The *Poultry Engineering, Economics & Management*
NEWSLETTER

Critical Information for Improved Bird Performance Through Better House and Ventilation System Design, Operation and Management

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Getting the Most from Your Gas Supply and Piping Systems

Last May, in issue #29, we covered ways to keep the cost of purchased gas down. In this issue, we turn to the heating system itself, focusing on the most important factors a grower needs to know to make sure his gas supply and piping systems are both safe and energy-efficient. Winter is coming soon and now is the time to get ready. There is no reason to believe that saving money on heating will be any less important this coming winter than it was last year. Indeed, all indicators are pointing to very high gas prices this year, and having inefficient or unsafe gas supply and piping is one way to see a lot of hard-earned cash literally "go up in smoke."

This issue mainly addresses propane use, since that is the heating fuel used in most poultry houses, but much of the material presented will be relevant to either fuel, and we include notes on natural gas where there are significant differences. The information presented should be useful in planning new or renovating older installations, as well as for managing existing systems. We also include a checklist of critical factors to look at to make sure your gas supply and piping systems will be safe and will operate at maximum energy efficiency.

Importance of Proper Pipe and Hose Sizing and Placement

A typical broiler house LP gas supply and piping layout is shown on page 3. Usually, one 1,000 gallon LP tank is needed per house, if not using natural gas. LP gas tanks should be located at the center of the brood end of each house. Gas pressure needed should be determined by consulting the manufacturer of your heating equipment. In most cases, pressure will be taken at the last brooder in line, with all other brooders in the house lit and operating.

Gas piping must be carefully sized for poultry housing. The pipe sizes needed depend on the number of appliances, size of the propane tank, the length of pipe between the tank and the house and the layout of the brooders, and on the type and size of space heaters in the house. If natural gas is used instead of propane, gas pipe sizes need to be much larger because natural gas operates at much lower pressures.

Each brooder and furnace is designed to operate at a specific gas pressure. When gas pressure is too low, not only do you not get the rated heat from the brooder or furnace, you may also get incomplete gas combustion, resulting in the production of carbon monoxide or other harmful gases. If gas pressure is too high, it is possible that brooders may get too hot.

Photo shows what can happen if gas hoses to brooders are of poor quality or not properly installed. Arrow points to end of hose which broke loose from the brooder, caught fire, and sprayed burning gas wildly until it was shut off, narrowly averting a major fire. Tri-ply has been burned through and rafters and insulation scorched.

Typical LP gas piping systems to a poultry house can be divided into five areas:

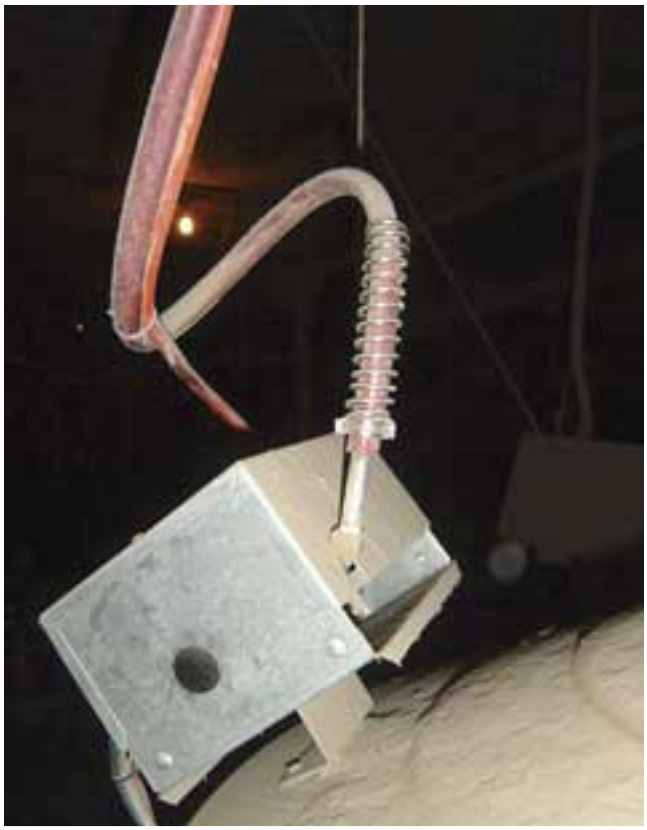
1. Supply tanks, usually holding 1,000 gallons.

2. Piping from the tank to the first stage regulator, usually located at the tank, as shown in top photo on facing page. The first stage regulator reduces tank pressure to trunk line pressure, usually about 10 psi, for delivery to the house.

3. The trunk or high-pressure line. This line may be copper or black iron, and carries gas from the first stage regulator to the second stage regulators at the house. These lines must be sized correctly to carry gas at about 10 psi pressure. Photos on facing page show copper trunk line from tank to second stage regulators.

4. Second stage regulators, which take 10 psi high-pressure gas down to approximately 11-13 inches W.C. pressure for use by the appliances in the poultry house. Second stage regulators should be located outside the poultry house, as shown in second photo on page 3.

5. Interior or low pressure lines and hoses that supply brooders and furnaces. These lines must be sized correctly to carry low-pressure gas (usually 11-13 inches W.C. pressure) to appliances. In most cases these lines are black iron pipe, with low-pressure flexible hose carrying gas from these lines to brooders, which must be raised and lowered. To prevent high risk of fire, it



Above photo is a close-up of the picture on the front page, showing clearly the burnt end of the gas hose. Arrow shows where it was originally attached. Photo below shows gas hose running directly above the brooder, which risks fire if the hose comes in contact with the brooder when it is raised.

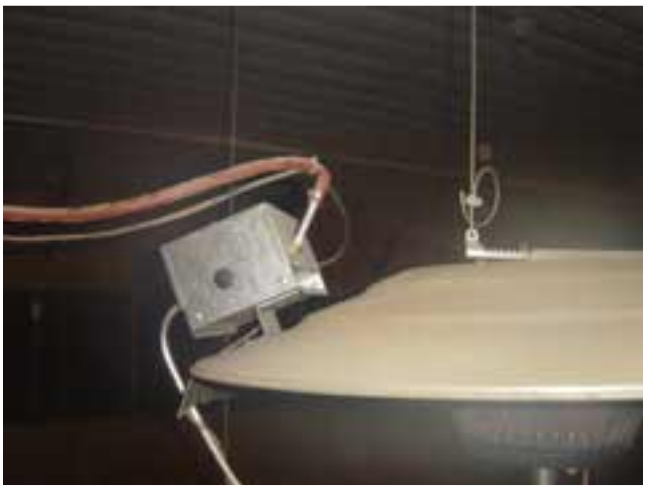
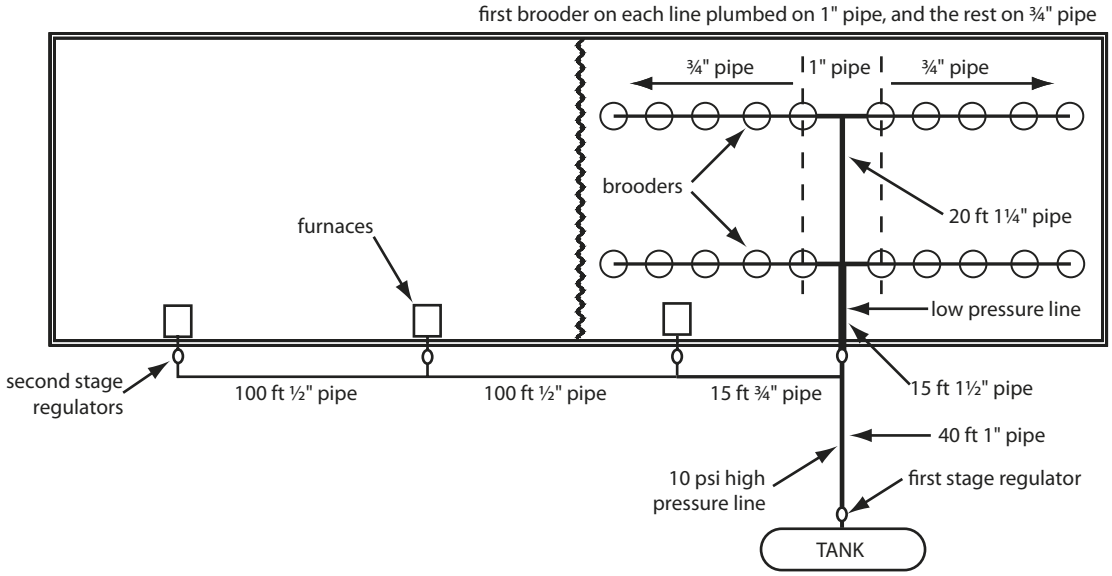


Photo above shows flexible gas hose to brooder pulled at a sharp angle so that it develops a kink, which will starve the brooder for gas, and also will be in danger of breaking at the kink point. Photo at left shows a spring-type anti-kinking device, which is good practice for all flexible hose.

Photos courtesy of Mike Czarick, Extension Engineer, University of Georgia.



The diagram above shows a typical layout of gas piping to the brooders and space heaters in a 40x400 poultry house. The house has a total of 3 space heaters, rated at 225,000 BTU per hour, and 20 brooders, each rated at 31,000 BTU's per hour. The total heating capacity of this house is 1,295,000 BTU's per hour. The gas pipes to these appliances must be properly sized and routed so that proper gas pressures will be available at all appliances on both the coldest days, with all appliances on, and on mild days when only a few appliances are in operation. Note that where the low pressure line enters the house to supply the brooders, the pipe size is 1.5 inches. The pipe to the last brooder is 3/4 inch.

Photo at left shows a gas supply tank and the first stage regulator that steps the gas pressure down to approximately 10 psi for delivery to the poultry house through the trunk line.

The trunk line from the gas tank and first stage regulator branches to serve three second stage regulators, which take gas at 10 psi and reduce the pressure to approximately 11-13 inches of water column. Second stage regulators should be located outside the house.

is absolutely essential that these hoses be gas-rated hoses, not ordinary air or automotive hoses. Hoses must also be routed from the overhead distribution pipe at a sufficient horizontal distance from the brooder cable and arranged so that they cannot come in contact with the brooder canopy or drop directly below the brooder when the brooder is raised or lowered.

Another high risk of fire arises if precautions are not taken to prevent brooders from firing when they are raised to ceiling level, especially in the period between flocks. Warning signs should be prominently posted and signs or labels placed on gas controls, circuit breakers, thermostats and/or controllers to caution workers to turn controls off when brooders are not actually in use.

Be sure to get qualified help in sizing all gas piping. Inadequate pipe size starves brooders and furnaces for gas, which causes loss of heat and poor combustion and can cause carbon monoxide poisoning.

Gas Tanks and Piping Checklist

_____ Gas tanks must be of adequate size and placed away from heavy traffic; ideally near center of the brood end of the house, and accessible for refill trucks.

_____ Gas piping to houses, regulators, and heating units inside the houses shall be sized as recommended by the heating equipment manufacturers, and installed in accordance with national and local codes.

_____ Flexible hose gas lines to brooders must be gas-rated, not ordinary air or automotive hoses.

_____ Flexible hose gas lines to brooders must be arranged so there is no possibility of the hose being kinked or coming in contact with the brooder canopy when it is hot, or of dangling directly below a lighted brooder.

_____ Gas company and equipment company should furnish proper number of regulators and gas lines for equipment to operate properly.

_____ Gas tanks and piping must be inspected by the local gas company for proper installation and all appliances be lit and leak tested before a new or renovated installation is accepted by grower.

_____ Take precautions to prevent brooders from firing when they are raised to ceiling level.

_____ Before heating season starts, have gas company check system for proper pressures and test-fire brooders and furnaces.

U.S. Poultry & Egg ASSOCIATION

The Poultry Engineering, Economics and Management Newsletter **is produced in cooperation with the U.S. Poultry & Egg Association, as part of their commitment to poultry industry education. We are proud of this association, and know it will help to improve our continuing efforts to bring you the critical engineering, economics and management information you need.**

ALABAMA COOPERATIVE Extension SYSTEM

The Poultry Engineering, Economics and Management Newsletter provides up-to-date information on topics of interest to poultry production personnel, focusing on most effective and efficient uses of modern technology and equipment, with a special emphasis on economic implications. The Newsletter is published six times a year, or as needed to address emerging or special issues. Contact: Jim Donald, Extension Biosystems Engineering, 228 Corley Bldg., Auburn University, AL 36849-5626, (334) 844-4181, fax (334) 844-3548, jimdonald@aces.edu. Published by:

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