E3239

Gestation Group Sow Housing Options: **Electronic Sow Feeding**

Introduction

Housing sows in individual stalls has become commonplace across the pork industry. This method of production has grown in popularity because animals can be housed and cared for individually. However, growing consumer concern has increased scrutiny on this standard industry practice. Multiple states have passed legislation that mandates that pregnant females be group housed for specified portions of gestation. This change in system design and production method has raised concerns among producers, who have stated their need for information and specifications on group sow housing options. In Michigan, results from pork producer focus groups identified descriptions and cost comparisons of group sow housing options as their top educational need. This bulletin describes one group sow housing option, electronic sow feeding (ESF).

General description of system

ESF typically has a single enclosed feed station to feed 50 to 60 group-housed sows. Some manufacturers state that a single station can feed up to 80 sows. The feed station is equipped with microprocessors (computers) that track and dispense feed for each sow as she goes through the feed station (Figure 1). Sows typically have one removable ear tag that contains a radio frequency identification (RFID) Transponder that identifies a particular sow to the system (Figure 2). ESF is considered a protected system that allows producers and farm managers to continue feeding sows as individuals in a group-housed setting.

Once a sow enters the feed station, the entrance gate will lock for a predetermined amount of time – typically less than 2 minutes. As the sow moves into the feeding area, the computerized system reads the identification code from the RFID ear tag and transfers this information to the computer on the feed station. The system will then begin dropping the sow's allotted feed amount into the feeder. As long as the sow is in the antenna field, a signal is sent to the microprocessor, the system will continue to drop feed, and the entrance gate will remain locked. The sow is allowed to consume her feed while being protected from the other animals in the group. Once the sow has eaten her allocation, she may exit the system. If the sow exits the station before she has eaten all of her daily allocation, she will be able to reenter the station and consume the rest of her feed, which is referred as her feed balance. Feed is dispensed in small amounts, typically 100 grams or 0.2 pounds. This small amount of feed will be dispensed in regular intervals, typically every 30 seconds, until the sow exits the station. These amounts and times can often be increased or decreased by the farm staff using the computer program. Often a small amount of water is provided into the feed trough, through a separate dispenser, at the time feed is dispensed. This improves the sow's ability to consume the feed. Once the sow has consumed her specified amount, the computer will allow the rear gate to reopen, she will leave, and another sow will enter.

Photos provided courtesy of National Pork Board.

Figure 1. Two different examples of Electronic Sow Feeding Stations.

Photos provided courtesy of National Pork Board.

Figure 2. Radio frequency identification (RFID) tag placed on the inside of the sow's ear. This identifies the sow to an ESF station.

Group size and make-up

ESF is designed for large groups. The number of sows in a group is often based on effective use of the feed station. Because ESF stations can typically handle 50 to 60 or more sows in a group, a minimum group size is often 50 to 60 sows, dependent on manufacturer recommendations and the potential of the specific system design. With the addition of more stations in a pen, group size can be larger, and sows can access any of the stations within their pen. The computerization of this system allows for multiple stations to work together and share information about each of the sows in the pen. It is not unheard of to have 100 to 200 sows in a single group, and sometimes more, with multiple ESF stations in the pen.

Dynamic versus static groups

In group-housed production systems, how sows are penned together is extremely important. Gestating females are typically penned into static groups or dynamic groups. Static groups are pen groups of females that are mixed once, and no new animals are added to the pen after the initial formation of the group. Sows that become open or injured may be removed, but no new animals are added into the pen. Dynamic groups are those in which females are regularly added to pens with females already in them. Typically, dynamic groups are large groups with more than 40 animals in the pen, and they can be as large as several hundred. Either static or dynamic grouping strategies can be used with ESF.

For static groups on ESF, each pen should consist of sows of similar size and parity; if possible, gilts are penned together, small and thin sows are penned together, and large sows are penned together. Once the group is formed and the social hierarchy is established, no new animals will be added. Floor space allocation should be 15 to 18 square feet per animal for gilts, 19 to 24 square feet for mature sows, and 18 to 23 square feet for a mixture of gilts and sows. (Gonyou, Rioja-Lang, & Seddon, 2013)

In managing a production system using dynamic groups, floor space allocation should follow the recommendations above. In addition, the following guidelines should apply when adding females into pens: females should not be added to groups that are at 1 to 3 weeks of gestation, the number of new females entering the group at one time should be greater than 20 percent of the total, and new animal introductions should not occur more than once every 5 weeks (Bates & Ferry, 2013).

Management of replacement gilts

Because gilts are smaller than mature sows, they don't need as much floor space and can be housed with 15 to 18 square feet each without experiencing detrimental effects on performance. For ESF, gilts should be trained to use the ESF station before mating and penning during pregnancy. Typically gilts are trained to use the station for 2 to 3 weeks before they are mated and integrated into the sow herd. For example, if gilts are typically mated at 8 months of age, they can be moved into the breeding herd facilities at or soon after 7 months of age and trained to use the ESF station.

When forming breeding groups with gilts, ESF allows producers two options. The first option is that gilts can be mixed in with sows. This practice works better with larger pens with loafing space so that the gilts may have an opportunity to hide from the dominant sows (Strawford, Li, & Gonyou, 2008; Stukenborg, Traulsen, Puppe, Presuhn, & Kriete, 2011). A second option is to house bred gilts by themselves and not mix them with older parity sows. Research indicates that older sows are more aggressive to younger females, which results in an increased risk of injury and culling. Therefore, if possible, gilts should be housed with other gilts or younger parity sows (Li, Wang, & Johnston, 2012).

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Equipment and technology needs

ESF is more technologically advanced than most group housing systems. It features computerized control of the feeding plan, and individual feed curves for each sow can be specified from the computer in the barn office. This system allows for the feed station microprocessor, RFID ear tag and computer system to communicate, giving farm managers the ability to adjust feed allocation, run detailed reports, and use optional features such as paint marking or sorting to manage or treat individual animals. Most ESF systems also come equipped with a handheld RFID reader (Figure 3) that allows employees to search for specific animals in a pen. Most often, the handheld reader is used to identify animals that have not visited the feed station so the employee can visually evaluate the animals to determine why they are off feed. ESF manufacturers provide training for producers and employees on the workings of the system and how the computer software should be used to manage the feed stations and what reports it will provide to manage sows. Typically ESF manufacturers also have technical support available.

Photos provided courtesy of National Pork Board.

Figure 3. Handheld RFID readers are used to read the RFID ear tags of sows and check and update their information and status.

Although technical support is available from manufacturers, farms that have ESF systems will need to have employees with a working knowledge of the system and its maintenance and repair. At times employees will have to change out circuit boards or other equipment pieces on the feed station to ensure that it is working correctly. Repairs will need to be completed in a timely manner so that the animals are not left without feed. Alternative feeding options need to be planned and easy to implement in case station repairs take longer than 24 hours or the farm experiences an electrical outage with no functioning back-up system. A basic understanding of the computer program will be important for all farm employees.

System specifics

Typical pen design

In designing the layout for ESF pens, it is important to understand the three major pen areas: prefeeding, postfeeding and common areas. These areas when combined can make or break the management of an ESF system. ESF manufacturers typically have recommendations available for producers regarding how the pen layout should be completed.

The prefeeding or feed station entry area is where the animals gather to enter the station. Typically, when the feed cycle resets or begins again, this area can become crowded, and sows can exhibit signs of aggression when waiting to enter the station.

The postfeeding or station exit area should be designed so that the animals do not directly return to the prefeeding area. This is helpful in managing the dominant sows so that they do not continually try to access the feed station, denying the other animals access to it. Both the prefeeding and postfeeding areas should have slatted floors, to prevent pooling of water, manure, etc. Although water is supplied through the feed stations, it is important for a watering system to be in place in the pen. Establishing the access points for the water system away from the feed station will also help encourage sows to move away from the entry and exit points.

The third area of the pen is the common area where sows can go to rest, often called the loafing area. This is where the animals go after they exit the feeding station. Within the loafing area, pens may have solid PVC partitions or concrete walls for the animals to rest against, and may also have solid flooring or floor mats to lie on. These areas can also be where farms provide some form of enrichment such as straw for the animals to chew on. The solid partitions will also work to discourage dunging in areas with solid flooring.

Feed cycles

The feed station can be programmed to provide a set amount of feed to each sow during one feed cycle. The feed cycle is typically a 24-hour day, but producers can alter the cycle length in the computer program. The amount of feed allocated to a sow during each feed cycle is programmable, typically at a remote computer location that communicates

with the computers on the feed stations. The feed allocation for each sow can differ depending on her body condition and stage of gestation. The computer will provide daily feeding activity reports. The feed station software can summarize a report on those animals that did not visit the feed station within the previous feed cycle so that producers know which sows did not consume all of their feed and can begin identifying and evaluating those animals for illness, lameness or a lost RFID ear tag.

Additional features

Depending on the features installed upon purchase, ESF stations can do more than just feed sows. They often have the capacity to mark particular sows with livestock spray paint or sort sows into holding areas to complete management practices such as vaccination, pregnancy detection and removal from the pen for placement into farrowing stalls. Furthermore, some ESF systems also can identify sows that may recycle, or return to estrus. This is accomplished by having a boar in a separate pen adjacent to the ESF gestation pens. The boar pen has a small open area where sows can see and smell the boar, but the boar and sows cannot intermingle. The opening has an antenna that detects the sow's RFID tag, and the number of times a sow enters the antenna field can be used to determine whether she may be returning to estrus.

Animal training requirements

Sows typically have to learn to use an ESF station. For the most part, pigs learn quickly – usually in 1 to 3 days – if they're trained correctly. The key element in training is patience, particularly with gilts that have never used an ESF station. They may take longer to train. Training pens should be constructed to keep females near the entry portion of the feed station. This is typically accomplished by dividing the pen in half with portable gating or gating mounted on the wall and fence line. Employees can easily identify which animals need assistance going through the feed station when the training gates are in place. Once training is complete, the gating can be removed and females will use the station on their own. Sows that return to ESF pens after completing farrowing and lactation may need to be retrained. Training pens should be reset and sows observed on their use of the ESF station. Assistance should be provided as needed. Typically, this retraining will take only a day or two.

Photos provided courtesy of National Pork Board.

Labor needs and requirements

As farms transition from stall to group sow housing, employees must be trained appropriately to develop and use their observational skills differently. Traditionally, swine farms hire and train employees to be task-oriented – to focus on completing single tasks throughout the work day. When working with sows housed in groups, employees will need to focus on multiple tasks at one time and be aware of what is happening in the barn as a whole, as well as in each pen. Improving employee observational skills is a challenging task, but, once accomplished, it will improve the overall efficiencies on the farm.

The daily work routine will differ with the type of group housing system used. Production staff members and farm managers should develop a workable outline that highlights the important areas to be evaluated each day. Over time, this may be updated and changed to accommodate the particular nuances experienced on the farm. Employees working in ESF systems will have to monitor the radio frequency identification tags as sows are fed daily. This includes daily monitoring of feed consumed and retagging sows as necessary, as well as managing the feed system and training animals to use it. Although employee numbers on the farm are not expected to change, the daily tasks and routines will have to be adjusted to manage an ESF system. Producers may also need to change their focus when hiring new employees. New stock people should be able to readily adapt to working with animals in groups, be able to multitask, have a general understanding of computers and be able to learn to work with electronic systems.

Advantages and disadvantages

All sow group housing systems have advantages and disadvantages. Those related to ESF follow.

Advantages

- **Flexibility** – an individual feed station can feed one to 60 sows, or possibly more, with appropriate setting of the feed station.
- **Individual feeding** – feed stations feed each sow individually, and can be programmed to provide a specified amount of feed for each sow. This allows for good control of body condition and feed allocation, along with quick identification of sows that are off feed.
- **Individual sow management** – the system will identify all sows that have not eaten during the previous feed cycle. Employees must identify these sows, determine why they have not eaten and correct the problem.
- **Multiple operations** – feeding stations can be outfitted to mark sows with livestock paint and sort sows for particular management needs. Some systems can also be equipped to help detect sows' return to estrus.

Disadvantages

- **Electronic operations** – farm personnel must be able to diagnose and replace malfunctioning feed station components as necessary. Having employees with skills in electronics, basic computer skills and technology is a positive.
- **Alternate feeding strategies may be needed** – if the feed station is not working for an extended period, such as during a power outage with no back-up source of power for the facility, an alternate means to feed sows will be needed.
- **Replacement parts** – an array of replacement parts must be kept on hand to service the station as needed; having to wait for parts to be shipped will increase the time it takes to repair a feed station.
- **Radio frequency identification tags maintenance** – farms will need to replace lost tags, and the feed station computer will need to be reprogrammed. Identifying sows with missing tags will need to become a routine task for farm employees.

Conclusion

Electronic sow feeding is a viable option for group sow housing. This type of group housing system allows for sows to be managed individually while being housed in groups. The use of RFID tags combined with a computer program provides opportunities to monitor individual sows daily, adjust feed curves, and develop feed allocations according to a specific animal body condition score or estimated backfat depth. Producers considering ESF should determine the number of feeding stations they would need, the pen design and the positioning of stations in either renovated or newly constructed facilities. When assessing this type of system, producers should evaluate system costs and the need for employees to develop new skills.

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