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FACT SHEET

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GAS BROODER MAINTENANCE

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Energy use in the brooding of chicks represents one of the major expenditures for poultry producers. Every available means that is economically sound should be used to reduce energy costs. Poultry producers should consider all three areas of costs related to poultry facilities — maintenance, construction and management.

Proper maintenance is important but may represent only a small part of the wasted energy in chick brooding. It may do much, however, toward eliminating brooder failure during a severe cold period or toward minimizing maintenance labor when it is most needed for other management chores. Proper maintenance also will prolong brooder life and thus reduce overall brooding costs.

Brooder Construction

Figures 1, 2 and 3 show some of the typical brooders on the market and in use on Texas poultry farms. The parts are labeled on each drawing. What are the differences between brooders?

First, all brooders have a canopy of some sort to direct heat downward toward the chick or to help hold the heated air down. As the canopy is heated by the burner, it radiates heat toward the chick. Unfortunately, it also radiates heat from the upper surface and heats the air above the canopy. This heated air rises and in cold room brooding is lost as far as the baby chick is concerned.

Brooders usually have some type of heat cone mounted above the burner and below the canopy. These metal or ceramic cones are designed to receive most of the direct heat. They become very hot and serve as excellent radiators of heat to the chicks around the brooder. Ceramic cones have a greater capacity for holding heat than metal cones.

Major differences between brooders are in the gas valves and controls. Older brooders utilized relatively simple gas valves with a bellows-type thermostat control for the main gas valve. Figure 1 shows this type of brooder. The pilot does not have a separate valve or control and stays on as long as gas is supplied to the brooder. The main burner contains a quick cut-off valve to prevent its coming on.

Later brooders have control valves as shown in Figures 2 and 3, which include a safety shut-off for the gas supply in case the pilot flame goes out. Depending on the manufacturer, the pilot safety valve is actuated by a thermocouple and holding coil or a gas-filled bulb and a bellows. The thermocouple control provides for more compact construction and is most widely used.

A main valve that is thermostatically controlled to maintain a certain temperature under the brooder is included in addition to the pilot safety valve. This is accomplished by cycling the burner on and off. The thermostat control may consist of a gas-filled bulb and bellows-controlled valve with an adjustment that varies the pressure within the bellows required to open the main gas valve. Or, the main gas valve may be controlled by a thermocouple and coil designed to open and close the main valve. Temperature control in this case is achieved by varying a resistor in the thermocouple circuit, which in turn controls the temperature required to open or close the main gas valve.

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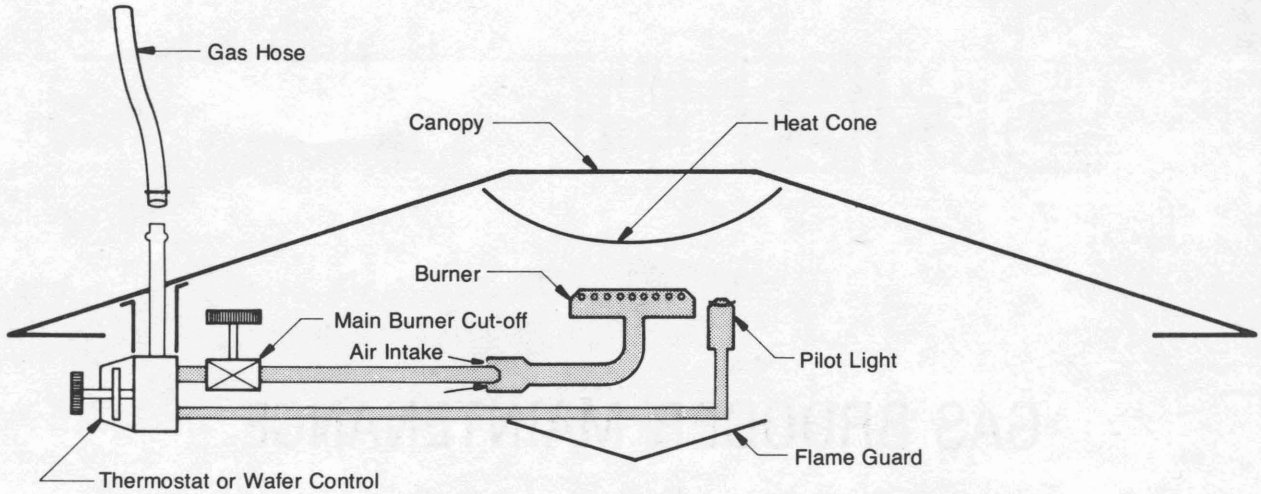

Figure 1. Brooder with cast iron burner and wafer-type gas control. Air and gas are mixed in the burner.

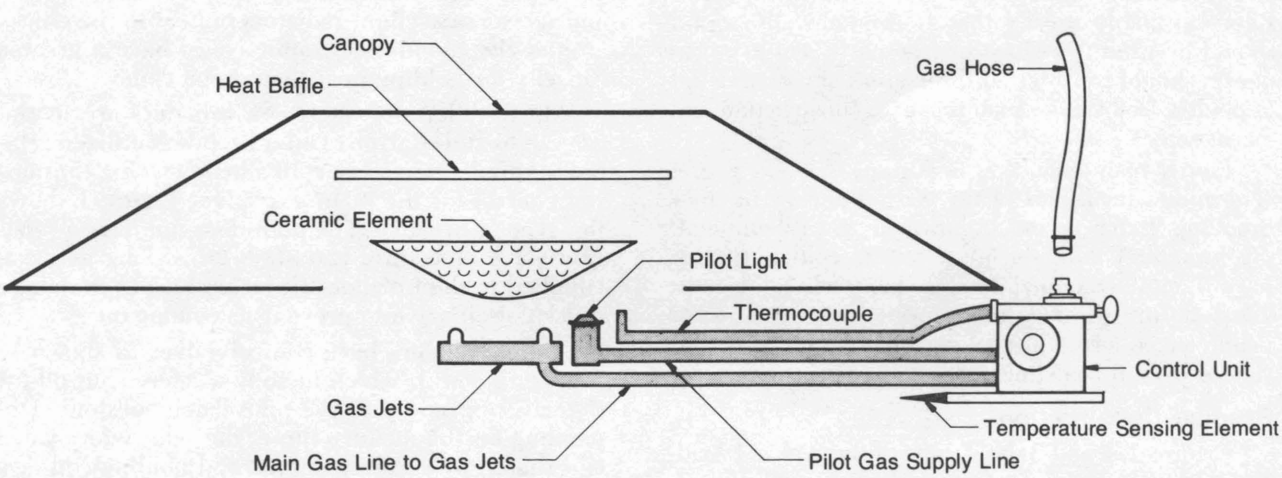

Figure 2. Brooder with jet-type burner, thermocouple-controlled safety valve and bulb-actuated main gas valve.

Brooder burners are of three general types. In Figure 1, air and gas are mixed at the entrance to the burner. The burner is often circular and has small holes around its perimeter to distribute the flame over a ceramic or metal cone. These burners usually are of cast iron or some alloy. In the second type, shown in Figure 3, air and gas are mixed at the entrance to the burner, but the burner surface consists of a perforated ceramic element. The flame is held at the ceramic element and keeps its temperature high, resulting in a highly radiant heat source. The third type, shown in Figure 2, consists of a gas jet mounted below a ceramic element. Mixing of air and gas occur above the jet and no air control is possible.

Brooder Problems

Poor brooder performance may be associated with improper installation, malfunction of parts or improper adjustment. No one of these will always be the source of trouble, so all possibilities should be checked.

Starting at the beginning of the brooder system means starting with the gas supply. Whether natural

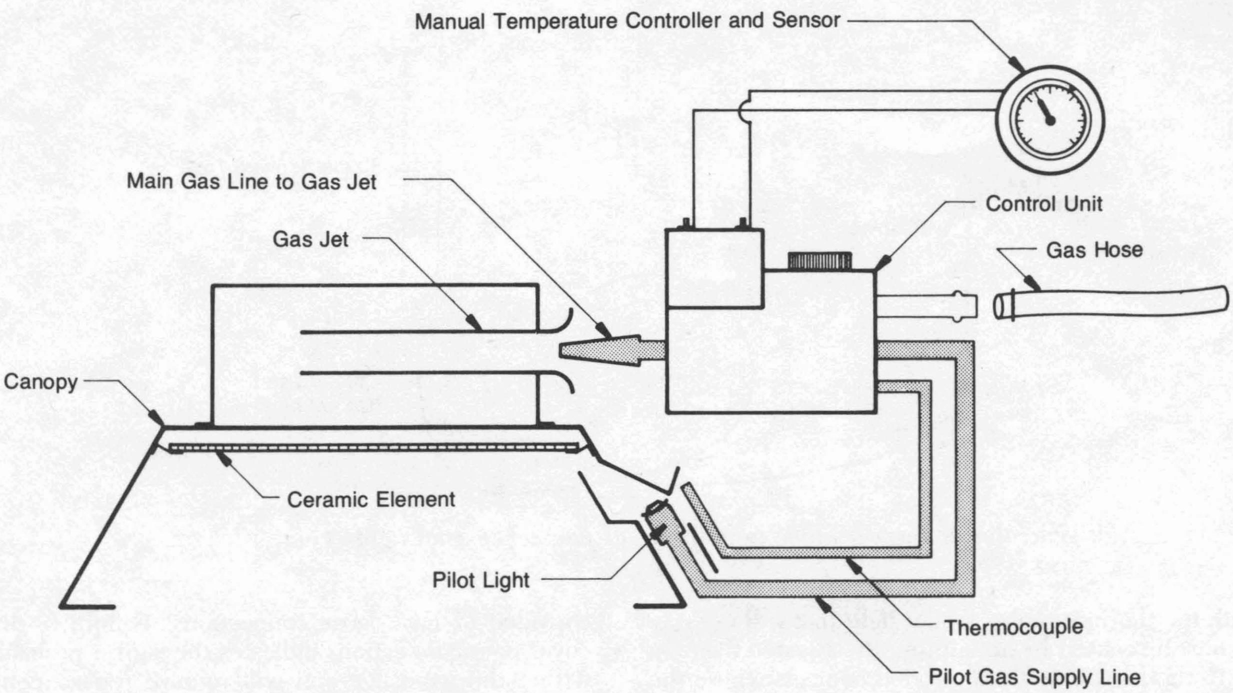

Figure 3. Radiant-type brooder with perforated ceramic burner and combination gas valve.

gas or L.P. gas is used, proper pressures must be maintained at the supply. This is the responsibility of the gas company because it installs, adjusts and maintains the meter and regulator in the case of a natural gas supply. For L.P. fuel, the supply company usually provides the tank and regulator. Be sure the pressure settings are those required for the brooders you have. Many brooder gas valves are rated for a maximum pressure of ½ pound per square inch. This is equivalent to 8 ounces per square inch or 4.63 inches of water column. Pressures higher than this may cause problems with the seating of spring-loaded shut-off valves. Even with the proper pressure regulator setting, the gas distribution line may be a source of trouble. Be sure it is sized for the number of brooders operating on it and the line length. If the line is too small, the brooders the greatest distance from the regulator may not receive sufficient gas flow when all brooders are operating. To minimize the pipe size and pressure drop, supply the gas to the center of long houses where possible.

Excessive pressure drop will result in less than rated heat output from the brooder. Where low pressure is suspected with all brooders operating, check by shutting off about half the brooders closest to the supply and checking the performance of the brooder at the end of the gas line. A noticeable increase in the flame indicates excessive pressure drop or low line pressure as the probable cause. If the pressure regulator is correctly adjusted, the only solution may be to increase the pipe size. When installing gas lines, use the fewest elbows, valves, tees and couplings possible. These connectors increase pressure losses.

Check hoses and connections for leaks with a brush and a soap solution. After wiping a joint or suspected leak with the soap solution, appearance of bubbles indicate a leak. Do not use flames to test for leaks. Replace cracked hoses with new hose designed for use with gas. When installing gas hose, be sure it is supported so that it does not hang below the brooder or contact the canopy. This can cause rapid deterioration of the gas hose. Use positive tightening hose clamps over a gas hose fitting. Use standard hose fittings and do not use pipe nipples as hose connectors.

After each brooding period, remove the brooders and clean thoroughly. Repair damaged parts and order new replacement parts for those used for repairs. It is wise to stock a quantity of gas hose, hose clamps, several replacement thermocouples (where used) and at least one new complete gas valve unit when a supplier is not close by. Remove accumulations of carbon, especially that on the pilot thermocouple and burners.

Pilot light adjustment is important to proper brooder operation. The pilot flame should be as low as practical, but sufficiently high to keep the thermocouple operating. The pilot flame should be blue and should provide approximately ½ inch of contact

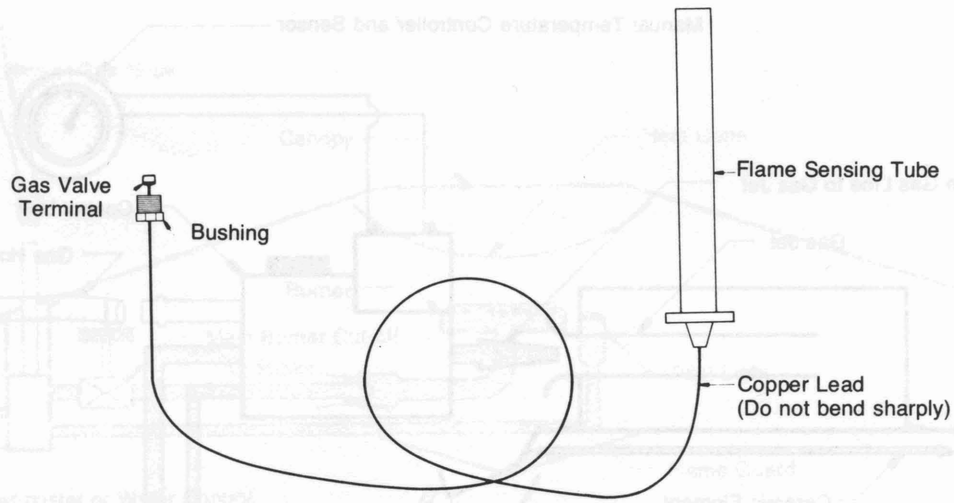

Figure 4. Pilot generator or thermocouple to prevent gas flow when pilot light is out.

with the thermocouple. A pilot light that will not stay lit may be caused by an improperly adjusted flame, a dirty thermocouple tip, corroded contacts where the thermocouple connects to the gas valve or a defective thermocouple. Figure 4 shows a typical thermocouple. The bulb can be cleaned by light sanding to remove carbon. The contact at the other end should be scraped lightly to provide good contact with the gas valve receptacle. Do not bend the thermocouple sharply as this will cause damage. If the pilot fails to stay lit after adjusting the flame and cleaning the thermocouple, try installing a new thermocouple. This usually will correct the problem. If it does not, the fault may be in the pilot valve holding coil or coil connections. Checking these parts requires electronic test equipment and should be attempted only by experienced repairmen. If this appears to be the problem, replace the complete gas valve.

A thermostat controls the main gas valve to the burner when the pilot is properly working. To check it, light the pilot and then turn up the thermostat so that it calls for heat. If the main burner fails to come on, the fault may be in the thermostat control, the gas valve or a clogged main jet nozzle. The first step is to remove the main gas jet and clean it. Remove carbon deposits and then use an orifice-reaming needle sized for the nozzle you are using. These should be available from your dealer. If not, suppliers of oxyacetylene welding gas and equipment usually carry tip cleaners for welding torches and may have the proper size. Should the main burner still fail to operate after cleaning the nozzle, the fault may lie in the thermostat control. A thermostat electrically connected to the gas valve, as in Figure 3, is a thermocouple-actuated, main gas valve and may be corroded or have loose connections. Failure to discover poor connections indicates the fault is probably within the gas valve and will require replacement. For gas valves with temperature sensing bulbs as shown in Figure 2, loss of gas from the sensing bulb will result in the main burner not cutting off. Sensing bulb failure is not common but will require the replacement of the complete gas valve.

Repair of equipment is best done with proper tools. A small set of wrenches should be obtained to fit all gas fittings and nuts on the brooder and controls. In addition, spare parts such as thermocouples, thermostat wafers, gas valves, bolts and winch parts should be stocked. A thermometer for checking thermostat control should be kept with the maintenance kit, along with a brush and soap for leak detection. If brooders are to be cleaned in the brooder house, a portable air compressor or air tank will be needed to blow away dust, cobwebs and other foreign materials from brooder surfaces.

Install safety chains on all brooders and attach them to a ceiling hook to prevent the brooder from dropping to the floor in the event of winch failure or a broken winch cable or rope.

Testing of thermocouples and main gas valve parts other than by substitution requires the use of an adequate millivolt and ohm meter. Manufacturer data will be needed as to the millivolt output of the thermocouple when heated by the pilot flame. An ohm meter is necessary to test for coil continuity and corrosion of connections. The cost of a good millivolt meter will not be justified except for operations that provide their own repair service for other electrical systems and controls.

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