

# Hot Weather Effects on Swine

controlled air temperatures and relative humidity aid in study of weight gains and well being of hogs

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**Environmental temperatures** of approximately 75° F for hogs weighing 70 to 144 pounds and 60° F for hogs between 166 and 260 pounds were the temperatures under which experimental swine at Davis made the largest daily gain and required the least amount of feed to produce 100 pounds of gain when the temperature was kept constant.

Changes in environmental temperature and humidity, as they affect swine body temperature, respiration rate, pulse rate and such factors as the utilization of feed consumed, were investigated under controlled conditions by the Division of Animal Husbandry.

A specially designed and constructed room—or psychrometric chamber—made the studies possible. Air motion through the insulated chamber is relatively constant, and the air temperature and relative humidity can be controlled within the limits of these experiments.

Purebred Duroc Jersey or Poland China swine, or their first generation cross, were used. They were fed a complete ration in an open trough twice daily in such amounts as they would clean up without excessive wastage. Water was supplied without restriction.

The pigs—in groups of two, three or four—were acclimated at 70° F, usually for at least one week, while they were becoming accustomed to the surroundings. The air temperature was then changed to that desired for the test.

Test periods, usually seven days in length, were occasionally varied. Body temperature readings, pulse—with the use of a stethoscope, and respiration rates—breaths per minute—were taken twice daily, before feeding in the morning and before feeding in the late afternoon.

## Air Temperature

The lower limit of temperature—40° F—used in these experiments was determined by the cooling capacity of the equipment; the upper limit, by the ability of the hogs to withstand heat.

As the air temperature increased from 40° F, the body temperature and respiration rate increased. Pigs weighing under 150 pounds were more comfortable at a

given high temperature than the pigs weighing more than 150 pounds. The lighter weight animals could be kept at a temperature of approximately 115° F, whereas the heavier hogs could not be taken much beyond 100° F.

Pulse rate decreased with increased room temperature.

Feed consumption decreased as the air temperature increased from 40° F to 100° F, and it appears that this decrease is more rapid at higher temperatures.

Average daily gain also varied with the changes in air temperature. Hogs weighing 166 to 260 pounds gained more rapidly in the neighborhood of 60° F, while the lighter weight animals weighing 70 to 144 pounds gained most rapidly at approximately 75° F.

The amount of feed required to produce 100 pounds of gain was at a minimum when the rate of gain was at a maximum.

Both below and above these temperatures—approximately 60° F for the heavier weight pigs and about 75° F for the lighter pigs—utilization of feed declined.

## Relative Humidity

Experiments in which humidity was the variable were run only at 90° F and 96° F.

At 90° F, the data indicate that there is not much difference in the response of hogs weighing over 200 pounds to relative humidities of 30% and 94%, except that the respiratory rate is increased at the higher humidity.

At 96° F and relative humidity of 30%, swine weighing over 200 pounds lost weight but survived for prolonged

periods. When the relative humidity was increased to 94%, they were immediately increasingly distressed.

In one experiment at a temperature of 96° F, the relative humidity was gradually increased during eight hours from 30% to 94%, the body temperature increased 2.5° F, and the respiratory rate more than doubled. It was not deemed advisable to hold the hogs under these conditions, and the relative humidity was lowered. In two hours, the relative humidity was decreased to 58%, the respiratory rate and body temperature were back to that at the start of the experiment.

## Cooling by Evaporation

In the first trial, hogs weighing around 250 pounds were kept for a period at 90° F on a dry floor with relative humidity of 35%.

The temperature was then held constant and a trickle of water was run across the floor for a seven-day period. During the period with a wet floor—about 4.5 gallons of water per hour flowing across the floor—the rate of gain was markedly increased; the respiration rate was about 30% of that during the period on the dry floor; and the body temperature was 1.5° F lower. The same comparison was made at 100° F with similar differences.

It was possible to raise the air temperature to 115° F with water on the floor before seriously distressing the animals. On a dry floor the same animals were seriously distressed at 100° F.

The cooling effect due to evaporation of water was very rapid. An experiment

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Interior of the psychrometric chamber at Davis, where temperature and humidity changes can be controlled for observation of effects on swine.

