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# COMPARISON OF TEMPERATURE VARIATIONS AND EFFECTS ON REPRODUCTION IN TUNNEL VENTILATED VS. NATURAL VENTILATED GESTATION BARNs

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## Introduction and Objective

There is much debate on the appropriate ventilation design for gestation barns in hot climates. Although tunnel ventilated designs are becoming popular, they have important shortcomings relating to energy usage and maintenance. They also prevent the sows being exposed to natural light, an important emerging welfare consideration. On the other hand, it is thought that natural ventilated buildings may become too hot during summer for optimal sow performance.

The objective of this study was the evaluation of temperature variations between a tunnel ventilated and a natural ventilated building, and how these variations affect sow performance

## Materials and Methods

Four 620-sow gestation barns, two with tunnel ventilation and two with natural ventilation were built at the same location and at the same time. This farm is located in a hot and dry climate (South East of Sonora, Mexico) with sustained temperatures of 40°C in the summer. In the tunnel-ventilated barns the inlet air was brought in at one end through an evaporative cooling wall and exhausted at the other end. The natural ventilation barns had large (75%) sidewall openings regulated by an automatic curtains and an open ridge. All barns were filled with sows of the same age, genetic line and sanitary status Nutrition and management was also identical. The four building were instrumented with Hobo data loggers in order to record temperatures every 10 minutes throughout the study. The loggers were located inside the barns at the ends and in the center of the buildings. Every month the information generated for the loggers was downloaded and analyzed. This evaluation started in February of 2002 and running throughout the year finishing in January of 2003. Sow production data was also recorded for the whole duration of the study.

## Results and discussion

As expected, average temperatures were lower (4 to 7 C) in the tunnel ventilated barns (Table 1) than the naturally ventilated barns (Table 2) during the hot months. The tunnel ventilated barns had a small, consistent 2 to 5 C temperature variation (Table 1),

between the inlet and exhaust ends, This variation was lower in the hot months (June, July, August and September). The naturally ventilated barns had no temperature variation between the ends of the building (Table 2). Sow productivity showed no significant difference between buildings in farrowing rates, averaging only 1 % less in the tunnel ventilated barns Litter size was 11.44 for tunnel and 11.25 for natural There was therefore no significant differences in the sow data, suggesting that hot temperatures have a smaller effect than previously suggested In conclusion, both building designs used in this study proved to be appropriate choices, so that decisions on which system to use must be based on building and maintenance costs.

**Table 1.** Temperatures recorded for the Hobo data loggers in the Tunnel ventilation barns (°C)

	Tunnel		
	Inlet	Center	Exhaust
<b>Feb</b>	17.65 ± 4.3	20.82 ± 2.75	22.68 ± 2.3
<b>Mar</b>	16.9 ± 2.62	20.12 ± 1.54	22.52 ± 1.13
<b>Apr</b>	18.19 ± 2.01	21.37 ± 1.15	23.02 ± 1.16
<b>May</b>	19.79 ± 3.1	21.8 ± 2.05	23.72 ± 1.77
<b>Jun</b>	23.1 ± 3.72	24.19 ± 3.14	25.56 ± 2.85
<b>Jul</b>	25.32 ± 2.98	25.75 ± 2.63	26.8 ± 2.5
<b>Aug</b>	24.97 ± 2.35	25.92 ± 2.24	26.65 ± 2.22
<b>Sep</b>	23.9 ± 3.13	25.04 ± 2.89	25.83 ± 2.87
<b>Oct</b>	21.73 ± 3.78	23.73 ± 3.01	24.47 ± 2.63
<b>Nov</b>	19.82 ± 3.96	21.82 ± 3.06	23.47 ± 2.46
<b>Dec</b>	16.81 ± 4.57	19.77 ± 3.14	21.95 ± 2.71
<b>Jan</b>	19.04 ± 4.12	20.9 ± 3.51	22.5 ± 3.14

**Table 2.** Temperature recorded for the Hobo data loggers in the Naturally ventilated barns (°C)

	Natural		
	East	Center	West
<b>Feb</b>	19.42 ± 5.52	19.01 ± 5.54	19.35 ± 5.49
<b>Mar</b>	21.9 ± 5.28	21.09 ± 5.54	21.44 ± 5.40
<b>Apr</b>	25.79 ± 4.92	24.98 ± 5.24	25.49 ± 5.13
<b>May</b>	27.90 ± 5.41	27.37 ± 5.64	27.69 ± 5.5
<b>Jun</b>	30.68 ± 4.8	30.09 ± 4.90	30.29 ± 4.8
<b>Jul</b>	28.33 ± 4.08	27.91 ± 4.13	28.19 ± 4.03
<b>Aug</b>	27.99 ± 3.92	27.57 ± 3.91	27.8 ± 3.9
<b>Sep</b>	27.22 ± 4.29	26.72 ± 4.35	26.84 ± 4.36
<b>Oct</b>	23.57 ± 5.26	22.98 ± 5.29	23.19 ± 5.27
<b>Nov</b>	20.16 ± 5.8	20.73 ± 4.82	20.73 ± 5.64
<b>Dec</b>	16.30 ± 6.03	16.73 ± 5.97	17.32 ± 5.63
<b>Jan</b>	20.76 ± 5.17	20.21 ± 5.25	20.55 ± 5.14