

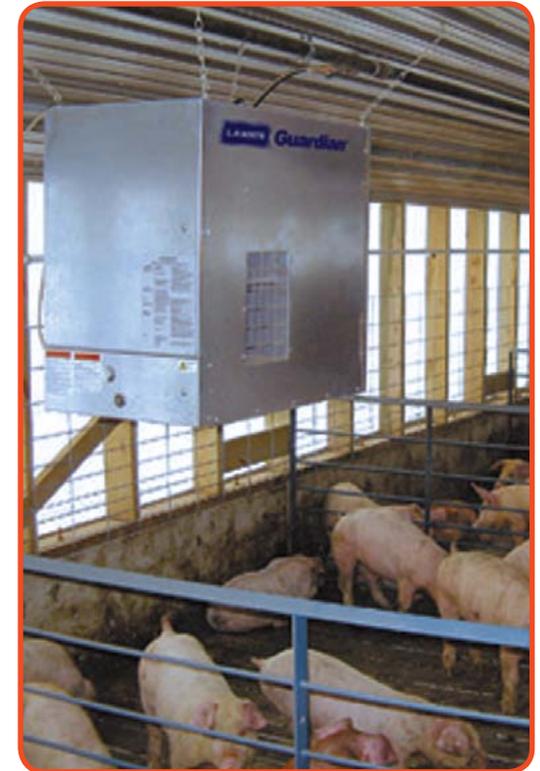


WEAN-TO-FINISH  
**HEATING**  
PROTOCOL

## Comparing Traditional Nursery and Wean-to-Finish

### Traditional Nursery Management

- As the pig transitions from the sow to the nursery it needs to establish its own immunity.
  - This process can take up to 14 days.
  - During those 14 days a higher level of heat than the pig experiences in the farrowing environment is used to maintain pig health.
- Typically, pigs are started in the nursery with temperature settings targeted to maintain air temperature within their Thermal Neutral Zone.
- Traditionally this results in a Day 1 temperature of 85 °F (29.44°C) as the DRT (Desired Room Temperature) or 'set point.'
  - In traditional control, the set point is treated as a 'not to exceed' temperature.
  - In the ventilation mode, if the room air temperature exceeds the setpoint, ventilation is increased.
  - In the heating mode, typically 2-3 °F (1.11-1.66 °C) of offset from the DRT and 0.5 to 1 °F (.28 to .56° C) of 'burn' is utilized in order to prevent over shoot of the DRT.
    - ◆ This typically results in an average room temperature, as measured at the sensors, of about 2 °F (1.11° C) lower than DRT, i.e., 83 °F (28.3° C)
    - ◆ Actual air temperature at the pig can be another 1-2 °F (.56-1.11° C) lower due to sensor height location.
- Temperature curve practices vary, but typically the set point will be reduced 0.5 °F (.28°C) per day.
  - Day 14-15, when the pig's immunity should be established, results in a temperature setting of 78 °F (25.56° C).



### Wean-to-Finish

- The concept of wean-to-finish is to bypass the nursery stage moving the pigs directly from the farrowing room to the finisher.
- The need to transition the pig to its own immunity still exists.
  - During this transition it is critical that the pig's temperature be properly maintained as immunity is being established.
- With the overall size of a finisher and pen areas sized to accommodate full-grown pigs there is a need for localized areas of sufficiently elevated temperature—this is essential for the weaner pigs during the immunity development period.
  - This presents an ideal application for radiant heating—providing heat directly to the animals.
  - During the immunity development phase, radiant heat becomes the primary source of heat.
    - ◆ With radiant heat being provided directly to the animal it is not necessary to maintain the room temperature at typical nursery temps.

## Wean-to-Finish (continued)

- The practice of using radiant heating as the primary source of heat during immunity development varies widely and can result in excessive and unnecessary fuel cost.
- Common questions associated with Wean-to-Finish heating:
  - How much of the total fuel is or should be used by radiant heating in the Wean-to-Finish grow phase?
  - Do we need to run the radiant brooders longer during the cold weather periods?
  - Where should the temperature sensors be located?
  - Do you need to move sensor locations depending on whether it is 'cold' or 'warm' outside?
  - What should the radiant heating temperature target be?
  - What should the room temperature target be when using the radiant heaters during the immunity development phase?
  - What is the installation height for the brooder for most efficient operation?
- The purpose of this Wean-to-Finish Heating Protocol is to address the most common questions and concerns.
  - There are four key aspects to be considered when using radiant heat in Wean-to-Finish:
    - ◆ Pig coverage—how many pigs to be covered by each radiant heater.
    - ◆ How much heat is needed—the temperature rise of the heated area for the pigs over the room air temperature.
    - ◆ Sensor location.
    - ◆ Temperature management.



## Related Articles

Follow these links to read more about Wean-to-Finish systems from industry experts.

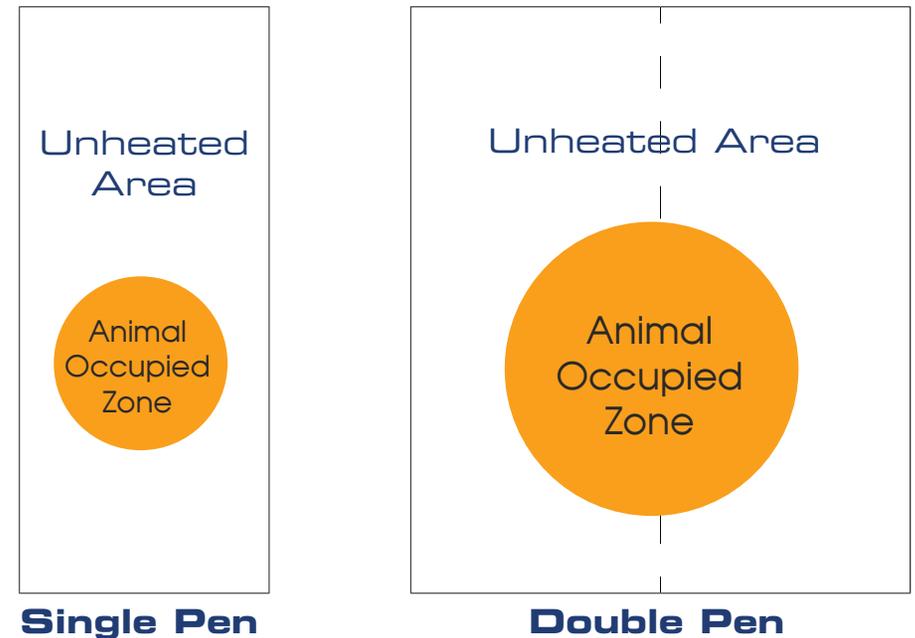
- [Wean-to-Finish Systems: An Overview »](#)
- [Comparing Conventional, Wean-to-Finish Systems »](#)
- [The Wean-to-Finish Revolution »](#)
- [The New Economics of Wean-to-Finish Production »](#)

Source: [nationalhogfarmer.com](http://nationalhogfarmer.com)

## Radiant Heating in Wean-to-Finish

- Radiant heat is the primary source of heat for pigs during the immunity development period—approximately the first 14 days.
- The radiant heat must provide a sufficiently large area of temperature coverage (the animal occupied zone) at the proper temperature to support the immunity transition time (see Fig 1a).
- The area to be heated, area occupied by pigs, is determined by the number of pigs.
  - A typical feeder pig occupies about 1.5 ft.<sup>2</sup> (.14m<sup>2</sup>) of floor space at the start.
- Dr. Steve Hoff, Iowa State University, developed a method to determine the effective heating coverage of a radiant heater. [Read more »](#)
  - Uses 'simulated' pigs—a 'tan' colored device with the same relative radiant absorption characteristics as the pig and instrumented with thermocouples.
    - ◆ The data devices are placed at various radii and in various quantity to determine the absorption temperatures.
    - ◆ The data is then used to calculate an average temperature of the heated area.
- For a radiant heater (e.g. the L.B. White I-17) the quantity of pigs covered is dependent on the installed height and the amount of 'heating effect' or 'rise' desired.
  - Heating effect or 'rise' = the desired average occupied zone temperature minus the temperature of an unheated pig.
  - The higher the heater, the larger the area covered. However, the higher the brooder, the lower the temperature rise.

**Fig 1a:** Spot Radiant Heating Effect in a Single Pen and Double Pen



## Heating Effect

Equals the desired average temperature in the Animal Occupied Zone minus the temperature of unheated pig.



## Key Application Issues

- The key application issue for radiant heat in the wean-to-finish installation is temperature sensor location.
- A sensor location that represents the average temperature of the area occupied by the pigs is critical for proper management.
- Using an IR (infrared) gun to shoot the mat will not give the best indicator of the temperature in the zone—mats are black and absorb maximum radiant energy. Because pigs are not black, they have a lower absorption coefficient.
- In conjunction with Dr. Hoff's method of determining the average temperature of the zone occupied by the animals, a sensor design and location can be developed.
- The L.B. White heating system incorporates a sensor holder on one of the radiant heat brooders within the zone (see Fig. 2).
- A typical room control temperature sensor is located inside the holder.
  - Any shielding or isolators incorporated on the conventional room temperature sensors should be removed to improve response.
- The sensor location represents a combination of radiant energy and convection heat and is selected to provide a temperature that correlates between the average radiant heating temperature of the animal occupied zone and the desired temperature. If the desired Day 1 animal occupied zone is 85 °F (29.44° C), the sensor installed in the holder on the radiant heater indicates approximately 85 °F (29.44° C).
- See Fig. 3 for a proper laying pattern utilizing this method of radiant heat sensing and management.

**Fig 2:** Sensor holder on an L.B. White I-17 brooder.



**Fig 3:** Proper laying pattern using W-F radiant heat.



## Wean-to-Finish Heating Protocol

- Radiant heat is the primary heat source for the weaned pigs from Day 1 to Day 14, and then the transition from radiant heaters to forced air heaters begins at Day 14-15 (see Fig. 4).
  - Run the radiant heaters to provide the appropriate heat to the occupied zone.
  - Run the forced air heaters at a lower temperature—they are not the primary source of heating while radiant heaters are in operation.
  - Program the radiant heaters to decrease heat as needed to obtain the desired Day 14-15 temperature and coincide with the forced air temperature setting at Day 14-15.
    - ◆ Minimizes transition in temperature and heating methods.
- Using traditional nursery temperature management practices the following is illustrative of application of the concept of radiant heating to Wean-to-Finish concurrent with management of the forced air heaters.
  - Temperatures are illustrative—actual numbers and days are at the discretion of the producer.
- As indicated, traditional nursery management results in Day 14 temperature of 78 °F (25.56° C)
  - This becomes the Day 1-Day 14 temperature for the forced air heaters in Wean-to-Finish.
- Forced air room temperature:
  - Day 1-Day 14 → 78 °F (25.56° C)
    - ◆ Consideration can be given to utilizing a lower temperature setting considering that the primary source of heat for the pigs is from the radiant heating. At the same time, consideration must be given to having appropriate air temperature at the time of transition from radiant to forced air heating.
  - Day 14-Day 44 ramp down to 70 °F (21.11° C)
  - Day 45 to end ramp down 1 °F (.56° C) per day to 63-65 °F (17.22-18.33° C) and hold at that temperature for the duration of the turn.
- Radiant heater temperature
  - Start Day 1 at 85 °F (29.44° C)
    - ◆ Maintain for first 3-4 days.
  - Ramp down to 78 °F (25.56° C) by Day 14.
  - Turn radiant brooders off on Day 15.

Fig. 4: Wean-to-Finish Heating Protocol Settings

