

## Proper Disposal of Dead Animals on Michigan Farms

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The Bodies of Dead Animals Act (BODA; Act 239 of 1982, as amended) regulates the management of dead animals in Michigan. The intent of this law is to:

1. Protect human and animal health
2. Reduce risk of disease transmission
3. Control flies, vermin, and scavenging animal problems
4. Protect ground and surface water and air quality

A person violating BODA is guilty of a misdemeanor punishable by a minimum fine of \$300 or imprisonment for a minimum of 30 days, or both. Three or more convictions for violating BODA is a felony punishable by imprisonment for up to one year or a fine of up to \$2,000, or both.

Under this act, there are currently six alternatives for dead animal disposal in Michigan:

1. Burial
2. Incineration
3. Rendering
4. Land-fill
5. Composting
6. Anaerobic digestion (Pending promulgation of rules)

MDA may require an alternative disposal method, at the owner's expense, if all of the current disposition methods for dead animals inadequately address potential toxicological contamination threats to human or animal health, or to the environment.

Regardless of which method of disposal is being used, all mortalities must be disposed of within 24 hours after death. The three exceptions to this rule are 1) dead animals stored secure at less than 40° F for no more than 7 days or at less than 0° F for no more than 30 days; 2) small mammals, deer, and birds taken under the authority of a damage and nuisance animal control permit issued by the MDNR (Part 401, NREPA, 1994 PA 451, MCL 324.40101 to 324.40119); and 3) road kill.

Mortality must only be those animals "intrinsic to an operation under common ownership or management." Carcasses may originate from multiple farm sites and be a mixture of livestock species, if all are owned by the same person or firm.

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Dead animals may be transported from several sites as long as BODA rules for transport are followed. Vehicles and (or) container(s) cannot leak or spill, and must be covered so that public viewing of the dead animals is not possible.

### **Burial**

Burial sites must have no contact with bodies of water; both surface and ground, and must be at least 200 feet from wells. Frozen ground makes burial difficult in winter.

Individual graves must be:

1. At least 2 feet beneath the natural surface
2. Limited to 100 graves/acre or 5 tons of tissue/acre
3. Separated by a minimum of 2.5 feet
4. Closed within 24 hours of opening

Common graves must:

1. Be limited to 2.5 tons of tissue per acre
2. Be separated by minimum of 100 feet
3. Have each day's mortality covered with minimum of 1 foot of soil
4. Not remain open for longer than 30 days
5. Have at least 2 feet of soil as final cover

### **Incineration**

Burning must not cause a public nuisance. Act 451, Part 55 "sources of air pollution" states that incinerators must be permitted by Air Quality Division of MDEQ. Residues from the burning process must be buried as outlined above, land-applied at agronomic rates, or properly disposed of in a landfill licensed by the MDEQ.

### **Rendering**

Rendering services must be provided by a licensed dead animal dealer, rendering plant or animal food manufacturing plant. As of April 27, 2009, rendering facilities are required to remove the brain and spinal cord of all cattle ages 30 months and older if by-products are to be used for animal feed. FDA is trying to lessen the chance of bovine spongiform encephalopathy getting into the human food supply. The rule presents new challenges for renderers and farmers, including documenting and identifying such animals.

### **Landfill**

Farmers should contact local landfills to learn if they will take delivery or pick-up farm mortality. The number of Michigan landfills which take dead animals has been decreasing and may currently be 10 or less. Arrangements can be made for carcass pick-up by the waste management firms, but they must comply with provisions for transportation as written in BODA. If a farmer delivers to the landfill, BODA rules for transport must be followed and the risks of transporting disease from the landfill site back to production facilities need to be addressed in a the farm's biosecurity plan.

### **Composting**

This is the biological decomposition of animal tissues under controlled or managed conditions. After composting, soft tissues should not be recognizable, bones should be broken in small pieces, and the compost should be aesthetically acceptable to other people.

All composting rules under BODA must be followed. A comprehensive document named the Michigan Animal Tissue Compost Operational Standard (MATCOS) was written to explain in detail the composting options provided to farmers in BODA. These may found on-line at: <https://www.msu.edu/~rozeboom/catrn.html>.

Under BODA, mortality composting on-farm may be done in piles or in-vessel. Piles may take shape: 1) in bins, 2) in open piles, 3) in overlapping piles, or 4) in windrows. With any of these methods, aeration of the compost material may be forced (mechanized with fan and ductwork), active (mechanical turning of material), or passive (air exchange within the composting material as fresh air is pulled into the lower portion of the pile as heat takes gases out of the upper portion of piles).

For smaller farms with 20,000 pounds or less of mortality annually, composting may be done in piles on bare soil without floor or roof (a.k.a. “open”). The soil must be land used for crop production. Collection of compost leachate is not required, but it must not cause a violation of any other federal, state, or local laws.

For larger farms, with more than 20,000 pounds of mortality annually, open piles or windrows may also be used, but they must be on a concrete pad or liner which is laid down according to the NRCS 313 practice standard. Using a concrete pad or liner with open pile and windrow compost ensures adequate environmental protection and provides a solid surface year-round for driving of large equipment even with freezing, thawing, and precipitation.

Site selection is important. On-farm traffic patterns, equipment access, animal housing, feedstuff movement, and adequate space around the compost materials for loading, unloading, and mixing should be considered. All composting sites must meet the following criteria:

1. Well drained soil with a minimum setback of 200 feet from waters of the state such as lakes, streams, wetlands, sinkholes, seasonal seeps, or other “hydrologically-sensitive” areas.
2. A minimum of 2 feet above the seasonal high water table.
3. A minimum of 200 feet from any well.
4. A minimum of 200 feet from the nearest non-farm residence.

Management of active composting is required to be done under the conditions:

1. Carbon-to-nitrogen ratio 15:1 to 40:1.
2. Moisture content, range of 40 to 60%.
3. Oxygen concentration of greater than 5% which accompanies a compost density in the range of 800 to 1200 pounds/cubic yard.

All composting systems require the controlled formation, identification, and management of compost batches. BODA requires that each batch undergoes a minimum of three heat cycles over 130° F before final utilization as “finished” compost. Timely aeration and moisture additions will allow active composting to continue in repeated heat cycles for months and minimize total composting time.

Bulking agents (a.k.a. feedstocks, amendments, carbon sources) are organic materials placed around carcasses to provide nutrients, desirable density, and aeration. An approved list of bulking agents is given in BODA.

Flies, rodents, pests, vermin and other scavengers or predators must be controlled so as not to disrupt the compost or constitute a risk or health hazard to human or animal populations. A biofilter, or layer of fresh, bulking agent, placed over a pile after each addition or each aeration, reduces odors and discourages pests. Carbon-rich materials such as chopped bean stover, chopped corn stover, chopped straw, dried grass, grain hulls, chopped dried hay, and sawdust or shavings should be used as biofilter materials. Animal manure solids, partially-decomposed feedstocks, green grass clippings, fresh hay, green leaves, and litter cake are less effective in controlling odors, insects, and vermin and should not be used as a biofilter.

Finished compost should have no visible pieces of soft tissue when reused in new compost batches or spread on cropland. Large bones of mature animals generally take 2 to 3 times as much time as soft tissues to compost. Bones should be placed in a new batch of compost for further decomposition until easily crumbled during the mechanical spreading process. Finished compost need not be fully cured.

Records containing all of the following information must be kept by the owner or operator of the composting facility for a minimum of 5 years and must be made available to MDA immediately upon request.

1. The start date of each compost batch.
2. Date of and approximate weight of dead animal additions to new compost batches. Animal tissue additions to a new pile should be concluded in two months or less to facilitate proper management of the compost batches.
3. The internal temperature of each actively composting batch measured weekly, except twice per week for a rotat ing drum, continuous flow, in-vessel system. The internal temperature of curing material measured once each week.

4. The date compost material is aerated if done with loader or turning equipment.
5. The final use or distribution of finished compost, including the method, location, date, and volume for the batch.

### **Cooperative or Commercial Composting**

Michigan currently does not have language in its regulations allowing for cooperative and (or) commercial animal tissue composting. MDA, MDEQ and MSU are currently giving consideration to the regulation of both options.

### **Anaerobic Digestion**

Anaerobic digestion was approved as an alternative in the past year (BODA, Amended 2008, Act 311, Effective December 18, 2008), but is not currently allowed to be used as Part 665, Sub 15 states that the Department of Agriculture shall promulgate rules for the “methodology for the anaerobic digestion of organic materials.” This process has not been completed.

### **Mass Carcass Disposal in a Major Animal Health Emergency**

A memorandum between MDA, MDEQ, and the Michigan Department of Natural Resources was entered into in September of 2004, to define their respective roles and responsibilities when mass carcass disposal is needed because of a major animal health emergency (e.g. a foreign animal disease or a natural disaster). Work with your veterinarian quickly when you become aware of the potential for disease. BODA address only the normal and natural mortality occurring on a farm. Sub rule 5 in section 19 of BODA says that any increase in normal natural daily mortality, due to any cause known or unknown, shall be reported to the MDA Director immediately. This is a biosecurity measure intended to protect our state's and nations' animal agriculture industry. A document entitled Standard Operating Procedures for Michigan Mass Carcass Disposal is available at: [http://www.michigan.gov/mda/0,1607,7-125-48096\\_48404---,00.html](http://www.michigan.gov/mda/0,1607,7-125-48096_48404---,00.html).

## **Production Efficiency of Specialized Swine Producers**

Dr. Glynn Tonsor, Dept. of Agricultural, Food, and Resource Economics

The swine industry in the US has changed drastically in recent years. One notable change is the proportion of total market hogs produced from traditional farrow-to-finish operations falling from approximately 65% to less than 38% between 1992 and 1998; this change has continued since 1998 as well. This change has been coupled with an increase in production by specialized hog operations, as a percentage of total US production, from 22% to 58% over the same period. An important question that arises from this rapid adjustment is how performance varies across emerging specialized swine production operations and traditional farrow-to-finish operations.

To address this question, Dr. Glynn Tonsor at Michigan State University and Dr. Allen Featherstone at Kansas State University recently completed an assessment of efficiency in the swine industry. The main purpose of this project was to examine how efficiency varies across five different swine production specializations: farrow-to-finish, farrow-to-feeder, feeder-to-finish, farrow-to-weanling, and weanling-to-feeder. This short note highlights the findings of this study.

To address this question, the authors used the 2004 USDA Agricultural Resource Management Survey (ARMS) of US hog producers as the source of the data for this study. This survey collected detailed information from a cross section of 1,198 hog operations in 19 states and was designed to be representative of producers across the swine industry. It is worth noting that several things have changed in the industry since 2004 that may impact this study's findings, but the next available ARMS data set won't be accessible for at least another year as it conducted about every 5 years.

The demographic characteristics of producers completing the 2004 USDA Agricultural Resource Management Survey varies notably across firm specializations. Farrow-to-finish producers tend to be older, less educated, more experienced, looking to exit the industry sooner, and less specialized in hog production than representative farrow-to-feeder, feeder-to-finish, farrow-to-weanling, and weanling-to-feeder producers. The frequency of larger operation sizes tends to be higher for feeder-to-finish and weanling-to-feeder operations, especially relative to more traditional farrow-to-finish operations. The geographical distribution and relative importance of feed, labor, and capital inputs also varies by special

ization. These differences and the desire for increased understanding of economic forces driving observed specialization in the industry call for further analysis of efficiency within and across specializations.

For economists to consider a firm to be “overall efficient,” it must produce the actual level of output with the lowest level of inputs (i.e. be technically efficient), use the optimal bundle of inputs given the price of those inputs (i.e., be allocatively efficient), and must operate at a size that minimizes average cost (i.e., be scale efficient). Results of our study suggests the industry’s farrow-to-finish producers include a diverse set of operations that may use older facilities, smaller scales of production, and traditional production methods relative to a more homogeneous set of farrow-to-feeder and weanling-to-feeder operations. Our results also suggests farmers of each specialization may have more room for efficiency enhancement by improving their ability to produce on the cost or production frontiers rather than focusing on altering the allocation of inputs. That is, producers are encouraged to focus on effectively converting operation inputs into sellable hogs, rather than changing the mix of inputs (e.g., labor, capital, or feed ratios) or adjusting their operation scale.

Producers interested in additional information on this study or related issues are encouraged to contact Dr. Tonsor (gtonsor@msu.edu). Moreover, interested parties ay also obtain the complete research paper from this project from Dr. Tonsor.

## A Review of Biosecurity Methods

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Biosecurity are rules and procedures that we implement to protect the health of our herds and to avoid the entry of a new disease on our farm. These rules and procedures should be the most straight forward protocols on the farm, and they are also the hardest to teach and maintain. The key element of biosecurity is to train yourself and your employees to be aware of the risks of introducing a new disease to your farm and to manage those risks accordingly.

A mixture of attitude, routine communication and a little common sense should be a part of biosecurity rules and procedures that can be easily maintained on a farm. We need to be able to understand ourselves and teach employees how to grasp the importance of these different protocols. All employees must understand an important basic principle. This principle is that when a disease outbreak occurs, the efficiency of the pigs worsen, the work load increases and the farm will incur a decrease in profitability. A full understanding of this principle is needed to ensure that proper biosecurity protocols are put into place and followed.

In order to maintain correctness and efficiency of your biosecurity protocols, you need to clearly define each protocol and complete audits or checks of your system. This will allow all people involved in the farm to have a clear understanding of what is expected of them on a daily basis. It is very important that upper management and owners/operators also adhere to these protocols, setting an example and maintaining a standard for all employees. The following article reviews some of the basic principles of a biosecurity system.

### Location

Location can be thought of as the single most important factor when trying to maintain the herd health on your farm. We understand that placing farms as far away from other farms is a great idea; yet we also have to be practical and cost effective when siting our locations. Ideally we would look for a site that is approximately 2 miles from any other swine herd, minimizing the risk of aerosol spread, vehicle crossover and insect exchange (Reicks, 2008). When looking for a location we also have to give value to the topography of the area. Hills and trees break up wind flow patterns and may be able to disperse any virus that is traveling through the air. Finally, when siting a facility you need to look at the general make up and logistics of the area that you wish to place your facility in. It helps to check for major roadways that might have pig traffic and the number of other facilities in the area that might employ people on their farm, increasing the instance of people mingling and spreading disease.

## Pig Source

A second component in a biosecurity matrix is the source of your pigs. Stocking your facility with animals from the same source herd is your best chance at controlling the introduction of new disease in your herd. This allows you to minimize the possibility of bringing in new strains of disease or compromising the health of your animals when bringing in replacement gilts or boars. Studies have shown that herds that purchase stock from more than one supplier in a year are three times more likely to become infected with *Mycoplasma hyopneumoniae*, than herds which purchase from a single source (Amass, 2006). This idea also applies to your source of semen. When introducing new genetics into your herd, some farms purchase semen collected at an off-site boar stud. While this gives you the opportunity to select from many different genetics, it also opens up your facility to the chance of disease introduction. Constant communication with your veterinarians, routine testing at the boar stud and understanding the specifications for each facility are required to minimize the risk of disease introduction and to maintain a good herd health status.

A final key to the pig source component of biosecurity is utilizing an isolation/acclimation unit for your facility. These facilities can be housed off-site or as an attached facility. These units should have strict entrance/exit protocols and have the same general biosecurity standards as the rest of the facility. Replacements gilts and boars enter into the facility through this unit and remain there until no clinical signs of a virus are seen and appropriate testing of the replacement animals have been done. In *Biosecurity Protocols for the Prevention of Spread of Porcine Reproductive and Respiratory Syndrome Virus*, authors suggest a 30 day timeframe for incoming replacement stock to be kept in isolation (Pitken et al., 2006). Employees should complete the tasks in this area at the end of the day and avoid returning to the main farm after a visit to the isolation/acclimation unit. The sharing of air space or pits between units is not advised. Once an animal has been housed in the unit for a pre-determined amount of time, no clinical signs are observed, communication with the source herd has found no problems and all tests have returned negative the group is then cleared to move to the home unit.

## People

Employees or visitors to different swine facilities can also be seen as a vehicle for disease transmission between herds. In general, it is asked of employees to avoid contact with other pigs, this includes county fairs, other pig barns, sale barns, slaughter plants, petting zoos, diagnostic labs and other areas where pigs are housed (Reicks, 2008). If an employee does come into contact with a pig from another herd it is suggested that they utilized a “downtime” protocol, which requires people to be away from pigs for a pre-determined amount of time. For most facilities the suggested “downtime” is two nights away from any other source of pigs. The “downtime” requirement changes with each phase of production and the health status of the facility.

When entering into a facility people still play a large part in maintaining the herd health of a unit. If the unit has shower in/shower out facilities, employees and visitors are asked to remove footwear in the initial entryway of the farm in order to gain access to the farm. From here they are asked to proceed to the dirty side of the shower, removing their clothes, undergarments and jewelry. All people looking to gain entrance into the farm are required to thoroughly shower and shampoo and enter the clean side of the shower, where fresh clothing and boots await them. From here they may gain entrance to the farm.

In farms where there are no shower facilities available, employees and visitors are still asked to follow biosecurity measures. It is important to change into clean outerwear, including boots, when entering the barn. Employees and visitors are also asked to wash their hands prior to entering the facility. If clean boots are not available, proper biosecurity protocols would be to scrub the boot, removing all fecal and other organic matter and to effectively disinfect the boots utilizing a clean boot bath or individual disinfectant methods (Reicks, 2008). Another option for footwear in barns without shower facilities is to use plastic disposable boots or to designate boots for each barn.

## Vehicles

The everyday operation of a swine facility requires the movement of many different vehicles to complete different tasks that occur. When vendors are servicing a general area it is important to maintain constant communication about expect-

tations and protocols. It is expected that service vehicles will follow a biosecurity matrix that requires them to go to the herds with the highest health status first, so as not to continually spread disease or introduce new virus to other herds. When limiting the amount of vehicles that enter your farm you may be able to incorporate some considerations with your service vendors.

- Have supplies delivered to an off-site location or to the base of the farm premises. Farm employees can then shuttle supplies into the facility
- Keep dumpsters and trash receptacles away from your facility. Placing these in an area on the outer portion of your location will minimize these vehicles at your facility, especially if they are servicing other farms in your area.
- Talk to your electric company to see if they will read the meter remotely, allow farm personal to read it or to prioritize the meter reading at your farm, before other farms are read.

## Supplies

As mentioned before, the delivery of supplies should be limited to your farm. Off-site delivery systems can be utilized to decrease a source of contamination (Reicks, 2008). Supplies should be moved onto a farm through a fumigation room or at the very least, inspected to ensure that everything is clean and dry. If possible allow supplies to sit overnight in a pass-through room before moving into the storage area. Supplies can also be sprayed or wiped down with a disinfectant prior to entering the farm. It is also suggested that supplies not be shared between farms and each individual farm be responsible for their own inventory and ordering.

## Audits

Although we can easily implement different biosecurity protocols on each farm, it is difficult to assess how well each method is working. Audits of your system help provide feedback and help you gain a better understanding of how your employees function with different biosecurity standards. “Audits are necessary because nothing remains static on a hog farm. Production procedures change over time and so do employees” (Vansickle, 2007). Simply asking routine visitors to your site, such as veterinarians, feed truck drivers, UPS delivery people about their experience and noting when a protocol has been breached will go along way in maintaining the herd health on your farm. “An audit is an internal working document that provides a yearly report card of where farms are at on biosecurity. This in turn will help you determine the root causes of the problem including: inadequate training, lack of supply, equipment, weather, neglect, procedure modification or others” (Vansickle, 2007).

Biosecurity protocols should be implemented on your farm based on a risk assessment for each individual farm. In order to maintain a high level of herd health, efficiency and profitability, a structured biosecurity system must be put into place. The success of this system largely depends on personnel compliance and an adequate training program. Another resource that plays a big part in incorporating and maintaining biosecurity standards is your farm’s veterinarian. This person can be seen as a source of scientific information, instructor of biosecurity protocols and auditor on your farm. Maintaining a set of biosecurity rules not only reduces the perceived risk of introducing or spreading disease, they also help to maintain herd health over an extended period of time.

## References

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## Forum Announcing MSUE Pork Team State Wide Winter & Spring Programs!

The Pork Industry is ever changing! Can you maintain your current level of production and efficiency without challenging yourself to learn and know more about the industry your work in?

Join the MSUE Pork Team to learn further how to improve your performance, your business and ultimately your bottom line. Watch for further details in the December issue of the Pork Quarterly and on-line at <http://web1.msue.msu.edu/aoe/pork/>

### **We Care! Embracing Social Accountability in the Pork Industry.**

Co-Sponsor: United Producers, Inc.

Meeting Dates;

Jan. 13 – Dowagiac, MI

Jan. 14 – Coldwater, MI

Jan. 20 – Mount Pleasant, MI

Jan. 21 – Zeeland, MI

Topics to include;

- PQAPLUS Certification
- Transport Quality Assurance Certification
- Getting ready for PQAPLUS Assessment
- PQAPLUS Self Assessment Examination

Meetings will start in the afternoon with PQAPLUS Certification and TQA Training held sequentially. The evening meeting will provide insight into PQAPLUS Site Assessment. The exam for producers to complete self assessment will be available for those wanting to conduct their own PQAPLUS Site Assessment.

### **2010 Green and White Education Fair and Show**

January 30, 2010

Pavilion for Livestock and Agriculture Education, MSU, East Lansing, MI.

This day long event for Youth will feature;

- Swine Quiz Bowl
- Swine Skillathon
- Powerpoint Presentation Contest
- Essay Contest
- Scholarship Contest
- Market Hog Show

### **2010 Professional Pork Producers Symposium**

Co-Sponsors: Michigan Pork Producers Association and Elanco Animal Health

Thursday, February 11, 2009

The Lansing Center, Lansing, MI

Topics to Include;

- Industry Outlook
- Fibre for gestating sows
- European trends in pork production
- The future of environmental stewardship
- Carcass merit selling
- Feed contaminants
- Industry data collection and use

### **2010 Michigan Pork Producers Association State Informational Meetings: Co-Sponsors:** Michigan Pork Producers Association and Pfizer Animal Health

- Understanding the impact of swine diet formulation and finishing barn type on nutrients in manure

This program is presented at four different locations across Michigan in late March. Watch for further details regarding topics, locations and dates in the December issues of the Pork Quarterly, and the Michigan Pork magazine, and on-line at Michigan Pork Producers Association website, [www.mipork.org](http://www.mipork.org), or the MSUE Pork TEAM website, <http://web1.msue.msu.edu/aoe/pork/>.

**MICHIGAN STATE**  
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**EXTENSION**

*Bringing Knowledge to Life*

# Can You Score Body Condition?

Ronald O. Bates,  
State Swine Specialist

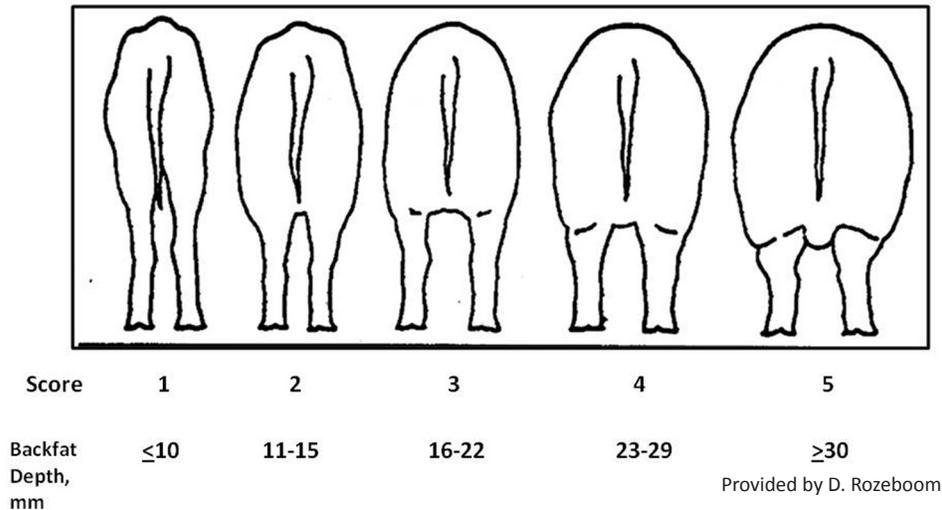
## Introduction

Much about sow management decisions involves the amount of “condition” that a sow or gilt has. Sow condition is the amount of body tissue reserves that a sow or gilt maintains on her body. The exercise of body condition scoring (BCS) assigns a numerical score to the sow ranging from 1 through 5 (Figure 1). In this system a score of 3 is considered optimal. Sows with more condition, primarily fat cover, would be assigned a score of 4 or 5 while sows with less than optimal condition, would be scored a 2 or 1. Sows that are scored a 1 (too thin, including emaciation) or 5 (excessively fat) are targets for intensive nutritional intervention. Sows that are scored a 2 or 4 would receive minor nutritional intervention. Assigning these scores helps identify which sows may need to be managed differently in order to improve their condition and subsequently their productivity. Sows that are too thin typically have trouble maintaining milk output for their litters during lactation and can have a delayed return to estrus after weaning. Sows that are too fat during lactation, can have trouble delivering her pigs, often do not eat well and can have trouble maintaining lactation output. These sows frequently experience considerable weight loss during lactation and can experience irregular return to estrus after weaning. Farms that can maintain sows within a BCS of 2 through 4 throughout their gestation and lactation cycle should experience fewer reproductive and lactation problems relating to body condition. However how accurately can people assign these body condition scores from which critical management decisions are made?

## Condition Scoring

The art and science of scoring body condition is not necessarily as straight-forward as some might think. Some have suggested that an objective measurement of fat thickness is a more accurate and repeatable method than visually scoring body condition (Hill et al., 1998). Backfat thickness can be readily measured at the last rib and these measurements can be used to classify sows into body condition scores (Figure 1).

Fig. 1: Body Condition Score Chart



A recent published study evaluated the ability of people to assign body condition scores to sows (Fitzgerald et al., 2009). Persons were primarily college students. These students had a diverse background in visual appraisal of livestock and varied from no experience to extensive experience. Students were provided a one-hour training session on scoring body condition in sows. This included a short work session in which they scored body condition on 25 sows in reference to the instructors. The instructors for the training session were experienced in evaluating sow body condition and assigning BCS scores. After completing the training session participants scored 125 novel sows that were in varying stages of gestation. Persons scored sows in random order. After completing this initial scoring session, sows were re-randomized and participants scored these sows again so that each person scored each sow twice. Sows then had fat depth at the last rib estimated with B-mode ultrasound and this estimate of fat thickness was used to assign sows into official body condition scores (Table 1).

**Table 1: Classification of Sows into Body Condition Scores by Last Rib Backfat Thickness<sup>a</sup>**

Body Condition Score Class	Backfat Thickness Minimum, mm	Backfat Thickness Maximum, mm	Number of Sows
1	0	9.9	6
2	10	14.9	24
3	15	22.9	75
4	23	29.9	17
5	30		3

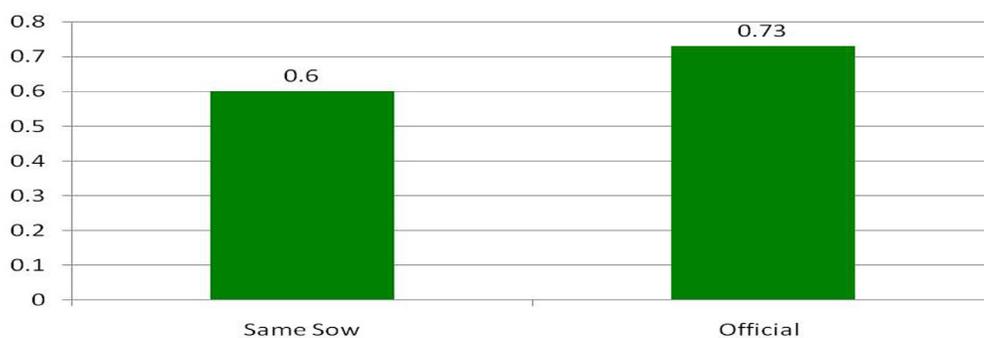
<sup>a</sup>Adapted from Fitzgerald et al., 2009.

These official body condition scores served as the reference to which all persons were compared.

The number of sows classified into official body condition scores was not uniformly distributed. There were 75 sows (60%) that were considered BCS 3 while only 7.2% would be classified into BCS 1 or 5.

It was reported that there was no difference in variability due to previous experience in live animal evaluation. This suggests that persons with minimal experience can be trained to score body condition and have similar variability to persons with more experience in live animal evaluation. Figure 2 lists the comparisons of participants to themselves as well as to the official BCS. When comparing the two scores for the same sow across all participants, the average difference was 0.6 scores. This suggests that participants could assign the same score to approximately one-half of the sows twice, while differing in score assignment by one score for the rest of the sows. In other words for one-half the sows participants assigned the same score to a particular sow twice. For the other sows, the two scores differed, on average by one score.

**Figure 2. Body Condition Score Comparisons<sup>a</sup>**



<sup>a</sup>Comparisons of participant body scores for the same sow as well as to an official body condition score estimated from backfat thickness. (Adapted from Fitzgerald et al., 2009)

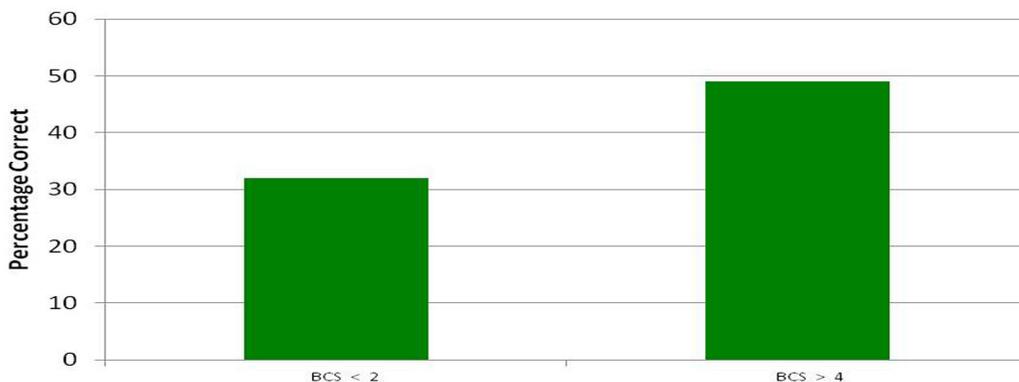
In Figure 2 is also a measure of how participants compared to the official BCS as determined by estimated backfat thickness. Participants, on average, were within one BCS score of the official score. This suggests that participants were able to differentiate sows that differed in backfat thickness in relation to a quantitative estimate of backfat thickness.

Overall participants consistently assigned a similar BCS to the same sow twice. In addition they were within one score of the official BCS as determined by backfat thickness. This indicates that persons can be trained to competently score body condition.

However, the overarching goal of scoring sows for body condition is to identify thin sows that need additional feed or fat sows that need less feed compared to sows that are considered to have optimum body condition. In other words, can persons consistently identify thin sows (BCS # 1 & 2) and fat sows (BCS # 4 & 5)? The authors determined how well

participants correctly assigned scores to sows that were either BCS 1 and 2 or BCS 4 or 5, based on the BCS assigned from backfat thickness estimates. In Figure 3 is the percentage of thin (BCS 1 and 2) and fat sows (BCS 4 and 5) scored correctly. Unfortunately participants had difficulty in correctly identifying thin and fat sows. For sows that were a BCS of 2 or 1, only 32% were correctly identified. Participants were better at identifying fat sows. For sows that were a BCS of 4 or 5, 49% of these sows were correctly identified. Over all though, less than 50% of sows that may have needed nutrition intervention, feed reduced or feed increased, were correctly identified. This suggests that individuals may poorly identify sows which need an alteration to the amount of feed allocated to them.

Figure 3. Assignment of Critical Body Condition Scores<sup>a</sup>



<sup>a</sup>Percentage of sows assigned to a BCS in which nutritional intervention may be necessary.  
(Adapted from Fitzgerald et al., 2009)

### Final Thoughts

Sow management should include some measure of condition which can be either an estimate of backfat thickness with an estimate of body weight or a Body Condition Score. Though this study suggests that persons don't effectively identify sows that need either less or more feed, the results may be a bit misleading. The authors did not report how well participants correctly identified sows with a BCS of 1 or 5. Sows that are a BCS of 1 or 5 are those that need immediate nutritional intervention. From the information provided it would appear that those sows should have been correctly identified due to the indication that persons were consistently within once score of the official score and that their own scores for the same sow were highly repeatable. Furthermore, sows should be evaluated 2-3 times for condition during gestation. Thus if sows were mis-classified at an earlier classification, there will an opportunity to correctly classify the sow at the next evaluation and then correct the sow's feed allotment.

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