2006

Comparison of Alternative Winter Farrowing Techniques on Four Niman Ranch Cooperating Farms in Southern Minnesota

David Serfling
Iowa State University

Mark S. Honeyman
Iowa State University, honeyman@iastate.edu

Jay D. Harmon
Iowa State University, jharmon@iastate.edu

Comparison of Alternative Winter Farrowing Techniques on Four Niman Ranch Cooperating Farms in Southern Minnesota

Abstract

Swine farmers interested in enrolling in the growing niche markets for alternatively-reared pigs must usually farrow during the winter. The niche markets have a shortage of winter-born pigs because it is the most difficult time to meet the standards of no farrowing crates, use of bedding, and no antibiotics. The purpose of this study is to document alternative winter farrowing on four farms in southern Minnesota.

Keywords

Animal Science, Agriculture and Biosystems Engineering

Disciplines

Agricultural Science | Agriculture | Animal Sciences | Bioresource and Agricultural Engineering

Comparison of Alternative Winter Farrowing Techniques on Four Niman Ranch Cooperating Farms in Southern Minnesota

Dave Serfling, graduate student
Mark Honeyman, professor
Department of Animal Science
Jay Harmon, associate professor
Department of Ag and Biosystems Engineering

Introduction

Swine farmers interested in enrolling in the growing niche markets for alternatively-reared pigs must usually farrow during the winter. The niche markets have a shortage of winter-born pigs because it is the most difficult time to meet the standards of no farrowing crates, use of bedding, and no antibiotics. The purpose of this study is to document alternative winter farrowing on four farms in southern Minnesota.

Materials and Methods

On Producer A's farm, his old traditional 40 ft × 60 ft barn was used for farrowing. A 2-in.-thick coating of urethane sprayed on all walls made it a very "tight" barn. Ventilation into the second-level hay mow was accomplished by two 12 in. × 12 in. doors. An exhaust fan was also set to come on if the natural ventilation did not keep the temperature below 50°. On this farm, portable 6 ft × 7 ft A-frames in large rooms were used. No heated creep areas or supplemental heat were provided. Temperatures and relative humidity were monitored during the winter of 2002–2003 inside and outside the A-frames.

Producer B had a 100-year-old 36 ft × 90 ft dairy barn with 18-in.-thick stone walls. Some areas of the barn had dirt floors. A temporary wall of straw bales was constructed to provide a farrowing area of 35 ft × 45 ft. There was no additional ventilation via numerous cracks in the walls. Too much "natural" ventilation was a continual struggle. A propane heater was used, but there are no heated creep areas. Farrowing was done in temporary pens approximately 15 ft × 18 ft and usually included two or three sows per pen. Litters were then mixed together at three weeks of age. A major challenge for the farm was when sows in the same pen farrowed simultaneously.

Producer C had a block-walled barn that used both supplemental heat and heat lamps in creep areas. The farrowing area was ventilated into the hay mow by access doors. The farrowing pens were 12 ft × 6 1/2 ft including a 2 1/2 ft × 6 1/2 ft creep area with a 250-watt heat lamp. The bulb was changed to a 125-watt bulb 15 days after farrowing. An open center aisle ran the length of the barn between the farrowing pens. The pigs also had access to an outdoor lot if the weather was favorable.

Producer D used a remodeled hog house (30 ft × 48 ft). The hog house had a 7 ft × 4 in. gutter that was cleaned with a tractor loader. It also had a plywood feeder that ran the length of the building. It was divided into four pens each with a 12 ft × 12 ft bedded area next to the gutter. The ceiling had 6 in. of fiberglass insulation and chimney ventilation. The ceiling insulation improved the 4 in. of fiberglass roof insulation and an open ridge. The chimneys were 2 ft × 2 ft with a sliding plywood baffle. Sidewalls were insulated with 6-in. fiberglass. Waterers and feed troughs accommodated 10-lb pigs as well as 500-lb sows. The building had a 110,000 BTU L.B. White heater. Producer D built pen dividers to make three farrowing pens in each 12 ft × 12 ft section, for a total of 12 pens in the building. The 48-ft^2 pens were constructed as trapezoids allowing the sows more room to turn around and making an obvious choice for the creep area. The creep area was heated with a 250-watt bulb for at least 15 days and then switched to a 125-watt bulb.

Results and Discussion

Results from the four farms compare favorably with area and industry averages (Table 1). Although many of the differences can be traced to management, the variation in genetics should not be ignored. Only Farms C and D used identical genetics.

Temperature and relative humidity data was collected at all farms during the winter of 2002–03. The monitors took readings every half hour. Unfortunately, the monitor failed at Farm B. In the winter of 2001–02, the temperature and relative humidity data was collected at Farm B. Comparisons for the entire winter would be misleading, because each farm allowed the barns to be empty without supplemental heat at various times during the winter between farrowings. Observations for this study concentrate on temperatures during the week of farrowing at each farm (Table 2).

The four producers were utilizing environmental temperatures that were much lower than the lower critical temperatures for piglets in conventional farrowing barns. The cool temperature was partially offset by bedding and supplemental zone heat.

A 4° temperature increase at the top of the A-frame compared with the main barn was recorded on Farm A. The A-frame had a full-length 1-in. gap at the peak. The barn on Farm A was maintained at an average of 24° above the outside temperature without any supplemental heat.

In Farm B's barn, an average temperature rise of 23° above outside conditions was achieved. The goal was to keep the temperatures above freezing.

Farm C's barn had the most consistent temperature and the lowest humidity. It should be noted that during the monitoring period, the barn was only at 50% of capacity.

Farm D's hog house had the most variation in temperature and humidity. This facility had the highest stocking density. It also had some readings taken by the monitors during cleaning, which occurred every third day.

Producers C and D tried to keep their facilities just warm enough to avoid chilled newborn pigs. This strategy encouraged the little pigs to utilize the heated creep areas. Approximately 50ºF in a bedded environment is near the pigs' critical temperature at farrowing. Both farmers tried to attend farrowings and moved newborns to the heated creep areas until dried.

Producers B and D were able to keep energy cost records. Farm B used LP solely, while Farm D used both LP and electricity for heat lamps. Tables 3, 4, and 5 summarize the energy use.

Farm A's barn used no supplemental heat; therefore, there were no energy cost. Farm D had the smallest and best insulated facility as shown by the reasonable energy cost and the maintenance of higher temperatures. As with most productivity measures, litter size has the greatest effect on efficiency. The supplemental heat cost per litter could easily pay for itself with one more pig per litter saved.

Overall, the results from the four farms compare favorably with industry averages. Although Farm A had the lowest production values, it had the lowest energy cost and operated in the coldest temperatures with the tightest barn. Farms C and D both used heated creep areas. These creep areas were utilized much differently by the pigs compared with a creep area next to a sow's udder in a farrowing crate. Reports from both farms showed that the newborn pigs needed to be 24 hr old before they would utilize the creep areas on their own. Piglet crushing after the first day was minimal. Farms C and D farrowed in the warmest temperatures. Warmer temperatures as well as the heated creep areas at both farms were instrumental in increasing the production efficiencies.

Table 1. Farrowing results.

	# born alive		# at commingling		# at weaning	
Year	01-02	02-03	01-02	02-03	01-02	02-03
Farm A	8.7	10.7	8.0	8.0	7.8	7.8
Farm B	12.8	10.0	9.3	8.3	9.0	7.6
Farm C	12.4	11.0	10.1	9.9	9.7	9.5
Farm D	12.1	10.1	11.4	9.6	10.2	8.7
Minnesota farm management summary	10.1	10.1	N/A	N/A	8.7	8.7
USDA– 2000 NAHMS	10.0		8.9		8.6	

Table 2. Analysis of temperature.

Dates of 1st week of farrowing	Farm	Avg. outdoor temp (ºF)	Temperature (ºF)			Humidity (%)		
			Avg	Max	Min	Avg	Max	Min
1-14 to 1-20-03	Farm A in A-frame	6	34.5	39.5	25.9	75.3	94.8	60.1
1-14 to 1-20-03	Farm A in barn	6	30.4	34.9	23.3	78.9	88.2	65.8
12-28-01 to 1-3-02	Farm B	13	36.9	42.5	30.9	61.7	73.4	50.4
12-1 to 12-7-02	Farm C	25	52.0	53.7	49.7	51.5	63.8	42.2
12-1 to 12-7-02	Farm D	23	46.7	56.6	37.2	64.1	74.9	51.0
1-10 to 1-16-03	Farm D	7	45.6	64.2	32.5	56.6	74.4	25.7
2-17 to 2-23-03	Farm D	21	52.5	67.6	30.1	61.0	92.8	32.8

Table 3. Energy cost comparison – LP.

	Gallons LP/litter		Gallons LP/pig		Cost/litter		Cost/pig	
Year	01-02	02-03	01-02	02-03	01-02	02-03	01-02	02-03
Farm B	18.5	24.5	2.6	3.2	16.61	25.00	2.37	3.29
Farm D	3.68	3.57	.35	.47	4.34	3.57	0.42	0.56

Table 4. Energy cost comparison – electricity.

	Electricity/litter Kwh/litter		Electricity/pig Kwh/pig		Cost/litter		Cost/pig	
Year	01-02	02-03	01-02	02-03	01-02	02-03	01-02	02-03
Farm D	160.0	175.8	15.3	19.1	11.20	12.31	1.07	1.34

Table 5. Energy cost comparison – total.

	Cost per litter		Cost per pig	
Year	01-02	02-03	01-02	02-03
Farm B	16.61	25.00	2.37	3.29
Farm D	15.54	15.88	1.49	1.90
Farm A	0.0	0.0	0.0	0.0