Deep-Bedded Systems

PANEL:
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Dan and Lorna Wilson, farmers, Paulina, Iowa
Barbro Mattsson, researcher, Agrovest, Sweden
Åke and Cecelia Bergvall, farmers, Sweden
Dennis Kent, ISU Armstrong Farm, Lewis
Facilitator: Jeff Zackarakis-Jutz, ISU Extension

Part of the audiotape for this session was inaudible, so remarks by Halverson, Wilson, and Mattsson have been summarized from notes. —Ed.

Halverson: I have been working with ISU researcher Mark Honeyman to bring the Swedish model of swine production to the United States. In 1992 we received a grant which enabled us to study the economics of swine welfare. We visited farms in Sweden where such systems were used. We also visited the World Health Organization, where we saw a model of what is called the “health triad,” in which people are dependent on both the environment and animals.

The concept of welfare covers the state of an individual as it copes with the environment. Factors to be considered should include ecology and economics, with the welfare of both the human and animal considered.

In Sweden we found a very integrated view of animal welfare. There they use deep-bedding where sows are able to exercise their material characteristics. Piglets learn behavior at their mother’s side. Their fattening system allows only partial slats, with mostly solid floors. Straw bedding is composted after use, and the system depends upon good quality straw. The visit to Sweden was characterized by a sign we saw, which translates to “Happy pigs make good meat.”

Wilson: We traveled to Sweden with Marlene and from 1994 until now have been designing the system we plan to implement. We hope to break ground as soon as the frost goes out this spring. The system will include a 100’ X 48’ farrowing barn with 12 sows per room. Sows will go into the unit August 10. We chose the deep-bedded system because of how the hogs are handled and the environment. We feel it offers quality of life for both the farmers and the pigs. We don’t know how we will do, but we’ll be able to tell you next year at this time.

Mattsson: The Swedish system is a natural system in which straw plays an important part. This system uses no antibiotics or growth hormones. This is a group-housed gestating system where it is important that the sows have time to know one another. In Sweden, 75 percent of the sows are raised in deep-bedded systems.
Frequently old barns are used, but in some cases, farmers are actually building stables to be used in this system. In Sweden, we are not allowed to wean before four weeks of age; weaning usually takes place at five to six weeks. This system ranks high in the number of pigs weaned per sow. The current trend in Denmark is also toward group-house gestated sows. Crated sows are not allowed in Sweden. I recommend stables with individual feeding stalls with a gate. We also feed in a trough without a gate, but the former is a better method.

Sows farrow in individual pens and are moved when pigs are two to four weeks old into group housing. Some are also kept in a pen until weaning day and then moved to deep straw.

Åke Bergvall: ...we have seven units for farrowing. We would like to have the farrowing very close because when they come into the units we are able to move the piglets between different sows. I have some video here, so I can show you.

The sows are coming into the unit about one or two days before they are going to farrow. When they come into the unit, we put up cubicles at the sides of the unit. We put straw in the unit and nothing outside. That’s because we want the sows to go into the cubicles so they farrow there. There is a lot of straw outside in this scene because all the sows have already farrowed. They always find their own place to go so they never go into each other’s [cubicle] or take another’s litter from another sow. They are not in a hurry, as you can see. Usually when they come into the unit they use their noses so they can find where their piglets are.

Questions and Discussion

Do you have guard rails in those cubicles?
Åke: There is nothing inside. After seven to ten days the piglets start to jump up and then we take away the cubicles so they can have the whole unit, sows and piglets, running around.

How warm is that area?
Åke: We don’t put any heat into it; though when it’s farrowing time we try to keep it above 10° C.

None of the buildings we’ve seen pictures of have any heat?
Åke: No heating, no. The straw helps it feel very warm inside the cubicles.

Cecelia Bergvall: Just in the winter when it’s very cold, you can put in a heater.

Åke: We have about 10 square meters per sow and litter. I think the space for them is very good.

Swine System Options for Iowa  Deep-Bedded Systems: Discussion
Do they ever farrow out in the big area?
Åke: It happens sometimes, yes. That’s why I said we won’t have any straw outside the cubicles when they are going to farrow. But if they do farrow outside, we just put the piglets in the cubicle and then the sow will follow them.

The other important thing is that we have ventilation; one fan for every unit. And it is very important that the fan not make very much noise so that the communication between the piglets and the sows is good. We put in the big bale as often as is necessary and take it and put it out when it’s dirty. It’s very important that you keep it very clean so that you can get the straw to burn.

We wean at six weeks. We take away the sows into the breeding unit where we have the boars for use in insemination. We mate the boar together with sows, always on Thursday, and the boar comes together with the sows. He is with them until Sunday; then we take him away. We start breeding on Monday morning.

We also have to put some gilts in because some of the older sows have to go away. We try to put the gilts into the group at least a month before they are coming into the farrowing unit, otherwise they can fight. This market is a special market for our farm, Ramsta-Geison, because we have to contract with a market chain that sells our meat.

Cecelia: The consumers can come and look at our farm, so that they can trust us when they buy our meat.

What percent of your pigs go to that market?
Åke: It was about 50 percent this time. We hope that it will be more. We are six farmers from Sweden who have the same market chain.

How often do you clean those pens?
Åke: As I said, we are weaning at six weeks, and then the piglets will stay for another six weeks. Sometimes they will stay a little bit longer. So when they are moved to the finishing stable we clean it. We just take a machine and push it out and clean the unit with water.

So from the time you put the sows in until the time you take the pigs out, which is about 12 weeks, all you do is add the straw?
Åke: Yes. It gets higher at the sides of unit, between 15 and 18 cm (6 to 7 inches). It’s very deep. That’s the secret: you must know how to make the bed so it starts to burn. Add lots of straw. I was just showing a few figures of our production. You see that the number of pigs weaned per sow per year is between 21 and 23, mortality is about 15 percent, and returns are between 3 and 5 percent.

Facilitator: Our next presenter is Dennis Kent.
Kent: Thank you. I'm with the Iowa State University Armstrong Farm in southwest Iowa near Atlantic. I, along with Dan Wilson, went to Sweden in September of 1994, and I too was impressed with this system, especially since most of my background is in intensive confinement systems.

We have decided to implement this system at the Armstrong Farm on a demonstration basis, but instead of building nice, new, fancy facilities, we are going to try to emphasize low-cost and existing structures. Our breeding and gestation will be in one of these hooped structures. We built it last fall. As of yet, we're not in production; we'll start breeding in May. We got the equipment in this past week; we have the feeding stalls that will be used for the gestating sows, and then on the other side we'll have individual boar pens. Our building is 37' X 70' and I'll have about 30 sows in it with boars. Here's the loose housing pens behind the feeding crates; the bedding will be added back there as needed, and these buildings will be cleaned out about every three to four months.

We've taken this old hog house built in the late 1950s, which was an old farrowing house, and we're going to convert that into our farrowing/nursing room. This is an interior shot of it before we started the remodeling process. Here it is as it looks right now. We've added walk-through doors and windows and closed up a big 13' X 13' door on the end. We insulated and lined the inside walls of the building.

We have an observation room on the east end; we've lined the walls with recycled plastic. We insulated the roof. Our air intake is up in the peak of the roof and we'll be drawing the air through a perforated ceiling material up there as our air inlet. One of the keys to this system is a gentle airflow across the whole room. The ventilation system is not in place yet, but we're working on it. We're not due to farrow until September so I've got a few months to work on that yet.

Where did you get the feeding stalls and how much did they cost?
Kent: The stalls were manufactured from BSM in Canada and the cost was around $100 per crate. The crates have a handle on top so that we can open and close the back gate so the sows will enter, we'll lock each sow in individually, and that way it prevents the fighting between dominant sows and submissive sows. It's also for management so we can do an individual crate check and if we need to, give an individual sow attention while she's confined to that system. We don't have to try to chase her around that big pen.

Isn't there a company in Sioux Center that brokers those crates?
Kent: Oh, yes. They were purchased through Sioux Automation in Sioux Center, but they were manufactured in Canada.

What was the cost of the hooped building?
Kent: I couldn't tell you that right off the top of my head. That was handled on campus so I don't know the exact cost of the structure. Structures similar to this
are running around $10,000 or less with the steel arches, covering material, and the wood siding.

You have concrete on the entire inside?
Kent: Yes, we cemented the entire floor and then where those feeding stalls sit we have a raised area alleyway and the feeding stalls. Then the boar pens and the waterer also sit up on there. They are raised 16 inches. And we have the floor sloped to the center and to the south to aid in cleaning. Our raised area does have a peak in it to allow any urine or water to run off.

What is your plan for farrowing?
Kent: We’re going to farrow in the cubicle system. I saw that system and thought, “I don’t like moving pigs any more than I have to.” It looked to be the most labor-efficient one to me. The other system we saw was one in which they farrowed in the stalls. After a couple of weeks the pigs and the sows were moved to those large rooms where all the sows and pigs commingled. I liked the idea of the sows farrowing in the boxes. The piglets will be weaned at five weeks. I’m going to maintain a five-week nursery. I only have one farrowing facility, but I want to be as efficient with my buildings as I can. So with the five-week nursery, when I wean the sows I can breed them back on the first heat and the sows will be right back in as soon as the building gets cleaned, right after we remove the pigs.

How many sows will you have farrowing at one time?
Kent: I have space for ten to twelve of those boxes. I’ll have two separate farrowing groups. That building will have sows in it four times a year. But the gestation barn won’t have sows in it all the time. One group will be in the farrowing house for five weeks while the other sows are gestating. And then we’ll wean. So for a while, we will have two groups. But in my building, I have two sets of 12 for gestating sows, and then I’ll also have a small pen there for my gilt pool. Thirty is my maximum capacity; I don’t envision having that many sows on the farm at any one time.

In Sweden, do you castrate your boars? At what age do you process your pigs with this open housing system? Some people do it at day one, and some of us do it in two or three weeks. How you handle that in that open system with sows running around loose?
Åke: We castrate, file the teeth, and give them iron on the second or the third day. I just go into the cubicle and catch the piglet and go out and take it outside.

Do the sows ever come out and try to “help” you?
Åke: Not very often. Some of them are a little big angry, but it seldom happens.
Do you work around your animals all the time, do you walk among them all the time every day even when they're in the gestation area so that you have close personal contact with your animals all the time?

Åke: “Yes.”

Mark Honeyman, from audience: When I visited I visited the Bergvall’s farm, particularly Cecelia was among those groups of sows more than once a day. When they would walk in there those sows would just come up to them like big dogs. There is a lot of human-pig interaction there.

Do you vaccinate your sows or your piglets?

Åke: Yes, we use vaccinations for sows. We have a special program that the veterinarian has given us.

Cecelia: Even when they are gilts, we have them in quarantine. We buy gilts when they are about 12 weeks; that’s why they are so friendly when they’re farrowing. They are not so aggressive because we know them so well.

I’m assuming you have concrete under all these pens? Is that correct?

Åke: Yes.

Yet when I was in the hooped structure seminar, they said that was a “no-no.” Please enlighten me. What’s the difference between a hooped structure and a regular structure?

Marlene: They don’t use hooped structures. But Dennis has concrete under his...

Isn’t a tremendous amount of heat created in the summertime with the deep bedding plus the exterior heat when you have a concrete floor underneath?

Åke: Yes, it could be real hot. But you have to have a fan which is large enough to pull the heat out. Sometimes when it’s really hot, you have to open the big doors.

Have you ever tried sand as a bedding in the summertime?

Åke: No. Just straw.

Is the reason for the concrete under your pens (where we’re using dirt under some of them) part of your environmental rules? You’re required to have concrete under your pens so you don’t get filtration into the water system, isn’t that right?

Åke: Yes.

How do you commingle your gilts with your sows, so you don’t get fighting among your newly added gilts, between the young sows and old sows?

Åke: We try to mix the groups in the gestation unit at least a month before they
come into the farrowing unit. We try to keep not more than ten in the group. We try to, for example, change just two of those, and bring the two gilts into the group.

(Lauren Christian, from audience) In 1988 there were a lot of electronic feeders. Of course these sow stalls take up a good deal of space. Just one small electronic feeder could accommodate a whole group of sows, and that would seem to be a better answer. I think I know why that’s not been expanded in Sweden in favor of these stalls, but maybe you would want to comment on that.

Mattsson: These kind of electronic feeders are being thrown out by the farmers and replaced by other kinds of systems. The reason is the amount of labor needed to teach the sows how to use this kind of electronic feeder. The gilts, for example, and low-range sows have problems in this kind of system.

Christian: I saw that some people were also using what you’d call a “drip-o-later” system without partitions between the sows in the stalls, and I know at least one good breeder in Sweden who has taken that out in favor of a system of stalls that you describe.

Mattsson: Yes. Of course, without any kind of separation between the sows in those kind of crates, you had to keep sows of equal size. You can’t mix gilts and old sows. The trough had to be long enough per sow. So it may work sometimes, but I would not recommend it at all.

Åke: It used to be like that in the groups; you would always have one lady who likes to decide everything. That would be difficult if you can’t close her into a feeding stanchion.

Question for Dan and Dennis: It gets hotter and more humid here than it does in Sweden. How are you going to handle your system when it’s 100° and 80 percent humidity and no wind?

Dennis: That’s the biggest question we have. When Dan and I were over in Sweden, we spent many hours discussing that factor alone. There are options such as changing the bedding more often to keep it dry so it’s not composting, or removal of the bedding completely. What the Bergvalls have told us this week is that the sows will get up into the stalls and lie. In the farrowing unit they’ll lie up on those feeding areas. Perhaps drippers, misters, and fans will also help. We’re going to learn as we go.

Dan: I’d like to respond to that. There is a system in Minnesota that’s been going for a year. This summer when it hit almost 110° I called Nolan Youngclas and asked him how the sows were doing. He had a batch he had just started farrowing, and he said that it worked really well. He was misting the sows in the building. Most of the ceilings are fairly high in these units, and the heat has enough room to rise above the hogs so it might not be as bad a problem as we think.
Halverson: The building that Nolan has is very well insulated. I think it has about 6 inches of insulation in the walls; the ceiling is also very well insulated. It really makes a difference to have an insulated building and adequate ventilation. Nolan opened the windows on the south side and the back door so there was a constant air flow. He also had the fans. I think the insulation is one key ingredient for keeping it cooler inside than it was outside. In the summer on those very hot days it was cooler inside that building than it was outside.

Dan: The days that scare the most are when we’re going to hit 110° and 80 to 90 percent humidity and there is no air movement at all. We’ll see what happens; that could be a tough day to get through.

What months are you going to farrow? Maybe you’ll miss some of that, Dan.
Dan: I want to avoid July. We’re looking at starting it the 10th of August and going through August. I know sometimes on the 10th through the 15th of August we can have occasionally one of those bearcat days.

What kind of gestation unit are you going to use?
Dan: My sows are gestating in old barns and open lots.

(audience comment:) OK. So [it will be] a little bit of the same environment they’re going into. As summer goes on, especially in July, they’re going to be used to some hot humid days.

Dan: I’ve been pasture farrowing for—well, my dad started 30 years ago—and we always avoided July. I think I’ll continue to avoid July.

Dennis, when are you going to farrow?
Kent: Our first farrowing will start in September and after that about every 11 weeks.

Halvorson: I’d like to add that during those really hot days, some of the intensive confinement systems in our area lost a lot of pigs. And Nolan lost no pigs in his systems. So, in those terms, he was more successful than some of the most intensive farms in our neighborhood.

(audience comment:) These sows can move around on those hot days and that makes a big difference. When they get trapped in a crate, they’re going to get more panicky than when they’re out running free. I’ve turned sows loose out of their crates just so they would walk around.
What’s your waste management plan? After you take the straw outside, where does it go from there?
Åke: I try to get mostly wheat and barley straw. Some years we have difficulty getting enough, so we must take whatever we get. When I take away the straw bed, I move it to the fields where we are going to spread it, and we compost it there.

Dennis: For the gestating sows, we are going to use cornstalks, and try to use straw in the farrowing and in the early nursery. In the later nursery we may go back to cornstalks. There are other materials out there we’ll probably look at also.

How long do you compost your straw, and when do you haul it to the field?
Åke: We are not allowed in Sweden to spread it whenever we like, so it’s usually once a year, often in the autumn.

How long have you been on this system, and how many farmers would have switched over to it if it hadn’t been required by law?
Åke: Before I built this system, I just had hogs, so when I changed systems and started with sows, I started with this system. I had no experience from other systems. We started in 1990. We drove around in Sweden and looked for other systems. This was what we liked most. I forgot to tell you that we have an automatic liquid feeding system, and we mix whey, oats, barley, wheat and some proteins. That’s one of the secrets that produces very good results—that we feed the sows ad libitum during lactation so they can eat as much as they want.

Did you do this only because the law forced you to or do you have reasons for adopting the system other than the law?
Åke: The reason we built this system is that we think it takes care of the natural behavior of the animals, and we take good care of our animals in Sweden. Everyone does it. We wanted this system because we think the animals like it very much.

Cecelia: You don’t need any antibiotics or hormones or growth promoters. Nothing—we don’t need any of it.

Mattsson: Just 10 percent of the pigs are born in this kind of deep-straw nursing system.

Weren’t they wanting to make you do away with tethered sows?
Mattsson: We have never been allowed to do that in Sweden. In Denmark they do a lot, but they are turning toward this type of group-housed sows.

What do you do for parasite control? Are they eradicated?
Mattsson: They are treated with Ivomec twice as gilts because they are required
to be free when they enter the system. Then you use a deworming program 10 days before farrowing.

Cecelia: And parvo, just after weaning.

What do you do if you do have problems and you have to call a vet in? Do you prescribe drugs if you have to?
Mattsson: It’s no different than compared to us humans. If we are ill, we need to be treated; ill sows or pigs also need to be treated.

Åke: The veterinarian comes to us once a month. He goes through whatever we have been doing with piglets or sows. We must write everything on paper so we can show it to him.

Halvorson: They are part of the animal health service in Sweden. They are members, so they get a visit every month.

So they do use drugs but the vet is the one who makes the recommendations?
Halverson: Right. Always therapeutically.

Mattsson: But that is a part of the animal welfare law. If a pig is sick, you have to treat it, or otherwise slaughter is the alternative.

I just wanted to make sure that you were saying “We don’t use drugs” meant that you don’t dump a bunch of drugs in their feed all the time.
Mattsson: Yes, we don’t use drugs in our feed. This kind of system has protection for health problems. When we were forced to quit antibiotics in our feed, this kind of system automatically developed in our country.

In Sweden is the pork industry subsidized by the government?
Mattsson: Not at all.

I need to clarify something. The cold weather period doesn’t really concern me. It’s this hot weather period and this deep bedding and hooped structure—I’d like to get a handle on this. It’s composting in the summertime too, right? And it’s creating heat. To me, it looks like the worst thing to have in a building is all that straw creating heat, or any kind of organic material, be it straw, cornstalks, beans, whatever. Has anything other than that been used? Something has to absorb that waste or urine. Has sand or anything nonorganic been used or tested? It just scares me to death to be thinking about Iowa summers.

(Lauren Christian, from audience:) I don’t think it’ll be a problem if there’s good flowthrough ventilation and an opportunity for the sows to go up 18 inches out of the stalls out of the straw.
In a hooped structure, you have an 18-foot pad in a 72-feet or 90-feet building and you have 100 or 200 head of hogs on it, they’re going to be lying on top of each other.

In the poultry industry when it gets hot, they use more bedding and they insulate the animal from that composting organic matter. So they use the bedding as an insulation to keep the animal away from the heat.

But heat rises, and a 30-feet X 70-feet piece of composting material will create approximately 110,000 BTUs, which is equivalent to the heat of a full-time furnace running in an average home. That’s a lot of heat to dissipate and it has to come up. Regardless of what you put between it and them, the heat has to get away, and unless it seals it off and no oxygen gets to it so that we stop the composting process, it’s going to create that heat.

If you dissipate that heat with a fan though, you can deal with it. The sows are going to be use to the heat. They are not going to be in a confinement where you’re trying to control the temperature all the time. They’re going to be out in these other buildings so they’ll already be accustomed to that temperature “problem” that you’re calling it. You’re going to be moving air around them; when you move air around them, it’s just like you and me, it can be hotter than hell with the sun shining on you but if you have a good breeze on you can do a lot of things out in 100° heat and a lot of humidity.

Mattsson: Another aspect of our climate is that in this kind of system, you have about 8 square meters per sow. I do assume that you have more sows per square meter than we have. The animals produce heat, too. I don’t think this is a problem, even here. We do have experience in Sweden with 100° F but not for the [amount of] time that you have here, and not with that kind of humidity. The experience is that if the sows farrow during this hot temperature, the pig mortality will increase some, but it’s not a disaster. I don’t see this as a problem compared with our conventional systems.

(audience comment:) We pasture farrow a lot of sows, and in some of these wet years we’ve ended up with a terrible amount of bedding in some of our community type buildings by the time summer arrived. Maybe there’s a strange relationship or maybe not, but we see that when it gets hot, hogs will burrow into that wet damp bedding and actually cool. I don’t know what the difference is between a compost pile and a pile of bedding that the pigs lie on, but I know that our hogs end up burrowing into that stuff and that seems to have a cooling effect.)

What is the main diet of a finishing hog in Sweden?
Åke: Mainly the same as the sows, but it’s a different recipe for them. It’s mostly wheat, barley and whey.
**Mattsson:** In finishing units, we use liquid feeding systems at about 80 percent of the farms. The ingredients are whey, wheat, some barley, potato shreds, waste from bread companies, and potato chips from industry, and other cheap feed ingredients. The economic situation is tough in this kind of production.

**Is whey your protein source for your feed mix?**

**Mattsson:** No. We use some soybean meal if the price is right. We use synthetically produced amino acids, and we use some rape, some peas. The price dictates our recipes.

(Halverson, to Mark Honeyman): **Is there a difference in the diet as it affects heat production by the sows, so that a sow fed a corn diet would have a different heat production from a sow fed wheat, oats and barley?**

**Honeyman:** The higher fiber diet makes more heat during digestion. So theoretically a corn-soy diet would make less heat than a barley-based diet. I’m not sure how the liquid whey figures into that. But the other thing is that these sows eat a lot of straw, and that is high fiber and that generates heat for the animal. In hot conditions, that would be heat the animal needs to get rid of.