

**What Level of Manure Management Is Right for You?
MAEAP CNMP or Right To Farm GAAMPs?**

Lee W. Jacobs

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There has been a great deal of visibility and a strong suggestion by the Michigan Agricultural and Environmental Assurance Program (MAEAP) during this past winter at several regional meetings that pork producers should prepare Comprehensive Nutrient Management Plans (CNMP) for their operations. A MAEAP CNMP is one option that producers can choose to use and then obtain third party verification that their pork operation has achieved a level of management worthy of environmental assurance certification. Another manure management option is to adopt and follow practices that would comply with the Michigan Right to Farm Act.

Michigan has had Right to Farm Generally Accepted Agricultural and Management Practices (GAAMPs) for Manure Management and Utilization since 1988. These GAAMPs provide guidance on recommended practices that producers should follow to obtain protection under the Right To Farm Act and to operate in an environmentally-responsible manner. While following the GAAMPs will not attain the higher level of management that is required by a CNMP, the GAAMPs level of management is a good goal to achieve on your farm first. If a pork producer then wants to further improve or raise the level of management on his/her farm, the MAEAP CNMP is a logical, next "step" to take. Going directly to a CNMP may be a "giant step" that could require a producer to make too many changes too fast, causing him/her to become discouraged and quit.

In addition, the US Environmental Protection Agency (USEPA) has changed their proposed federal regulations (December, 2000) which would now require that CAFOs (Concentrated Animal Feeding Operations) prepare a PNP (Permit Nutrient Plan) rather than a CNMP. The PNP is defined as a subcomponent of a Natural Resource Conservation Service CNMP and is much closer to the type of plan that has been recommended for many years in the Manure Management and Utilization GAAMPs. Whether or whether not CAFO regulations become a reality under the new Presidential Administration, or whether the proposed PNP changes to something else, the manure management GAAMPs will continue to provide guidance on recommended practices that we would like all producers to adopt and follow.

Another aspect of manure management that needs emphasis is that developing a manure nutrient management plan is only part of what is needed for adopting recommended management practices. The more important part is **implementation of the plan**. Having a nutrient management plan, but never using or following it, does little to ensure that a pork operation will be successful and environmentally sustainable.

Therefore, my recommendation is that pork producers start out by first adopting and implementing GAAMPs on their farm. Develop a plan that addresses manure nutrient management and odor management on your farm and then

(Continued on page 2)

What's Inside ...

What Level of Manure Management is Right for You?	p. 1
Using Boars for Estrous Stimulation and Detection	p. 2
MSUMN A Management Tool to Assist Michigan Crop/Livestock Producers ..	p. 3
Gilt Management: Minimizing and Managing the Entry-to-Service Interval	p. 4
Hog and Pork Outlook - 2001 and Beyond	p. 5
MSU Feed Mill Renovation	p. 8

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implement that plan. Once this has been accomplished, if you want to continue improving management practices on your farm, then developing a MAEAP CNMP is a logical progression that I would encourage producers to consider. Efforts put into implementing the manure GAAMPs will not be wasted, but instead, will become an important part of a MAEAP CNMP.

A new management tool is now available from MSU to assist you with developing and implementing a manure nutrient management plan. The MSU Nutrient Management (MSUNM) computer program has been converted into a Windows version (WinMSUNM) and was released

for sale in February, 2001. This program can assist crop and livestock producers with fertilizer and manure nutrient management and pesticide application recordkeeping. WinMSUNM is being further improved during 2001 to assist users with following a step-by-step process to develop a manure nutrient management plan, and WinMSUNM is a user-friendly program that will allow most producers to develop a plan and implement the manure management or siting GAAMPs themselves. WinMSUNM is available at a nominal cost (see accompanying article) that is much less expensive than hiring a consultant to prepare a MAEAP CNMP for your farm.

Using Boars for Estrous Stimulation and Detection

Roy Kirkwood, DVM, Ph.D.

Extension Swine Veterinarian, Michigan State University

For many herds, a major component of total non-productive days is the gilt entry-to-service interval (ESI). In order to reduce the ESI, as well as gain predictability of gilt services, the gilts should be adequately stimulated with boar exposure. This both reduces gilt age at puberty and permits accurate estrus detection. Accurate estrus detection allows improved breeding management. Occasionally, producers report that the boar effect does not work very well on their farms. Where the effectiveness of boar contact is questioned, the first thing to do is examine how boar exposure is managed. To get the best response from boar exposure, there are several rules that should be followed:

- The gilt must be old enough. The optimum gilt age may vary a little between genotypes but target a minimum age of 150 days. Below this age, the boar effect will still work but will take longer. The net result is the same age at puberty but more work to get there.
- The boar must be old enough. Boars may be able to sire a litter from 6 to 7 months of age but their ability to stimulate puberty is not good before 10 months of age. A major part of the boar's stimulus value is the odors (pheromones) produced by the submaxillary salivary gland. This gland produces the frothy saliva observed when the boar is sexually stimulated or aggressive (the watery saliva produced when the boar is hungry comes from a different gland). The submaxillary gland undergoes its final development from six months of age and is not "adult" until about 10 months of age.

- Allow direct physical contact between gilts and boar. This maximises the boar effect although fenceline contact will provide some stimulation. Fenceline contact is OK for puberty detection, but direct contact is better. For puberty stimulation, direct contact is important. The reason for this is unknown but suggests that the full boar effect needs more than just pheromones (e.g. the stress of full contact courtship).
- Do not house gilts next to the stimulus boar. This practice may stimulate an earlier puberty but detecting that puberty will be difficult. Once a gilt (or sow) has been in standing estrus for about 15 minutes, she will unlock and then will not respond (be refractory) to boar stimuli for some time. If the gilts have recently been standing when you check them, they will not stand and be considered prepubertal. The usual advise is to house gilts and boars at least 3 feet apart.
- Move the gilts to the boar. This maximises the boar effect although taking the boar to the gilts will provide some stimulation. The reason for this is not known but may involve increased odors in the boar home pen and the boar is more likely to interact with the gilts rather than exploring the pen. For estrus detection, consider the use of a separate detection-mating area.
- If possible, allow boar contact more than once daily. The response will be improved by twice-daily boar contact. In addition to stimulating a younger age at

(Continued on page3)

puberty, estrus detection will also be improved. Data from the University of Alberta herd where boar exposure was done up to three times a day shows that 60% of gilts stood for the boar in the morning, 30% in the afternoon and 10% during the night. We all know the importance of accurate estrus detection and so, based on these results, twice-daily estrus detection is recommended. This improved detection accuracy will be followed by an improved timing of mating and so an improved gilt fertility.

- Do not crowd the gilts. Crowding makes estrus detection more difficult. Allow about 1.5-2.0 m² per gilt
- Use a different stimulus boar every 1 to 3 days. Some boars are better than others at stimulating onset of puberty, although their fertility will likely be OK. If a boar is a poor stimulator of puberty, he will be very difficult to detect quickly. The use of a boar

rotation will minimise the effect of these poorer boars.

- If gilts are not bred at their first detected estrus, continue boar exposure. It has been shown that pubertal gilts are more likely to show regular estrous cycles if boar exposure is continued.

If an intact boar is used for direct stimulation, then the exposure must be carefully monitored to prevent unwanted matings. However, if continuous supervision is not practical, consider using vasectomized boars (V-boars). If V-boars are used, less intense supervision is needed since breedings can be allowed. Indeed, a V-boar breeding at puberty will enhance fertility in gilts subsequently bred at their second estrus. Boars can be vasectomised at any age but it is a relatively major surgery. A simple surgery to create sterile boars is to remove the epididymus from the testes. This can be done on young boars, but not once they approach puberty.

MSUNM: A Management Tool to Assist Michigan Crop/Livestock Producers

Lee W. Jacobs

Department of Crop and Soil Sciences, Michigan State University

The MSU Nutrient Management (MSUNM) computer program has been converted into a Windows version (WinMSUNM) and was released for sale in February, 2001. This program can assist crop and livestock producers with fertilizer and manure nutrient management and pesticide application recordkeeping. WinMSUNM contains the MSU Fertilizer Recommendations computer program which provides the user the convenience of generating his/her own MSU fertilizer recommendations, by utilizing soil fertility test results from the MSU Soil and Plant Nutrient Laboratory (SPNL) or other commercial soil testing laboratories. This new version allows for the electronic transfer of soil test data from the SPNL directly into WinMSUNM, and later this year, the capability to transfer soil test data from other selected commercial soil test labs into WinMSUNM will be added.

Once fertilizer recommendations are generated for individual fields and subfields, WinMSUNM allows the tracking of nutrient additions from fertilizer and manure applications. For pork producers, WinMSUNM can calculate manure application rates for fields and subfields that are in compliance with the Right To Farm Generally

Accepted Agricultural and Management Practices (GAAMPs). In addition, pork producers can:

- 1) estimate quantities of manure nutrients produced on their farm(s) based on the number of animals housed now, or that would be housed if a new or expanded pork operation was established, and then compare these nutrient quantities to crop nutrient removal by the available land base (this "farm nutrient balance" report can be helpful for long-term planning to help keep your pork operation sustainable);

- 2) develop manure spreading guides (i.e., proper manure application rates), that will be in compliance with the GAAMPs, for different combinations of selected manure types and groups of fields and subfields that the user chooses;

- 3) calculate manure application rates for selected manure types and for selected individual fields using seven different manure allocation strategies;

- 4) have WinMSUNM determine amounts of nutrients applied by specific manure rates and then subtract these nutrient credits from the fertilizer recommendation to determine additional fertilizer nutrients still required to

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meet crop nutrient needs on individual fields (taking credits for manure nutrients can significantly reduce your fertilizer bill for crop production);

5) have WinMSUNM automatically calculate residual nitrogen (N) carry-over credits from previous manure applications, or legume N, and subtract these N credits from the fertilizer N recommendations for the coming year's crop (can reduce your N fertilizer costs); and

6) use WinMSUNM to help them prepare a Manure Management System Plan, as recommended by the

GAAMPs, or a MAEAP CNMP (Comprehensive Nutrient Management Plan).

If you are interested in purchasing the new WinMSUNM program, the cost is \$150 for new users, or if upgrading from your DOS version of MSUNM, the cost is \$100. Please obtain an order form from our web page: www.egr.msu.edu/age/msunm/, or contact me at 517-353-7273 or fax at 517-355-0270, or email at: jacobsL@msu.edu

Gilt Management: Minimizing and Managing the Entry-to-Service Interval Roy Kirkwood, DVM, Ph.D.

Extension Swine Veterinarian, Michigan State University

Usually, the largest single component of herd NPD is the gilt entry-to-service interval. To minimize this, it is necessary to have gilts reach puberty as soon as possible after arrival on the farm, or entry into the breeding herd. The ability to meet the weekly breeding target requires a predictable supply of service ready gilts (i.e. gilts in estrus when required). This is most easily achieved by having gilts show an early puberty. The decision on when to breed the gilts (in terms of age, weight, backfat depth, estrus number) is a separate issue and will vary for different farms. Two methods to stimulate an earlier onset of estrous cycles are boar exposure and the injection of hormones (gonadotrophins).

Boar exposure is the most common practice for inducing early puberty and is the method that should be used. If the effectiveness of boar exposure is questioned, it is important to evaluate whether the rules of boar contact are being followed (see Gilt management: Using boars for estrus stimulation and detection). If boar exposure is not working as well as expected (e.g. a seasonal effect), and if as far as possible the rules of boar exposure are being followed, then an intervention strategy may be considered.

Gonadotrophin treatment (e.g. PG600[®]) is effective for the induction of estrus and ovulation in prepubertal gilts. However, before considering the use of hormones you must be confident that the gilts are truly prepubertal. If hormones are administered to cyclic gilts, estrus is unlikely to be observed and the predictability of the eventual return to estrus will be lost. When gonadotrophins are injected into prepubertal gilts, experience has shown that up to 30% of the gilts may not show behavioral estrus (but do

appear to ovulate) and, of those that do show estrus, about 30% will not have a regular estrous cycle. Since predictability beyond the induced estrus is not good, if hormonal induction of estrus is used then the gilts should be bred at the induced estrus.

A recent study illustrates the likely outcome of breeding prepubertal gilts at a gonadotrophin-induced estrus (Table 1). During a 3-week period, detected estrus rates were 78% and 38% for PG600[®]-treated and untreated gilts, respectively. In other words, the PG600 successfully induced estrus. Also, for hormone-treated gilts that were not bred or that were bred but did not conceive at the induced estrus, a 2:1 ratio of regular to irregular returns was observed. This confirms the 70% incidence of normal estrous cycles in hormone-stimulated gilts. In this study the farrowing rate of hormone-induced gilts was lower. However, calculating the number of pigs produced per available gilt, based on estrus detection rate x farrowing rate x litter size, favored the estrus induction treatment (5.5 vs 3.2 pigs).

Table 1. Performance of gilts bred at PG600[®]-induced or natural first estrus.

	Control	PG600
Service ready gilts, %	38	78
Service age, d	193	186
Farrowing rate, %	88.6	74.4
Litter size (total)	9.7	9.4

Kirkwood 1999

(Continued on page 5)

The aforementioned study above indicates a reduced farrowing rate and no effect on litter size. However, on your farm you may see a different response. Either or both farrowing rate and litter size may be increased, decreased, or remain unchanged. It is important to remember that PG600 was developed to induce a fertile estrus and should not be used to try and improve other aspects of gilt fertility (e.g. litter size).

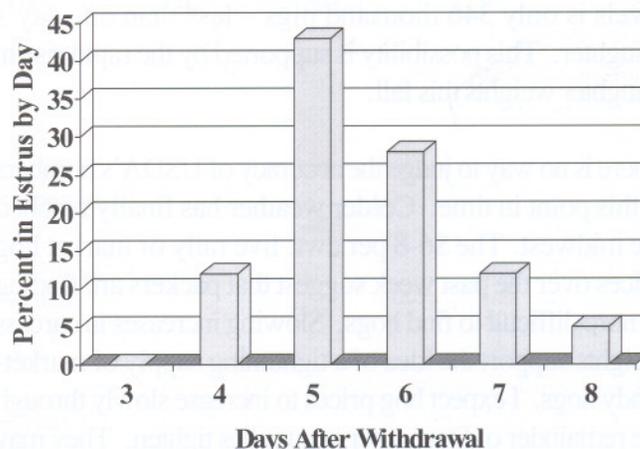
In practice, a problem often encountered is that some proportion of incoming gilts (5 to 15%) fail to show estrus within a reasonable time period after entry (e.g. 28-days). It has been suggested that these gilts are likely either having a silent estrus or are prepubertal but relatively infertile. In either case, an argument can be made that they should be culled. Where pressure exists to keep them, they can receive a “last chance” injection of PG600® and be bred at the induced estrus. My advice is that any of these gilts failing to exhibit estrus by 7-days after hormone treatment should be culled. A well-developed gilt failing to show a natural estrus and then not responding to gonadotrophic stimulation is unlikely to be a productive and profitable sow. Also, arguably, any of these gilts that are bred but fail to conceive should also be culled as infertile (assumes good estrus detection and breeding management).

How do you increase the chance that a cyclic gilt in the gilt pool will be service-ready when you want her? First, maintain good records of estrous activity so, based on a 21-day estrous cycle, you can predict the return date. If the gilt pool is large enough, the chances are good that a gilt will be estrous when required.

What if the gilt pool is not very large and, based on records

of estrous activity, often gilts are not service-ready as needed? For this situation some control over the estrous cycle is needed. It is not possible to predictably short-cycle gilts so you would have to use estrus suppression. The idea is that, based on the records of estrous activity, you identify those gilts that are due to return to estrus during the days before they are actually needed. Then, estrus in these gilts is blocked until the time they are needed. Currently, the only product I am aware of that can do this is Regumate (Intervet) which is not yet registered for use in swine. When it is, and under the guidance of your veterinarian, you will find it works very well. It is fed to females each day at a rate of 7cc/day from day 13-14 of the estrous cycle (starting earlier is not a problem, it just costs more) until 5-days before you need to breed the gilts. If you do not know the timing of the estrous cycle, feed it for 18 days before removal. The likely pattern of returns is shown in Figure 1. It is important to remember that Regumate works very well when used as recommended but if for any reason gilts are under-dosed then cystic ovaries may occur.

Figure 1. Timing of return to estrus after Regumate® withdrawal



Hog and Pork Outlook – 2001 and Beyond
Dr. Steve R. Meyer, Director
Economics, National Pork Board

The U.S. pork industry in late 2001 can be best characterized as either guardedly optimistic or guardedly pessimistic; take your pick. While that sounds like economic gibberish at its best, it's really not a bad description. The source of guarded optimism is two years of profits (and healthy ones at times!) with very little or no expansion of the breeding herd. The source of guarded

pessimism is knowing the history of the pork industry and expecting the expansion bug to infect producers eventually, thereby increasing supplies and plunging prices into a prolonged down cycle. It is impossible to choose which view is more correct at present, so let's look at recent conditions and explore the key factors to watch in months to come.

Fall 2001 – Where did all the hogs come from?

USDA's September Hogs and Pigs Report indicated that producers had actually reduced the breeding herd and that the break-neck rate of productivity gains during 1999 and 2000 had come to a screeching halt. The latter of these boded well for the fall of 2001. But the predicted reductions of market hog supplies have not materialized. In fact, hog slaughter since September 1 has exceeded 2000 levels by 0.5% and has exceeded the levels suggested by the September report by nearly 1.4%. So where have all the hogs come from?

It is always possible that USDA undercounted market pig inventories. They spent about a year over-counting them and made some much-needed revisions to past numbers in the September report. It's possible this "downward revision" mentality spilled over into the current numbers.

A more plausible explanation is that the mild fall in most of the major hog growing areas caused excellent performance that may have pulled hogs marketings forward a bit. The 1.4% increase in slaughter vs. expected levels is only 346 thousand pigs – less than one day's slaughter. This possibility is supported by the rapid rise in slaughter weights this fall.

There is no way to judge the accuracy of USDA's numbers at this point in time. Colder weather has finally reached the midwest. The \$6-8 per cwt. live rally of market hog prices over the past week suggest that packers are finding it more difficult to find hogs. Slowing increases in carcass weights support the idea of a tightening supply of market-ready hogs. I expect hog prices to increase slowly through the remainder of December as supplies tighten. They may well reach \$40/cwt. live by year's end. The major dampening factor for this trend will be the usual December swoon in ham prices as the seasonal strength of ham demand ceases.

What's in store for 2002?

Pork demand is down slightly this year, having fallen by about 1.4 percent for the January-October period vs. 2000. This figure is actually better than where pork demand stood through August and there is still no evidence from objective data that the September terrorist attacks,

the war and the ensuing economic slump have had any negative impact on pork demand. There is ample evidence that these factors have hurt beef and chicken demand – mainly due to their higher level of exposure to the slumping travel and foodservice sectors. Many analysts expect the economy to rebound this spring and it appears that pork demand may make it through without significant damage.

Hog demand is actually up for the January-October period vs. 2000, mainly due to exceptional performance in exports, which are up 22 percent through September. It will be difficult to duplicate such performance in 2002 due to some degree of slowdown in the world economy and to the Japanese safeguard tariff being in effect through March 30. In addition, larger hog supplies in the second half of next year will allow packer margins to widen and put some downward pressure on hog demand. I do not expect either of these to result in large declines UNLESS packing capacity is severely tested next fall. Current slaughter capacity and supply expectations indicate that capacity utilization will be high, but not critically so.

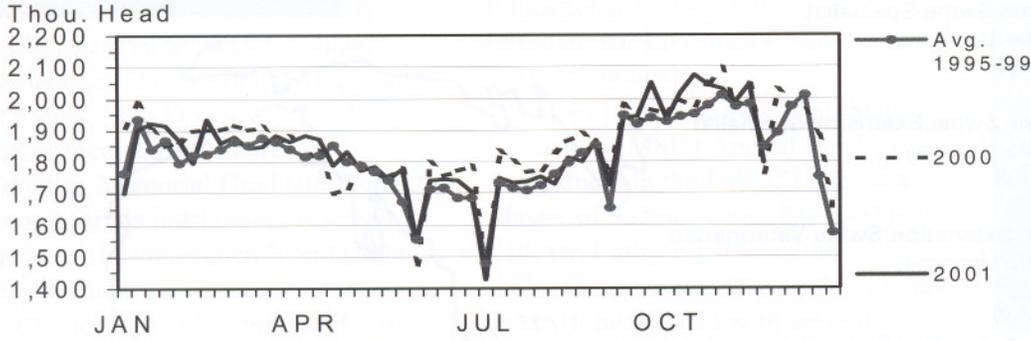
Until the December Hogs and Pigs Report is released on December 28, we have to work with the September numbers in analyzing potential supplies. Those data indicate little growth in the U.S. breeding herd and slaughter levels below 2001 in the first quarter and above 2001 thereafter. Hog supplies in the second half of the year could be 3-5% larger than this year. Add in a 1% growth in weights and pork production should grow by a short 2% in 2002 with most of that increase coming in the second half. I expect IA-MN 51-52% Lean carcasses to average from \$56-\$59/cwt. (\$41-\$44/cwt. live) for the year with quarterly averages as follows:

Q1	\$56-59	\$41-44
Q2	\$65-67	\$48-50
Q3	\$55-58	\$40-44
Q4	\$46-49	\$34-36

Watch the December Hogs and Pigs Report closely, looking especially for signs of growth in the breeding herd (anecdotal evidence says this isn't happening to any large extent at present), increased farrowings per breeding animal and increased litter size. I find it hard to believe that productivity growth has stopped as dead in its tracks as USDA says it has and I believe it will take off again – U.S. performance levels are still far from the biological capabilities of the pig.

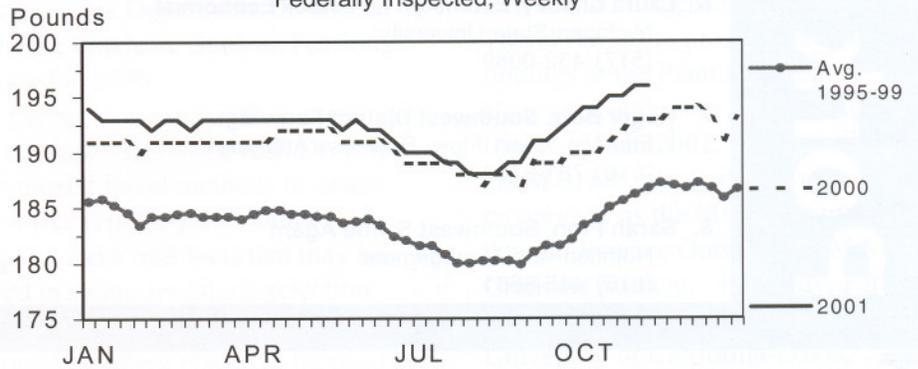
HOG SLAUGHTER

Federally Inspected, Weekly



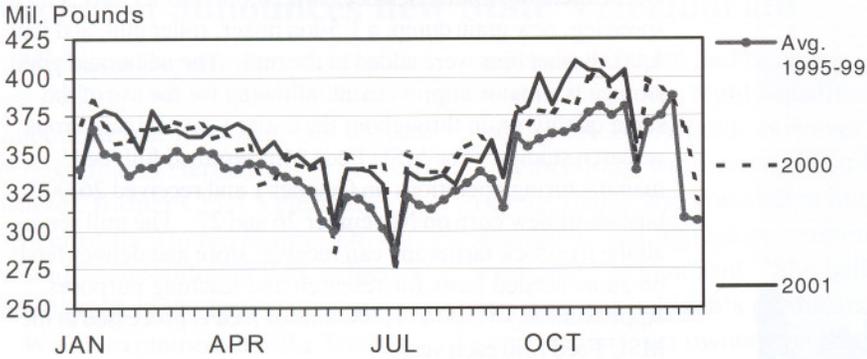
BARROW AND GILT DRESSED WEIGHT

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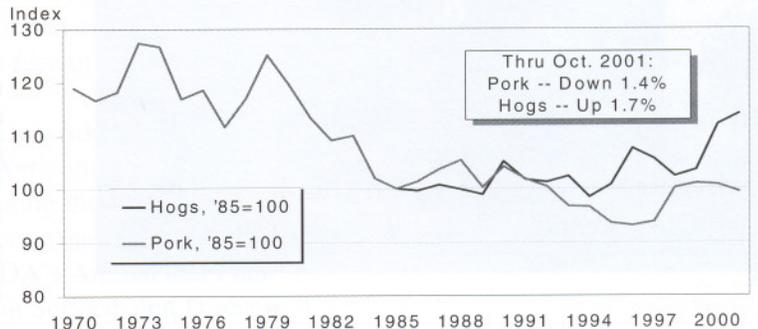


PORK PRODUCTION

Federally Inspected, Weekly



DEMAND INDEXES, 1985=100

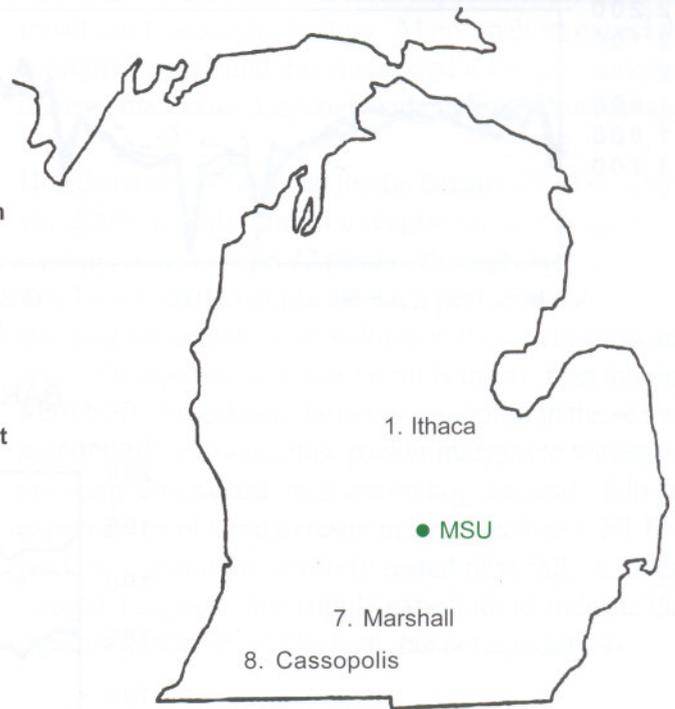


Source: University of Missouri

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All comments and suggestions should be directed to:

MICHIGAN STATE UNIVERSITY EXTENSION



MSU Feed Mill Renovation In 2001, a renovation project was completed at the Michigan State University Feed Mill. With funding from the Michigan Animal Initiative and the Department of Animal Science, two 26,000-bushel bins, a high-speed leg, new grain dump, a 1.5-ton mixer, roller mill, and four 1,000 bushel bins were added to the mill. The additional grain storage is a major improvement, allowing for the use of the same quality grain throughout the entire year and numerous research studies. The MSU Feed Mill resumed full feed manufacturing operations on October 1 and received 26,000 bushels of new corn on November 26 and 27. The mill serves all the livestock farms and can receive, store and deliver feed on an as-needed basis for research and teaching purposes. Approximately 1,500 to 1,700 tons of feed is processed at the MSU Feed Mill each year.

Persons involved in the renovation project were;

- Design Engineer - John Mentzer, Mason MI
- General Contractor - Mike Fitzgerald, Michigan Mill Equipment Company, Wayland MI
- Construction Firm - Specialties Industries Inc., Sunfield MI
- Electrical Contractor - Bernie Hickey, Nashville, MI
- MSU Land Management Project Coordinator - Ben Darling
- MSU Animal Science Faculty Coordinator - Dale Rozeboom
- MSU Feed Mill Operator - Brian Story