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COOLING THE SWINE HERD WITH A THERMOSTAT-TIMER CONTROLLED SPRINKLING SYSTEM

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When temperatures reach 80 to 85 degrees Fahrenheit (F.), pigs must be cooled to obtain maximum performance and to prevent death loss. The pig cools its body by four methods — conduction, radiation, convection and evaporation. Conduction is the loss of heat by the pig to a solid that is cooler than the pig's body temperature, such as occurs when a pig is lying on the ground or concrete. Radiation is the loss of heat waves to objects that have temperatures lower than the pig; the pig radiates heat to these objects in the same manner as the sun radiates heat to the earth. Convection is the loss of heat to cooler air or a cooler pool of water. Evaporation is the loss of heat by the drying of a wet surface, such as the inner surface of a pig's lungs or when a pig's skin becomes wet and subsequently dries.

As the ambient temperature (temperature of surrounding air) increases above 70 degrees F., evaporation becomes the most effective method of cooling the pig (see Figure 1). When temperatures approach 100 degrees F., cooling by conduction, radiation and convection are ineffective because the air and objects surrounding the pig are nearer his body temperature (102.5 degrees F.).

When the ambient temperature approaches 85 degrees F., hogs begin experiencing heat stress. At this temperature they eliminate body heat initially by evaporation of moisture from their lung surface through more rapid breathing. Wetting the pig's skin results in skin surface evaporation and greater comfort when ambient temperatures are high. To secure maximum cooling, the water must be evaporated from the body surface; therefore, periodic wetting of the animal followed by evaporation should give maximum cooling efficiency. This intermittent wetting can be done most economically with an automatic "sprinkler" system.

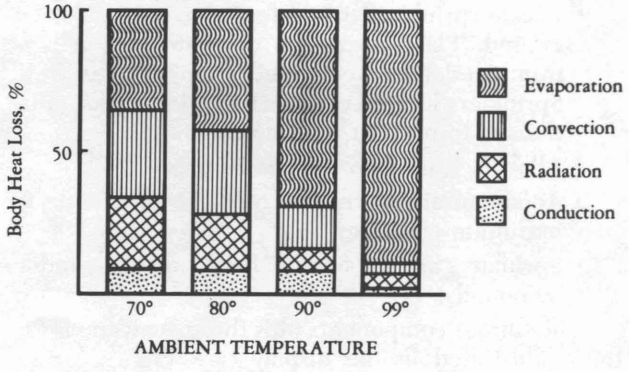

Figure 1. Heat lost from body of 57- to 81-pound pig.

An automatic sprinkler system includes several components (see Figure 2). The system is automatically "turned-on" by a *thermostat* (at a temperature selected by the operator) and a *timer* controls a *solenoid valve* permitting the sprinkler to operate 1 or 2 minutes (optional up to 9 minutes) out of 10. This results in greater cooling efficiency, less water usage and less deterioration of buildings and equipment as

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compared to a "fogger" system that sprays continuously.

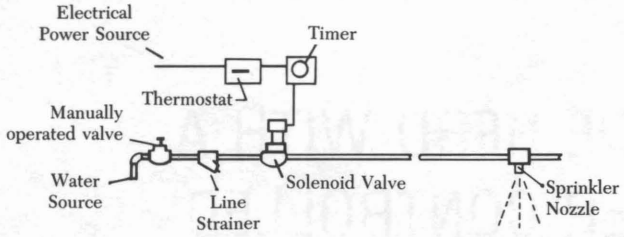

Figure 2. Schematic diagram of thermostat-timer controlled sprinkler system.

Some guidelines for using sprinkler systems include the following:

- Use sprinklers that deliver 2 to 3 gallons of water per hour per nozzle (the spray should wet both the hogs and the floor).
- Set the timer so the sprinkler is off long enough for the floor or ground to visually appear dry before it sprinkles again (use 1 to 2 minutes on and 8 to 9 minutes off, initially).
- Set thermostat at 80 degrees initially and adjust to fit cooling needs.
- Locate sprinklers 3 to 4 feet above the floor or ground. Place nozzle on opposite end of pen from feeder to keep feed from getting wet. Sprinklers located over dirt should be placed in the sun to prevent mud holes.
- Allow at least 1 nozzle per 20 pigs.
- Adequate air movement must be provided for maximum efficiency.
- Sprinklers are not suitable for young pigs (under 30 pounds).

The various components plus the specifications for those illustrated in the display (see Figure 3) are given below. This is not a recommendation for any specific brand name since a similar component with similar specifications from any other company would be equally satisfactory.

- Fuse protected switch 120V, 60 cycle, such as a Fusetron Box cover for a handi-box. Use 1 amp screw in fuse.
- Adjustable thermostat 120V, 60 cycle, 30 to 100 degrees F. range, such as a Honeywell, Model T631C-1103.
- Cycle repeat timer, 10 minute cycle, 120V, 60 cycle clock motor, switch capacity ½ hp, such as a Paragon Percentage Type, Model JW 10-0.
- Pilot operated solenoid valve, diaphragm-type, normally closed, 120V, 60 cycle, ½ inch pipe brass body, such as an Asco 810D2.
- Inline "Y" strainer with 40 to 50 mesh screen, ½ inch pipe inlet and outlet, iron, bronze or plastic body adequate for local pressure, such as Sarco Y strainer, AT or BT.
- Spray nozzles solid cone 60 to 90 degrees spray pattern, brass tip and strainer assembly (50 mesh), such as Delavan nylon eylet #10001, ½ inch, with strainer and BC-5-70° tip.

This system will turn itself off when it gets below the set temperature at night, and will turn itself on again when it gets warmer the following day. It will operate mostly unattended throughout the summer except for lime plugged tips and strainers. However, because the strainer and solenoid are especially vulnerable to breakage from freezing, it is necessary to prevent freeze damage. Some types of lime plugging can be cleaned by boiling the tips and strainers in vinegar.

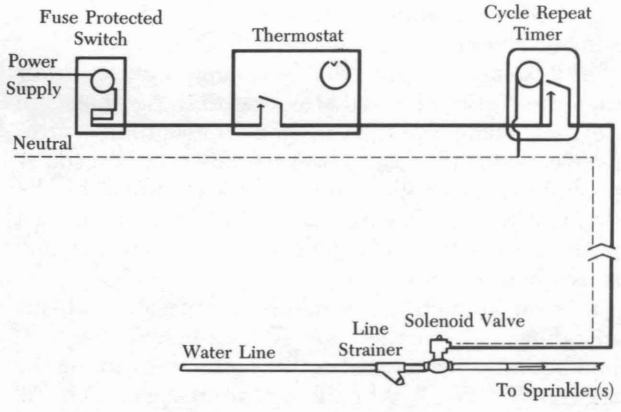

Figure 3. Wiring and components diagram for sprinkler system.

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