in facilities, repairs, property taxes and insurance, electricity and fuel, labor, and supplies. Additional costs of manure management systems include record keeping, permitting and compliance, fines and legal fees, losses of net crop receipts, land clearing and grading.

Even though broiler and pork production units face similar environmental challenges associated with manure nutrient management (e.g., odors and an imbalance between nutrient uptake and placement), broiler units, in general, have more opportunities and choices available to them to increase the value of manure and other byproducts. A major factor for this difference is the physical form of the manure. In contrast to the liquid product of the swine industry, broiler manure is absorbed by and mixed in with the litter placed on the broiler house floor for bedding. When removed from the house, the litter is a combination of manure, feathers, spilled feed and water, and the original bedding material (e.g., sawdust, wood or paper shavings) (Rahn). Consequently, broiler litter is more transportable than the effluent from hog units.

To capture the nutrients inherent in the litter, some broiler farmers use equipment to separate the heavy pieces of litter and apply this nutrient rich source to their fields. Still others will compost the litter and transport the composted material out of the area for field application or commercial sale. One broiler producer in Mississippi sells bags of composted manure locally for $4.95 per bag, with an estimated total cost per bag of only $0.55 (Pyenson). Even when transportation costs are significant, alternative markets still develop for dry litter removal (Burt). This transportability allows nutrient surplus areas to sustain broiler production, while recycling nutrients and transporting them to deficit areas.

A further option available to broiler producers is the feeding of deep-stacked litter to ruminant animals as a feed source. According to Ransom and Strickland, the Tennessee Valley Authority, working cooperatively with Auburn University and other interested parties, has supported activities to increase the use of broiler litter for feed and fertilizer to develop and expand the beef cattle industry in the region.

Manure and litter are not the only recyclable resources involved in broiler production. Composting of dead birds is generally permitted. This practice is in contrast to the hog industry, where not all states, particularly in the South, allow composting of dead swine. In areas of concentrated swine and poultry production, dead birds and pigs are collected daily

and recycled through rendering. Collection and rendering avoid additional nutrient loading to land surrounding hog and poultry production facilities.

An alternative strategy to managing manure nutrients at the "back-end" is to focus on the nutrients going in the "front-end". From an environmental perspective, improved feed use results in reduced surplus nutrients to be managed. While previous feeding programs mainly emphasized rapid, efficient, weight gain, increased attention is being placed on improving feeds to sharply reduce the surplus phosphorus and other minerals excreted by swine and poultry (Cromwell and Coffey). Broiler feed efficiency improved from 3.0 to 2.04 pounds of feed per pound of gain (Havenstein, et al.) between 1957 and 1992. Likewise, large, specialized farms in North Carolina use 3.0 pounds of feed to produce a pound of live hog compared to averages of 3.5 or greater on traditional Midwest farms.

An additional measure for reducing surplus phosphorus in the manure is the feeding of microbial phytase in poultry and swine rations. This supplement improves the availability of phosphorus in corn and soybean meal to the animal and therefore reduces the need for supplemental phosphorus. However, for producers to adopt such practices, they must be both economically and technically feasible. Ironically, while industrialization has facilitated the rapid adoption of many cost-effective technologies, it has not always spurred the adoption of environmentally-effective technologies such as phytase feeding. More succinctly, in an industrialized animal agriculture system, profit-driven firms and integrators are unlikely to spend more than they judge profitable over the long run on byproduct management. Likewise, when production contracts accompany industrialized animal agriculture, the separation of the central decision-maker from the farm-level environmental impacts can cause divergent interests. As animal agriculture industries become more industrialized, what then, is the role of public policy and environmental regulation?

<u>Environmental Regulation and Public Policy Choices</u>

It would be an oversimplification to suggest that the geographic shifts in industrialized broiler and pork production are the result of producers searching for the path of least environmental resistance. The previous historical discussion points to a myriad of forces affecting industrialization and production locations. That is not to say, however, that environmental regulations and enforcement have not played a critical role in the rapid growth and clustering of animal production facilities in specific regions. There exists an *ad hoc* array of federal, state, and local laws and procedures facing producers and consumers who are interested in negotiating a mutually-acceptable set of environmental protection standards (Thurow). Oftentimes, however, environmental standards are either solely science-driven or socially-driven, but neglect to account for the economic implications of industrialized agriculture.

Since North Carolina accounts for 60 percent of the South's total hog inventory, 40 percent of recent growth in farms with more than 2,000 head, and because it receives the majority of attention in the public press regarding environmental impacts of intensive pork production, it seems only fitting to use this state as a background to discuss environmental regulation and public policy choices.

Prior to 1992, livestock and poultry were regulated by the state of North Carolina as nondischarging agricultural operations. Farms were "deemed permitted" unless they were found to be discharging waste to the waters of the state. It was illegal for farms to discharge waste to the waters of the state including streams, rivers, and lakes. Farms were expected to follow Soil Conservation Service and Cooperative Extension Service guidelines to construct

and operate manure management systems. The minimum setback allowed was 750 feet from the nearest residence.

In 1992, North Carolina adopted regulations referred to as ".0200". These rules required all new hog farms to have waste management plans certified by qualified engineers or by others designated by the state. All existing hog farms were required to register with the state department of Environment, Health, and Natural Resources and to develop a certified waste management plan by December 1997. Such a plan must state how many animals are on the farm, the size of the treatment lagoon, and the acres of each crop receiving effluent. Nitrogen in the effluent can be applied to cropland at no more than agronomic rates on the acres of each crop included in the plan. Such was the setting for environmental regulations prior to the summer of 1995.

In June of 1995, after 21 inches of rain had fallen over a three-week period, the dike impounding an above ground lagoon at Oceanview Farms near Jacksonville, North Carolina, broke. The entire contents of the lagoon, estimated at more than 20 million gallons, escaped and drained across neighboring fields and a highway into the New River above Jacksonville. Approximately 5,000 fish valued at $6,500 were killed. Boaters and riverside businesses downstream complained of odorous water and were warned to avoid contact with the water. Also that summer, four other hog lagoons and a poultry lagoon experienced spills. Since most hog lagoons in North Carolina are excavated rather than above ground impoundments, the other spills were of much smaller volume and only two of them reached streams directly.

In response to the lagoon spills and growing environmental awareness, the governor ordered inspections of all livestock and poultry lagoons in the state. More than 4,000 lagoons were inspected. Approximately 2.8 percent were found to have illegal discharge devices such as overflow pipes or overflowing lagoons or some other fairly serious problem. Another 400+ lagoons had lesser problems such as eroded lagoon banks or insufficient freeboard. One producer with a 14-year-old farm was found to have no sprayfield. He apparently had been discharging effluent into a swamp. This producer had his farm shut down by the state attorney general's office and was facing felony charges. Later in the summer and fall of 1995, millions of fish died in the Neuse river. Coastal residents and fisherman were alarmed and expressed concern. Environmental advocates blamed the fish kills on the hog industry and demanded action.

Responding to the incidences that occurred in 1995, the state legislature passed a law increasing the minimum setback for hog facilities to 1,500 feet from the nearest residence and 2,500 feet from the nearest school, church or other public facility. In North Carolina, counties did not have authority to zone against farming operations in rural areas. The governor, the speaker of the state house, and the president pro tem of the state senate each appointed members to a Blue Ribbon Panel on Agricultural Waste. The panel conducted hearings over several months and developed recommendations for further regulation of the livestock and poultry industries. Those recommendations, with some additions, were adopted by the state government in 1996.

The new rules (referred to as Senate Bill 1217) specified that all farms with more than 250 swine must obtain a general permit to operate. Two inspections are required each year: one by the Soil and Water Conservation Service and one by the Division of Water Quality. Farmers must pay an annual inspection fee of $50 to $200. The rules require that a certified waste applicator be on the farm whenever waste is being land applied. In order to become certified, the operator must attend 10 hours of training, pass an examination, and attend six hours of additional training every three years. The new rules also require a setback of 500 feet

from property lines for facilities and lagoons in addition to the previously established setbacks from residences, schools, and churches. Reflecting the fact that in 1993, broilers generated about 50 percent more plant available nitrogen than hogs, (Barker and Zublena, Table 3), S.B. 1217 also requires poultry producers using the litter manure handling system to have certified nutrient management plans.

In 1997, golf course developers near Pinehurst in Moore county, North Carolina sought a moratorium on new hog farm construction when a proposed new farm was sited near a golf course. Later, a group of armed residents blockaded a road to the construction site of a new hog farm in Craven county, North Carolina. A few weeks later, two hog farms in a neighboring county were vandalized and bullets were fired into the buildings. Following these events, the governor of North Carolina announced his support for a statewide moratorium to allow a "cooling off period". As this paper is being written, the North Carolina senate and house have agreed on a new bill that would give counties zoning authority over hog farms above a specified size. That bill would also impose a moratorium on new and expanded hog farm construction through March 1999 while research is completed on the measurement and control of odor. The new bill adds daycare facilities, golf courses and other public recreation areas to the list of locations from which new hog operations must be set back at least 2,500 feet.

In recognition of the fact that swine farms were found to be the source of a small part of the total nitrogen load in the Neuse River, the new bill also imposes a 5.5 parts per million limit on the nitrogen discharges of municipal treatment plants in four watersheds considered sensitive. The bill includes other measures intended to reduce nitrogen discharges from other sources such as urban stormwater and land areas greater than 50 acres that receive fertilizer.

<u>Opportunities and Challenges for Balancing Industrialized Animal Agriculture and Environmental Quality</u>

The shift to larger, specialized farms means greater concentration of byproducts and therefore *potential* for greater disaster. However, the movement toward industrialization also means a greater concentration of resources, knowledge and incentives for sustaining environmental quality. Industrialization may mean greater dependence on management and technology, thereby creating greater potential for mismanagement. On the other hand, large, specialized farms employing full time labor can spread the cost of proper manure management over more production, minimizing average cost per animal. Furthermore, because large, capital intensive farms imply large investments, owners of these farms are highly motivated to avoid liability for environmental damage.

Just as economies of scale reduce costs on larger production facilities, they present greater opportunity for treatment and alternative utilization of byproducts (see Powers for further discussion and detail). The concentration of large quantities of byproducts at one farm and in a small geographic area increases the potential for offsite marketing. Such concentration increases the potential for specialized byproduct management services such as custom poultry litter applicators. From a policy perspective, professional applicators can be more easily trained and monitored than a large group of farmers.

Greater concentration of production imposes diseconomies of byproduct dispersion (e.g., Henry and Seagraves). Barker and Zublena note that several counties in North Carolina produce more nutrients in swine and poultry manure than can be used by crops grown in those counties. Concentration of large farms creates greater potential for centralized processing and export terminals. Centralized byproduct treatment facilities can actually improve environmental quality by removing material that was previously buried or land

applied. For example, a central dead bird and pig collection site established by the Greene County (North Carolina) Livestock Association allows smaller, independent livestock producers to recycle their dead livestock.

However, not all centralized systems are economically feasible. Centralized pig manure drying facilities in the Netherlands have been abandoned because the transportation and drying costs are too high. Denmark has used centralized anaerobic digestors to treat manure and capture methane. These facilities are only feasible with a substantial subsidy from the government. Centralized composting and shipping facilities for poultry litter are profitable in some situations. In the pork industry, systems for separating, collecting, and marketing solids from treated swine manure are being evaluated.

Another issue associated with the geographic concentration accompanying industrialized animal agriculture is that livestock and poultry production may become large importers of feed such that nutrients in byproducts accumulate more rapidly than they can be applied to cropland. Nitrates are the primary concern given their mobility in groundwater and surface water. Further treatment of manure to convert the nitrogen to N_2 gas or to separate and export N, P, Zn, and Cu are options in such situations (Barker, 1996). Producers and regional leaders weigh the costs of reducing buildups of mobile nutrients (P, Zn, Cu) in the soil against the costs of further treatment and export.

Large, specialized farms are highly visible and easily inspected compared to a similar number of livestock scattered over many smaller farms. Consequently, increased attention from the general public and from regulators seems to accompany industrialization. Such attention puts pressure on existing farms to upgrade technology. Often, older farms are already only marginally profitable and the imposition of requirements for new capital investment may cause them to close. Consequently, the process of industrialization may create interim environmental problems. Rapid increases in farm size may result in farms outgrowing popular technology: systems that worked well for 100 sows may not be as well suited to farms with 5,000 sows; setbacks that seemed adequate for 100 sows may seem inadequate for 5,000 sows.

Industrialization has a range of implications for environmental impacts of animal agriculture. Concentration of byproducts at a single site and of numerous large sites in a single area increase the potential for large scale accidents and environmental damage. This fact has caused many states to adopt more stringent permitting, inspection, certification, record-keeping, and education requirements for hog farms and other farms using liquid manure handling systems. Often, the regulation of one industry reaches out to multiple livestock and poultry sectors. Such was the case in North Carolina when the movement toward basin-wide management plans led to the imposition of certified nutrient management plans for poultry producers using dry litter systems. Regardless of whether one discusses livestock or poultry, the potential impact is the same for smaller operations: economies of scale result in a greater cost per head of regulatory compliance for smaller operations -- consequently, the movement to regulate larger farms seems to accelerate the rate of change.

However, with change comes opportunity. Large farms and concentration of large farms create opportunities for adoption of improved recycling of nutrients and large scale treatment and marketing of byproducts. Researchers continue to develop and evaluate various alternatives for managing byproducts. Regulations are evolving to ensure environmental protection without causing unnecessary financial harm to rural communities and existing producers. In the midst of a politically charged debate, economic analysis is a critical component of current research and regulations as leaders strive for optimal resource allocation

— optimal resource allocation which involves multiple objectives, including economic prosperity for individuals and rural communities, and is constrained by the local resource base, settlement patterns, production technology and byproduct management technology.

Footnotes

1. **In an earlier paper (Martin and Zering), the evolutions of the broiler chicken and pork industries are discussed with emphasis on the relationships between vertical coordination (especially contract coordination), industrialized animal agriculture, and environmental sustainability.**
2. **Here, the South refers to the following 13 states: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, and VA.**

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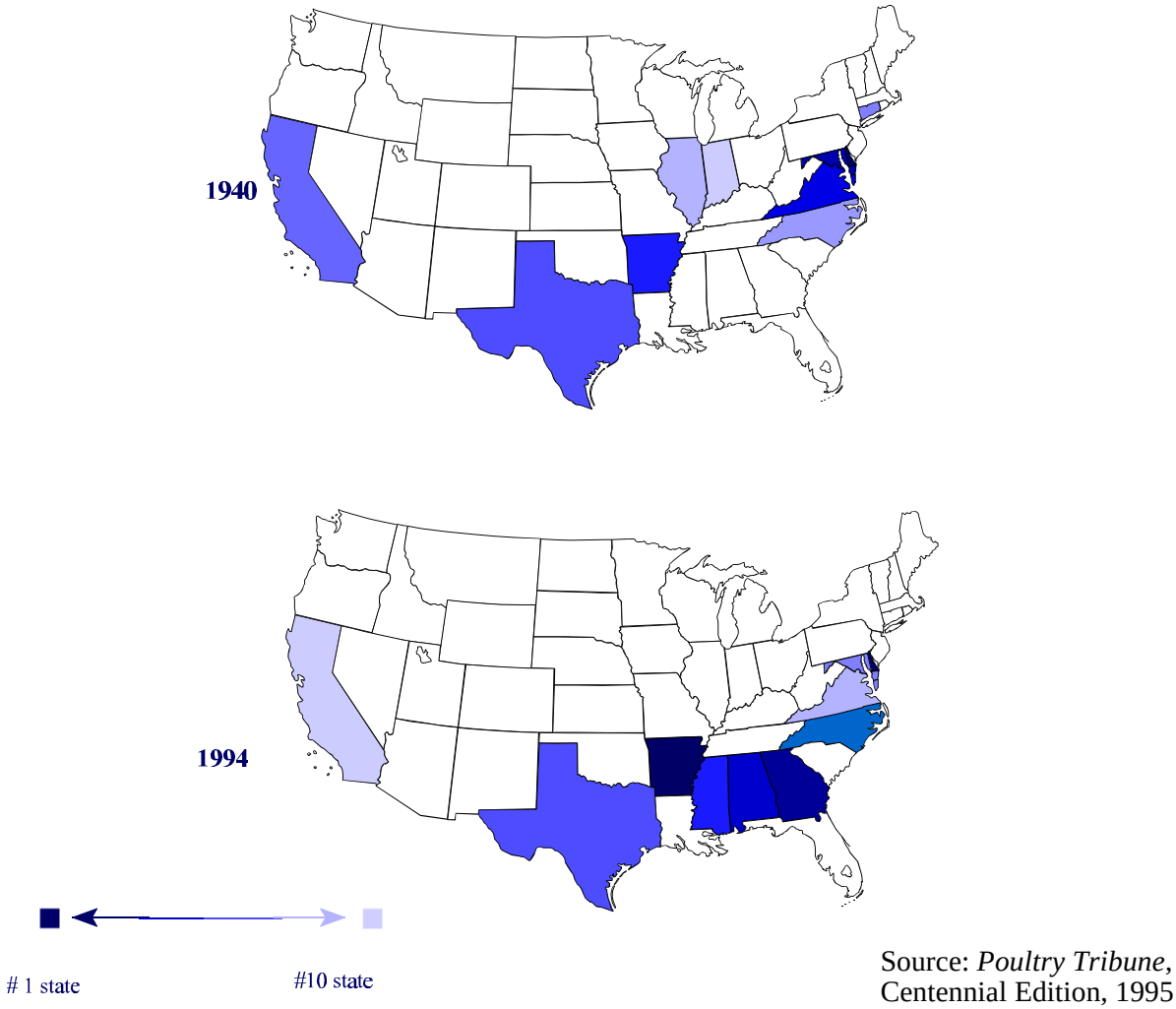
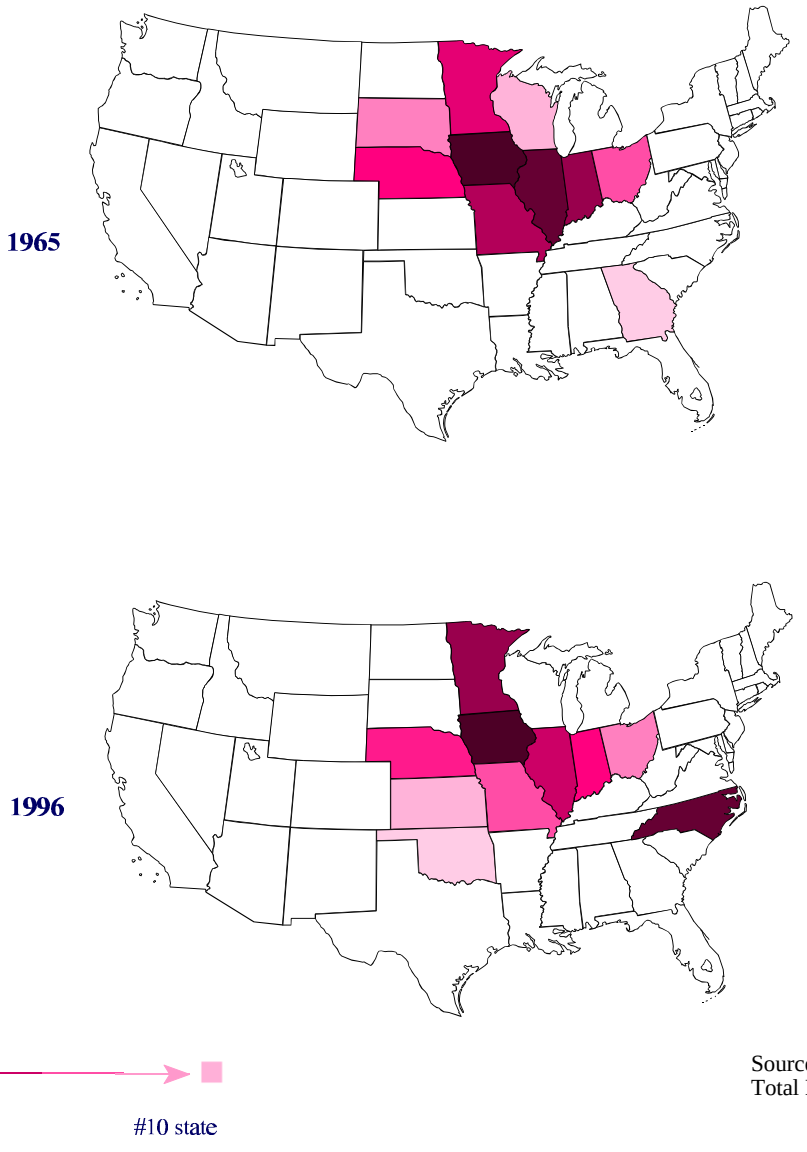
Figure 1. Top Ten Broiler Producing States



Source: *Poultry Tribune*, Centennial Edition, 1995

Figure 2. Top Ten Pork Producing States



CONSEQUENCES OF ANIMAL AGRICULTURE: EMERGING ISSUES RELATED TO FEDERAL, STATE AND LOCAL CONTROL*

By

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Introduction

The industrialization of the U.S. animal agriculture sector is bringing about significant change and giving rise to concerns about environmental degradation and other issues. The concentration of animals on fewer, larger farms and increased vertical integration, contracting and joint ventures are changing the structure of agriculture and the public perceptions about farming. Larger animal production units are increasingly leading to conflicts between producers and neighbors, and communities are faced with many actual and potential environmental or nuisance threats (Hallberg, Abdalla and Thompson, 1996).

This paper is organized as follows. First, an overview of the setting for the emergence of environmental concerns resulting from the industrialization of agriculture is presented. Second, the federal and state responses to animal agricultural pollution are reviewed. Third, the role of jurisdictional boundaries in influencing the political articulation of preferences about the external effects of industrialized animal production is described. The focus here is upon the implications of state versus local decision-making about environmental and nuisance issues related to animal agriculture in five states. Finally, several suggestions for improved research and policy education are offered.

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* This paper is adapted from an article by Charles W. Abdalla, Associate Professor of Agricultural Economics, Pennsylvania State University, University Park and James D. Shaffer, Professor of Agricultural Economics, Michigan State University. For a more detailed discussion of several topics addressed, see the July 1997 issue of the *Journal of Agricultural and Applied Economics*.

The Setting: Industrialization and External Effects

Industrialization involves economic reorganization with specialization in work and trade and the introduction of new technology that advances the productive output of the agricultural sector. This process also changes the pattern of external effects, creating winners and losers. The changing interdependencies brought about by industrialization causes many existing institutions to become obsolete. New institutional arrangements are often needed to coordinate economic activities to better meet societal goals (Shaffer 1969). Adjustment to industrialization is an evolutionary process. Economists can assist the adaptation process by helping people understand the political and economic forces at work and conducting timely analyses of policy issues and choices. To be effective in these endeavors, we need to be aware of the critical role of selective perception of property rights and the benefits and costs associated with the industrialization process.

Selective Perceptions: Defining Benefits and Costs within a Political Context

Property rights are often taken as given in policy analysis. The practice has been to deal with a particular change in rights and take other rights as given, or to ignore them. Defining property rights involves determining what is counted as a cost and as a benefit or entitlement. Entitlements are rights to charge costs to the system or impose costs on others. In a modern economy many rules define costs. These rules have a pervasive influence on the economic outcomes. Individuals, firms and governments selectively perceive the appropriateness of the rules. This is due in part from their limited capacity to comprehend and understand the complex rules defining costs and to analyze the implications of changing them. The industrialization process alters the consequences of existing rules of the economic game creating incentives to change the rules. But perception about what is up for grabs is highly selective (Shaffer 1989). A key role of the economist is to expand the scope of inquiry. That is, we should attempt to frame issues in a context that opens up a broader set of options than is perceived to be relevant, given prevailing beliefs about the acceptability of the existing system of rights. Selective perception of rights and its implications for what are determined to be costs and benefits are central to the many conflicts arising from industrialization of animal production.

Jurisdictional Boundaries: Who Gets to Make the Rules of the Economic Game?

The concept of boundary is relevant at several levels in analyzing the issues resulting from the industrialization of agriculture. Currently many external effects occur beyond the boundary of the firms engaged in animal production and are not considered by firm decision-makers and reflected in market prices. For political decisions, jurisdictional boundaries define the group whose voice gets heard in the process of specifying rights and granting entitlements.

In the remainder of the paper, the focus is primarily on the relationship of industrialization of the livestock system and rules for use of natural resources, especially costs not counted by firms (i.e. externalities). An overview of federal level policy is provided before going to an analysis of jurisdictional boundary issues in five states.

An individual or firm's opportunity set is defined by the interaction of many inter-related federal, state and local institutional rules. At the federal level, these rules are broad, including basic rights and responsibilities from the constitution and common law that frame the scope of issues open for decision at the state and local levels. This institutional context also includes specific laws, such as the federal Clean Water Act, which defines the rules for large confined animal feeding operations.

Under the federal Clean Water Act, permits for discharging waste into surface water are required only for confined animal feeding operations with greater than 1000 animal unit equivalents. As of 1995, forty states had taken over this program. However, the implementation of the permitting process has varied greatly across the country. As of April 1995, only 30% of an estimated 6600 feedlots with greater than 1000 animal units had discharge permits (US GAO 1995). Moreover, the current federal approach to addressing environmental problems attributable to animal agriculture is in theory a sensible decentralized effort, but this program's implementation has been limited in scope (Smith and Kuch, 1995).

The Clean Water Act has been slated for reauthorization for five years, but Congress has not yet acted on it. Local disputes between neighbors and farmers that are settled in court cases (such as C.A.R.E. vs. Southview Farm in New York) have expanded the possibility that confined feeding operations using land application may be in violation of the Clean Water Act (Martin 1996).

Federal coastal zone management regulations passed in 1991 (CZARA) mandate the control of point and nonpoint water pollution, including that from animal facilities. This program sets land-based criteria for manure utilization rather than discharge limits. In many coastal areas, concerns about phosphorus are more important than nitrogen. While federal goals have been set and guidance on management measures were established, states are responsible for implementing these procedures. Some states are moving ahead in this area (Cabbage 1994; Muirhead 1995).

Jurisdictional Boundary Selection

The issues associated with selection of boundaries for making political decisions about the external impacts of animal production are addressed in this section. The focus is on how the choice of state versus local institutions affects whose preferences count. The conceptual issues inherent in jurisdictional boundary selection are reviewed before turning to a review of outcomes of decisions on this issue in five states.

Criteria for Jurisdictional Boundary Choice

An individual's ability to have public policies enacted that are consistent with his or her preferences depends on the tastes and beliefs of fellow citizens. The definition of the decision-making group depends on where the individual lives and how political boundaries are drawn. Only a selected overview of the criteria for selection is presented. See Tiebout (1956); Breton (1974); Oakerson (1987); Schmid (1987); Bish (1988) ; and Oates (1990) for a more detailed treatment.

Responsiveness

Conventional wisdom suggests that local governments are closer and are therefore more in tune with local conditions and citizen preferences. Thus, it is more likely to provide the mix and level of output that satisfies local citizens. This follows from the maxim that the government that is best is the one that is closest to the people (Breton 1974). However,

depending on how particular boundaries are drawn one can be a member of a majority or minority on a particular issue (Schmid 1987).

Homogeneity of Citizen Preferences

If people in an area have similar preferences, larger jurisdictions that provide uniform outputs are possible. If tastes differ, allowing for more, smaller jurisdictions may allow preferences to be better satisfied. Homogenous governmental units may form if people have the opportunity to "vote with their feet" by moving to units that have the public goods or services that they desire most (Tiebout 1956). A related approach emphasizes the role of competition among local jurisdictions in helping to reveal preferences. The ability of citizens to move is believed to discipline governmental taxing, spending and rule-making and allows discovery of new institutional arrangements (Vihanto 1992).

Interdependencies: External Effects and Coordination Issues

The actions of governments are interdependent. This leads to effects that occur beyond jurisdictional borders and results in coordination problems. Such effects prompt recommendations to redraw jurisdictional boundaries to encompass the spillovers so that these costs will be considered by decision-makers. Similarly, individual actions by jurisdictions may result in overall results that are not in the interest of a group of jurisdictions. A remedy for this problem is to involve higher-level authorities to coordinate actions through collective action, allowing the group to avoid costs or capture benefits.

Economies of Scale

Economies of scale in provision of certain goods or services suggests larger jurisdictions that allow these advantages to be realized. However, if the distinction between rovision and production of services is recognized (Oakerson 1987), a government can obtain the benefits of producing goods with scale economies, such as the centralized waste treatment, without actually having to produce the service. They can act as governance structures to arrange for without actually engaging in production of the good or service itself.

Uniformity and Stability

Uniformity or stability in the output of certain goods or services of government may be desirable to promote economic activity or to reduce uncertainty or costs. The lack of uniformity caused by excessive differences in outputs of local units may increase costs for firms whose activities span these boundaries. Similarly, it may be argued that uniformity is needed for equity reasons to create a "level playing field" for competition among firms or to assure that everyone receives a certain minimum level of a public good or service.

Favorable Political Rules (or Power and Influence)

An individual or group's ability to influence a decision may be greater at one governmental level than another. This may be due to differences in the ways that preferences are aggregated. Examples include differences in the specific rules for representation of different interests, agenda setting, and policy implementation. In some cases it may be advantageous for an interest group to shift a decision to another level in order to protect its position or create opportunities. It has been suggested that efforts to raise responsibilities to higher level authorities are actually efforts to limit the advantages of one region or industry over another (Parshigian 1985).

Jurisdictional Boundaries Issues and Their Implications

A selective review of recent state and local policy responses to the external impacts of animal agricultural production is provided. This is followed by a discussion of implications for issues of preference articulation and jurisdictional boundaries.

Policy Responses to an Industrializing Animal Agriculture

While a policy framework exists at the federal level, it is at the state and local level where much governmental activity to address externalities from animal agriculture is occuring. There are significant differences in environmental regulations and ways costs are counted among geographic areas and among states. Within states, the different criteria from the previous section have been used by interest groups to argue for the most appropriate jurisdiction for decision-making.

Pennsylvania

Concern about water quality in the state and in the Chesapeake Bay, as well as residents' fears about nuisance odors from swine expansion in some regions, motivated passage in 1993 of the Pennsylvania "Nutrient Management Act." The Act requires all farms with more than two animal units per acre to implement a management plan certified by an nutrient management specialist. A key feature of the law is the pre-emption of local laws affecting nutrient management on farms. It prohibits local governments from enacting ordinances concerning animal nutrients that are stricter than those required by the Act. Prior to 1993, numerous individual townships in south east and south central Pennsylvania developed ordinances to address problems from animal expansion. This local preemption provision was sought by the state's major state-wide agricultural organizations primarily because of concerns about non-uniformity of numerous local ordinances. The lack of technical capacity of municipal units to develop and enforce such laws was another key argument for local preemption. Rules to implement the law were finalized in early 1997 and will take effect in October 1997. Until the law goes into effect, municipalities still retain the authority to regulate animal nutrients, but such activity has slowed substantially since the law's passage. It is quite likely that the legality of local preemption will be challenged and may need to be settled in the courts.

Iowa

In 1995, Iowa enacted the Animal Feeding Operations Act, creating many new requirements for poultry and livestock producers and additional defenses against nuisance lawsuits. Important components of the law include: separation distances between buildings, lagoons and manure storage structures and nearby residences; state construction permits for certain facilities; an indemnity fund generated from permit fees; manure management plans; habitual violator penalties; and manure disposal requirements (Gault and Baumert, undated). The state's natural resources agency developed rules to implement the Act that became effective in March 1996. The law has made nuisance suits more difficult by clearly placing the burden of proof on those initiating such suits, increasing the standard of evidence needed to prove that a nuisance exists and was caused by a facility, and making all legal costs of suits the responsibility of the initiator if the suit is found to be frivolous.

Recent administrative and judicial decisions in Iowa are providing mixed signals about counties' abilities to regulate confined livestock operations. In 1996, the State's Attorney General responded to a request from a county that wished to create ordinances to regulate the location, construction and waste disposal of swine facilities. The Attorney General concluded that by enacting the Animal Feeding Operations Act the legislature had reserved the regulation of both

large and small confined feeding operations to the state, thereby precluding the possibility of local regulation (Benton 1996).

County officials in Iowa attempted to regulate large swine facilities through their zoning authority but were thwarted recently by a state Supreme Court decision to expand the definition of a farm to include specialized production facilities. The court contradicted an earlier landmark case that left open the possibility that "commercial" farms were not subject to the agricultural exemption from local zoning. In its 1996 decision, the court concluded that a 2000 head unit proposed on five acres was an agricultural activity. This decision broadened the definition of a farm to include the rearing and management of livestock irrespective of feed supply or the owner's other farming activities (Marbery, Dec. 1996).

A 1997 decision in an Iowa district court case involving agricultural zoning ordinances in Humboldt County has increased uncertainty about state and local governments' powers to regulate animal agriculture. In this decision, the court validated three of four ordinances that were challenged by a coalition of agricultural organizations. These ordinances are based on a county's authority to protect public health, not it's zoning authority (Marberry, April 1997). They require county approval for construction of new livestock facilities, regulate manure application, and require financial assurance for possible clean-up in case of abandonment. Those opposed to the local controls, which includes the state's governor, feel that the local rules duplicate state law and will result in the proliferation of different approaches to local zoning for animal and perhaps crop agriculture (Vansickle, 1997). While proposals were introduced to address the local control issue, the state legislature adjourned in mid 1997 without taking action. The decision on Humboldt county will be appealed to the Iowa Supreme Court.

North Carolina

Counties are prevented from using zoning to regulate large-scale swine facilities due a provision in their state law that exempted "bona fide" farms, including large scale livestock facilities from county zoning (Copeland 1994; Heath 1996). In response to a county's enactment of an ordinance that created a definition of such a farm, a state law was enacted in 1991 to specifically include livestock facilities within the definition. This act came at the initiation of the North Carolina Farm Bureau (Stith and Warrick 1995). The nation's largest manure spill to date, 25 million gallons from a waste lagoon at a large hog facility in eastern North Carolina in June 1995, provided impetus for strengthening the state's regulatory programs. A commission established by the legislature after the spill produced a series of recommendations that were adopted by the state legislature in mid-1996. Important features of the law addressing hog producers include: two annual inspections by state authorities; creation of a state general permit; and requirements for owners of new or expanding farms to notify nearby landowners (Dew 1996). One general "non-discharge" permit exists under which all regulated livestock operations must be registered and approved (Feitshans 1997).

In North Carolina a state-level zoning preemption has not stopped counties from attempting to regulate hog farming. Five counties have used their powers under state statutes allowing them to adopt stringent statutes to protect public health (Buggs 1996). The first major test of the legality of local action of this type may come in a suit by Carroll's Foods against a Robeson County ordinance (Marbery, Nov. 1996).

The issue of local involvement in regulating animal waste management has received much recent attention in the North Carolina legislature. For instance, the state House of Representatives recently passed a bill that removes the exemption from zoning and would allow counties to regulate intensive hog farms (Vansickle, 1997). Other key elements contained in this proposal

include: one-year moratorium on new or expanded swine facilities, prohibitions of waste lagoon construction in floodplains, and limits on nutrient discharges into sensitive waters. The state Senate has passed a broader clean water bill that would also remove the county agricultural exemption from zoning and calls for a two-year moratorium (Shiffer 1997). Differences between the versions of the bills passed by the two legislative arms have yet to be worked out.

South Carolina

In 1996, South Carolina passed one of the nation's toughest comprehensive hog waste disposal laws. Under the new law, large[**] producers must obtain permits and smaller ones must comply with guidelines to be developed by the state's environmental and health agency. Important elements of the law include: setbacks of manure lagoons from nearby properties and water bodies; standards for lagoons and application rates of manure on farmland; annual inspections of lagoons and monitoring wells, and recording-keeping and training of facility operators. Its also has provisions for odor control (Marbery, June 1996).

One interesting aspect of the development of this bill is that it originated as an effort by the major state agricultural organizations to establish state-wide uniform guidelines for animal waste management and to pre-empt counties from enacting laws in this area. The effort proved unsuccessful, however, as local governments rallied to oppose limits on their authority (McKenzie 1996). Local officials' concerns about preempting their authority, combined with an awareness on the part of other interest groups of the environmental and nuisance impacts associated with the rapid growth of large hog facilities in North Carolina, served to shift the outcome away from the original preemption goal of the bill's initial drafters.

Kansas

Recent developments in Kansas illustrate how concerns about corporate farming, environmental quality and nuisance concerns interact and how the outcomes depend on the jurisdictional boundary chosen. In the early 1990s, several counties wished to expand their animal industries and felt they were constrained from doing so by the state's corporate farming law. This law was amended in 1994 allowing county commissioners to permit corporate farming, provided they have the support of a majority of registered voters via a referendum (McEowen and Wadley, 1994). Twenty-three counties subsequently approved corporate farming. Due to a complex of concerns related to environmental, nuisance and corporate farming issues, several counties recently reversed their policies, creating much controversy and uncertainty. Several large hog corporations that had made significant investments in the state claim such reversals constitute a "taking" (Marbery, March 1996). The state's attorney
general has ruled that counties have the legal authority to make such changes in law in the public interest, based on the "home rule" defense. However, the attorney general's office is not the final arbitrator. (McEowen and Wadley, 1996). Legal uncertainties remain to be settled in another jurisdictional unit, the courts.

Perception of what is to be defined as a taking varies among jurisdictions, with courts making

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[**]The threshold contained in the legislation for dividing large and small farms was 420,000 pounds of animal capacity (roughly 3000 head of finishers, 1100 sow farrowing units and 300 sow farrow to finish operations). Regulations to implement these thresholds and other aspects of the law were being debated in early 1997.

judgements imposing preferences about rights on legislative jurisdictions. In this case changing the rules, thereby creating a loss in the value of an investment in a hog operation, could conceivably be judged in the future as a taking requiring compensation. At the same time the loss of value in neighboring land due to odor is less likely to be judged a taking by a distant court than by local voters who judge the odor and property value declines to be an unacceptable cost. And it is certain that the increase in land values resulting from a law allowing large hog operations will not be taken from the benefitting land owner and given to those imposed upon by the odor. As argued before, perception of rights is highly selective.

Implications of Recent Developments

Several observations may be made about whose interests appear to be served by institutions at different jurisdictional levels. These themes are discussed along with supporting evidence from states. The observations are tentative and await verification in future research. They are based primarily on observations of interactions between interest groups in states generally in the first several years of interaction over animal agricultural pollution issues. As the process for policy development changes over time with participants learning about the implications of different arguments and positions, they will need to be updated and perhaps revised.

The Bundling of Concerns and Where they Get Expressed

As academics we can talk about the "water quality" issue or the "odor" issue. In the real world such distinctions are blurred. For areas in which no rules exist to deal with new or newly perceived consequences from industrialized animal agriculture, there are important implications for preference articulation. In many cases, nuisance issues, such as odor, have no existing legal framework to either define them or force them to be taken into account. People concerned about them get frustrated and attempt to get their preferences registered by whatever means of interest group politics are open to them. This is often accomplished by attaching one issue to another issue that already is recognized as legitimate, such as protecting water quality (Hamilton 1995; Abdalla and Kelsey 1996). Interest group politics and selective perception of rights may result in preferences being worked out in unexpected jurisdictions. In some instances, odor may be the real local issue but the preferences for protection from odor of livestock enterprises may be expressed by support for more stringent state water quality rules. Recent developments in Kansas provide an example of bundling of corporate farming concerns.

Organized Interest Groups have Reasons to Prefer State Level Regulatory Authority over Local

In three states reviewed, organized agricultural interests supported state involvement and preemption of local laws regulating animal agriculture. The problem with local regulations was the lack of uniformity or a "level playing field" due to the potential for proliferation of many local ordinances. When proliferation of different laws occur, the costs for firms with activities that span across the local jurisdictional lines increases. Given the sizeable investment needed for modern large-scale animal facilities, the stability and predictability of regulations that affect costs is critical to investors. State-level regulation is more predictable than the independent actions of many local units. In addition, local governments, because they are unable to capture economies of scale, may have less technical capacity to develop or implement effective regulations.

Agricultural and other interests may also prefer state decision-making because they are able to more effectively influence legislation and implementation of laws affecting animal agriculture compared to the local level. There is evidence that this occurred in North Carolina (Stith and

Warrick 1995) and Pennsylvania in the 1990s. This last observation is consistent with arguments of Libecape (1996) and Parshigian (1985) regarding calls for regulatory authority to be raised to a higher level (federal) by industries seeking protection from competition and other forces of change. The economics of political influence clearly leads to a general preference for state level regulatory authority by organized interest groups. Monitoring and lobbying at the state level is much less expensive than providing these services at hundreds of local governmental units.

Food industry, agri-business, and related economic development groups are likely to have a general preference for a state-wide uniform approach to regulating animal agriculture for the same reasons just discussed for organized agricultural interests. Uniformity and predictability of regulatory costs are important in promoting investments in large scale animal enterprises which are perceived to contribute to the growth of regional and state economies. The economic benefits associated with expansion of animal production is likely to provide broad-based benefits to a regional economy, whereas the potential costs are more likely to fall on people in the individual jurisdictions where facilities are located. In addition, state-level environmental groups and the agencies they seek to influence may have reasons to favor state approaches that can provide more control and predictability in meeting state-wide goals. They may wish to "rationalize" the disparate efforts of local governments and also be skeptical of the technical capabilities of local government representatives and personnel. State-level environmental groups generally favored local preemption in deliberations over Pennsylvania's Nutrient Management Act in 1993. In discussions this year in North Carolina, some environmental and other state-level organized interests have argued for more local control. This could be due to learning by the participants about outcomes or change in the perceptions of the issues or policy options over time.

Unorganized Residents Have Reasons for Preferring Local Regulatory Authority

Nearby residents and others closest to the problems of animal agriculture tend to want rules from government that is closest to them. Such groups may believe that local governments are more responsive to their interests, more knowledgeable about local situations or perhaps can act faster to address problems. In the past, rural residents may have been more similar in their attitudes about agriculture, seeing it as a land use that sometimes caused pollution or nuisances but one that contributed to the rural economy and provided open space benefits. However, large scale animal agriculture is changing these perceptions and attitudes. Nearby residents affected by potential water degradation or nuisance odors have quite different perceptions of the benefits and costs from large scale animal facilities than the general population. Consequently, they often oppose them. In such efforts, they are likely to feel that local governments are more responsive to their interests than bureaucrats located in offices far from their homes and communities.

The Institutional Learning Process

Participants in the policy process learn from both their own experiences on an issue within a state and from the experiences of other states. As noted earlier, the attitudes and actions concerning preferences for local control of organized environmental interests in some states may change as they learn about the outcomes associated with different policy approaches. In other words, they may "play the political game" differently after they receive feedback from the process.

The political economies of the different states are interdependent. Cross-state institutional learning can take different forms.[***] South Carolina, for example, observed pollution and other

[***] The learning can go in a direction to weaken environmental regulations as well. For example, in another economic and political climate, development interests may lobby for

problems from hog waste occurring to its north and decided against local preemption in passing stronger environmental rules for large swine enterprises in 1996. Only three years earlier, there was little opposition from local governments in Pennsylvania to a nutrient management bill that contained a local preemption provision. One difference between these two time periods is expanded public awareness of environmental and nuisance problems from large hog operations resulting from major manure spills in 1995 in North Carolina and the Midwest (Smothers 1995; Satchell 1996). Also, a state moratorium on hog expansions in Missouri in 1996 may have affected the North Carolina legislature's decisions to enact tougher regulations than it would have otherwise (Marbery, June 1996).

Interestingly, North Carolina, the fastest growing swine production state, appears to be moving toward allowing greater involvement of neighbors and local officials in regulatory decisions. In contrast, the institutional rules in Iowa, a state with a dominant industry position that has recently been challenged, has significantly limited opportunities for local input in such decisions.[****] This may be due to a different balancing of the economic benefits and environmental and nuisance costs for each state depending upon its phase in the life cycle of growth.

Final Comments and Suggestions for Research and Policy Education

Industrialization of the animal agriculture sector has brought with it an array of economic, social and equity concerns. This paper focused on issues related to access to resources, especially shared resources like air, water and space. The basic policy questions involve the rights to use or prohibit use of the resources and the rights to compensation for changes in access or values of these resources. In addition to selective perception, the critical role that jurisdictional boundaries have in influencing the political articulation of preferences about the external effects of industrialized animal production were highlighted. The focus of this discussion was upon the implications of state versus local decision-making with regard to environmental and associated nuisance issues. Differences in states' institutional rules affect whose preferences count in making decisions about rights and costs. Since decisions about property rights and boundaries influence the degree to which such costs are born by participants, they affect the costs of doing business and the quality of life in different states.

These differences in turn will influence the development and spatial location of animal agriculture in the U.S.

Broadly framed, the issues go to the heart of the role of governments in our society and involve the expression of preferences about the role of government at all levels. The importance of implementation of the legislative rules of the economic game has been omitted from this discussion . This brings up the issue of jurisdictional boundaries among implementing agencies.

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regulations providing competitive advantage, thereby leading to the "race to the bottom."

[****]As noted in the discussion of Iowa, recent court decisions have favored local control. However, the point may still be valid given the statements from the governor and other state-level leaders who have argued for state-level control as a means of retaining the state's position within the industry.

For example, is it an issue for a state environmental or agricultural department?

There are many implications of this discussion for agricultural economists as they deal with the emerging issues related to the changing organization of livestock production. Several specific suggestions concerning roles for agricultural economists that would lead to more effective research and policy education are:

1. Contribute to a better understanding of the likely level and distribution of benefits and costs following from specific changes or failure to make changes in the rules for the livestock sector.
2. Contribute to a better understanding of the institutional system which defines the rules of the game for the livestock system providing a context for policy.
3. Pay particular attention to the problems of preference articulation for the dispersed interests, reducing their costs of information and participation.
4. Contribute to the process of working out compromise solutions to emerging issues and conflicts of interests. Perhaps the most important contribution would be to promote a fundamental understanding of the democratic process and the roles of government in articulating the rules of the economic game for a democratic entrepreneurial market economy (which remains an experiment to be proven sustainable).

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NUISANCE LAW, LAND USE CONTROL, AND ENVIRONMENTAL LAW IMPACTS ON PORK PRODUCERS: A LEGAL PERSPECTIVE

By

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Nuisance

A long view: In 1610 William Aldred complained his neighbor Thomas Benton's pig sty was making his home life unbearable. The Judge said among those things the law would protect in a man's home was wholesome air. Benton was forced to move his pig sty. *William Aldred's Case* 9 Co. Pep. 57b, 77 Eng. Rep. 816 (1610).

A shorter view: In 1987 when Duane Michael complained to his cousin Darrel that the odor from the slurry Darrel spread next to Duane's house made Duane's wife ill. Darrel laughed and told him, "There's nothing you can do about it." Duane and his wife Janice set out to prove Darrel wrong. They sued Darrel all the way through the Iowa court system. In the end the Iowa Supreme Court agreed with Duane and Janice and prohibited Darrel from spreading on certain fields and required same date incorporation when he spread on others. Putting and end to Darrel's sarcastic refrain, "There's nothing you can do about it." *Michael v. Michael*, 461 N.W.2d. 334 (Iowa 1990).

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What is Nuisance

Nuisance, in this context, is defined in the law as whatever interferes with ones comfortable enjoyment of property. A number of factors are considered by courts when determining whether or not a particular nuisance is actionable and what a court will direct be done in response to a specific situation. The courts employ a balancing test. On one hand they consider the utility of the conduct causing the nuisance and on the other the gravity of the harm the conduct is causing.

Utility of the Conduct

The value to society of the conduct that is complained of will be a factor considered by the court when determining whether an actionable nuisance exists. If there is little value to society from the complained of activity, it will likely be enjoined or prohibited from continuing If there is value to society which comes from the complained of activity that will weigh on the side of allowing the activity. As judge Winslow expressed the value of pork to society in *Clark v. Wambold*, 160 N.W. 1039 (Wis. 1917) "so long as the human palate craves the thin cut of juicy ham and the crisp slice of breakfast bacon."

The suitability to the locality of the activity which is subject to complaint is also important. Often it is material in agricultural nuisance suits that the area surrounding the site of the claimed nuisance is devoted to the same activity being complained of. Thus the fact that 20,000 hogs were produced within a two mile radius of Ralph Glosemeyer's Missouri farm was important when he

was sued for nuisance by his neighbor.

The ability to avoid the harm is an important determinant. If the nuisance can be easily avoided but the person responsible for the nuisance insists on standing on his "rights," trouble often follows. Thus statements like "I don't have to and there is nothing you can do about it" do not ring true when replayed in court as in *Michael v. Michael*, 461 N.W.2d. 334 (Iowa 1990) and refusing to haul the extra quarter mile to avoid spreading next to the neighbors house results in an order to avoid certain fields completely and disk in all waste spread on others the same day it is spread as in *Valasek v. Baer*, 401 N.W.2d 33 (Iowa 1987).

Gravity of the Harm

The extent of the harm involved will be a determinative factor. If the harm is great and for prolonged periods the activity is more likely to be enjoined. The odor caused vomiting in both *Michael* and *Valasek* . In *Flansburgh v. Coffey*, 370 N.W.2d. 127 (Neb. 1985), the odor caused the Flansburghs' eyes to water and made it difficult for them to breath.

The social value of the activity harmed is important in the calculus. Thus it was a hard choice when the Sisters of the Blessed Sacrament brought suit against the Society for the Prevention of Cruelty to Animals claiming the noise from the kennels was a nuisance in *Ryan v. Louisiana S.P.C.A.*, 62 So.2d 296 (La. Ct. App. 1953). The extent of the harm may have been what carried the day. In this case the sisters had to place pillows or towels over their ears in order to go about their business.

The suitability of the harmed activity to the locality may help determine the matter. In *Town of Mt. Pleasant v. Van Tassell,* 166 N.Y.S.2d 458 (N.Y. Special Term 1957) The court held the district was better suited for dwelling and office buildings than for an early version of hog confinement.

Relative Hardships

The burden on the one complaining of putting up with the harm complained of will be weighed against the burden on the defendant caused by alleviating the harm. The burden of installing an air conditioner as against the burden of constructing a new livestock facility on a different piece of ground will be taken in to account.

It is likely that some of these considerations will be more important than others in a particular case. All can and have been important in the ultimate outcome of cases involving nuisance and agriculture.

Right to Farm Laws

The early and mid eighties saw every state in the nation enact some form of right to farm legislation, with South Dakota being the last in 1991. These laws can be seen as another attempt by those in agriculture to say: "There's nothing you can do about it."

The laws, however, have met with limited success. By and large, they are codifications of the common law doctrine of "coming to the nuisance." Most laws provide that in order to be protected from nuisance actions an agricultural operation must enjoy priority of location, that is be there, wherever, first.

Exceptions to that generalization are laws that provide protection to specific geographical locations, designated agricultural areas, or to operations which comply with certain agricultural practices, generally accepted or best management practices. Two states have recently adopted protections such as Iowa's recent law, which extend protection to all livestock producers regardless

of priority of location or geographical location, requiring only compliance with state and federal regulations as a prerequisite for nuisance suit protection. Iowa's newest right to farm law, passed in 1995, provides a rebuttable presumption that a livestock operation which complies with state standards is not a nuisance. The presumption can be rebutted with clear and convincing evidence that an operation is causing a nuisance that is unreasonable and continuous and is due to the negligence of the producer. The law has been characterized as one of the strongest in the nation and has been under constant attack. In fact it came very close to being amended in 1997 as part of a compromise made necessary by a district court decision indicating counties had much more authority to regulate livestock facilities than most had assumed. In return for a clear indication from the legislature that livestock regulation was to be under the exclusive preview of the state, many were willing to weaken the nuisance protections.

This may not have been such a concession as Right to Farm laws have not proven particularly effective for protecting pork producers, at least not universally so. Among the reasons for this ineffectiveness is the fact that most right to farm laws were written to protect established agricultural operations from new comers to the neighborhood who upon sensing the full spectrum of "farm fresh air" decide certain wave lengths of the spectrum are not desirable, and, in fact, interfere with their comfortable enjoyment of their property. While there are a few conflicts that still come about because of "city slickers who just don't understand the ways of farming," many more arise because older and established farmers do not understand or appreciate the new and expanded methods of pork production. Most conflicts today are between neighbors who have been in their current location many years and pork producers who are building new facilities or greatly expanding and changing existing operations. The priority of location is with the neighbor, not the farmer. Most right to farm laws do not protect the producer in such a situation. Even with right to farm laws, nuisance suits in many states prove to be a way neighbors can "do something about it."

<u>What Happens When a Producer Gets Sued for Nuisance</u>

There is a whole range of possibilities as one can imagine.

1. George Dixon, an Illinois producer, won the nuisance suit brought against him and his insurance company paid for his defense.

2. Noris Kerkhoff, an Indiana producer, wrote me a 15 page letter describing his three year ordeal in which he was found in the end not to be a nuisance to the neighbors. But victory was at a cost. Noris surmised that the amount of money expended on the trial could have put all of the children in both families involved through college—he intimated over $100,000. The emotional cost was what came through loudest in his letter, however. He said his family received emotional support from some neighbors but not nearly what he had hoped for. The trial took its toll even down to the elementary school children of the family. He concluded with a wish that an easily ascertainable standard be established so trial would not be what producers and neighbors would have to resort to determine what level of odor is acceptable.

3. Vance Overton, a producer with 35 sows, settled out of court by, in part, buying his neighbor's acreage. This was costly but perhaps a better value than spending the money on continuing legal fees.

4. I have not heard from Norm Wolff, Iowa's nuisance suit poster producer. The district court found that Iowa's agricultural-area-type right to farm law did not apply to Norm's case because he populated his 800 head finishing building with adjacent earthen waste holding basin before he had received his agricultural area designation from the county supervisors. Norm was ordered to pay his neighbor $45,000 in damages. He appealed the decision and thus became a

party in the first appellate case in Iowa interpreting the agricultural area law. Not only did he lose the appeal, the Supreme Court upheld the district court's damage award and they also sent the case back for determination of the diminution in value of the neighbor's property. *Wienhold v. Wolff* , 555 N.W.2d 454 (Iowa 1996). The district court then assessed Norman another $11,000. The only positive thing in the trial for the Wolffs was that the Supreme Court said the damages were for a permanent nuisance meaning Norman may operate as he has been in the future without fearing suit from those particular neighbors again. Slight concession compared to the $56,000 in additional expense to operate. There have been other wins and losses. The point to carry away is there are no guarantees when you take your case to court except that some one will pay the legal fees.

Fee Shifting, if I Win the Other Guy Pays, Right

There is a common misconception that the loser in a nuisance pays the legal fees incurred by the winner. This is rarely the case. Nine states include language with their right to farm law which seems to indicate the farmer is reimbursed his legal fees if he successfully defends a nuisance suit. Closer examination of the laws, however, reveals that such is the case only if the court determines the case was "frivolous," meaning there were no grounds whatsoever for the suit. This is a very hard standard to meet. In only three of those nine states do we find what is called strict fee shifting. Texas, Wisconsin, and Illinois appear to provide a simple shifting of fees when the agricultural producer prevails. The Illinois law, however, may be less than the bonanza it appears. In Illinois fee shifting can only apply when there has been a final judgment, making expenses incurred up to the point of an out of court settlement the responsibility of each party respectively. The only sure way to avoid the expense associated with a nuisance suit, in most cases, is to avoid the suit in the first place.

Impact of Nuisance on Pork Producers

The first impact should be and in many instances is, that producers now listen when they get complaints about their operation. Far from making statements such as, "There's nothing you can do about it," they should do whatever is possible to stay on good terms with their neighbors. Personal and public relations are now a priority in pork production.

Land Use Control

Land use control, or zoning, is largely a matter of local politics. It is powerful and pervasive. While zoning should be a matter of structuring development within a community according to a prearranged plan and not of excluding uses altogether at the whim of the current zoning board in response to public pressure, there is enough flexibility within zoning plans and procedures that the process is very much a reflection of current public sentiment.

At the moment land use control tends to impact pork producers by prohibiting or severely restricting their ability to locate within the zoned territory. While many would like to claim zoning represents an unconstitutional taking of property, it is clear in the law that unless the state physically intrudes onto one's land, as in the case of a road, or so restricts its use as to take all economic value from the land, the restriction is not an unconstitutional taking.

The only thing standing between extreme restrictions on pork production in many states from local zoning ordinances are state laws restricting the application of county zoning to agricultural operations. Illinois, Iowa, Missouri, and North Carolina are among those with such

restrictions. Those provisions are constantly under scrutiny.

In Iowa, significantly, the provision was held, pursuant to a 1971 decision of the Iowa Supreme Court, not to apply to agricultural operation which were "independent productive activities." Because the Iowa law does not define what it means by agriculture when it prohibits the application of county zoning laws to agriculture, counties and the courts were free to construct their own definitions of the term. Many counties, more than 40 of the 99 in Iowa, did in fact restrict agricultural operations based on definitions of agriculture that removed from the term operations with, for example, corporate ownership, over a certain number of animals in one operation, a certain percentage of feed produced off farm, etc. The court reversed itself in 1996 and stated it would look only at the activity being regulated and not other aspects of the operation or the operator when determining whether an operation is agricultural or not. Whereas the court had determined in 1971 a proposed 80,000 chick raising facility on five acres was not an agricultural operation, they determined in 1996 a 2000 head hog finishing building on five acres was an agricultural operation.

Just when it seemed clear counties no longer had any regulatory power over agricultural operations, Humbolt county enacted a set of ordinances based not on their zoning authority but purportedly on their general powers to regulate for the health, safety and welfare of the people. The ordinances were challenged and upheld at the district court level. The case has been appealed. Conflicts between pork producers and local neighbors continue on many fronts.

Environmental Law

Environmental regulation is relatively new to the law, beginning in the late 1960's and reaching a significant milestone with the passage of the Clean Water Act of 1972. Previously the law largely relied on public (as distinguished from private) nuisance suits, a well established part of the common law. Even though relatively new in historical legal terms it is clear environmental regulation is here to stay. Environmental regulation as it pertains to agriculture is even newer, but is just as certain to be a part of the law as is general environmental regulation. Major changes have taken place in state regulation of agriculture, especially livestock, in the last three years and more changes are to come.

Features of new environmental regulation in pork production include:

1. Continuing education for manure handlers. First seen in Arkansas, manure applicator certification is now a part of the law in both North Carolina and Illinois and will undoubtedly be a feature of other states programs soon. Similar to pesticide applicator licensing programs, programs for certifying manure applicators stress responsible procedures and the dangers inherent in misapplication. These programs are aimed at preventing problems before they occur by relying on the benefits of education. They represent another requirement for the pork producer to fulfill.

2. Manure management plans are another common feature of new regulatory schemes for livestock producers. Commonly producers are required to produce a plan showing that the nutrients from the manure produced in their facility will be utilized by the crops grown on the land used for manure application. Manure is to be applied at agronomic rates. Records of manure application must then be kept in order to show compliance with the plan. Most regulations only track nitrogen.

3. Some form of financial assurance is commonly required to assure counties will not be stuck with clean up costs should a producer be unable to pay for proper closure of a lagoon or other waste holding facility. Additionally, some regulations are requiring financial assurance for

environmental damage caused by accidental or intentional contamination of ground or surface water.

4. Separation distances between neighboring houses, schools, churches, or businesses are being increased. Most separation distances are linked to the size of the operation. The larger the operation the larger the separation distance. This is an attempt to regulate the impact of the odor associated with pork production. Odor regulation is not pervasive except as in separation distances. The difficulty in measuring odor and quantifying an acceptable level have kept overt odor regulation form appearing in regulations.

5. Closer supervision of construction of new facilities, especially the waste holding portions of the facilities, is now required in many states. Illinois now requires earthen structures be constructed under the supervision of a certified engineer. Iowa requires a certified engineer certify the structure was built according to plan specification. This is in contrast to former regulations which only required plans be drafted by a certified engineer. Additionally, requirements for structures are being changed to provide greater assurance the waste will not contaminate the ground water. Thicker clay liners are being required, inspection for and removal of drainage tile lines is now required, and water table provisions are being strengthened.

6. Inspection on a regular basis by state environmental officials is now a common feature of many states' regulatory schemes. This is a feature in both Missouri and North Carolina.

The impacts on pork producers of these regulations are several. It is now more expensive than ever to begin a pork enterprise. Greater separation distances means higher land acquisition costs. Increased engineering requirements means higher engineering fees. Increased record keeping requirements means more book work and the related expense. But perhaps the greatest cost is in the time it takes to make sure your operations will comply with the requirements. Lenders are now more cautious. Many now want assurances your proposed facility is approved by the local and state regulators. Any indication of opposition even if the ground of opposition is not well founded is likely to make a lender leery and slow the process if it does not cancel the loan altogether. Producers in some instances are becoming more secretive, and sometimes with good reason. In two different instances in two different states producers are fighting a regulatory battle that resulted when their plans for new facilities were shared with the public, with the result that house trailers were moved in on the corners of adjoining properties in an attempt to defeat the required separation distances. Had the producers begun construction without notifying the neighbors, there would have been no opportunity for the "new residences."

In some cases pork producers are becoming more politically active. As they see that local and state politics has a real potential to impact their operations and their lives they become more politically aware and more willing to participate in political efforts.

Many are making real efforts at public relations. Seeing that pork production has such a bad reputation, some are inviting school classes to their new facilities to explain the production process and show the environmental safeguards built in to the new facilities. Public relations is now recognized as an integral part of many operations.

Some producers are calling it quits. As buildings age and the cost of upgrading increases many producers feel the effort necessary to stay in pork production is not worth the return. Some producers commit to improving their facilities and to staying in pork production.

For many pork producers who are doing an excellent job of maintaining their facilities and protecting the environment, the continued push to enact further regulations and the continued and worsening public perception of pork producers the impact must be to cause next to despair. Pork producers, never high on the social ladder, are now thought of by much of the general public as

barely better than scum, right down there with deadbeat dads and dog kickers. The impact must be depressing.

What Needs to be Done

Public perception of pork production must be changed. Public relations along with environmental costs must be factored into the budget for a pork production facility. Pork producers can no longer simply pay attention to the pigs, but must be concerned with the neighbors as well.

Some established principles in the design and operation of facilities must be re-examined in light of the increased cost of regulation and the risk of nuisance suits. Perhaps aeration of lagoons is not cost prohibitive. Covers over manure storage facilities may not be too expensive. When the alternative is buying the neighbor's land or fighting the neighbor or the state in court, a few dollars for increased odor containment or environmental protection may look pretty good.

Public perception of the pork industry is at an all time low and yet the financial outlook for profitability has never been better. The challenge for all involved is great but the potential rewards are substantial.

WASTE MANAGEMENT OPPORTUNITIES FOR POULTRY GROWERS

By

Richard D. Urban, Ph. D.*

Poultry Water Quality Consortium

The Poultry Water Quality Consortium (Consortium) is a proactive initiative of the poultry industry (U.S. Poultry and Egg Association) and three governmental agencies (United States Department of Agriculture - Natural Resources Conservation Service; United States Environmental Protection Agency; and Tennessee Valley Authority) that was created in 1991. The poultry industry has experienced continual and consistent growth over the course of several years. With this growth there has been increased visibility of the industry's activities by the public, as exemplified by the increasing number of broiler houses which are dotting the country side. Not only are there more broiler houses but they are larger, again making them more visible.

As the public became more aware of the growth in the industry they identified several environmental concerns related to the production of poultry:

- Degradation of water quality of streams, rivers, and lakes from increased loading of nutrients (nitrogen and phosphorus) and bacteria;
- Pollution of ground water from nitrogen and pathogenic bacteria; and
- Control of nonpoint sources of pollution.

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These issues were related to how growers were handling their by-products - dead birds and litter. There were many examples of dead birds and litter being improperly managed, which only increased the apprehension of the public. In addition there was an increasing number of growers who were experiencing degraded water quality in the water supplies being used for drinking water for their birds.

There are four basic objectives of the Consortium:

- Pollution prevention;
- Protecting the environment and natural resources;
- Encouraging the use of poultry by-products as a resource rather than a waste; and
- Technology transfer.

To meet these challenges the Consortium is promoting cooperation and information exchanges between government and industry on water quality and by-product utilization. By focusing on pollution prevention, the Consortium encourages the development and transfer of new technologies designed to protect water quality and promote a clean environment. One of the tools used by the Consortium to disseminate information is the Poultry Water Quality Handbook, which contains information on water quality issues, poultry waste management, poultry mortality management, other related environmental issues (e.g., air quality, pest control, and siting facilities), and resource information (e.g., names and addresses of federal and state agencies and poultry organizations).

Mortality Management

With both the number of broiler houses increasing and the number of birds being raised in each house increasing, management of the naturally occurring mortality has become a major issue for the grower. In providing information on alternative mortality management methods the Consortium focuses on methods that allow for the environmentally safe and biosecure disposal of poultry carcasses. No single method will completely solve the problem. Mortality management methods available to the grower that achieve the basic criteria are:

Burial Pits - a reinforced hole in the ground with an open bottom and one or two covered openings in the top through which carcasses are dropped.

Incineration - cremation of carcasses, a biologically secure method of disposing of dead birds in which the ash is not disposal problem.

Rendering - cooking the carcasses and converting them into a useable ingredients such as protein, fat, feed products, or nutrients. However, getting the dead birds to the rendering facility poses a biosecurity challenge. To reduce the possibility of spreading disease the industry has used on-the-farm freezing and acid preservation as holding techniques for the dead birds before they are delivered to the rendering facility.

Composting - on-the-farm composting of dead birds in a specially designed facility, a natural process that relies on bacterial decomposition of organic matter to produce a product that is pathogen free and has several beneficial uses.

Litter Management

Changing land use patterns and increasing restrictions or regulations on the disposal of litter require that the industry to take a proactive position on the management of litter. Because poultry production is concentrated in fairly small geographic areas, waste management planning has become an important part of the grower's operation. The Consortium stresses the need for the grower to have an integrated waste management strategy. The grower must plan for the ultimate use of the litter. Therefore, waste management begins inside the poultry house. Along with the grower's objectives of flock health, production, and odor control, today's waste management strategy must also protect water quality and contribute to a profitable farm operation.

Properly managed poultry litter has an economic value as:

Cattle Feed = $80 or more per ton; or
Fertilizer = $25 - $28 per ton

Part of the waste management program must be the storage of litter so that it retains its nutrients and nutritional value. Development and utilization of nutrient management plans permits the grower to land apply the litter while minimizing the possibility of creating a nonpoint source of pollution.

Status of the Poultry Industry

The poultry industry has experienced a consistent rate of growth over the last several years. The National Agricultural Statistics Board in its April 1997 ***Poultry Production and***

Value publication stated that the value of poultry production in the United States for 1996 was 21.8 billion dollars. USDA's World Agricultural Outlook Board in its publication ***Agricultural Baseline Projections to 2005, Reflecting the 1996 Farm Act,*** projected broiler production to increase 42% between 1996 and 2005 and the export market to gain about 57%. Such projections suggest that the rate of growth experienced by the poultry industry in the past will continue into the foreseeable future. Such growth will increase the environmental concerns that the industry must address. This is especially true for those regions of the country where the poultry industry is concentrated (Tables 1 and 2).

With the projected growth of the poultry industry the demand for environmentally sensitive and biosecure mortality management methods will continue to increase. In 1991 when the Consortium was created mortality management options were limited to burial pits, incineration, and landfills. Composting and rendering were in the testing and demonstration phase. There are still some technical issues to be resolved with on-the-farm storage of dead birds and how to deal with feathers at the rendering plant before rendering can be a universally available mortality management alternative. Composting, however, has proven to be a cost effective mortality management strategy for the growers regardless of their geographical location. Through the technology transfer efforts of the Consortium composting as a poultry mortality management strategy has gained popularity as a method for dealing with dead birds.

Table 1
1996 Broiler Production - Top Ten States[1]

State	No. Produced (1000 Head)	Value ($1000's)
Arkansas	1,155,000	2,122,313
Georgia	1,154,000	2,205,294
Alabama	873,300	1,634,802
North Carolina	681,100	1,310,429
Mississippi	675,900	1,197,004
Texas	419,200	726,264
Maryland	294,800	512,672
Virginia	259,100	466.388
Delaware	257,600	524,216
Missouri	246,300	397,163

1. United States Department of Agriculture, National Agricultural Statistical Service, April 1997, *Poultry Production and Value.*

Table 2
1996 Turkey Production - Top 10 States[1]

State	No. Produced (1000 Head)	Value ($1000's)
North Carolina	59,500	612,255
Minnesota	43,500	426,735
Arkansas	28,000	231,616
Virginia	25,000	204,250
California	22,500	221,738
Missouri	22,000	248,798
Indiana	14,000	151,102
Pennsylvania	11,700	103,194
South Carolina	8,300	107,717
Iowa	8,000	101,936

1. United States Department of Agriculture, National Agricultural Statistical Service, April 1997, ***Poultry Production and Value***.

In 1996, the Consortium conducted a survey in all 50 states to determine the number of mortality composters in service. In 1991 there were no mortality composters in commercial operation. By 1996 there were over 7,600 composters in service handling the dead birds being generated in normal growout operations (Table 3). The number of composters is expected to continue to increase as growers curtail the use of burial pits, the integrators require growers to use composters, and the USDA provides cost-share money for their installation.

Table 3
Poultry Producers With Mortality Composters in the Major Poultry States as of 1996

State	No. Producers	No. Compsters
Arkansas	5,748	1,485
Georgia	4,159	160
Alabama	4,184	768
North Carolina	5,040	760
Mississippi	2,808	436
Texas	945	115
Maryland	1,596	624
Virginia	954	283
Delaware	1,191	591
Missouri	1,000	500
Total U. S.	47,582	7,602

The industry has worked to improve the in-house management of the litter which has enabled more flocks to be raised in a house before it must be cleaned out. Consequently the nutrient content of the litter has increased making it a more valuable by-product. Based upon the 1996 production of almost 7.6 billion broilers in the United States, enough litter was generated to create a two lane highway three feet deep and 1619 miles long. This highway would run from New Orleans to Chicago to Fargo, ND. The volume of litter will only increase as the industry continues to expand. With this increase in volume of litter comes new challenges to the grower on what to do with this ever increasing volume of material. In some areas, as noted in a March 24, 1997 ***Poultry Times*** article, the "Demand for poultry litter as fertilizer exceeds supply in Georgia." In this same article Stan Savage, Poultry Scientist, Georgia Extension Service, stated that "if farmers can buy and spread litter for less than $25 per ton they are coming out ahead." This statement points to one of the problems that a grower or any potential user must address—transportation costs.

While some areas of Georgia and other States can still use more litter, there are other areas that have too much litter. A headline in the March/April 1997 University of North Carolina, ***Water Resources Research Institute Newsletter*** read "Broiler producers facing waste disposal pinch." Poultry litter not only contains nitrogen and phosphorous but also other chemicals such as copper and zinc which accumulate in soil. Consequently, after years of application of litter to soil these

compounds reach concentrations that become toxic to plants. This is happening in parts of North Carolina, thereby removing land application as a viable management alternative for many growers. Land application of litter also raises concerns about storm water runoff and being a source of nonpoint source pollution. Because of nonpoint source pollution and plant toxicity concerns the Consortium emphasizes the need for the grower to develop waste management plans that include, among other things, nutrient management plans.

As with mortality management there is no one answer for managing poultry waste. Other alternatives that are being evaluated include:

- Fluidized Bed Combustion units sized for the individual farm which burn the litter in a specially designed furnace with reduced air emission and make the heat available for other beneficial uses.
- Fuel for steam electric generating stations (being explored in England).
- Horticultural media for the plant nursery industry (being evaluated and showing some promise).

The challenge facing the poultry industry and researchers is how to take these growing masses of poultry by-products and create sustainable uses which also add economic benefit to the growers and the integrators.

COLLABORATIVE PROCESSES IN PUBLIC POLICY: LOCAL MORATORIA ON INTENSIVE LIVESTOCK OPERATIONS IN NORTH CAROLINA

By

L. Steven Smutko*

Introduction

The hog industry in North Carolina has experienced a rapid expansion since 1990. The industry has nearly tripled in size since that time, moving North Carolina to the number two position in hog production in the United States, behind Iowa. This growth has not occurred without controversy. As the industry has expanded, concerns about odor and water pollution have been voiced by rural neighbors, environmental organizations, and anti-hog activists. A massive lagoon eruption in June 1995 tilted public sentiment and political action toward tighter controls of the industry. At the state level, the legislature handed new tools to its regulatory agencies to reduce the risks of water pollution and isolate animal production areas from residences, churches, schools, and businesses. Local governments began to use their police powers and health rules to curtail, and in some cases, halt further expansion of intensive livestock operations.

Craven County, located on North Carolina's coast, has a strong economic base in both agriculture and tourism. There, the Neuse River opens up to the Pamlico Sound at the eastern end of the county. Noted as a haven for fishers and boaters, the county has been the focus of attention as millions of fish have washed up on its shores, a dramatic symptom of pollution from nutrient runoff and discharges in the upper reaches of the watershed.

Like its neighboring counties in the coastal plain, Craven County has experienced unprecedented growth in hog production. The number of hog operations doubled from 15 in 1990 to 31 in 1997. Although there was some organized local opposition to this growth, the issue gained wide attention when a group of investors announced plans to construct a large sow operation on land in southwest Craven. Following strongly voiced concerns by rural and urban residents, the Craven County Board of Commissioners passed an ordinance in February 1997 declaring a moratorium on new intensive livestock operations and expansion of existing operations. Citing numerous public and environmental health concerns, the Board recognized the need for a public discussion on the issues surrounding the growth of the livestock industry in the county.

The ordinance called for the formation of the Craven County Intensive Livestock Operations (ILO) Moratorium Study Committee to conduct research to describe the problems associated with intensive livestock operations and recommend solutions to those problems. At its inception, the Study Committee was to be composed of representatives of the livestock industry, the county health department, a local environmental organization, the NC Cooperative Extension Service, the Soil and Water Conservation District, and citizens at large. However,

because of a lawsuit filed by the Pork Producers Council protesting the county moratorium, local hog producers were advised by Council attorneys not to participate on the committee.

Recommendations by Consensus

The Study Committee's objective was to forward a consensus recommendation to the Board of Commissioners on how the Board should proceed with respect to adopting regulations of intensive livestock operations over and above those enacted by the State of North Carolina. Recognizing the level of disagreement within the community over siting and management of swine operations in Craven County, and the diversity of opinions held by those at the negotiating table, the Craven County ILO Study Committee enlisted a facilitator to assist them in reaching a consensus decision.

The Craven County ILO Study Committee is one example of many where "devolution" in local decision making has occurred. Governing bodies are finding that they can offset the risks of making decisions on controversial and divisive issues by seeking consensus recommendations from appointed citizen committees and boards. However, these efforts are not always successful. Citizens appointed to reach agreement on a set of recommendations often represent the strong positional factions that make up the sides of the dispute. Once together, they are usually hesitant to give up their respective positions in order reach a consensus. Disputes about which data to use to define the problem and reach solutions is often a matter of disagreement. Moreover, the problems they are instructed to resolve are often linked with other problems facing the community. However, by adhering to some basic principles, groups can overcome these obstacles to consensus decision making.

This paper provides a short overview of the principles of collaborative problem solving -- a term that describes the efforts of a diverse group to come together to reach a jointly agreed upon path for problem resolution. These principles can be considered in the context of representatives of the many interests at stake getting together and negotiating an agreement that works for all. Hence, many of these principles are discussed in this negotiation context. The application of these principles is demonstrated using the efforts of the Craven County ILO Study Committee as an example.

Principles of Collaborative Processes[1]

Collaborative processes include group interactions that promote lateral communication and working together. The following principles have been identified from case studies of successful processes. The extent to which these principles are being followed in Craven County is discussed.

- *The key decision makers must agree to participate in the collaborative process and use it as an integral part of their 'real' decision-making process.* In Craven County, the Board of Commissioners established the Study Committee and charged it with the task of recommending policy actions.
- *The power of a collaborative process comes from being inclusionary, not exclusionary. Processes which exclude participants create process saboteurs*. The Craven Board of Commissioners attempted to include all stakeholders in the Study Committee. The decision

by the pork producers not to participate may hinder implementation of the final recommendation.

- *Regular and free-flowing information is crucial for keeping decision makers, participants, and the non-participating public informed. Constricted flows of information and distrust*

of the process create suspicion. The focus of the Craven Study Committee has been to share information between organizations represented at the table.

- *A collaborative process is educational to the participants and to the decision makers*. The Study Committee has actively sought new information upon which to base its recommendations. Every member of the committee has learned something from the process.
- *Decisions made by consensus incorporate everyone's views*. The Craven Study Committee agreed to search for consensus recommendations. It was perceived that a recommendation that everyone could endorse would be more acceptable by the governing body, and hence more likely to be adopted.
- *A key to a successful process is well-run meetings. A meeting facilitator is often essential*. In Craven County, a facilitator was brought on board to help run each meeting, contact speakers, and document the group's findings.
- *Before the process commences, it must be designed, explainable, and agreed upon. Processes that are not thought through often appear to be a waste of time.* The first order of business of the Craven County Study Committee was to adopt a group charter which describes the process and the purpose, the nature of the final product, the stage of the decision making process, links to formal decision making, and procedures for reaching consensus.
- *Multiple viable options are identified as a means of seeking a wise, durable, and implementable solution*. The purpose of the joint fact finding phase of the Craven County process is to generate as many options as possible.
- *Participants share responsibility for the management of the process and benefit in the success of the process*. The facilitator merely organizes information, creates a civil and fair atmosphere for deliberation, and enables the participants to use their time most effectively. The process, and hence the outcome, is truly owned by those at the table.

Complexities of Public Disputes

There are issues in public disputes that make them more complex than most private disputes. These include issues of representation, media, data, links to formal processes, and overlapping issues. Each of these is discussed briefly below.

Complex Data Issues

Data can be a source of contention. It is often used as a tool by the parties to support their positions. Gridlock often occurs when proponents of the different factions disagree on which data is relevant in defining the problem and in finding solutions. Information is most useful when it is commonly created and helps develop a common body of knowledge which the group uses to evaluate options. As a "fact finding" committee, the Craven County Study Committee had to deal with data issues early in their deliberations. Rather than debate on whether information from any one source was biased, they agreed to select data from a variety of fields and organizations and present a summary of all the information gathered in a findings report. They would then base their deliberations on these findings.

Representational Issues

All parties to the dispute, and all parties who can affect, or are affected by a possible solution, should be represented at the decision-making table. Problems with representation are two-fold: (1) working with a potential large number of people, and (2) getting stakeholders to the table. In cases where many people have a stake in the issue, narrowing the field to a manageable number will require effective representation of the many stakeholders by a few participants in the process. The challenge is to ensure that representatives at the table are truly representing the interests of the various stakeholders. Members of the Craven County group have agreed to actively inform their constituents of the committee's deliberations, and to seek feedback on how they should proceed from meeting to meeting.

Another challenge is to ensure that all parties are represented at the table. If an individual or group is excluded from the process, the resulting solutions are likely to be attacked, endangering the consensus process. The fact that no hog producers are represented on the Craven County Study Committee, for whatever reason, may jeopardize the recommendations that the group forwards to the governing body.

Complexities of Overlapping Issues

In public disputes, it is very common for many issues to be under negotiation at the same time. Some will be contentious while others are smooth. It is not uncommon for parties to attempt to link the issues to balance a concession on one issue for a gain on another. Or, a party can allow animosity on one issue to spill over into another topic.

While linkage between issues can be real and inevitable, a rule of thumb should be to separate issues when possible. Separating issues can simplify overwhelming complexities and allow participants to make small accomplishments when tackling large problems.

In public disputes, it is particularly important to separate personal relations from substantive issues. There may be justifiable reasons not to like a representative of another party. As a representative of a public interest however, personal interests must be balanced against public interests.

Complex Links to Formal Processes

It is very common in public disputes that the principal negotiator is a government body and is not a party in the problem-solving process. In these cases, regardless of the collaborative agreement reached in the conflict resolution process, that decision can not be implemented until ratified by an official decision making process.

If the public decision-making body is not represented in the collaborative process, it is important to make regular links to it. A successful process should produce no "surprises" at the end. To the contrary, it should produce a result that the decision-makers can claim as their own.

Links to the Craven County Board of County Commissioners have been maintained in two ways. First, members of the decision-making body were brought into the process as active participants. Secondly, periodic formal reports have been made to the commissioners to confirm approval of preliminary decisions and assure support for the final product.

Shifting Policy Landscape

A group working in a public conflict resolution process has to be aware that it is working in a shifting landscape. At any time during their deliberations, events may occur that will change the nature of the problem or the availability of options for solution. Changes of this sort also can occur after a process is concluded, making implementation difficult. Examples of this shifting landscape include legislative decisions made by another governmental authority that may alter the issue significantly, or an election that changes the membership and political balance of a decision-making body in the middle of a process.

In the collaborative problem solving process, these changes should be anticipated. Candidates for key offices should be briefed on the justification, process, and progress of ongoing processes. When necessary, negotiations should be planned to avoid decisions at particularly unstable times. Implementation plans should permit reopening the discussions (rather than abandoning the agreement) when change occurs.

Several months after Craven County issued its moratorium on new or expanded intensive livestock operations, the North Carolina General Assembly enacted a two-year moratorium on new and expanded swine operations statewide. They also provided local governments with additional powers to control the location of new facilities, and added more restrictive buffering requirements on new operations. Given that these changes were expected for more than a month before they were enacted, and that the Study Committee had not completed its deliberations, it was a simple matter for the group to absorb these changes in their deliberative process.

Complexities of the Media

The media role is complex. In private disputes, information can be shielded behind closed doors and court orders. In public disputes, members of the media believe they have a responsibility to report information about decisions that affect the public. At the same time, they want to play a constructive role in their communities. The media poses as a neutral while simultaneously filtering, amplifying, fact-finding, and adjudicating.

Treated with respect, the media can be extremely helpful and cooperative partners in a collaborative process, transmitting information you want and need dispersed. Once the need for discretion is explained, the media will usually give limited cooperation. A group should decide early in their work how they want to deal with the media. Usually, the earlier the media is involved, the better. In public disputes where all affected persons are seldom directly involved, the media plays a key role in communicating between representatives and their constituencies, and between decision makers and the public.

The Craven County Study Committee agreed early in the process how they were to handle the media as well as citizens interested in their deliberations. They established ground rules for working with the media (not commenting on issues currently under deliberation, and not characterizing other members of the committee, are two examples), and identified a single spokesperson to speak for the group.

The Four Pillars of Collaborative Problem Solving[2]

To successfully work through the complexities of the intensive livestock issues in Craven County, the Study Committee agreed on a set of principles on how they were to interact and strive toward a consensus decision. These principles are at the heart of "principled negotiation" and described by Roger Fisher and William Ury in their book *Getting to Yes*. These principles

are extremely useful for individuals or groups in conflict who seek to resolve their issues through a negotiated agreement. Consensus, by its very nature, is an act that involves two or more people who negotiate in order to reach agreement. Hence, successful consensus decision-making is founded on principles of negotiation.

Separate the People from the Problem

To resolve a problem, participants in a collaborative problem solving process must move beyond relationship conflicts and jointly focus on the problem at hand. The substantive issue cannot be resolved until any relationship issues are dealt with, or at least temporarily shelved. Perception is a key to moving beyond relationship issues. Parties at the negotiating table need to understand how others perceive the issue at hand. It is important that they discuss each others' perspectives.

Emotion enters the negotiated problem solving process in may ways. Fear, anger, anticipation, and elation are all emotions that are expressed at various times during a negotiation. Negotiators need to recognize and understand the emotions that others may be feeling during the process, as well as make their own emotions explicit. Often, people need to vent before they can begin to resolve the problem.

Communication plays a key role in the negotiators ability to separate relationship issues from substantive issues. Each person at the table must make an effort to make him/herself understood, and to listen to what others are saying.

Focus on Interests Not Positions

A position is where an individual stands on a particular issue at a particular point in time. Interests are the motivating factors that led her to the position she has taken. A position represents only one way an individual can meet his interests. There may be many ways to satisfy those interests, many which the individual had not thought of. By moving beyond positions to interests, negotiators open up the realm of solution possibilities.

To focus on interests, negotiators need to communicate. They need to share information on why they have a particular position, recognizing that the most powerful interests are basic human needs. Once interests are articulated, negotiators then have an opportunity to bridge their interests and find solutions that work for everyone.

Invent Options for Mutual Gain

Once interests are identified, negotiators then engage in a brainstorming exercise of inventing options to satisfy their interests and those of the other negotiators. Although this is usually the least contentious phase of any negotiation, Fisher and Ury identify four obstacles that can prevent negotiators from fully exploring the range of options.

When inventing options, negotiators should allow any and all ideas to be offered for discussion. Prematurely judging ideas will stymie the free thinking necessary to discover the best options. Another obstacle to discovering the full range of options is the tendency of people to search for a single answer, when a combination of options might work best. Negotiators often enter the option generation phase with the assumption that all resources are fixed, forgoing any options that can work to expand the pie. Finally, when negotiators leave it up to each other to

solve their own problems, even when options come to mind that will help the other side, the full range of options will certainly not be discovered. The idea is to search for options that work for all.

Use Objective Criteria to Evaluate Options

Inventing options should not require debate and deliberation. Selection of the best option most certainly will. To select the best option, negotiators must identify a set of criteria independent of each others' will. Rather than debating which criteria are best, negotiators should instead frame the issue as joint search for objective criteria. Typically, we select criteria that represent fair standards by which to evaluate options. For example, economic, legal, or technical feasibility are commonly used standards as are standards of equity and efficiency. But negotiators can also agree on a set of procedures that will be used in evaluating options as well.

Stages of the Collaborative Problem Solving Process[3]

Based on the principles of collaborative problem solving, groups can undertake a systematic approach to problem resolution. This approach, as outlined here, forms the backbone of the process undertaken by the Craven County ILO Study Committee. Note that the steps in the deliberation phase coincide with the four pillars of collaborative problem solving. With the aid of an outside facilitator, the Study Committee has moved through the phases of pre-deliberation, and deliberation.Their final product, a set of policy actions to be undertaken by the Board of County Commissioners, was as yet incomplete at the time of this writing. The steps in the post-deliberation phase have yet to be undertaken.

Initiation

Someone, a stakeholder in the issue or a trusted outsider, has to raise the possibility of collaboration and initiate the process.

Getting Started - The Planning Phase

The planning phase should be carried out with a group of stakeholders who are knowledgeable about and committed to the issue and are willing to participate in the process from the beginning.

1. **Assess the issues**
   - Identify conditions for collaboration (see Process Design: Understanding the Issues)
   - Develop a clear description of what needs to be addressed.
   - Frame the problem in question form: "How can we..."
2. **Identify stakeholders**
   - Determine what (whose) interests are at stake.
   - Who can affect and who is affected by the issue?
   - Contact stakeholders and determine their needs for participating in a collaborative process. Stakeholder interviews are crucial to the design of the process.
3. **Design a strategy**
   - Consider most productive format: committee, negotiating team, conference format.
   - Agree on process steps.

- Plan your time frame.
- Identify roles and who might fill them: chairperson, facilitator, recorder, technical resources, meeting logistics, etc.

4. **Set up a program**
   - Decide on logistical details: where and when to meet, agenda, etc.
   - Draft a meeting plan (also called "group protocols" or "convening document").

Searching for Agreement: The Deliberation Phase

At this point all stakeholders have been contacted, the process strategy has been designed, and the first meeting has been convened.

5. **Establish procedures**
   - With the whole group, ratify the meeting plan drafted in the planning phase. Make changes where necessary.
   - Develop ground rules to guide the discussion.
6. **Educate each other**
   - Share concerns related to the topic.
   - Identify what is given.
   - Identify what is understood.
   - Identify sub-issues.
   - Identify and share interests --reasons, needs, concerns and motivations underlying participants' positions -- rather than assert positions.
7. **Define the problem**
   - Define the present situation.
   - Define the desired future.
8. **Specify information needs**
   - Identify technical background information that is pertinent to the issue.
   - Identify information that is available and information that is needed.
   - Agree on methods for generating answers to relevant technical questions, or a path to follow even if no technical consensus exists.
9. **Educate each other (again, and whenever it is needed)**
   - Field trips.
   - Collecting data/soliciting reports.
   - Briefings.
   - Interviews.
10. **Generate options**
    - Use task forces for larger groups.
    - Bring in the public.
    - Brainstorm.
    - Use expert opinion.
11. **Develop criteria for option evaluation**
    - Technical
    - Political
    - Value-based
12. **Evaluate options**
    - Priority matrix

- Goal achievement.

13. Reach agreements
    Methods of reaching agreement include:
    - Build up/eliminate
    - Single text.
    - Agreement in principle.
    - Building block

14. Develop a written plan

- Document areas of agreement to ensure a common understanding of the participants' accord.
- Develop a plan of action: what, how, when, where, who.

After the Agreement is Reached: The Post-Deliberation Phase

Once an agreement is reached, many groups tend to relax, and pay little attention to the crucial steps of the post-deliberation phase. This often proves to be the downfall of many negotiated settlements. If the negotiators' constituents are not fully behind the agreement, or if formal decision makers are surprised with the final outcome, all the hard work put into the process may be wasted.

15. Ratify the agreement

- Parties get support for the plan from organizations that have a role in carrying it out. Each organization follows its own internal procedures as it reviews and adopts the plan.

16. Integrate the agreement into the public decision-making process

- Governing bodies and agencies not directly included in the process have been kept informed during earlier phases of the process.
- Plan is considered and acted upon by the relevant agencies and governing bodies for implementation.

17. Implement the agreement

- Maintain communication and collaboration as the plan is carried out.
- Monitor your results.
- Renegotiate, if necessary.
- Celebrate success.

Conclusions

Policy making in a divisive and contentious environment is fraught with pitfalls. The collaborative problem solving approach provides a principled, yet systematic method of reaching decisions that can potentially work in favor of all stakeholders. However, It is both difficult and time consuming. In Craven County, North Carolina the process will be put to the test as the Intensive Livestock Operations Moratorium Study Committee moves forward in search of win-win solutions to the challenges of raising hogs in paradise.

Endnotes

1. The ideas presented here on principles of collaborative processes and complexities of public disputes are adapted from the work of the Institute for Conflict Analysis and Resolution, George Mason University, Fairfax, VA, namely Frank Blechman and Wallace Warfield. They are presented in various training notes produced by the program.

2. These four pillars are the principles identified in the seminal manuscript, Getting to Yes, Negotiating Agreement Without Giving In (2nd Ed.), by Roger Fisher and William Ury, Penguin Books, New York, 1991. They form the foundation of what is known as principled negotiation, a way search for win-win solutions to disputes between two or more people.

3. Lawrence Susskind and Jeffrey Cruikshank of the MIT-Harvard Public Disputes Program in their book, Breaking the Impasse, Consensual Approaches to Resolving Public Disputes (Basic Books, Inc, New York, 1987), outline three major stages of the negotiation process. These are namely: prenegotiation, negotiation, and postnegotiation. In this paper, the term "negotiation" has been softened somewhat and reframed as "deliberation" in order to incorporate all types of collaborative decision-making processes. Finally, the discussion incorporates the work of Susan Carpenter in presenting a programmatic approach to public dispute resolution (Solving Community Problems by Consensus, Program for Community Problem Solving, Washington, D.C., 1990).

A KENTUCKY STRATEGY FOR EDUCATION ABOUT RESOLVING CONFLICT THROUGH LEADERSHIP: THE NATURAL RESOURCES LEADERSHIP INSTITUTE

By

Craig L. Infanger*

With almost every off-campus group with whom I have worked on public policy education since 1979, I have explained my interest and role with a quote from Thomas Jefferson:

> *I know no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion by education. (1820)*

I have never felt better about my role in informing their discretion by education than during my three years of experience with the Natural Resources Leadership Institute (NRLI). This has been a genuinely successful experience in off-campus educational programming to promote collaborative problem solving and conflict resolution in natural resources. I've learned a good deal from this experience. This paper provides an overview of NRLI and then expands on two special topics which relate to shared experience in teaching about natural resource issues: the role of values and environmental policymaking.

The Natural Resources Leadership Institute

NRLI is an adaptation of Extension's successful experience in agricultural leadership programs. Underwritten by Philip Morris and other tobacco manufacturers, both NC and KY have conducted intensive agricultural leadership programs for several years. Aimed primarily at young tobacco producers and those with related interests (e.g., banking, Farm Bureau, farm supply, etc.) these programs have focused on personal leadership skills, communication, influencing policymaking, and understanding the economics and policy environment confronting agriculture today. This complemented the on-going work of policy educators and was a natural application of the alternatives-consequences policy education framework promoted by extension agricultural economists in most states.

Leon Danielson and others at NC State first proposed extending our successful agricultural leadership work to a new audience and with a new focus -- collaborative problem solving. The new target audience would be stakeholders from resource-based industries, regulatory agencies, environmental advocacy groups, landowners, educators, and area/county extension agents. This represents an enlargement on the traditional clientele of policy education efforts conducted by agricultural economists in the South.

After we were successful in obtaining a large grant from the Kellogg Foundation to implement NRLI in 1995, we were able to recruit a part-time (75%) program manager, Jennifer Thompson. She brought significant mediation and facilitation experience with her. Although a geology graduate student at the time, she had been involved in consensus-based group decision

making for some time. NRLI's early success in both NC and KY can be attributed to the recruitment of day-to-day managers with conflict resolution and facilitation skills.

In implementing the first class in KY, we faced substantial recruiting of participants through talks, brochures, and videos aimed at many state-wide organizations. We have been largely but not completely successful in attracting a diverse set of participants who face a tuition charge ($575 in KY), travel costs, and a heavy time commitment. The 1996 class has 34 participants, currently in the final project stage, and the 1997 class has 30 participants, currently in the seminar stage. We would like to have more environmentalists and landowners but we are pleased with the participants we had in the first three years.

The goal of NRLI is to develop leaders who can assist groups, agencies, and organizations move beyond conflict toward consensus-building and collaborative problem-solving. The NRLI mission is stated in these terms:

The mission of NRLI is to develop leaders who are able to help groups move beyond conflict and toward consensus building and problem solving for issues affecting the development of Kentucky's natural resources and the quality of the environment.

To accomplish this we have designed NRLI to focus on the nature of natural resource conflicts and bolster personal and group skills: leadership, communication, group facilitation, interest-based problem solving, and policymaking. Working from our experiences in agricultural leadership programs, NRLI is structured around five three-day seminar sessions in different locations around the state. The curriculum emphasizes communication skills, leadership and teamwork skills, collaborative problem-solving and consensus building, conflict management and interest based negotiation, public policy and government regulatory systems, and case studies from KY and other locations.

These seminars are intensive, interactive, and involved. We assess leadership characteristics and conflict management styles. Much of the curriculum is delivered in role-playing and group exercises. It is not a parade of agricultural economists or others who are lecturing to participants. On-site visits are made to the state capitol and Washington, D.C. to examine the natural resource and policymaking systems as well as conflict resolution efforts at the state and national level. Finally, each participant is responsible for developing a practicum or final project which addresses some natural resource or environmental issue in the participant's agency, community, or region. NRLI subsidizes these projects ($1000 each) and has update meetings with participants for self-assessment, networking, and progress reports. Participants who have attended all the seminars and completed a project graduate at the end of 18 months.

What distinguishes the NRLI strategy? Two aspects of NRLI set it apart from traditional policy education conducted on environmental issues: (1) conflict resolution skills and (2) group facilitation and leadership skills. There is a rich body of alternative dispute resolution, conflict resolution, environmental mediation, and facilitation literature. Chris Maser's RESOLVING ENVIRONMENTAL CONFLICT is a good book, especially for those interested in the community aspects of environmental issues. The bible is Chris Moore's THE MEDIATION PROCESS: PRACTICAL STRATEGIES FOR RESOLVING CONFLICT, of which large parts have been adapted into a workshop notebook for the environmental mediation training offered by CDR, Inc. in Boulder, CO. The popular press version of this literature is GETTING TO YES by Roger Fisher and William Ury of the Harvard Negotiation Project. We provide this book to all our participants.

We build on this material with facilitated group experiences, all of which are designed to provide actual experiences which may be useful to participants in their work and projects. The

small group experiences are designed to walk participants through the conflict resolution strategy: Separate people from the problem; Focus on interests not positions; Invent options based on shared interests and mutual gain; and Insist on objective criteria for agreement. This all sounds so simple until you are confronted with an actual case study or real world conflict in which the stakeholders are emotional, the issues complex, and solutions unclear.

The second area in which NRLI stands apart from other policy education and leadership programs is the emphasis put on group facilitation and leadership skills. Our agricultural leadership programs have only recently begun to focus on group leadership. NRLI makes this a core piece of the curriculum by devoting time to listening skills (i.e., active listening, scoping, framing, reframing, etc.), group facilitation skills (i.e., identifying stakeholders, convening, logistics, records, etc.), and process skills (i.e., positions, defining issues, identifying options, generating options, agreement, etc.). We have been very effective with this based on the written evaluations conducted after each seminar. In addition, Mike Smith, agricultural extension agent in Henderson County, has this to say: "Why haven't we been teaching this before? This is the best stuff I can use with my County Extension Council and producer groups."

NRLI participants have implemented some amazing projects which have required many of the skills taught in the six seminars. For example, one KY/NRLI participant has underway a minor revolution in strip mine reclamation to promote reforestation. Recognizing that traditional reclamation techniques compact soils and inhibit tree growth, this participant took on the task of changing the thinking of mining engineers, field inspectors, and consultants about reclamation requirements. Working from a good research base and involving all the important stakeholders, he has now convinced the Environmental Quality Commission and the Cabinet for Natural Resources and Environmental Protection to endorse a new reclamation advisory memoranda which is a consensus-based document produced by the interested parties. Another KY/NRLI participant is bringing together representatives of all 125 public utilities which hold rights-of-way easements which could be managed for improved wildlife habitat. Another is fostering a state-wide regulatory negotiation on nuisance wildlife , where there is a basic conflict about how to handle wildlife removed from urban settings.

The Role of Values

Natural resource economists are well aware of the role of human values in natural resource decision-making and environmental policy. However, we pay only passing attention to it in the classroom and in most research efforts. If we are serious about conflict resolution and policymaking in natural resources and the environment, then we need to more seriously examine the role of values.

Take the Tietenberg textbook, ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS, which is now in its fourth edition and is probably the most popular undergraduate text. Values does not appear in the index nor is there any mention of the subject in the section on "The Human Environment Relationship." James Kahn raises the issue in his textbook but as a subset of topics in a chapter on Valuing the Environment . Kahn concedes that the economic approach to value ... is but one perspective into how to incorporate environmental values into social decision-making (pg. 119). He elaborates on this theme only briefly.

The only contemporary natural resource text which really addresses the role of human values in natural resource decision-making is the Pearce and Turner book, ECONOMICS OF

NATURAL RESOURCES AND THE ENVIRONMENT. This is a graduate-level text but it not only raises the issues of values as a matter of environmental ideology, it also expands on this theme in a chapter on environmental ethics which includes a discussion of anthropocentrism and ecocentrism. For my classes and in NRLI, I have expanded on Pearce and Turner to provide a basic schematic categorizing human values about the environment (Table 1).

I introduce the role of culture in forming environmental values and beliefs with an excerpt from the book ISHMAEL by Daniel Quinn. Let me paraphrase one section:

A culture is a people enacting a story. Mother Culture teaches you this story. Except for a few thousand savages scattered here and there, all the peoples of the earth are now enacting this story. This is the story man was born to enact, and to depart from it is to resign from the human race itself. Your place is here, participating in this story, putting your shoulder to the wheel. There is no 'something else'. To step out of this story is to fall off the edge of the world. And once you learn to discern the voice of Mother Culture humming in the background, telling her story over and over again, you'll never stop being conscious of it. Wherever you go for the rest of your life, you'll be tempted to say to the people around you, 'How can you listen to this stuff and not recognize it for what it is?' And if you do this, people will look at you oddly and wonder what the devil you're talking about.(pg. 37)

Table 1: Environmental World Views and Value Systems

Anthropocentric			**Ecocentric**
CORNUCOPIAN Economic growth ethic based on resource exploitation.	**ACCOMMODATING** Economic growth ethic based on wise resource use and conservation.	**COMMUNALIST** Sustainability ethic based on zero growth through environmental constraints and resource preservation.	**DEEP ECOLOGY** Preservationist ethic advocating zero population growth and steady-state economy.
Maximize GDP to achieve highest standard of living.	Maximize GDP while protecting resource base.	GDP only measured with Green Indicators to reveal social and environmental costs.	Economic growth antithetical to sustainability.
Advocate private property rights as economic efficiency requisite.	Promote private property rights but provide for public rights and management of resources.	Recognize limited role for private property but advocate shared interests, public rights, common property.	Repudiate private property rights in favor of limited human rights shared with set of intrinsic rights for all members of natural world.
Confidence in market allocations of resources and minimal government regulation for environmental quality.	Confidence in market allocations but concerned for sustainable growth through resource planning, BMPs, sustained yield, conservation.	Distrust of markets for resources and a belief in severe physical and social limits to resource use.	Rejection of market economics. Advocate 'minimum resource take' based on organic agriculture and zero use of nonrenewable resources.
Optimistic view of resource supplies through belief in technological innovation and infinite resource substitutability to mitigate long-term scarcity.	Belief in reasonable technological innovation and limited substitutability with larger moral concern for passing resource endowment to future generations.	Distrust of technological change and concern for unknown consequences of new technology on environmental systems.	Opposition to new technological change, especially in genetics and chemicals affecting plant & animal growth.
Instrumental value in nature (i.e. value based on usefulness to humans)	Instrumental value in nature.	Recognition of limited instrumental value in nature but moral superiority of intrinsic value in nature (i.e. value based on existence in the ecological system regardless of human experience)	Deeply held intrinsic value in nature. All organisms are teleological centers of life.

Source: Adapted from David W. Pearce and R. Kerry Turner, ECONOMICS OF NATURAL RESOURCES AND THE ENVIRONMENT.

I move from the discussion of values and world views to the story of the DeBeers diamond cartel, a case study which most undergraduates can relate to personally. I show them advertisements from *Sports Illustrated* which liken buying an engagement ring to training camp . DeBeers supplies all the necessary training information and then tells our marrying-age students exactly how much to spend on their product: two months' salary ! When this gets their attention I show them pictures of reclaimed strip mine areas in mountainous Eastern Kentucky which looks very similar to the Bluegrass topography after compaction and stabilization of mine spoil, gently undulating grassland. However, research has confirmed that untouched mine spoil is the best medium for reforestation but is an unacceptable option for most Americans. I then try to expand the discussion into a review of how virtually every natural resource has a story in which societal values have changed dramatically over time, causing all sorts of conflicts.

But for our NRLI participants, values have a more immediate role. In teaching the principles of interest-based collaborative problem solving among groups in conflict over environmental issues values play a integral role in navigating towards solutions. Problem solvers must understand the nature of the conflict in order to steer participants away from positions and toward interests. In helping them build a set of basic skills, we provide a road map for identifying the sources of conflict (Figure 1).

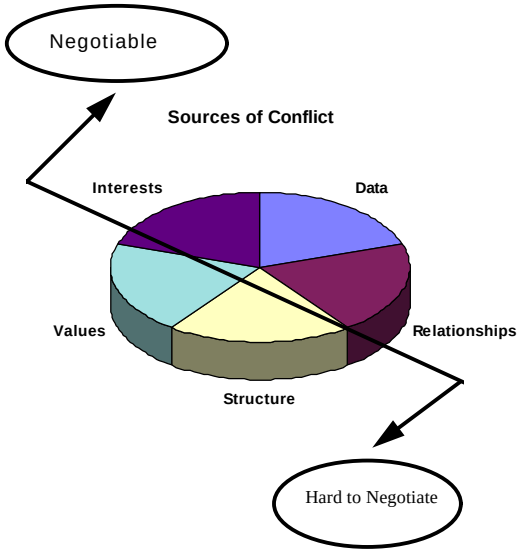

Figure 3: **A Road Map to Types of Conflict**

Values are probably the largest determinant of positions in resource conflicts. People need to know they are being heard. Getting positions out on the table is an essential step in conflict resolution. But the strategy is to use communication and facilitation skills to steer parties in conflict towards interest and away from value-laden positions. In addition, we in land grant universities should have a large comparative advantage in terms of data conflicts. This is not always true but it should be. However, land grant research on natural resource issues can be, and often is, rejected as biased, limited, untimely. If contentious issues have a solution, it lies in the data and interest conflicts, not in values.

Environmental Policymaking

The other area in which I have learned some new things through my involvement in NRLI is about resource policymaking. In other leadership programs we have always had an important component on policymaking. This has been approached through the iron triangle/policy clusters or group model for structure and the muddling through or incremental model of process. With our background in agricultural policy analysis and some experience in Washington, D.C., I think many of the agricultural economists in the South have been very successful with this approach. Certainly we've seen our graduates go on to heightened involvement in agricultural policymaking, including appointed positions with USDA, advisory boards, and other roles.

But in planning a policymaking component for NRLI and my natural resource classes, certain challenges arise. In agricultural policy your focus is a single executive agency, a few committees on the Hill, and the myriad of interest groups all focused on omnibus legislation which is designed for a major overhaul every 4-5 years. With natural resource policy you've got the two big resource management agencies (USDA and DOI) plus the environmental regulator (EPA), and the interest groups include the rent-seeking resource user groups, the old-line conservation organizations, the new environmental organizations, and then all the special interest groups. And there is nothing like a farm bill providing a convenient vehicle for periodic adjustments in policy direction and regulation. Furthermore, the regulatory process plays a much more prominent role in environmental policy than it does in agricultural policy. The constant call for new values in environmental policy, especially from the deep ecologists who are becoming very skilled with the use of national media, means you have a tumultuous regulatory process. In summary, you not only have a more complicated policy structure and a process rife with value conflicts, you have a new actor: The courts.

As Lettie McSpadden explains in a chapter in the very good book, ENVIRONMENTAL POLITICS AND POLICY :

> *At the beginning of the environmental decade, environmental activists made the conscious decision to take their demands to the courts. Many groups that lobbied Congress for new public laws controlling pollution and conserving natural resources believed they needed to monitor the administration of those laws and wrote into them provisions for citizen suits to help enforce the substantive requirements. Recognizing the success that economically powerless groups, such as civil rights groups, had had in the judicial arena, many attorneys with environmental values argued that the courts offered the most promising forum for achieving their policy goals* (pg 242).

In NRLI we address resource policymaking with visits to state capitols and Washington, D.C. and we go through intensive role-playing exercises before a panel of mock legislators led (in KY) by one of the more prominent environmental attorneys. We link our participants with representatives from all the major actors in the system, with the courts being represented by environmental attorney/activists. I know we don't do as good a job with this component as we have done in agricultural leadership groups. My only excuse is that it is complicated and difficult given our time constraints.

But we do let the policymaking system set the stage for one *raison d'etre* for conflict resolution: The pressure to avoid litigation through facilitation consensus rule making. We've seen successful and unsuccessful examples of this in KY and the U.S. It is clear that there are potential gains to be made through conflict resolution processes which keep resource owners, bureaucrats, and activists out of court. So EPA has an umbrella contract with RESOLVE, a

dispute resolution company with several regional partners, for rulemaking negotiation and mediation. Some of the major resource agencies have begun to use conflict dispute resolution techniques and we link our participants with these innovators.

There are however substantial transactions costs. Facilitation and mediation services are labor intensive and expensive. Only a few states have experimented with conflict resolution. Despite a few success stories, the need for third-party assistance is not well-established and remains costly. Since conflict resolution skills have elements of public goods on the benefit side, these services may continue to be undervalued in the market place.

NRLI is a successful off-campus adult education program. Both NC State and UK faculty enjoy good administrative support, receive positive feedback from participants, and find the project leads to new work in natural resources. NRLI may enter a dissemination phase with other states in 1998 with additional Kellogg funding.

COLLABORATIVE PROBLEM SOLVING AND CONFLICT RESOLUTION IN NATURAL RESOURCE ISSUES

By

Leon E. Danielson

Lessons Learned

Take Time to Plan

The process of collaborative problem solving does not just happen, it must be thoroughly planned in o anticipate and avoid problems during the process. Remember, you are working with a large number of stakeh of whom already are adversaries on that or other issues. Planning by the facilitator(s) should include several e including:

- Identify sources of conflict and stakeholders
- Make contact with stakeholders
- Develop structure for stakeholder representation
- Refine understanding of various interests
- Refine procedural plans with stakeholders
- Determine communication systems
- Design constituency and/or public involvement process

Planning should be a continual process, even during the project. More than half of your work time should be s from the table. It is also helpful to formalize the planning process into a "convening document" that can be ag the participants. Usually, it is helpful to spend time with participants between sessions.

Involve All Stakeholders

Often, it may seem easy to justify the exclusion of certain individuals or groups that might disagree on or solutions. However, in the long run, it is more effective to include all stakeholders at the outset in order for participate in the process and thus develop ownership in the solutions. Who are the stakeholders? Our approac include individuals or representatives of those affected by problem, those affected by alternative solutions, th affect the outcome, and those otherwise affected. The idea is to be inclusive, not exclusive. However, it is hel choose, if possible, constructive participants who are knowledgeable, have personalities that make it easier to and are interested in building bridges.

Involve All Stakeholders in Decisions About Process and Procedural Rules

This helps build ownership of the process, and the solutions. It helps develop "enforcement from withi is helpful since discussion of controversial issues can lead to disruptive behavior.

Procedures

Generally, it is wise to avoid voting. It is preferable to build consensus and get agreement as you go al tend to reinforce entrenched positions. Make clear what has been done at the last meeting, what outcomes are this meeting, and what lies ahead.

Use Your People Skills

Pay attention to relationships (use ground rules); define and enforce behaviors in order to build a clima and respect.

Dealing With the Issue

Work with a common definition of the problem. Reframe the issue, if necessary, from "I think that ... " can we...?" This helps participants recognize their interest, rather than being hung up on positions. Complex is that you bring in persons whom are knowledgeable on the topics as resources for the participants. As a facilita be important to develop content knowledge regarding the issue so as to better facilitate discussion on the topic

Work With the Media

It is important to work closely with the media. There are a couple of approaches here. The media may to provide information or report what is going on. It is preferable that they be more heavily involved in helpin citizens, and that they be proactive in providing educational opportunities.

Keep Decisionmakers Informed

Avoid "surprising" decisionmakers with new ideas, discoveries and plans. By keeping them abreast of progress made in dealing with issues and problems, the probability of support is increased.

Time Required

The process can take a great amount of time, but in the long run, the time investment will pay off with public support for policies developed. The process can be speeded
up in several ways. First, establish deadlines to help in maintaining a schedule. Second, plan ahead to avoid de the way. Third, make sure the facilitator is knowledgeable about content issues. Fourth, simplify complex issu organizing ideas through decision trees, flow charts and other methods. And, fifth, use group problem solving organize ideas (e.g. continuous quality improvement and total quality management).

The Process

Tailor the process to each situation. There is no guarantee that the issue can be resolved but generally i given time, patience and skill in dealing with people.