



Thermoregulation of the Nursery by Early Weaned Piglets Through Operant Condition

Clover J. Bench¹ M.Sc. and Harold W. Gonyou Ph.D.

Summary

A study was designed to determine the optimal temperature preferred by early weaned piglets in a standard nursery environment through the use of operant conditioning (pig controlled environment - see definition on page 3).

Introduction

Thermal environment has a large effect on the health and productivity of growing swine. This is especially critical in the case of newly weaned piglets, which require warmer temperatures in the nursery environment. Today's confined pigs are often

Piglets choose warmer days, cooler nights.

prevented from selecting their optimal temperature. Instead, the farm manager selects the temperature setpoint. During the colder months, nursery temperatures are often kept relatively uniform over space and constant over time. This deprives young pigs of the chance to select an environment more comfortable than the one the barn manager chooses. Previous studies on thermal preference in swine have concentrated on pigs four weeks of age and older, and have not investigated the ideal temperature for early weaned pigs. Through the use of operant conditioning in these previous studies, pigs have demonstrated the ability to respond to heat rewards and successfully control their thermal environment.

Experimental Procedure

Temperature preference was studied in piglets early weaned at 12-14 days of age in five consecutive replications during the

winter of 2000. Each replication of the study lasted 21 days and took place in a single nursery room of six pens with eight piglets per pen.

Through the use of operant conditioning, in which an infrared heat lamp was used as a heat reward, one pen of eight pigs controlled the gas heater in the nursery room. Within the controlling (C) pen, a box was mounted which had both an operating (O) and non-operating (NO) lever. The infrared heat lamp was positioned over the O lever. The position of the O and NO1 levers were switched between replications. A second pen within the room was also equipped with a box mounted with a NO2 lever.

Temperature data was collected every five minutes by means of thermocouples positioned throughout the nursery room connected to a datalogger. All hits to the O, NO1, and NO2 levers were recorded via the datalogger as they occurred. Relative

humidity readings were taken daily with a psychrometer. Pigs were weighed at weaning and at 21 days post-wean.

Results and Discussion

The results demonstrate that piglets early weaned at 12-14 days are aware to a degree that allows them to learn to control their thermal environment successfully through the use of operant conditioning.

As age increased, the average preferred temperature for the early weaned piglets decreased by approximately 1.0°C per week ($P = 0.29$; Figure 1). Average temperature preferences were 26.33°C, 25.71°C, and 25.24°C for days 3-5, 10-12, and 17-19, respectively. While the average maximum temperature each week did not differ significantly ($P = 0.67$; Figure 1), the average minimum temperature was highest days 3-5 post-wean ($P < 0.05$; Figure 1). Furthermore,



Piglets enjoying the warmth of the infrared heat lamp.



minimum temperature in the room did not drop below 19°C (lower temperature safety setting), which kept average minimum temperatures between 22-23°C. Thermal preferences consistently ranged between 22-29°C each week post-weaning.

Thermal preferences reflected a circadian sinusoidal pattern in which the piglets preferred the highest temperatures during the day and the lowest temperatures during the night ($P < 0.0001$; Figure 2). These results agree with trends found in studies done in grow/finish hogs.

Implications

While it is known that early weaned piglets need warmer temperatures in the nursery, these data suggest that keeping the thermal environment uniform over space and constant over time is not preferred by piglets. Temperature settings for the nursery should be based on size and age of the animal as well as time of day. This challenges hog producers to consider more fuel efficient (and welfare friendly!) ways of managing the thermal environment of the early weaned piglet.

Acknowledgements

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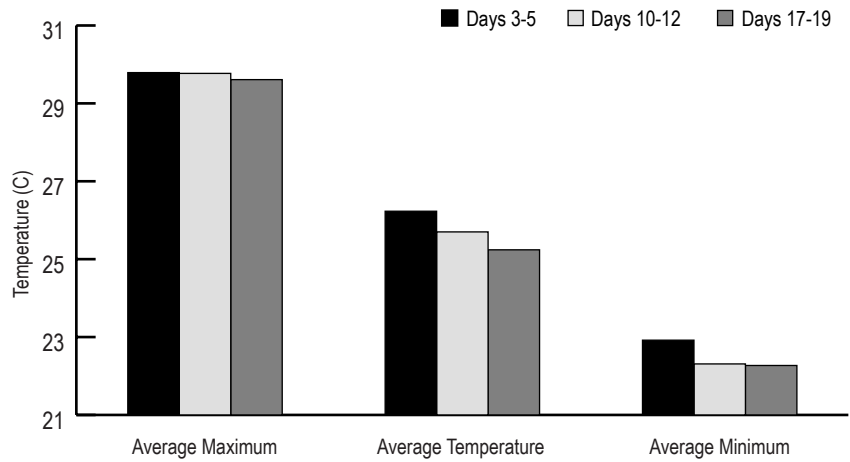


Figure 1 Average preferred temperature with minimum and maximums for days 3-5, 10-12, and 17-19 days post-weaning.

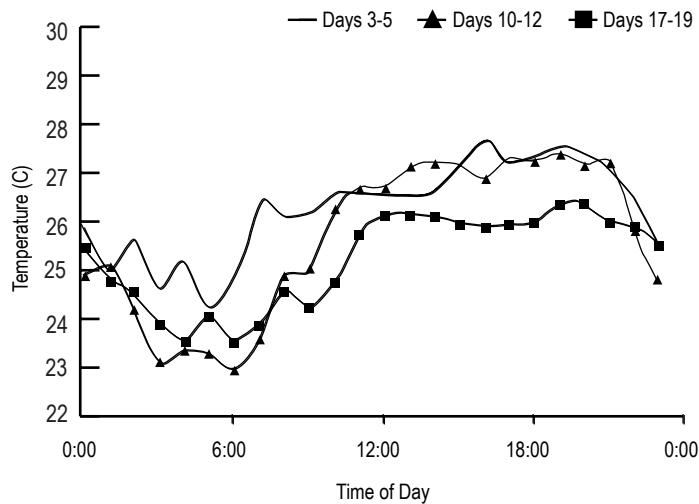


Figure 2 Sinusoidal pattern for average temperatures preferred over a 24 hour (circadian) cycle. Temperatures averaged for days 3-5, 10-12, and 17-19 days post-weaning.