

Managing Alternative Production Systems

Dr. Stanley Curtis

Department of Dairy and Animal Science

The Pennsylvania State University

Stanley Curtis spent 20 years in the animal science department at the University of Illinois, Champaign-Urbana, before moving to head the department of dairy and animal science at Pennsylvania State University, University Park. He now has returned to research and teaching, with a focus on adaptation of the pig to thermal, air, and social stressors in production environments. He also studies behavioral aspects of pig husbandry and swine equipment and facility design. He earned B.S.A., M.S., and Ph.D. degrees in animal science from Purdue University.

I would like to say thank you to the Leopold Center and the Iowa Pork Industry Center and Iowa State Extension for inviting me to participate in this conference. I consider it an honor and a privilege to have been invited.

I have a couple of simple messages. The first is that *the pigs are up to it* in terms of outdoor production. There are questions as to whether today's pigs—given the modern genetics that have for the most part been designed for intensive indoor production—are up to outdoor production. The answer to that seems to be yes. Second, in outdoor production, just as in indoor production, *sloppy management leads to farm sales*. This is especially tied to *attention to details*, the essence of sound management. Attention to detail is also important with respect to equipment design. We know that one farrowing crate is not the same as another farrowing crate, and one nursery feeder is not the same as another nursery feeder. It turns out that one farrowing hut for outdoor production is not the same as another farrowing hut, and the differences can be quite dramatic. So these two messages are the important, "take-home" ones.

We take pork products of all kinds for granted nowadays. But in 1885, just a little over a century ago, Dutch peasants were painted by Van Gogh as potato eaters—not much meat in their diet! Times have changed, and so have pigs, from this beauty of the late 1800s (photo of a healthy pig) to this beauty of the late 1900s (photo of Miss Piggy of the Muppets). Of course the difference is in swine management now versus then. And this difference has been likened to the difference between lightning bolts and lightning bugs. All along, pork producers have had to heed Herbert Mumford's 1917 admonition in his now famous "A Tribute to the Stockman":

“... to make sure our livestock suffer not.”

Again, times certainly have changed. But the well-being of livestock was a big enough question even then that it took up three pages in a textbook published in 1912. What we're talking about here, of course, is sound care.

The three goals of pig husbandry are these: anytime, anywhere, any system's job is to make sure the pigs are *comfortable*, to make sure they're *calm* in terms of temperament and disposition, and to make sure they're *healthy* (and this of course includes adequate nutrition). These goals can be achieved in a wide variety of production systems because the pig is an extremely adaptable creature.

Only a handful of species has ever been domesticated. Of some 4,000 mammalian species existing on the face of the earth today, fewer than a dozen have been domesticated. The pig epitomizes a species fit for domestication. It has a high tolerance for human beings. It isn't finicky about what it eats. It's a promiscuous eater. The list goes on. Pigs thrive in natural settings where they can choose or build niches that suit them—if we give them the opportunity. And they thrive in artificial settings as well—again, if we carefully provide for their various needs.

So 100 years ago, pigs did well in the early version of a partially slatted floor house. And also, nowadays, they do all right residing in ultramodern production systems. But, alas, not everything new is good. And in confinement housing systems such as this (slide), the producer has the responsibility of providing for the pigs, because the pigs have so little opportunity to provide for themselves—feed, water, manure cleanup, environmental temperature, disease control, and all the rest. As we know, even light drafts can be catastrophic in such systems, especially with younger pigs, whereas with pigs outdoors, if a breeze comes up, they can simply move to the other side of the hut. They have an opportunity to fend for themselves that pigs in intensive indoor systems don't have.

Now something new is upon us—change. And change always leads to jitters. Henry Van Dyke urged us to “chill out!” and get analytical when he said, “There is no conflict between the old and the new; the conflict is between the false and the true.” Sir Winston Churchill was characteristically blunt when he said, “Better to take change by the hand than let it take you by the throat.” And Howard Ruff reminded us that it's the early bird

that gets the worm when he said, "It wasn't raining when Noah built the ark." What we're talking about is outdoor pig production. And who would have thought ten years ago that it would still be with us this year? Not that pigs haven't always been produced outdoors. But now we're talking about *intensive* outdoor pig production, using modern knowledge and new ways and means. Although many in the industry can hardly believe their eyes, it's true. Let's remind ourselves of the range of production systems we have seen in our relatively short lifetimes.

For gestation, our locations ranged from the woodlot, to bringing them up to the farm, to quite artificial, relatively barren environments. And farrowing was done in an even wider range of habitats. First attempts at farrowing stalls in the late 1950s had straw in them, didn't they? Remember that round unit that Ernie Peo worked with in Nebraska, Lauren? (Christian, see p. 1). And of course, one more typical of today—the standard 5' x 7' unit with a 2' x 7' sow crate. And then on to market in an equally wide array of systems.

Why has there been in our lifetime a general trend toward intensive *indoor* production systems? We know they have drawbacks as well as plusses. So why have we gone this way? Land costs, labor availability, environmental regulations, and (in some parts of the country more than others) predators. Interestingly, I originally prepared this slide about ten years ago to use in a presentation in Minnesota justifying intensive indoor pig production in the real world, where economic realities must be factored in. But with time come changes in the relative importance of these respective factors. And new equations evolve as they must. John Lawrence (see p. 6) reminds us of the factors and the control points that we can use in this business.

As for land, agricultural land prices have moderated over the last 15 years. And as for labor, there's still plenty of work to do, even indoors—and frankly, the new generation has never had its tail frozen while doing pig chores outdoors. As for environmental pollution, new manure management challenges and problems have arisen. Finally, as for predation, however, a piglet still makes a fine meal for marauding carnivores where they roam, and that's not to mention piglet mortality due to hail, fire ants, and a few other features of nature that intensive indoor production systems still protect against.

I hope you noticed that on the list noting land costs, labor availability, environmental protection, and predators, nothing was said about intensive indoor systems providing the animals a better environment. That's because, on balance, every system has its plusses,

and every system has its drawbacks. As for the environment in which the pigs live, it is my opinion, all things considered, that no system comes out the clear winner.

Indoors, producers can operate sophisticated systems and achieve supportive environments. Outdoors, given the means at their disposal, the pigs can use their environment to their own advantage. And they do. The sows go on lactating to beat the band, even in extremely hot periods. They take care of themselves *if* we provide mud wallows. And the microenvironments in which the piglets live, in contemporary sophisticated outdoor systems, are, if anything, better than those piglets experience, on average, in indoor farrowing operations.

Why is the pendulum swinging back? These are probably the three main reasons—capital investment, especially; environmental protection regulations, especially; and to a somewhat lesser extent, concerns about animal well-being. As we know, even some of the mega-producers in the pork industry are preparing for the day when there might be regulation that requires, as it does in a few European nations already, more extensive production systems. To keep their slaughter lines filled in vertically integrated operations, they want to prepare for that possibility.

But this change, this swing of the pendulum, requires new husbandry. Husbandry to accommodate changes in the pigs and changes in the technology of pig production—changes that have come about since the good old days. Producers need to be competitive, and to have the potential for profitability (if the price of corn goes down)!

Think about how today's hogs have changed. Genetically, structurally (in fat cover alone) functionally, and, yes, behaviorally. But the question is, does it matter that they have changed? Do we need special genetic lines for outdoor pig production? Does the new nature of our hogs result in different requirements for environment? Also, there are changes in feeds as our nutritional knowledge continues to increase. Locales where most hogs are produced are changing. Lauren Christian talked about North Carolina ascending on the list in this past decade. Then there is the disease picture, profit expectations, and changes in technologies as well. We know more about huts. We know more about fencing. We know more about watering systems and feed delivery. And we're taking existing knowledge and putting the bits and pieces together in new ways, applying knowledge we've had a long time in many cases, but have never put together in exactly this way. It's all coming together in what might be called modern technology for outdoor

pig production. That is, *intensive* outdoor pig production. And it's already happening—in the Southeast, in the southern plains, in the panhandle of Texas and Oklahoma, and even here in the Midwest. And the pigs seem to be loving it!

Let's focus now on just one outdoor system, one option. And I don't want to leave the impression that this is the option of choice. The discussions you will be having the rest of the day, and the presentations that follow this one, will focus on the broad range of options you have to pick and choose from, as if on a cafeteria line, to get what fits your particular operation. I'm focusing on one system simply because we have some hard scientific data on how this system works. It seems to be working extremely well, to get ahead of the story. In the Oklahoma panhandle, the commercial industry, even mega-producers, are dipping their toes into this pond. Dr. John McGlone, an animal scientist at Texas Tech University, is keeping in touch with these developments as well as engaging in research on intensive outdoor pig production. The system that is evolving there depends on land that is well-drained, with an appropriate soil structure, and a relatively dry climate. These are important features. Here in the Midwest, as in much of the rest of the nation, these features often won't be as favorable as they are in the Panhandle.

In this system, mated sows gestate in groups of 15 to 20. Breeding is monitored as closely here as it is in an indoor system. And by the way, much of the summer slump in fertility is moderated by giving the sows access to mud wallows. So sows in gestation, farrowing, and lactation always have access to mud wallows during warm and hot periods, as well as access to shade. Sows are fed once a day, and the feed is prepared in the form of cubes about the size of walnuts, which are broadcast on the ground from a cart pulled by an ATV. Hunting those nuts and eating them gives the sows something to do with their day. No more gobbling down the day's feed in five minutes. Often the fencing consists of one strand of electric fence 18 inches off the ground. It holds them in; pigs are quick learners. Frost-proof watering systems . . . the list goes on.

These new technologies have appeared since the good old days. They can make intensive outdoor pig production profitable and competitive today. Farrowing takes place in individual huts. The design is critical to the system's success (more on that later). And a hut is not necessarily a hut. I know that Mark Honeyman (p. 42) will talk about this too.

These huts are not insulated because producers want the sows to go out on hot days and jump into the wallow. If the hut is insulated, they wait too long into the day before they

leave the hut, and they become overheated. That reduces feed intake and lactation rate. Notice the little porch (slide). Before farrowing and for a couple of weeks after, it's in front of the door. It lets the sow come and go at will but keeps the piglets (most of them, anyway) at home for the first couple of weeks, when they need the protection, especially thermal protection, of the straw bed in that hut.

A paddock for farrowing and lactation has about seven sows in it. The area needed will vary with the location's soil and drainage situation. The paddock is left idle for a few weeks between groups—and preferably even longer than that, although it depends on the pressure on the land. This is so the ultraviolet part of solar radiation can do its job in cleaning up the germs. The huts are always moved from one place to another. Sometimes the straw is burned at the site, if it's in burning condition. In farrowing and lactation, the sows are still fed the cubes on the ground. In the Panhandle climate, the farrowing hut gets half a bale of straw in the summertime, before the sows are put into the paddock, and a full bale the rest of the year. This, of course, is critical for the comfort of the newborn piglets most of the year.

Here's a lactating sow trying to cool off (slide). And it's amazing—when the thermometer is reading 100 degrees, and the sun is as bright as can be in a clear sky, the breathing rate of these sows is only about 20 breaths per minute, which is not much higher than normal. They're certainly not under heat stress.

Here's a sow and litter (slide). She's eating and still getting thin. And the piglets are learning to eat.

And the sows are amazingly calm too! I'm impressed by the disposition of the sows in this system. They permit you to go and pick up their piglets. Piglets squeal in this system as they do in any, but the sow doesn't seem to care as much.

What about performance? What about economics? First, capital investment can be as low as a few hundred dollars per sow in the herd. And that, I remind you, covers breeding and gestation through weaning. Based on direct comparisons at Texas Tech University, performance in properly managed intensive outdoor systems has been at least as good as indoors. The key is proper equipment. At first, using American-style huts, there was one fewer pig per litter weaned outdoors than indoors. But when American style huts were compared with English-style huts, the English-style huts had about 31%

more floor space in them, and that seems to be one of the secrets. It is clear that this extra bit of space made a big difference—in fact, a difference of two more pigs per litter weaned! And that's over four and a half pigs weaned per sow per year. An amazing difference—four and a half pigs per year due simply to the design of the hut!

Make no mistake: small design differences can make major differences in the productivity of the system. So environmental design and environmental management are as critical outdoors as they are indoors. And success will attend only those operations where attention is paid to this fact.

Commercial producers are weaning as many as ten pigs per litter in this system. And at weaning, the pigs are ready to go into any environment—for nursery, growing, and finishing—that might be in the plan.

Now what about hog genetics, or what animal scientists call genetic environmental interaction? With Dr. Christian sitting right here, I'm probably a fool for getting into this area, but I'm going to anyway. The bottom line—from results of work at Texas Tech University with PIC pigs and a maternal white line that they had going on there to begin with—is *not to worry*. A line that does well indoors does well outdoors too, provided you use your head about the system you raise them in.

Texas Tech collaborated with PIC, and they made direct comparisons of three genetic lines in the two environments. Those lines were the typical Camborough-15 that we know a lot about. They also brought in the Camborough-Blue, which is marketed in England, that's about 25% Wessex Saddleback, the idea being that it would make them more adaptable to outdoor production. Then, in addition, they had the Yorkshire x Landrace maternal line that Texas Tech has had, just as a control.

It turns out that the Camborough-Blue sows, the ones with a bit of color in them, did not outperform the other lines outdoors. Performance was comparable across the lines. Similarly, in a comparison of Camborough-15 sows with an experimental line including 25% Mishan (the Chinese breed known to be especially prolific and good at mothering, lactation, and so on), the experimental line outperformed the Camborough-15 both indoors and outdoors. The lesson from this, if it can be generalized (and I believe that these are the soundest scientifically derived results available), is that *the pigs will adapt well* if provided proper environment, equipment, and other means to adapt.

Now, briefly and finally on a personal note, there's one item of pig production that I thought was on its way to the historical museums, and that is the hog ringer. The hog ringer went out of American pork production about 25 years ago, for the most part, and many of us thought we would never pick one up again. I happened to save mine from my boyhood in northern Indiana and kept it in my office always, hanging on the wall. It was and still is called a Humane hog ringer. Who would have guessed that we'd be back in the hog ringer business? For those people who saved their stock in the Humane company, it looks like it will pay off. We're back into having a considerable fraction of our nation's pig output produced outdoors, and they're being nose-rung.

With modern technology, it appears that outdoor pig production can be competitive economically, making it a viable option for pork producers. There are special considerations to heed in different parts of the country. But if we keep these things in mind, along with the general tenet that sound management and attention to detail are just as important outdoors as indoors, then it looks like this might be a way for a lot of producers to get ahead in the not-too-distant future.

Questions

How old are they weaning the pigs in that (Texas Tech) system?

They're weaning them at about four weeks. And McGlone is now involved, by the way, beginning last summer (1995) in weaning the pigs in very large groups—maybe as many as 200 pigs in a paddock, so they have an outdoor nursery as well. They're coming off that outdoor nursery, even in June and July—which is hot down there—heavier than they're coming out of the indoor nursery. They seem to be healthier with respect to respiratory diseases as well; it seems to have been mitigated some by that system as well.

With seasonal weather extremes in Iowa, can we farrow year round?

I think the seasonal situation is something you would have to keep in mind. Probably not so much the cold and the hot, because frankly the sows can take the cold if they're well fed and lactating heavily. Their internal heat production is such that their lower critical temperature is quite low. *They can take it.* And the piglets stay in the nest that the sow has prepared for them in the hut, so their microenvironment is pretty toasty. The real problem, it seems to me, is going to come if you don't have proper drainage and you have a soil that doesn't have the right percolation characteristics, one that isn't sandy enough, in particular. So those would seem to me, *a priori*, to be the things to watch.