Economics 051 The Economics of North Carolina

# Hog Farming and Lagoon Management in North Carolina: The Farmer's Economic Decision

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### Brief Overview of Hog Farming in the State

No evaluation of the economy of North Carolina is complete without a deep look inside the business of hog farming. With more pigs than people in the entire state, hog production is one of the leading sources of revenue for North Carolina. As of the 1997 moratorium the number of hogs being raised in the state nears ten million, that's two million more hogs than people (Wood, p1). In the early 1990's the hog farming industry



took off, raising the number of hogs almost exponentially from two million to ten million in less than a decade. As the graph to the left illustrates, the number of hogs in the state nearly doubles that of the next competing state (Livestock, p2). It is due to this

extraordinary fact that the hog farming industry in North Carolina has become a billion dollar industry second only to tobacco production. North Carolina is the second largest producing state and houses 3,600 hog farms, each producing more than one hundred hogs per season. Unfortunately, the industry is at a stand still due to the 1997 ban on the creation of new farms (NC Statute).

### HOG INVENTORY LEADING STATES -- JUNE 2000 - JUNE 2006

#### The Process

The process of hog farming has a fairly simple structure. At the start of the process is an integrator. Usually a wholesaler or big corporation, the integrator takes a sow and raises it until it weighs about fifty pounds. At this point, the sow can either be fattened by the company or contracted to farmers in the state to be finished. Otherwise known as finishers, these farmers receive the hogs, food, and medication to help put about two hundred pounds on each hog before they are collected by the integrator and

shipped to a slaughterhouse.

This process is usually repeated twice per year. The six largest pork producers are seen on the table to the right (Major Industry Player's p6).

	Nationwide Market
Company Name	Share (2003)
Smithfield	26%
Tyson/IBP	17%
Swift(ConAgra)	11%
Cargill/Excel	8%
Hormel	8%
Premium Standard Farms (PSF)	5%

Smithfield Foods, the largest producer in the state, stakes claims to about 1,500 of the 3,600 farms, 1,200 of those are contracted to local finishers (North Carolina's Largest Hog Producers p1).

#### Our Problem

The previous two sections detailed the many benefits that hog farming brings to the state, however, with every benefit comes a downfall, and ours is severe. Most hogs are capable of producing three times as much waste as average sized humans. Unaware of the major health risk, the state insisted that hog waste be dumped into a huge hole in the ground, known more commonly as a hog lagoon. These lagoons, which can reach sizes of several football fields, house bacteria and become cesspools for diseases. The hog lagoon posed an easy and affordable solution to the hog by-product dilemma. Despite being the best option for the farmer, the hog lagoons pose serious threats to the environment and residents of homes near a lagoon. If a lagoon breaks and the waste gets into nearby lakes or streams, entire ecosystems can be destroyed. According to Doctor Mike Williams, professor at North Carolina State University, the most harmful effect of a lagoon is the amount of ammonia emissions that rises to the top and spreads off the lagoon rim. So the major questions are: What is the alternative, and how feasible is it to the farmer? In order to save hog production in North Carolina environmental standards as well as economic feasibility must be established for the farmer. The discussion throughout the rest of this report will focus on the economic feasibility of hog farming from the perspective of a farmer.

#### Cost-Benefit Analysis of Hog Lagoons to a Farmer

Since the introduction of major farming in North Carolina hog lagoons have been the most recommended forms of disposing hog effluent. The state government, not knowing any better endorsed its use as an efficient and cheap way to deal with the hog waste. The state was correct in labeling it cheap but failed when it came to disposing of the waste safely. The costs to build and sustain a hog lagoon are minimal. There is a basic three step process in hog lagoon construction and operation. The first is to build the lagoon which consists of digging the area out and filling it with materials which prevent the spread of waste to local water supplies. The second step is pumping the lagoon over the rest of the farm to keep the lagoon water levels low. The last step is removing all waste from the lagoon, which needs to be done on average, every twenty-five years with an acre-sized lagoon. While the revenue generated from the lagoon-spray field system is minimal, it does help offset the cost of daily operation. This benefit comes from not having to buy fertilizer due to the pumping of the effluent onto the crops. The following table puts numerical values to each of these costs and benefits. While these numbers are not taken directly from lagoon receipts, they do represent an accurate way to analyze the costs and benefits of a hog lagoon (Conway).

Cost to the Farmer (per year/ per 1000 hogs) in Dollars	
Installation	\$10,000
Operation	\$4,000
Pumping instead of Fertilizer Use	\$-1,000
Total	\$13,000

## Cost-Benefit analysis of New Technology to a Farmer

Now that we have seen the cost and benefits of a log lagoon to the farmer let us discuss new technologies and their impact on the cost benefit analysis for a farmer. In the summer of 2000 the Attorney General of the State of North Carolina signed a 17.1 million dollar agreement with Smithfield Foods and Premium Standard Foods (Smithfield Agreement). In the agreement the state would look for environmentally superior technologies that would be economically feasible to the farmer. Headed by Doctor Mike

Williams at N.C State University, the project yielded results five years later in 2005. The agreement concluded with the findings that there were no economically feasible alternatives to hog lagoons (Williams's pg 5). In this section we will analyze, as we did for hog lagoons, the costs and benefits of environmentally superior technology. The installation and operational procedures of new technologies are more complicated and therefore cost more to install and keep running on a daily basis. The upside to the new technology is that there are benefits from converting waste into energy. This energy can be transferred to power supplies and eventually to the citizens of the county in which the hog farm is located. The table below puts numerical values to the costs and benefits. Again, while these are not the actual figures from the Smithfield Agreement, they do accurately portray a cost-benefit analysis for environmentally superior technology (Conway).

Cost of Environmentally Superior Technology (per year/per 1000 hogs) in Dollars)	
Installation	\$20,000
Operation	\$8,000
Providing Electricity from Waste	\$-4,000
Total	\$24,000

## **Revenues and Profits of Hog Farming**

Now that the costs and benefits for each technology have been calculated and totals have been reached, we need to calculate the profit and revenues for a farmer with 1,000 hogs. A farmer with 1000 hogs is typically contracted to receive ten dollars a head per healthy hog. A farmer also receives bonuses if his hogs are over a certain amount of weight and if he keeps most of his hogs healthy. For the purpose of this analysis we will not take into consideration the bonuses a farmer may receive. In calculating the profits of hog farming we consider the notion that profit is equal to revenue minus costs. The table below lists the revenues and profits after one year of farming 1000 hogs.

Revenues from Hog Farming (one thousand hogs times ten dollars a head times two seasons per year)	1,000 x \$10 x 2 = \$20,000
Profit from Hog Farming with Hog Lagoons (revenue minus costs)	\$20,000-\$13,000=\$7,000
Profits from Hog Farming with New Technology (revenue minus costs)	\$20,000-\$24,000=\$-4,000

As shown by the table the profit earned producing one thousand hogs in a year is equal to seven thousand dollars. Unfortunately the profit earned with the new technology given the same circumstances is negative four thousands dollars. Due to this, the new technology is not economically feasible for the farmer.

### **Concluding Remarks**

From these results it is easy to see why a farmer would not be willing to put in an environmentally superior technology. Randy Smith, a hog farmer from Deep Run, put it best when he said, "It's just not feasible, we would need the help of the integrator and they are not willing to do that" (Smith). Randy Smith is absolutely correct in his deduction. Integrators make it a point to exclude any connection between the lagoon and the company. For this reason no integrator will be willing to pay millions of dollars to make lagoons cleaner. What it amounts to be is an issue of social and private cost. The social costs to the neighbors downstream turn out to be an externality. What this means is that the farmer does not take into account the costs of leakage, odors, or any other problems associated with the lagoon. While the cost to society of a lagoon exceeds the cost of superior technology, the farmer is not willing to pay for a benefit that does not affect him. This is where controversy arises. The cost to the farmer is minimal, but the cost to society is large and surely outweighs the cost to the farmer. However, the farmers are not willing to pay for the benefit of society, society is not willing to pay for new technology, integrators refuse to aid the farmers financially, and the government risks losing a billion dollar industry if it regulates too much. All four of these situations culminate into the conclusion that hog lagoons are financially and economically the most efficient way for farmers to dispose of hog effluent. This method will continue to be the norm until new technologies prices dramatically reduce or the benefits of the new technologies off set the cost. Until then, count on hog lagoons to continue to be of constant concern in the state of North Carolina.

## Works Cited

- Conway, Patrick. "Evaluating New Technologies for Waste Disposal." <u>Economics of North Carolina</u>. 5 Oct 2005. University of North Carolina. 16 Nov 2006 <a href="http://www.unc.edu/courses/2006fall/econ/051/001/hogs/051ps2f06.pdf">http://www.unc.edu/courses/2006fall/econ/051/001/hogs/051ps2f06.pdf</a>>.
- "Livestock." <u>North Carolina Agriculture Overview</u>. 23 Feb 2001. North Carolina Department of Agriculture. 16 Nov 2006 <http://www.ncagr.com/stats/general/livestoc.htm>.
- "Major Industry Players." <u>Hog Farming</u>. 23 Feb 2006. North Carolina in the Global Economy. 16 Nov 2006 <http://www.soc.duke.edu/NC\_GlobalEconomy/hog/overview.php>.

"North Carolina General Statutes" Chapter 106, Article 67

- "North Carolina's Largest Hog Producers." <u>Hog Watch</u>. 2001. Environmental Defense. 16 Nov 2006 <http://www.environmentaldefense.org/documents/2557\_Hogwatch\_largesthogpr oducers.pdf>.
- Smith, Randy. Personal interview. 22 Sep 2006.
- "Smithfield Agreement." <u>Waste Management Programs</u>. July 2004. NC State University. 16 Nov 2006 <http://www.cals.ncsu.edu/waste\_mgt/smithfield\_projects/smithfieldsite.htm>.
- Williams, Dr. Mike. Personal interview. 22 Sep 2006.
- Williams, Dr. Mike. "Phase 3 Report." <u>Development of Environmentally Superior</u> <u>technologies</u>. 2005. NC State University. 16 Nov 2006 <<u>http://www.cals.ncsu.edu/waste\_mgt/smithfield\_projects/phase3report06/pdfs/re</u> port%20summary.pdf>.
- Wood, Cindy. "Modern Hog Production and Land Values." <u>Virginia Cooperative</u> <u>Extension</u>. July 1998. Virginia Tech University. 16 Nov 2006 <a href="http://www.ext.vt.edu/news/periodicals/livestock/aps-98\_07/aps-944.html">http://www.ext.vt.edu/news/periodicals/livestock/aps-98\_07/aps-944.html</a>>.