

*File*

*Price Co. Herald 2-10-99*

## Relief on the way for Wisconsin's hog farmers

By State Sen. Alice Clausing

MENOMONIE—“The State of Wisconsin is coming to the aid of distressed hog farmers who are suffering from the lowest hog prices in 35 years,” said Sen. Alice Clausing, Chair of the Senate Committee on Agriculture, Environmental Resources and Campaign Finance Reform. “The Joint Committee on Finance just passed a \$5 million farm emergency program to guarantee loans up to \$50,000 for Wisconsin's beleaguered family hog farmers.”

The emergency loan program will be administered by the Wisconsin Housing and Economic Development Authority (WHEDA). WHEDA will guarantee 90 percent of the emergency loans that farmers secure from farm lending institutions. Loans must be repaid over three years.

In order to qualify, farmers must:

1. Prove that they cannot qualify for traditional loans.
2. Have debts that exceed 40 percent of assets.
3. Prove that assets, cash flow and managerial ability make them a good credit risk.
4. Not have any outstanding child support or maintenance payments.

Emergency loans became a necessity as Wisconsin lost over 1,000 hog farming operations over the last year. Hog supplies remain high, but because there are not adequate slaughtering facilities, farmers are not able

to get their animals to market. As a result, hog prices are now 60 percent to 70 percent below prices from a year ago—yielding prices as low as 10 cents per pound. Analysis shows that a hog farmer must average about 40 to 45 cents a pound to break even.

Clausing worked with WHEDA and members of the Joint Finance Committee to ensure the emergency loans would adequately address the needs of Wisconsin's family farming operations. The WHEDA loans are targeted to the average-sized hog farming operations in Wisconsin that may not have access to conventional loans or be able to refinance. WHEDA indicated the biggest hog farms in the state may already have access to commercial loans that would likely disqualify them from participating in the emergency loan program.

“Ensuring the prosperity of our family farm must be a top priority for the legislature,” said Clausing. “Assisting our family farms helps our rural communities survive.”

Because of swift action by the legislature, emergency loans were to be available beginning Jan. 22. Hog farmers should contact WHEDA via its toll-free number at 800-334-6873 for loan information. For further information about the emergency loans or other farm loan programs, contact Clausing via her toll-free number at 800-862-1092 or via e-mail at [sen.clausing@legis.state.wi.us](mailto:sen.clausing@legis.state.wi.us).

Milwaukee Journal Sentinel January 22, 1999

# Low-cost loans for hog farmers approved

Aim is to help producers hurt by low prices

By STEVEN WALTERS  
of the Journal Sentinel staff

**Madison** — Hog farmers struggling with the lowest pork prices in decades will be able to apply for three-year state loans of up to \$50,000 beginning next week, officials said Thursday after a legislative committee approved the program.

On a unanimous vote, the Legislature's Joint Finance Committee restructured an existing state loan program to set aside \$5 million for the loans to hog farmers.

The decision to let the Finance Committee approve the program came after state Assembly leaders abandoned a plan to have the full Legislature debate and pass a separate bill, which would then have to be signed by the governor.

Sen. Brian Burke (D-Milwaukee), who vowed Monday to try to change the program so large corporate farms would not qualify for the loans, said he became convinced that the five Wisconsin farms that raise more than 5,000 hogs at any one time would not apply for the loans.

Burke said he agreed with a Wisconsin Pork Producers Association memo that said a large farm with 5,000 hogs would be lent only about \$10 per hog, which is too small an amount to make it worthwhile, while a farmer with 1,000 hogs would get about \$50 per hog.

To qualify, hog farmers must prove they cannot qualify for traditional loans and have debts that exceed 40% of assets. Hog prices fell to a monthly average of \$12.79 per hundredweight in December and averaged only \$31 for the year — a 39% drop from 1997.

"Many Wisconsin producers lost between \$50 and \$75 per head during the market crisis" in October, November and December, John Lader, vice president of the pork producers group, wrote legislators.

Interest on the loans will be prime rate plus 1%, and the state will guarantee 90% of the loans under the Wisconsin Housing and Economic Development Authority program.

WHEDA Executive Director Fritz Ruf said the farmers who most need the loans will apply within days, and most of them will not seek the maximum \$50,000.

Rep. Al Ott (R-Boulder Junction), chairman of the Assembly's Agriculture Committee, said the emergency loans "may provide the foothold many of our farmers need to hold on until the market stabilizes."

According to the pork producers, there were 3,300 hog farmers in Wisconsin on Dec. 1, 1998. Of that number, 2,100 — or 63% — raised fewer than 100 hogs, and only 150 farmers had more than 1,000 hogs.

## **Wisconsin Hog Industry Public Hearing Agenda**

**Thursday, December 17, 1998**

**9:00 am**

**417 North, (GAR)**

**State Capitol**

**9:00 to 9:30-Background on Wisconsin's Hog Industry**

- **Invited Speakers: Bob Battaglia (DATCP), Rick Tanger (DATCP), Dr. Vern Liebrandt (UW-Madison), Dan Short (UW-Extension)**

**9:30 to 10:00-National and International Perspective**

- **Invited Speakers: William Dobson (UW-Madison), A representative of the National Pork Producers Association**

**10:00 to 10:30-Producer Perspective**

- **Invited Speakers: Dr. Art Mueller (WISPIG), Bob Uphoff (Producer), Keri Retallic (Wisconsin Pork Producers)**

**10:30 to 10:45-Lender Perspective**

- **Invited Speakers: Mike Myers (First National Bank of Platteville), Bruce Thompson (Badgerland Farm Credit Service)**

**10:45 to 11:15-Marketing Perspective**

- **Invited Speakers: Greg Beck (Equity Livestock), Eric Drachenberg (Professional Products)**

**11:15 to 11:45-Processor Perspective**

- **Larry Clark (Lodi Sausage Company), Jens Knutson, (American Meat Institute)**

**11:45 to 12:15-Retailer Perspective**

- **Brandon Scholz (Wisconsin Grocers Association), A Grocers Association Member**

◆ **Due to the limited timeline, speakers need to be concise when addressing their specific area.**

December 10, 1998

«Title» «FirstName» «LastName»  
«Address1»  
«City», «State» «PostalCode»

Dear «Title» «LastName»:

Thank you for agreeing to take part in the Wisconsin Assembly Agriculture Committee's informational/public hearing on the state of Wisconsin's Pork Industry. I appreciate your willingness to participate.

Attached is the agenda for the invited speaker portion of the hearing. The Committee will hear testimony from invited speakers from 9:00 am to 12:15 pm. The Committee will then break for lunch from 12:15 pm to 1:00 pm. Public testimony will be taken beginning at 1:00 pm.

As you know, I have invited a number of speakers to provide the Committee with information about the various aspects of the hog industry. I have included a tentative timeline for the testimony to be given on each topic. I understand that some speakers may go longer than the time allotted, however, I will do my best to stay on schedule. The timeline will also allow speakers to better determine when they need to be present if they are not able to attend the entire hearing.

Thank you again for agreeing to participate. Please contact me if you have any questions.

Sincerely,

Al Ott  
State Representative  
3<sup>rd</sup> Assembly District



# WISCONSIN LEGISLATURE

P.O. BOX 8952 • MADISON, WI 53708

## For Immediate Release

**For Further Information Contact**  
**Representative Al Ott**  
**Representative Eugene Hahn**  
**Representative DuWayne Johnsrud**

**December 8, 1998**  
**608-266-5831**  
**608-266-3404**  
**608-266-3534**

### **Ag Committee to Hold Hearing On Pork Pricing** **Assembly Agriculture Committee will hold fact finding hearing**

Madison...The Assembly Agriculture Committee will be holding a public hearing to discuss the current crisis in the Wisconsin hog industry, according to the Chairman of the Committee State Representative Al Ott (R-Forest Junction).

Ott said the Committee will hear testimony from invited speakers knowledgeable about the various aspects of the hog industry, including the state of the hog industry in Wisconsin, national and international views, and producer, processor, marketing and retail perspectives. After the overview from the invited speakers, public testimony will be taken.

“Hog prices are currently the lowest they have been since 1971, at less than \$20 per hundred weight, while costs at the retail level remain high,” said State Representative DuWayne Johnsrud (R-Eastman). “We need to get some answers as to why this is happening. Hopefully this hearing will give us this that opportunity.”

State Representative Eugene Hahn (R-Cambria) stated that he has received contacts from a number of people about the plummeting prices for hogs and their concerns about the future of the industry in Wisconsin.

“I asked Chairman Ott to hold the hearing so we could get experts from all areas of the hog industry to come in and talk to us,” said Hahn. “This will give us a complete picture of the industry and a better understanding of the problem.”

The hearing is scheduled to take place in Madison on Thursday, December 17, in Room 417 North of the State Capitol. Invited speakers will address the Committee from 9:00 am to 12:00 pm. Public testimony will begin at 1:00 pm.



State of Wisconsin  
Tommy G. Thompson, Governor

## Department of Agriculture, Trade and Consumer Protection

2811 Agriculture Drive  
Madison, Wisconsin 53704-6777

PO Box 8911  
Madison, WI 53708-8911

TO: Representative Al Ott  
FROM: Rick Tanger - WDATCP Market News / 224-5097  
SUBJECT: Hog information  
DATE: December 4, 1998

There are a number of events that have contributed to the current situation in the hog market.

1. Over the past 18 months daily hog slaughter capacity has been reduced by approximately 35,000 head with the closing of three pork plants: IBP, Council Bluffs, IA; Docket Pork, Huron, SD; and Thorn Apple Valley in Detroit, MI.
2. Current daily hog kill capacity is at 385,000.
3. Producers are offering in an excess of 385,000 hogs daily and the current hog slaughter system is backed up several days.
4. Current Wisconsin hog prices are 14.00-16.00 per cwt. Compared to last years price of 42.00-43.00 per cwt.
5. The average weight of hogs in the Iowa and Southern Minnesota marketing area has increased about 4 pounds over last year this same time period.
6. According to USDA estimated total hog slaughter for November is 9 million head compared to Octobers slaughter of 8.345 million head.
7. Total U.S. hog slaughter to date is 89,766,000 head compared to 1997 slaughter of 81,770,000 in the same time period for an increase of 9.8 percent over last year.
8. According to USDA imports of Canadian hog imports to the U.S. will exceed 4 million head this year up from 3.2 million last year. The favorable exchange rate will continue to be an incentive for this to continue for some time.

**SENATOR HERB KOHL**



**MADISON OFFICE**  
14 West Mifflin Street  
Madison, WI 53703  
Telephone: (608) 264-5338  
Fax: (608) 264-5473

TO: Greg - Rep. Ott's Office

FAX #: 282-3603

FROM: Cara Carper

DATE: 12/08/98

NUMBER OF PAGES (including cover): 4

**COMMENTS:**

Kent Reds, Muscatine, IA

319 264-4888

(Jack May, President (006 Nov 1997))

**Kent Feeds "Midwest Livestock Initiative"**  
**Thursday, November 13, 1997**  
**Highlights**

The presentation began with a 10 minute multi-slide, multi-media presentation. The Midwest Livestock Initiative is comparable with Kent's "Enjoy Pork Often" initiative in the 1980s.

As **Jim Holderson**, VP of Sales East (originally from Monroe, WI) explained, Kent is trying to encourage livestock production in the Midwest (to get local investors to feed livestock - basically to keep their bread and butter in the Midwest). Their goal is a 10 percent increase in livestock in 10 years.

They believe that crops, corn for example, should be treated as a "raw material" in a business operation. Rather than sell corn for cash, add value to it by feeding it to livestock.

Livestock leaving the Midwest is causing a huge decrease in our added value. It is seen as the "greatest challenge to livestock production."

There are social issues to think about when continuing/starting a livestock operation. Kent recommends that farmers be proactive:

- use deep pits
- incorporate waste into the soil
- support indemnity funds

Be positive!

We, here in the Midwest, have the raw materials, packing plants and skilled workers to make livestock production successful. U-Rah-Rah-Wisconsin!

**Terry Main**, VP of Product Management, then discussed: "How to Grow the Business"

He pointed out that it is very difficult to be an expert in all aspects of ag management:

- corn and soybean production
- birth to market
- production
- management
- financial
- health
- labor
- facilities
- etc.

## **The Solution? Farmers need to NETWORK!**

### Sow Centers

Why? - specialized labor force, ease of expansion, quality single-source for pigs  
"You own the business and you name your price."

### Beef Centers - "Kent Alliance Feedlots"

Kent suggests weaning calves and transferring them to a feedlot before selling them (added value with retained ownership).

### Dairy Networking - "Kent Dairy Condo"

Centralized milking with decentralized (networked): calf farm, heifer farm, grain farm, forage farm, dry cow farm. The Kent Dairy Condo includes 500-1000 cows

More U-Rah-Rah Wisconsin and YOUR town: "Don't let livestock make others in other parts of the country rich while your town dies."

Message was anti-vertical integrations (opposite of what I heard at the "CALS Ag Issues Forum") - no to corporate livestock producers

### Kent Condo Swine Center

- farrow to wean
- farrow to segregated early weaning
- farrow to finish

### **Conclusion**

Do things by the book. Produce in a responsible, professional manner. Your Kent Sales Managers are very qualified to help you plan.

# PORK PRODUCER NEWS



Fall 1997



Kent Swine  
Research Facilities

## Pork Industry Showing Expansion – Kent Can Help You Expand Too!

As this issue of *Kent Pork Producer News* is being printed, it is estimated that expansion will increase hog numbers at the rate of 4-7% for slaughter in 1998-1999. Expansion is occurring in all size operations in states across the Midwest.

At Kent Feeds, we understand the planning and financial risks that accompany growth and expansion. Along with providing high-performance feeds to help you return more from every pig, we provide financial tools and expertise to help you remodel, update, or expand your operation.

Through programs that include low-interest feeder financing, no-interest breeding herd expansion loans, cash flow projections, and engineering recommendations, we work to give you the kind of information and financial advantage you need to grow successfully.

If you're planning to expand your operation, here's how we can help:

### **Cash Flow Projection:**

Using your own numbers and costs, this free and confidential service predicts potential results for a variety of production scenarios. What would happen to income if you expand your sow herd? Should you sell feeder pigs or finish feeder pigs? Cash flow projections help you answer the "what ifs" on paper before you make a financial investment.

### **Feeder Financing:**

We can provide low-interest financing to qualified producers for the purchase of Kent feeds. Available for all sizes of operations, you can obtain 6% financing on supplements and 8% on complete feeds. Payment is due upon sale of the group of hogs fed, or in the case of larger operations, on a timely marketing basis.

### **Swine Breeding Herd Expansion Loan:**

If you plan to expand your sow herd, you may qualify for an interest-free loan of \$75 per gilt through your Kent dealer. This extremely popular program requires a commitment to feed Kent products through the term of the loan.

### **Bulk Conversion/Expansion Loan:**

Cost may be reduced in converting your feeding system to bulk feeds or expanding your bulk system. To make this change, you may obtain an 8% loan through your Kent dealer for the purchase of bulk bins.

### **Loan Guarantee Program:**

Kent may guarantee up to 20% of loans obtained from your local lender for expansion, remodeling, or upgrading swine facilities.

### **Custom Engineering Services:**

Swine facility engineering services, including counseling and plans for new facilities, the redesign of existing facilities, plus ventilation, waste treatments, and more are available as a free service to Kent Feeds customers.

You can see that no matter how extensive a project may be, from remodeling to building new, Kent Feeds is there to help you.

If you would like to learn more about any of these projects or services, simply contact your Kent Feeds dealer, or call Vern Stille, treasurer, toll free at 1-800-552-9620, extension 4419.

by **Terry Main**  
Vice President,  
Product Management



# Main Street U.S.A.

## PORK

the industry each community needs

Every day we read about the great economic importance of industry to midwestern towns and communities. Huge concessions are made to attract new industry to communities like ours. At the same time, many community leaders do not fully understand the economic impact of an industry already established in our communities in the hog belt — pork production.

If we review history, we will see that much of the land we now farm was paid for by pork production. The Midwest continues to be the ideal place for pork production because of the availability of the lowest cost raw material (corn), and the ambitious, hard working labor force.

Pork production became the economic backbone of many communities because it provided a solid financial base. This is still true today. The corn belt still needs pork production to keep its rural communities strong.

If we look at the typical trade area of a rural community and estimate that it extends five miles in each direction, we will have an area of 100 square miles. Based on recent statistics, this area would represent approximately 44,296 hogs fed annually in the state of Iowa.

Let's look at the income a community realizes from pork production.

Please keep in mind, this is not a research study designed to detail the cost of pork production, but is meant to estimate the economic value of pork production to a com-



by **Terry Main**  
Vice President,  
Product Management

munity. Costs will vary by area and type of facilities, but the net result will be similar.

If we look at 44,296 hogs, sold at 240 pounds, at a market of \$42.60 per hundred weight, that is \$4,528,824 returned to the community.

If the corn fed to those hogs had been sold as a cash crop and brought a market value of \$2.26 per bushel, it would only have a value of \$1,151,253. Thus feeding corn through hogs increased the value of the corn by \$3,377,570.

There is another way of viewing the value added to corn marketed through hogs. By marketing corn through hogs in a farrow-to-finish operation, rather than on the cash market, the value of the corn was multiplied 3.9 times.

Given this information, some questions you might ask include: What is this \$3,377,570? Where does it go? Is it all profit to the producer?

To break it down, we'll itemize.

Let's call anything that goes into the ration, other than corn, a commercial feed. This would include medications and commercial protein supplement. This will run approximately \$31.95 per pig, or \$1,415,257 that will go to the people who supply that product.

Raising these 44,296 hogs will require approximately 21 people working 50 hours per week. This labor (including all family labor) is based on 1 1/4-2 hours per pig at \$6.50-\$10.50 (\$13.12 per pig). So, these people receive \$581,163 annually.

This \$581,163 is then spent in the

local community in the form of food, clothing, housing, and utilities. All the people on Main Street, U.S.A., would share in this income.

The veterinarian's bill would run approximately \$3.06 per pig, which would generate \$135,546 for the veterinarians in the community.

Utilities are a big factor in pork production. It is estimated that between electricity, propane, and telephone, the pork producer spends approximately \$2.49 per pig, or \$110,297 in our example. This income helps the utility people stay in business, and in the long run, helps keep everyone's utility bills in line.

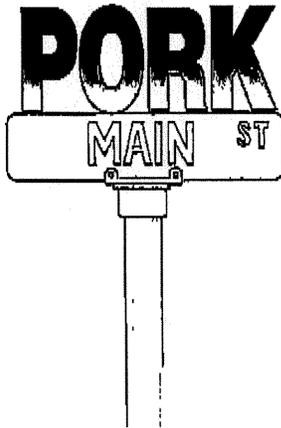
These swine operations also need insurance, which costs approximately 88¢ per pig or \$38,980 annually.

Taxes on these facilities are another item. It is estimated that it will cost approximately 53¢ per pig for taxes on the facilities. This generates another \$23,477 to the community. (This does not include payroll taxes from labor or other taxes that local merchants pay on the income they receive.)

continued on back

<sup>1</sup> 1992 average IA-S. MN cash hog price.

<sup>2</sup> 1992 average on-farm corn price received by Iowa producers.



Maintenance and repairs on a livestock facility can amount to about \$3.35 per pig, or \$148,392 for our example. This category can include anything from fixing a roof or repairing waterers, to putting in new farrowing crates. Maintenance and repairs also help keep the lumber yard and hardware store in business.

Depreciation on buildings and equipment amounts to \$4.44 per pig or \$196,674.

Another area of expense is interest on the livestock facilities. If you include interest on sows, feed, machinery inventory, and real estate, it could amount to \$7.34 per pig. In our example, that's \$325,133 to the lending institutions for the use of their money. The lenders also finance the businesses that supply pork producers, so they have a large stake in pork production.

Buildings and equipment are another major expense, costing as much as \$4.23 per pig. This comes to \$187,372 on an annual basis.

Last but not least is profit for the producer. It can be termed as

return to labor or return to management, but in our example, for the independent producer taking the risk, the profit is \$215,279 (if labor is added in, this amounts to \$796,442). This income will most likely be put to use in some manner in the local community.

When we total these all up, it comes to \$3,377,570 that pork producers will "plow" back into a community each year.

Again, these figures are estimates but they are not unrealistic. Everyone in this community is linked together, whether they realize it or not, with the income generated from hogs through independent ownership.

It's time we reassure people in our communities about the role that pork production plays, and point out the way to keep the corn belt the hog belt of America. After all, the skilled labor, the facilities, and the raw materials are here—what more could a Midwest community ask for?

*Thank you, pork producers!*

**Pork's Contribution To A Community**

	Per Head	Per Community*
Purchased feed (other than corn)	\$31.95	\$1,415,257
Labor	13.12	581,163
Veterinarian services	3.06	135,546
Utilities	2.49	110,297
Insurance	.88	38,980
Taxes	.53	23,477
Maintenance & repairs	3.35	148,392
Interest	7.34	325,133
Depreciation	4.44	196,674
Buildings & equipment	4.23	187,372
Profit	4.88	215,279
<b>Total</b>	<b>\$76.25</b>	<b>\$3,377,570</b>

\*Estimated 44,286 hogs produced in 100 square miles.

< Ag Comm.

Draft. strategy - AFO/CAFO -

(Workshop on large expansion or development)  
Sierra Club -

Hog Industry

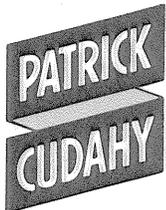
Farmland Pres. → Judy Klusman.  
→ Use Value

Hemp "Comm."

267 0555

Pesticide Data Collection

Close working relationship w/ Sen Kohl.



Over 100 Years Of Quality

PATRICK CUDAHY, INC.  
3500 EAST BARNARD AVENUE  
CUDAHY, WI 53110  
(414) 744-2000 • FAX (414) 744-4213

November 6, 1998

Mr. Al Ott  
P.O. Box 112  
Forest Junction, WI 54123

Dear Mr. Ott:

Thank you for participating in the consumer preference survey at the recent Wisconsin State Fair. Your evaluation of Patrick Cudahy consumer products provided solid insight on how consumers perceive the performance of our products.

As a result of the consumer preference survey, Patrick Cudahy Homestyle Sweet Apple-wood Smoked Ham was awarded the *Wisconsin State Seal of Excellence* by finishing the best in it's class!

Patrick Cudahy Sweet Apple-wood hams are manufactured in the old fashioned way, made from only the finest raw materials. This value added product is carefully cured and slowly smoked in the stockinet over sweet apple-wood chips, bringing out the rich, natural sweet apple-wood flavor Patrick Cudahy is known for!

We would like to invite you to try Patrick Cudahy Homestyle Ham as well as our other fine products with the attached coupons at your local grocer.

Again, thanks for your participation in the survey and future patronage of our consumer food products.

Sincerely,

PATRICK CUDAHY INCORPORATED

A handwritten signature in cursive script that reads "Bud Matthews".

James E. "Bud" Matthews  
Vice President Retail Sales and Marketing

Enclosure



**PATRICK  
CUDAHY**

**CELEBRATING  
110 Years  
of Goodness**

**PATRICK  
CUDAHY**

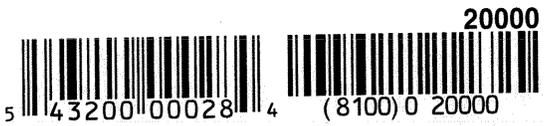
**SAVE \$.55**

On purchase of any two packages of Patrick Cudahy Bacon



MANUFACTURERS  
COUPON  
EXPIRES  
1/31/99

Retailer: We will reimburse you the face value of this coupon plus 8¢ handling provided you and the consumer have complied with the terms of this offer. Invoices proving purchase of sufficient stock to cover presented coupons must be shown on request. Any other application may constitute fraud. Coupon void where prohibited, taxed or restricted. Consumer must pay any sales tax. Cash value 1/20¢. Reproduction of this coupon is expressly prohibited.  
Mail To: PATRICK CUDAHY INCORPORATED, CMS Dept. # 43200, One Fawcett Drive, Del Rio, TX 78840.



**PATRICK  
CUDAHY**

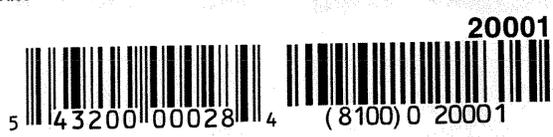
**SAVE \$.55**

On purchase of any two 10 oz. packages of Patrick Cudahy Sliced Meats



MANUFACTURERS  
COUPON  
EXPIRES  
1/31/99

Retailer: We will reimburse you the face value of this coupon plus 8¢ handling provided you and the consumer have complied with the terms of this offer. Invoices proving purchase of sufficient stock to cover presented coupons must be shown on request. Any other application may constitute fraud. Coupon void where prohibited, taxed or restricted. Consumer must pay any sales tax. Cash value 1/20¢. Reproduction of this coupon is expressly prohibited.  
Mail To: PATRICK CUDAHY INCORPORATED, CMS Dept. # 43200, One Fawcett Drive, Del Rio, TX 78840.



**PATRICK  
CUDAHY**

**SAVE \$1.10**

On purchase of any flavor Patrick Cudahy RealLean



MANUFACTURERS  
COUPON  
EXPIRES  
1/31/99

Retailer: We will reimburse you the face value of this coupon plus 8¢ handling provided you and the consumer have complied with the terms of this offer. Invoices proving purchase of sufficient stock to cover presented coupons must be shown on request. Any other application may constitute fraud. Coupon void where prohibited, taxed or restricted. Consumer must pay any sales tax. Cash value 1/20¢. Reproduction of this coupon is expressly prohibited.  
Mail To: PATRICK CUDAHY INCORPORATED, CMS Dept. # 43200, One Fawcett Drive, Del Rio, TX 78840.



**PATRICK  
CUDAHY**

**SAVE \$1.10**

On purchase of any size Patrick Cudahy Homestyle Ham

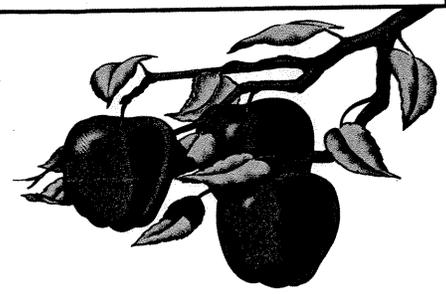


MANUFACTURERS  
COUPON  
EXPIRES  
1/31/99

Retailer: We will reimburse you the face value of this coupon plus 8¢ handling provided you and the consumer have complied with the terms of this offer. Invoices proving purchase of sufficient stock to cover presented coupons must be shown on request. Any other application may constitute fraud. Coupon void where prohibited, taxed or restricted. Consumer must pay any sales tax. Cash value 1/20¢. Reproduction of this coupon is expressly prohibited.  
Mail To: PATRICK CUDAHY INCORPORATED, CMS Dept. # 43200, One Fawcett Drive, Del Rio, TX 78840.



*...smoked with sweet apple-wood*



# PATRICK CUDAHY

## Sliced Packaged Meats

For lunch or party trays, nothing compares to Patrick Cudahy's mouth-watering assortment of Sliced Packaged Meats. You'll find a large and varied assortment including tender Turkey Breast, savory Corned Beef, Boiled Ham, 50% Less Sodium Ham, Honey Ham and Maple Ham to please every palate.



For over a century, families have enjoyed the wholesome and delicious flavor of Patrick Cudahy for breakfast, lunch and dinner.

Enjoy Patrick Cudahy's complete line-up – including several new offerings – anytime and anyplace to make your next get-together extra special.

## Bacon

The taste sensation that started it all -- our famous lean and delicious Bacon smoked with sweet apple-wood. Now available in several varieties to please the most discerning consumer including Regular Slice, Thick Slice, Lower Sodium/No Sugar Added, 40% Less Fat Realean and Fully Cooked Golden Crisp.



## New Flavors!



## Realean Ham

Realean Honey Ham is one of our most popular offerings, and now you can enjoy two new Realean flavors: moist and tender Realean Turkey Breast and sweet apple-wood smoke flavor Realean Ham. Delicious hot or cold, 97% fat-free Realean Hams and 99% fat-free Turkey Breast are ready to serve.



## New Product!



## Homestyle Ham

Now you can relish Patrick Cudahy's old-fashioned sweet apple-wood smoke flavor in a fully cooked boneless ham. Carefully cured and slowly smoked over sweet apply-wood chips, Homestyle Ham delivers rich, old-fashioned taste. Available in 2 lb. and 4 lb. packages.

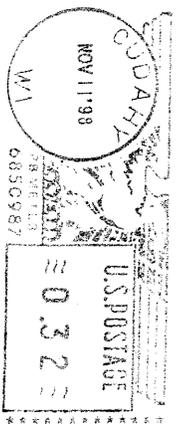
PATRICK CUDAHY INCORPORATED  
3500 East Barnard Avenue  
Cudahy, WI 53110



Wisconsin Proud for 110 Years

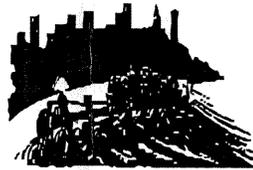
AI OII  
P.O. Box 112  
Forest Junction, WI 54123

54123-0112



Chairman:  
Agriculture Committee

Member:  
Environment & Utilities  
Government Operations  
Natural Resources  
Rural Affairs



# Al Ott

State Representative • 3rd Assembly District

## FAX COVER SHEET

TO: Stoney Creek Inn  
~~Stoney Creek Inn~~ FAX NUMBER: 715-355-0913

FROM: State Representative Al Ott

DATE: 12/9/98

Number of pages attached including cover sheet 3

**\*\*If all pages are not received or are illegible, please call (608) 266-5831**

Message: Please give this to  
Rep. Al Ott - He should know it  
is coming. Thank you



December 9, 1998

«Title» «FirstName» «LastName»  
«Address1»  
«City», «State» «PostalCode»

Dear «Title» «LastName»:

Thank you for agreeing to take part in the Wisconsin Assembly Agriculture Committee's informational/public hearing on the state of Wisconsin's Pork Industry. I appreciate your willingness to participate.

Attached is the agenda for the invited speaker portion of the hearing. The Committee will hear testimony from invited speakers from 9:00 am to 12:15 pm. The Committee will then break for lunch from 12:15 pm to 1:00 am. Public testimony will be taken beginning at 1:00 pm.

As you know, I have invited a number of speakers to provide the Committee with information about the various aspects of the hog industry. I have included a tentative time frame for the testimony to be given on each aspect. I understand that some speakers may go longer or shorter than the time allotted, however, I will do my best to stay on schedule.

Furthermore, I wanted to let invited speakers know about when they would be addressing the Committee so they could determine when they needed to be present. I would hope that all the speakers could attend the entire hearing, although, I understand that some speakers may have other commitments.

Thank you again for agreeing to participate. Please to contact me if you have any questions.

Sincerely,

Al Ott  
State Representative  
3<sup>rd</sup> Assembly District

*Hog Industry Crisis*  
*Informational*  
**Hog Pricing Public Hearing Agenda**

**Thursday, December 17, 1998**

**9:00 am**

**417 North, (GAR)**

**State Capitol**

**9:00 to 9:30-Background on Wisconsin's Hog Industry**

- Invited Speakers: Bob Battaglia (DATCP), Rick Tanger (DATCP), Dr. Vern Liebrandt (UW-Madison), Dan Short (UW-Extension)

**9:30 to 10:00-National and International Perspectives**

- Invited Speakers: Bill Dobson (UW-Madison), A Representative of the National Pork Producers Association

**10:00 to 10:30-Producers Perspective**

- Invited Speakers: Dr. Art Mueller (WISPIG), Bob Uphoff (Producer), Keri Retallic (Wisconsin Pork Producers) + 1

**10:30 to 10:45-Lender Perspective**

- Invited Speakers: <sup>(2)</sup> A Farm Credit Representative

**10:45 to 11:15-Marketing Perspective**

- Invited Speakers: Greg Beck (Equity Livestock), Eric Drachenberg (Professional Products)

**11:15 to 11:45-Processor Perspective**

- Dan Sutherland (Johnsonville Meats), Larry Clark (Meat Council), Jens Knutson, (American Meat Institute)

**11:45 to 12:15-Retailer Perspective**

- Brandon Scholz (Wisconsin Grocers Association), A Grocers Association Member <sup>(2)</sup>

*\* As you can see we need to stay on track, and be  
concrete and to the specific area of concern.  
would also be allowing for some committee questions -*

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# Iowa Beef Industry Council

Joel C. Brinkmeyer, Executive Director

PO Box 451

Ames, IA 50010-0451

Phone: (515) 296-2305

Fax: (515) 296-4873

E-mail: [sylva@iabeesf.org](mailto:sylva@iabeesf.org)

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10/10/76

Emerson Meet  
Justice

1/2 Price

> Let's Listen Done  
Cancelled Green Paper.

Membership - 98  
Editorial - Port  
National (WSP) Green  
from Frank  
Bob Boso - WAXX  
Bob Meyer - BETZ

STATE OF WISCONSIN

To Al

Date 11-30 Time 1:35

WHILE YOU WERE OUT

M Bruce Morrison

of UW - Ag + Applied Economics

Phone 263-4776

Telephoned	<input checked="" type="checkbox"/>	Please Call	<input checked="" type="checkbox"/>
Called to See You		Rush	
Returned Your Call		Will Call Again	

Message \_\_\_\_\_



Party Recycling Call Alinda

Keni Retallick  
Send a copy of the agenda to her  
703-7553 Fax  
Name of London  
Frank Freyart  
356-4903  
Ext. 242



STATE OF WISCONSIN

To Al

Date 12/01 Time 1:50

WHILE YOU WERE OUT

M Tim Toller

of \_\_\_\_\_

Phone \_\_\_\_\_

Telephoned	<input checked="" type="checkbox"/>	Please Call	
Called to See You		Rush	
Returned Your Call		Will Call Again	

Message Harrel chooses

not to send representative  
to Dec. 17 meeting

Party Receiving Call Jorda



STATE OF WISCONSIN

To Greg

Date 12/01 Time 11:20

WHILE YOU WERE OUT

M Rick Panger

of Wis. Dept of Agric.

Phone 224 - ~~6000~~ 5097

Telephoned	<input checked="" type="checkbox"/>	Please Call	<input checked="" type="checkbox"/>
Called to See You		Rush	
Returned Your Call		Will Call Again	

Message Agents & not

& attendees speaking  
& any other info.  
(instead of Devin Market

Party Receiving Call Jorda



STATE OF WISCONSIN

To Al

Date 12/1 Time \_\_\_\_\_

WHILE YOU WERE OUT

M Mike Zumbulker

~~Approved by~~  
 of Cungilla, Public Relations  
Michigan's

Phone 612-242-2982

Telephoned		Please Call	
Called to See You		Rush	
Returned Your Call		Will Call Again	

Message Forward to General



Party Receiving Call

~~USDA~~

Larry (Director) - Drucker

USDA

~~WASH:~~ 202 / 501 - 8522

Livestock / meat prices - Excellent

AMT American Meat Institute

Jerry Knutson

? Vir. 703 / 841 - 2400

John Huston - National

Cattlemen's Beef Assoc.

(formerly with National Livestock Board)

Smithfield - largest pork producer in nation

Don Lund - trying to get someone

6628 - 102 / 505 11/11/11

hullless - using heavy kernels

Richard Karp (massive) IMA

network feed

696-148 (507 11/11/11)

location - network and 2

need good chemistry

kernel (middle thin kernel) (broad)

Zeng Burkhardt - DHTCP  
superior - vs USDA etc.

Brandon Schlotz ~~244~~ = 7150  
Michael Krumm  
Woodman's

30879  
2118  
to feed 1/2 5117

December 9th - 5117

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150k grain  
Annual product

Rich  
Credent  
Specialty  
Purdue  
Economics

Ph. 494-4373  
765-  
195-2910  
4x

1-800-821-8000 EXT 6741

Mr. Harry Reebrodt

Haley

Farmland - ~~Horton~~ Matson

816/891-3698

Farmland  
Local → Ron Lund - 825-4240 Fax 608-825-4405

IBP - Gary Mikkelson

FAX: 402 / 241-2969

Con- ~~Agri~~ Agri. - V.P.

Jerry Vernon

462/595-4000

Excel/Cargill - Mark Klein

612/742-6211

#1 ~~Grand~~ <sup>1992</sup> ~~John~~ Johnsville - Dan Sutherland  
Waterbury 920/261-1072

STATE OF WISCONSIN

To Al

Date 12/04 Time 4:00

WHILE YOU WERE OUT

M Dennis Buege

Phone 262-0555

Telephoned	<input checked="" type="checkbox"/>	Please Call	<input checked="" type="checkbox"/>
Called to See You		Rush	
Returned Your Call		Will Call Again	

Message I don't feel qualified to speak at the park leaving. He wants to talk all.

 Party Receiving Call Linda

Dec 17, 98 9 - Noon / lunch - Public Testimony

Background Wisconsin 30 min

Bob Battaglia - 608-224-4838 Statistics, past/present hog #s, etc.  
Rick Tanger - 608-224-5097 market stats, trends  
Vern Liebrandt - 608-263-4312 (4200) Hog Industry Overview  
Dan Short - 414-386-4411 Hog Industry Overview

National International 20 min

Bill Dobson - 608-262-8965 Import/Export/Margins  
Neal Dierks - NPP 1-800-456-7675 National Pork Producers

Producers 30 min

Dr. Art Mueller (WIS PIG) 1-608-676-3200 (5959) Group Producer  
Bob Uphoff 1-608-222-7389 Individual  
Eric Droschenberg - 608-753-2040  
Keri Retallick 608-723-7551 WI Pork Producers

Marketing 30 min

declined  
Greg Beck - 608-356-8311 Equity livestock markets  
~~Dick Hilstrip - 608-448-4888 Marketing overview~~  
IBP ~~Howard Richards - 608-592-3043~~  
Rodie

Processors 30 min

Dan Sutherland 920-261-1072 - Johnsonville Meats  
Russ Wengel - 1-800-336-6328 <sup>Am Meat Inst.</sup> Wengel Farms Meat Processors  
Larry Clark - 608-592-3534 Meat Council

Retailers 30 min

Branden Scholz 1-608-244-7150 Grocers/Retailers  
1. \_\_\_\_\_  
2. \_\_\_\_\_

Dec 17, 98 9 - Noon / lunch - Public Testimony

Bob Battaglia - 608-224-4838 Statistics, past/present. hog #s, farm  
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Dick Velstrip - 608-798-4080 Marketing - overview  
IBP - Howard Richards

Processors 30 min

Dan Lutherland 920-261-1072 - Johnsonville Meats  
Russ Wengel - 1-800-336-6328 AMT Dennis Ruege 262-0555 Wengel Farms Meat Processors  
Larry Clark - 608-592-3534 Meat Council

Retailers 30 min

Branden Scholz 1-608-244-7150 Grocers/Retailers

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

# Pork industry asks Clinton administration for help

WASHINGTON — The U.S. pork industry is experiencing strong product demand. Consumer demand for pork is averaging 7 to 8 percent higher this year compared to 1997. U.S. pork exports for the first eight months of the year are up 32 compared to '97. Plus, the pork industry got a welcomed boost with the inclusion of 50,000 metric tons of U.S. pork for a Russian food assistance package.

NPPC representatives met with USDA officials earlier in the week to outline the difficult supply-driven situation the U.S. pork industry is facing. USDA estimates that U.S. pork producers are receiving approximately \$144 million less per week on average than they did during the past five years. Unfortunately, most pork producers are not eligible for financial assistance included in H.R. 4328, the Omnibus Consolidated and Emergency Supplement Appropriations for FY 1999.

The president was asked to consider the following initiatives:

1. Create an Economic Crisis

The request for government intervention comes at a time when

the U.S. pork industry is experiencing strong product demand. Consumer demand for pork is averaging 7 to 8 percent higher this year compared to 1997. U.S. pork exports for the first eight months of the year are up 32 compared to '97. Plus, the pork industry got a welcomed boost with the inclusion of 50,000 metric tons of U.S. pork for a Russian food assistance package.

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try's total weekly slaughter capacity.

Another request was to postpone the Immigration and Naturalization Service's Operation Vanguard, which seeks to document legal alien workers in packing and processing plants. The loss of any packing plant employees during the current crisis would exacerbate the existing problem.

3. Increase government purchases of pork and pork products. Pork producers suggested the administration increase its pork purchases for the breakfast and school lunch program, Emergency Food Assistance Program (TEFAP), Food for Peace (P.L.480) and Food for Progress (P.L.416) programs; and other humanitarian assistance initiatives. USDA was also encouraged to evaluate a program for exporting live breeding animals.

4. Grant credit forbearance for producers. Since most pork producers will face an equity or cash-flow crisis this year, the letter sug-

gested that all federal banking and financial institutions be contacted and urged to work with its producer clients during the crisis.

5. Make the Emergency Disaster Loan Guarantee Program available. Many pork producers are facing economic disaster. The government was asked to make pork producers eligible for such a program.

A record 2.129 million hogs were slaughtered in federally inspected plants the week ending Nov. 7, according to the USDA. The previous record was 2,086 million hogs set the week ending Dec. 10, 1994, according to ag economist Ron Plain of the University of Missouri. Total slaughter is running almost 10 percent above a year ago.

Mr. Plain says there is hope that things will improve for producers soon. With a little luck, he believes cash hog prices could improve as much as \$10 per hundred between now and January.

# PURDUE UNIVERSITY



DEPARTMENT OF  
AGRICULTURAL ECONOMICS

*TO GREG  
202-3603*

FAX

*Kirk*

To: *Kirk*  
Fax Number:  
Telephone Number: *608-234-1044*

From: **Chris Hurt**, 1145 Krannert Building, Purdue University,  
West Lafayette, Indiana 47907-1145  
Fax Number: **765-496-1224**  
Telephone Number: **765-494-4273**  
e-mail: **hurt@agecon.purdue.edu**  
Number of Pages (Including this page):

Message:

*Kirk*

*Some background on current hog  
situation*

*Chris*



## Hog Prices Will Improve, But No Profits Till Summer!

Hog prices dropped below \$20 per hundred weight recently, their lowest level since 1971. These levels are similar to those experienced in the pre-inflation era prior to 1973. Costs on the other hand, remain at 1990's levels. Financial conditions for producers are the poorest since the great depression of the 1930's. Losses per hog reached \$50 per head, likely a record level over the past 50 years.

Anxiety is high in the industry, and everyone is asking what is the cause of the current depressed conditions? What can be done? And, when will prices improve?

### Why Has The Bottom Fallen Out?

As always it will take time to sort out the reasons. First is the large supply of pork being produced this year which will be up about 9% over 1997. Second is the concern regarding the Asian economic downturn. Weak demand from Asia this year has kept many commodity prices depressed. However, pork exports have actually been up nearly 20% in 1998 and therefore are not the cause. A third concern has been the record large imports of live hogs from Canada. Imports will likely exceed 4 million head, about 4% of total U.S. slaughter for the year. However, even these record supplies, prices were expected to be in the higher \$20s and thus other explanations are needed for the extreme price depression.

The most likely cause is lack of packer capacity and high retail prices that have delayed increases in the volume of pork consumption. Another way to express this is to say that marketing margins have been extremely wide.

Official data lags somewhat but indications are very clear that pork marketing margins are not just large, but that their extreme levels are a concern not only to producers, but to every consumer of pork in the country. These wide margins may be both driving producer prices lower and keeping consumer prices higher. My estimates for the entire year of 1998 shows that the huge margins may have negatively impacted producers and consumers by up to \$4 billion. Numbers of this magnitude suggests that additional investigation of the margins should be considered by the USDA and public regulators.

Insufficient packer capacity is probably directly related to the extreme low hog prices. In November the number of hogs being marketed was greater than capacity packers had in place. The very low hog prices provided packers with the financial incentive to add shifts on Saturdays and even Sundays in order to handle the current large flow of slaughter hogs. These weekend shifts are higher costs due to inexperienced labor, and due to the need to pay overtime.

### What Actions Can Be Taken?

There are possibilities on both the demand and supply side. For demand, an investigation of margins, particularly at the retail level could provide some help. Why have retailers not lowered pork prices more this year to send consumers the clear signal that an abundant supply of pork awaited them at favorable prices. The federal government also has some ability to buy pork for school lunch programs, as well as export aid programs. The Russian food aid package negotiated in the fall is an example.

Consumers need to know that pork is a great bargain. At every opportunity the industry must strive to get retail prices down, and let consumers know that pork is abundant and will be

favorably priced through the winter. The NPPC is working in this direction with their, "The Other White Meat Sale" campaign.

Adjustment in supply has historically come as a result of large financial losses which encouraged a sufficient number of producers to reduce production. It is likely this will be the supply solution this time also. Some would argue that large producers are now of sufficient size to influence the national market price. However, even if a few very large producers who represent 10% of the industry would cut their production by 10%, the net result would only be a 1% reduction in supply. Some have advocated an organized national campaign to ask producers to cut production by trimming sow numbers and marketing at lighter weights. Unfortunately, attempts to organize producers broadly to cut-back would also fail since those who cut-back bear the costs, and those who do not cut-back receive benefits (higher prices on full production).

Producers will follow market signals to adjust supply. With the extreme low hog prices many will trim their least efficient animals. With hog prices at levels that won't even cover feed costs, it does not make economic sense to feed certain animals. Weights will also be cut-back as the least efficient period of conversion for market hogs is at high weights. And finally, discouragement and fear of financial ruin will convince more to simply reduce their herd size or to liquidate.

#### When Will prices Improve?

On a positive note, hog prices generally make their seasonal lows in early November and begin to improve in late November and December. Packers are gearing up to add more slaughter capacity on the weekends which could help prices recover back to the mid \$20s. Sow slaughter numbers since mid-August indicate a movement toward more-herd liquidation. It is now likely that farrowings for this fall and winter will not be as large as noted in the September report. In fact, I continue to look for a 2% to 3% reduction in farrowings this winter. In addition, a more normal, or even harsh winter, could reduce weaning rates and lead to the start of reduced pork supplies by next summer.

Beef supplies are expected to drop by 5% this winter and 8% in the spring. This will provide a greater incentive for retailers to focus on pork for their features, and to finally sharply lower pork prices which will stimulate consumers to increase their purchases. Lower pork prices will also help to stimulate added export sales, although the world economic uncertainty is expected to linger through much of 1999.

Losses are in store for producers through next spring, but should not be nearly as severe as the fall of 1998. Prices are expected to be in the higher \$20 for much of the winter, then move into the mid-\$30s by spring. Summer prices should be able to reach the higher \$30s and perhaps low \$40s with a return to some profitability.

I continue to follow the hog cycle and this analysis would suggest that the last-half of 1999 would see much better prices with low-to-mid \$40s likely. The next cycle high prices would come in 2000 with prices averaging in mid-to-higher \$40s for the year, and summer 2000 prices reaching above \$50 per hundredweight. In the last three hog cycles, prices moved from their lowest level to their highest level for that cycle in an average of 19 months. This would be consistent with high hog prices in the summer of 2000.

Producers can be assured that almost no one can survive with hog prices below \$25 per hundredweight for any extended period of time. This means that adjustments in supply must come, if for no other reason than a sufficient number are facing financial ruin.

Chris Hurt  
Purdue University  
November 13, 1998

## Have Wide Pork Margins Taken \$4 Billion From Producers and Consumers in 1998?

Hog prices dropped below \$20 per hundredweight recently, their lowest level since 1971. These levels are similar to those experienced in the pre-inflation era prior to 1973. Costs on the other hand, remain at 1990's levels. Pork producers are suggesting that financial conditions are the poorest since the great depression of the 1930's. With hog prices at \$16 per hundredweight, and costs near \$36, losses per hog are mounting at the rate of \$50 per head, likely a record level over the past 50 years. Modest sized family farms of 300 sows could be losing nearly \$1,000 a day. Many of these have already had a difficult year with low crop prices and in some cases poor yields.

Anxiety is high in the industry, and everyone is asking what is the cause of the current depressed conditions? What can be done? And, when will prices improve?

As always it will take time to sort out the reasons. First is the large supply of pork being produced this year which will be up about 9% over 1997. Second is the concern regarding the Asian economic downturn. Weak demand from Asia this year has kept many commodity prices depressed. However, pork exports have actually been up nearly 20% in 1998 and therefore are not the cause. A third concern has been the record large imports of live hogs from Canada. Imports will likely exceed 4 million head, about 4% of total U.S. slaughter for the year. Another problem is wide marketing margins. This has been especially true at the retail level.

Official data lags somewhat but indications are very clear that pork marketing margins are not just large, but that their extreme levels are a concern not only to producers, but to every consumer of pork in the country. These wide margins may be both driving producer prices lower and keeping consumer prices higher. The data for September show that retailer's pork margins reached \$1.38 per retail pound. This was 23 cents higher than the average of September margins from the previous two years. Even allowing for 3% inflation in retail margins over the past two years, retailers may have extracted an additional \$275 million from producers and consumers in the month of September.

Packer margins for the first 9 months of 1998 averaged only 1.5 cents per pound higher than the previous year after allowing for an inflationary increase in costs. It is likely that margins have widened in October and November, but official data is not yet available. Wider margins by packers may be needed to increase slaughter capacity on Saturdays and even Sundays in order to handle the current large flow of slaughter hogs.

Estimates for the entire year of 1998 shows that the large margins may have negatively impacted producers and consumers by up to \$4 billion. Numbers of this magnitude suggests that additional investigation of the margins should be considered by the USDA and public regulators. In addition, researchers need to probe the complex issue of margins to better evaluate whether undue market power is putting pork producers and consumers at a disadvantage.

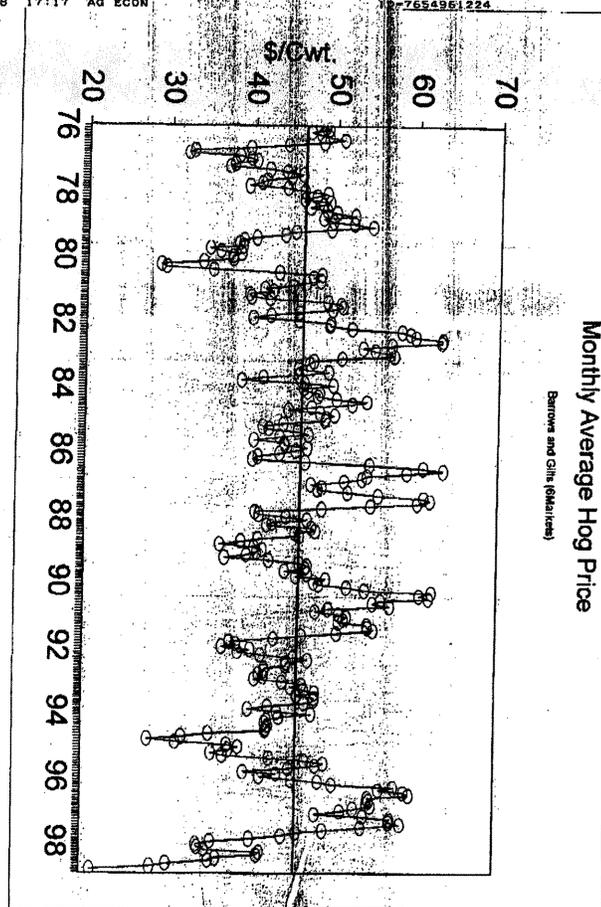
What can be done? There are possibilities on both the demand and supply side. For demand, an investigation of margins, particularly at the retail level could provide some help. Why have retailers not lowered pork prices more this year to send consumers the clear signal that an abundant supply of pork awaited them at favorable prices. The federal government also has some modest ability to buy pork for school lunch programs, as well as export aid programs. The current Russian food assistance package is an example. Hopefully they will be aggressive at including pork at every opportunity.

Adjustment in supply has historically come as a result of large financial losses which encouraged a sufficient number of producers to reduce production. It is likely this will be the supply solution this time also. Some would argue that large producers are now of sufficient size to influence the national market price. However, even if a few very large producers who represent 10% of the industry would cut their production by 10%, the net result would only be a 1% reduction in supply. Attempts to organize producers more broadly to cut-back would also fail since those who cut-back bear the costs, and those who do not cut-back receive benefits (higher prices on full production).

On a positive note, hog prices generally make their seasonal lows in early November and begin to improve in late November and December. Packers are starting up to add more slaughter capacity on the weekends, and sow slaughter numbers since mid-August indicate a movement toward more liquidation. It is now likely that farrowings for this fall and winter will not be as large as noted in the September report. In fact, the impulse to reduce a 2% to 3% reduction in farrowings this winter. Beef supplies will continue to drop this winter and provide a greater incentive for retailers to finally lower their prices and move this large supply to consumers.

Hog prices should be much lower in December, but precise levels cannot be anticipated until late next spring. If farrowings are cut this winter and harsh winter weather cuts into the weaning rate, hog prices can move back into the low-to-mid \$40 next summer.

Chris Hurt  
Purdue University  
November 9, 1998



## Summary of Odor Research at the University of Minnesota Biosystems and Agricultural Engineering Department

David Schmidt and Larry Jacobson,  
Minnesota Extension Engineers

The University of Minnesota Biosystems and Agricultural Engineering Department, along with other University of Minnesota departments, state agencies, and industry have undertaken a major research effort toward defining and controlling livestock odor. The following are brief descriptions of current projects. More information on many of these projects can be found at [www.bae.umn.edu/manure/manure.html](http://www.bae.umn.edu/manure/manure.html) on the World Wide Web.

### Farmstead Odor Database

Little background information is available on current existing odor emissions from farmsteads. Air samples have been collected for two years during spring, summer, and fall to develop background information and odor levels for assessing odor control techniques and ideas for future research.

### Electromagnetic Energy to Control Microorganisms

A laboratory-scale pulsed electromagnetic device has shown that application of high-voltage electric pulses (up to 35 kV/cm) for a short duration (2 to 30 milliseconds) can inactivate more than 99.9% of microorganisms contained in liquid waste. These microorganisms are responsible for the generation of odorous gases.

### TOAST Aerobic Systems

A Tertiary Oxygen Activated Sludge Treatment (TOAST™) system was installed on a swine production facility. The system is composed of an anaerobic reactor, an aerobic reactor, and a liquid/solids separation unit. This system significantly reduced odor and hydrogen sulfide emissions.

### Non-Thermal Plasma

A non-thermal plasma reactor has been tested in laboratory

and field settings. Air samples from swine production facilities are passed through a chamber in which hydroxyl ions and ozone react with hydrogen sulfide, ammonia, and other odorous volatile organic compounds producing oxidized compounds that are non-odorous.

### Biofilters

Odor, hydrogen sulfide, and ammonia removal efficiencies of experimental biofilters are being monitored. The biofilters are treating air from swine, dairy, and poultry facilities. Performance of a full-scale biofilter on a swine farrowing/gestation facility is also being monitored.

### Biofilter Microorganisms

Environmental conditions are being assessed for growing and survival of microorganisms either in pure or mixed cultures for removing odors, ammonia, and hydrogen sulfide.

### Manure Storage Covers—Laboratory Analysis

A laboratory study was completed using 200-gallon tanks to evaluate the reduction in odor and hydrogen sulfide concentrations using straw, oil, straw/oil blend, Permalon™ rubber membrane, Macrolite™ balls, and geotextile membrane as treatments compared to a control tank without a cover. Results indicate reductions in odor concentrations from 60 to 90%.

### Manure Storage Covers—Field Analysis

Air samples have been collected from existing livestock facilities where manure storage units were covered with a naturally occurring crust, Macrolite™ balls, and an aerated layer. The odor strength of air samples from these units was compared to odor from similar storage units without covers. Results indicate that some odor reduction can be achieved by covering manure storages.

### Dust Control

Odor is contained on aerosol particles that originate from the animal, feed, and dried wastes. Spraying oil as a dust control technique was recently evaluated as an odor reduction method and reductions of 20 to 80% were found.

### Pit Additives

Similar, paired, swine grow-finish units with deep pits were used to evaluate the effectiveness of additives for reducing odor and ammonia concentrations in barns. One pit served as a control and the other pit was treated with additives. Air samples were collected from inside the barns at 30-day intervals and analyzed for ammonia and odor. Results indicate a wide range of effectiveness for the products tested.

### Ground Carcass Material

Research has been conducted on the practice of disposing of carcass material from mortalities in liquid manure storage structures. Up to 4% (dry matter basis) ground carcass material was mixed into the normal manure stream with no significant increase in odor or hydrogen sulfide concentrations.

### Sulfur Balance

Three animal production units with high hydrogen sulfide emissions were compared to three units with low emissions.

The sulfur content in the drinking water, feed, veterinary supplies, and other sources of sulfur was determined. Results indicate that the hydrogen sulfide emissions did not correlate well with sulfur inputs in the water, diet, or veterinary supplies.

#### **Starter Diet Manipulation**

Swine nursery starter diets were adjusted to minimize sulfur content and improve sulfur digestibility and retention while maintaining pig performance. In addition, the sulfate anion associated with trace mineral mixes was replaced with a carbonate anion. Odor and hydrogen sulfide emissions from these facilities were compared to facilities with standard diets. Results indicate sulfur content in the diet can be reduced without impacting pig performance, but reducing sulfur in the diet does not necessarily impact hydrogen sulfide emissions.

#### **Standardization**

Standard techniques for sampling, transporting, and storage of odor samples, and for making measurements using a dynamic olfactometer, are being developed. Comparisons are also being made between odor measurements conducted at Iowa State University and the University of Minnesota.

#### **Odor Rating Systems**

A decision making tool is being developed for local units of government to assist in the siting of production facilities. The tool is used to estimate odor impacts from proposed facilities. Predictions of odor impact will be based on species, housing, manure management systems, odor control or reduction techniques, setback distances, probable wind direction and speed, and other factors that contribute to odor emissions and dispersion.

#### **Dispersion Modeling**

Once an odorous gas leaves the source, the gases are dispersed into the atmosphere in both horizontal and vertical directions. The dispersion effect is being studied with field measurements and computer models.

#### **Summary**

As is evident from the variety of projects discussed, the University of Minnesota odor research program is broad-based. This is consistent with the view of most scientists that solutions to the odor issue will be from a number of different approaches rather than from just one or two specific technologies. In addition, our work is based on cooperation with a variety of researchers both within and external to the University of Minnesota. This ongoing cooperation has proven to be an invaluable asset in understanding odor production, developing methods and protocols to evaluate odors, and determining potential solutions that are both reliable and economical.

## Farm Management to Mitigate Odor

Livestock production and manure management systems often emit less odor and ammonia if farmers simply improve their management practices such as keeping floors clean, removing manure accumulations frequently and regularly, keeping up with routine equipment maintenance, using feed additives to reduce dust and placing covers over flush tanks and open drain junction boxes. No system, regardless of how advanced the technology, will operate by itself without proper maintenance and management. Each farm owner and/or operator should first do an environmental assessment of their farm to check for possible sources of gas and odor emission and apply appropriate remedies before they spend an exhaustive and often unsuccessful search for an odor control "silver bullet." On-farm environmental/odor assessments by qualified professionals are available to livestock owners and growers. The following tables provide a menu of possible management remedies for odor, dust and ammonia emissions from livestock and poultry production farms. More detailed information on specific remedies can be found in fact sheets available from the Department of Biological and Agricultural Engineering at NC State University. Each Remedy is rated according to its effectiveness and cost. The ratings are based on professional judgement since many result from years of experience rather than controlled evaluations. Even though a particular remedy may have a low effectiveness rating, when combined with a grouping of remedies, it may still result in an overall improvement in conditions. Livestock farm owners and operators should never underestimate the value of using good judgement and common sense day-to-day management.

### Swine Production Farm Management Practices to Mitigate Odor

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
1. farmstead	swine production	vegetative or wooded buffers;	2	2	L
		recommended best management practices;	1	2	VL
		good judgment and common sense	1	1	VL
2. animal body surface	dirty, manure covered animals	clean, dry floors	2	2	VL
3. floor surface	wet, manure-covered floors	slotted floors;	2	2	M
		waterers located over slotted floors;	1	1	VL
		feeders at high end of solid floors;	2	2	VL
		scrape manure buildup from floors;	1	1	VL
		underfloor ventilation	2	2	M
4. manure collection pit	urine; partial microbial decomposition	frequent manure removal by flushing,			
		pit recharge, or scraping;	1	2	L
		underfloor ventilation	2	2	M

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.

# Control of Odor Emissions from Animal Operations

## Swine Production Farm Management Practices (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
5. pit exhaust fan	gases; dust	fan maintenance;	2	3	VL
		air scrubbing;	2	2	H
		biomass filters;	2	2	M
		biofiltration;	2	2	H
		wind break walls	2	3	L
6. side/end wall exhaust fan	gases; dust	fan maintenance and efficient air movement;	2	3	L
		air scrubbing;	2	2	H
		biomass filters;	2	2	M
		biofiltration;	2	2	H
		wind break walls	2	3	L
7. feeder	dust	feed additives;	2	3	L
		feeder covers;	1	3	L
		feed delivery downspout extenders	1	3	VL
8. indoor surfaces	dust	washdown between groups of animals;	1	3	L
		proven oil atomization techniques	2	3	L
9. outside feed tanks	spilled moldy feed	keep mechanical equipment in good repair	3	3	VL
		remove spilled feed promptly	2	3	VL
10. flush tank	agitation of recycled lagoon liquid while tank is filling	flush tank cover;	2	2	L
		extend fill line to near bottom of tank with anti-siphon vent	2	2	VL
11. flush alley	agitation of recycled lagoon liquid while flowing down alley	underfloor flush with underfloor ventilation	3	3	M
12. pit recharge	agitation of recycled lagoon liquid while pit is filling	extend recharge line to near bottom of pit with anti-siphon vent	2	2	VL

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

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# Appendix

## Swine Production Farm Management Practices (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
13. lift stations	agitation during sump tank filling and drawdown	sump tank covers	2	3	VL
14. outside drain collection	agitation of wastes while pit or junction box is draining	box covers	2	3	VL
15. end of drainpipe at lagoon	agitation of wastes while pit is draining	extend discharge point of pipe underneath lagoon liquid level	1	2	VL
16. lagoon surface	incomplete microbial decomposition; biological mixing; agitation	proper lagoon liquid capacity;	1	2	M
		correct lagoon startup procedures;	1	3	M
		minimum surface area-to-volume ratio;	2	2	L
		minimum agitation when pumping	1	2	L
		mechanical aeration;	2	2	H
		lagoon cover;	1	1	H
17. irrigation sprinkler nozzle	high pressure agitation; wind drift	proven biological additives	3	3	M
		irrigate on dry days with little or no wind;	2	3	VL
		minimum recommended operating pressure;	2	3	L
		pump intake near lagoon liquid surface;	2	3	VL
		pump from second-stage lagoon	2	2	M
18. storage basin surface	partial microbial decomposition; mixing while filling; agitation when emptying	bottom or midlevel loading;	2	2	M
		surface mat of solids;	1	2	L
		proven biological additives or oxidants	1	1	M
19. settling	partial microbial decomposition; mixing while filling; agitation when emptying	extend drainpipe outlet underneath underneath lagoon liquid level;	1	2	L
		basin cover;	1	1	H
		remove settled solids regularly	1	2	M

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

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# Control of Odor Emissions *from* Animal Operations

## Swine Production Farm Management Practices (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
20. manure, slurry or sludge spreader outlet	agitation when spreading	soil injection of slurry/sludge;	2	2	H
		proven biological additives or oxidants	3	3	M
21. uncovered manure, slurry or sludge on field surface	microbial gases while drying	soil injection of slurry/sludge;	2	2	H
		soil incorporation within 48 hours;	2	2	M
		spread in thin uniform layers for rapid drying;	2	2	M
		proven biological additives or oxidants	3	3	M
22. dead animal	carcass decomposition	proper disposition of carcass	1	3	L
23. dead animal disposal pit	carcass decomposition	complete covering of carcass in burial pit;	1	3	M
24. incinerator	incomplete combustion	secondary stack burner	2	3	H
25. standing water around facilities	improper drainage; microbial decomposition of organic matter	grade and landscape such that water drains away from facilities	2	3	L
26. mud tracked to public roads from farm access roads	poorly maintained access roads	access road maintenance	2	3	L

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.

# Appendix

## Dairy Production Farm Management Practices to Mitigate Odor

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
1. farm	dairy production	vegetative or wooded buffers;	2	2	L
		recommended best management practices;	1	2	VL
		good judgment and common sense	1	1	VL
2. paved lot or barn, alley surfaces	wet, manure-covered surfaces	scrape or flush surfaces daily;	2	2	M
		promote drying with proper ventilation;	1	2	L
		routine checks and maintenance on waterers, hydrants, pipes, stock tanks	2	2	L
3. commodity storage sheds or tanks	partial microbial decomposition and moldy feedstuffs	remove accumulations of spoilage	2	3	L
4. silo	bunker spoilage; microbial fermentation of freshly cut silage	remove accumulations of spoilage;	2	1	L
		divert liquid drainage to a grassy soil surface in thin uniform layers for rapid drying	3	3	L
5. feed bunk	moldy feedstuff	keep mechanical equipment in good repair;	3	3	L
		remove uneaten feedstuff accumulations	3	3	L
6. bedded areas	urine and partial microbial decomposition	promote drying with proper ventilation;	2	2	L
		replace wet or manure-covered bedding	2	2	M
7. manure dry stack	partial microbial decomposition	provide liquid drainage for stored manure	2	2	M
8. manure storage basin surface	partial microbial decomposition; mixing while filling; agitation when emptying	bottom or midlevel loading;	2	2	M
		surface mat of solids;	2	2	L
		minimize lot runoff and liquid additions;	2	2	M
		agitate only prior to manure removal;	1	2	L
		proven biological additives or oxidants	3	3	M
9. settling basin surface	partial microbial decomposition; mixing while filling; agitation when emptying	liquid drainage from settled solids;	3	3	M
		remove settled solids regularly	2	3	M
10. manure, slurry or sludge spreader outlet	agitation when spreading	soil injection of slurry/sludge;	2	2	H
		proven biological additives or oxidants	3	3	M
11. uncovered manure, slurry or sludge on field surface	microbial gases while drying	soil injection of slurry/sludge;	2	2	H
		soil incorporation within 48 hours;	2	2	M
		spread in thin uniform layers for rapid drying;	2	2	M
		proven biological additives or oxidants	3	3	M

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.

# Control of Odor Emissions from Animal Operations

## Dairy Production Farm Management Practices to Mitigate Odor (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
12. flush tank	agitation of recycled lagoon liquid while tank is filling	flush tank cover;	2	2	L
		extend fill line to near bottom of tank with anti-siphon vent	2	2	VL
13. outside drain collection or junction box	agitation of wastes while pit is draining	box covers	2	3	VL
14. lift stations	agitation during sump tank filling and drawdown	sump tank covers	2	3	VL
15. end of drainpipe at lagoon	agitation during wastewater conveyance	extend discharge point of pipe underneath lagoon liquid level	1	2	VL
16. lagoon surface	incomplete microbial decomposition; biological mixing; agitation	proper lagoon liquid capacity;	1	2	M
		correct lagoon startup procedures;	1	3	M
		minimum surface area-to-volume ratio;	2	2	L
		minimum agitation when pumping;	1	2	L
		mechanical aeration;	2	2	H
		lagoon cover;	1	1	H
17. irrigation sprinkler nozzle	high pressure agitation; wind drift	proven biological additives	3	3	M
		irrigate on dry days with little or no wind;	2	3	VL
		minimum recommended operating pressure;	2	3	L
		pump intake near lagoon liquid surface;	2	3	VL
		pump from second-stage lagoon;	2	2	M
		flush solids from lines at end of slurry/sludge pumping	2	3	L
18. dead animal	carcass decomposition	proper disposition of carcass;	1	3	L
19. contaminated milk	partial microbial decomposition	transport to approved processing plant;	2	3	L
		transport to approved wastewater treatment plant;	2	3	L
		add to farm lagoon and submerge in liquid;	2	3	M
		land apply and soil incorporate	2	3	M
20. standing water around facilities	improper drainage; microbial decomposition of organic matter	grade and landscape such that water drains away from facilities	2	3	L
21. mud tracked onto public road from farm access	poorly maintained access roads	farm access road maintenance	2	3	L

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.

# Appendix

## Poultry Layer Production Farm Management Practices to Mitigate Odor

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
1. farmstead	poultry production	vegetative or wooded buffers;	2	2	L
		recommended best management practices;	1	2	VL
		good judgment and common sense	1	1	VL
2. floor surface (walk aisles)	wet, dirty surfaces	scrape manure, dust, feathers into manure alley;	2	3	L
		splash boards along upper end of flush alley;	1	2	VL
		proper ventilation	2	2	M
3. cage battery manure dropping boards	manure-covered surfaces	scrape manure into manure alley or pit	1	2	L
4. manure collection pit or alley	partial microbial decomposition	scrape or flush alley daily;	1	2	L
		recirculate air over deep-pit stored manure	2	2	M
5. pit exhaust fan (deep pit)	gases, dust	fan maintenance;	2	3	VL
		air scrubbing;	2	2	H
		biomass filters;	2	2	M
		biofiltration;	2	2	H
		windbreak walls	2	3	L
6. side/end wall exhaust fan	gases, dust	fan maintenance and efficient air movement;	2	3	L
		air scrubbing;	2	2	H
		biomass filters;	2	2	M
		biofiltration;	2	2	H
		windbreak walls	2	3	L
7. indoor surfaces	dust	vacuum or washdown between flocks of birds;	1	3	L
		proven oil atomization techniques	2	3	L
8. watering system maintenance	excessively wet stored manure	frequent checks and maintenance of waterers and water pipes	2	2	VL
9. outside feed tanks	spilled moldy feed	keep mechanical equipment in good repair	3	3	VL
		remove spilled feed promptly	2	3	VL
10. manure conveyors	partial microbial decomposition	keep mechanical equipment in good repair;	2	2	L
		remove manure accumulations promptly	1	2	L
11. storage basin surface	partial microbial decomposition; mixing while filling; agitation when emptying	bottom or midlevel loading;	2	2	M
		surface mat of solids;	1	2	L
		proven biological additives or oxidants	3	3	M

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.

## Control of Odor Emissions *from* Animal Operations

### Poultry Layer Production Farm Management Practices to Mitigate Odor (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
12. settling basin surface	partial microbial decomposition; agitation while filling/emptying	liquid drainage from settled solids;	3	3	L
		remove settled solids regularly	2	3	L
13. manure, slurry or sludge spreader outlet	agitation when spreading	soil injection of slurry/sludge;	2	2	H
		proven biological additives or oxidants	3	3	M
14. uncovered manure, slurry or sludge on field surface	microbial gases while drying	soil injection of slurry/sludge;	2	2	H
		soil incorporation within 48 hours;	2	2	M
		spread in thin uniform layers for rapid drying;	2	2	M
		proven biological additives or oxidants	3	3	M
15. flush tank	agitation of recycled lagoon liquid while tank is filling	flush tank cover;	2	2	L
		extend fill line to near bottom of tank with anti-siphon vent	2	2	VL
16. outside drain collection or junction box	agitation of wastes while pit is draining	box covers	2	3	VL
17. lift stations	agitation during sump tank filling and drawdown	sump tank covers	2	3	VL
18. end of drainpipe at lagoon	agitation of wastes while pit is draining	extend discharge point of pipe underneath lagoon liquid level	1	2	VL
19. lagoon surface	incomplete microbial decomposition; biological mixing; agitation	proper lagoon liquid capacity;	1	2	M
		correct lagoon startup procedures;	1	3	M
		minimum surface area-to-volume ratio;	2	2	L
		minimum agitation when pumping;	1	2	L
		mechanical aeration;	2	2	H
		lagoon cover;	1	1	H
		proven biological additives	3	3	M
20. irrigation sprinkler nozzle	high pressure agitation; wind drift	irrigate on dry days with little or no wind;	2	3	VL
		minimum recommended operating pressure;	2	3	L
		pump intake near lagoon liquid surface;	2	3	VL
		pump from second-stage lagoon	2	2	M
22. dead bird	carcass decomposition	proper disposition of carcass	1	3	L
23. dead bird disposal pit	carcass decomposition	complete covering of disposal pit openings;	1	3	M

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

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# Appendix

## Poultry Layer Production Farm Management Practices to Mitigate Odor (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
24. incinerator	incomplete combustion	secondary stack burner	2	3	H
25. dead bird compost	partial microbial decomposition	proper compost recipe;	2	2	L
		proper compost pile formation	1	2	M
26. cull or broken egg disposal	partial microbial decomposition	collect and remove promptly	1	3	L
		proper disposition	2	3	M
27. standing water around facilities	improper drainage; microbial decomposition of organic matter	grade and landscape such that water drains away from facilities	2	3	L
28. mud tracked onto public roads from farm access	poorly maintained access roads	farm access road maintenance	2	3	L

## Poultry Broiler/Turkey Production Farm Management Practices to Mitigate Odor

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
1. farmstead	poultry production	vegetative or wooded buffers;	2	2	L
		recommended best management practices;	1	2	VL
		good judgment and common sense	1	1	VL
2. floor surface	excessively wet litter	proper ventilation;	2	2	M
		properly adjusted and operated foggers/misters	2	2	L
3. floor surface	dust	proper ventilation	2	3	M
4. side/end wall exhaust fan	gases; dust	fan maintenance and efficient air movement;	2	3	L
		air scrubbing;	2	2	H
		biomass filters;	2	2	M
		biofiltration;	2	2	H
		windbreak walls	2	3	L

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.

## Control of Odor Emissions from Animal Operations

### Poultry Broiler/Turkey Production Farm Management Practices to Mitigate Odor (continued)

Odor Source	Cause	Possible Remedy	Effectiveness*		Cost**
			Odor Emission Reduction	Ammonia Emission Reduction	
5. indoor surfaces	dust	vacuum or washdown between flocks of birds;	2	2	L
		proven oil atomization techniques	2	3	L
6. watering system maintenance	excessively wet litter	frequent checks and maintenance on waterers and water pipes	2	2	VL
7. outside feed tanks	spilled moldy feed	keep mechanical equipment in good repair;	3	3	VL
		remove spilled feed promptly	2	3	VL
8. stockpiled litter	partial microbial decomposition;	store litter under cover or roof;	2	3	M
		store litter on compacted or paved surface;	3	3	M
		direct leachate in thin layers onto grassy filtration areas	3	3	L
9. litter spreader outlet	dust; wind draft	spread on days with little wind	2	3	M
10. uncovered wet litter on field surface	microbial gases while drying	soil incorporation within 48 hours;	2	3	M
		spread in thin uniform layers for rapid drying	3	3	M
11. dead bird	carcass decomposition	proper disposition of carcass	1	3	L
12. dead bird disposal pit	carcass decomposition	complete covering of disposal pit openings;	1	3	M
13. incinerator	incomplete combustion	secondary stack burner	2	3	H
14. dead bird composter	partial microbial decomposition	proper compost recipe;	2	2	L
		proper compost pile formation	1	2	M
15. standing water around facilities	improper drainage; microbial decomposition of organic matter	grade and landscape such that water drains away from facilities	2	3	L
16. mud tracked onto public roads from farm access	poorly maintained access roads	farm access road maintenance	2	3	L

\*The odor and ammonia emission reduction effectiveness of each remedy is rated numerically, with 1 being the most effective and 3 the least effective.

\*\*Cost is rated H for high, M for medium, L for low and VL for very low.

All ratings are based on the professional judgement of scientists at NC State University. Even though a possible remedy by itself may be rated low, when combined with a grouping of remedies, it may result in an overall improvement. More detailed information on several of the possible remedies may be available in fact sheets from the Department of Biological and Agricultural Engineering at NC State University.