Keeping Poultry House Both Dry and Warm

Involves Problem of Litter Management[1]

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Wet litter in poultry houses is a common problem in this northern area. Low winter temperatures do not permit sufficient ventilation to keep litter dry without lowering the temperature in the house below the freezing point. This is true even in poultry houses that are well insulated and equipped with storm windows.

Hens give off water at the rate of about five gallons per day per 100 hens. About one-third of this moisture is given off in the breath and two-thirds in moisture in the droppings. This amounts to over three tons of water per 100 birds that has to be removed during each winter season. Spilled water from drinking fountain will also cause additional moisture problems.

Several methods of overcoming the wet litter problem were tried at the North Dakota Agricultural College Poultry Research Center. A 20′ x 20′ insulated poultry house was used in making these tests.

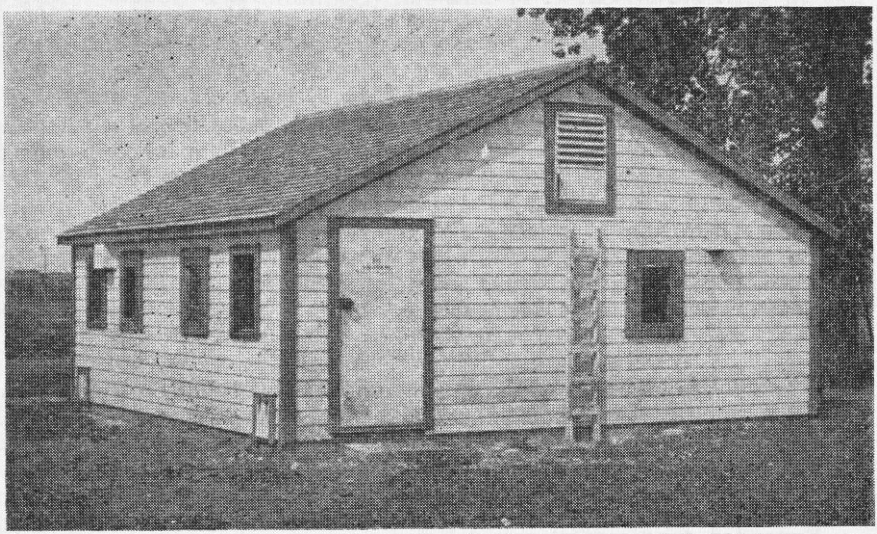

FIGURE 1.—*Poultry house used in litter management studies.*

The house has a concrete floor and was equipped with storm windows during the winter months. It has a "blow-in" ventilating system that delivers about four to five cubic feet of air per minute per bird. A thermostat shuts off the fan when the temperature in

[1]Final report on Bankhead-Jones 34 "Poultry House Ventilation and Litter Management Methods to Provide Dry Litter."
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the house drops to about 35° Fahrenheit. The house was stocked with 125 birds each fall at the beginning of the test program. This averaged about three square feet of floor area per bird.

Soil Heating Cable in Floor

In order to keep the floor warm and thereby attempt to dry out the litter, three 400 watt units of soil heating cable were installed in the test house. This cable was laid over one-half inch insulating board to keep excessive amounts of heat from going down through the floor. One inch of concrete was placed over the heating cable to keep it in place and so that it would not interfere with the normal cleaning of the house. No heating cable was placed under the droppings pit area. Figure 2 shows arrangement of the heating cable.

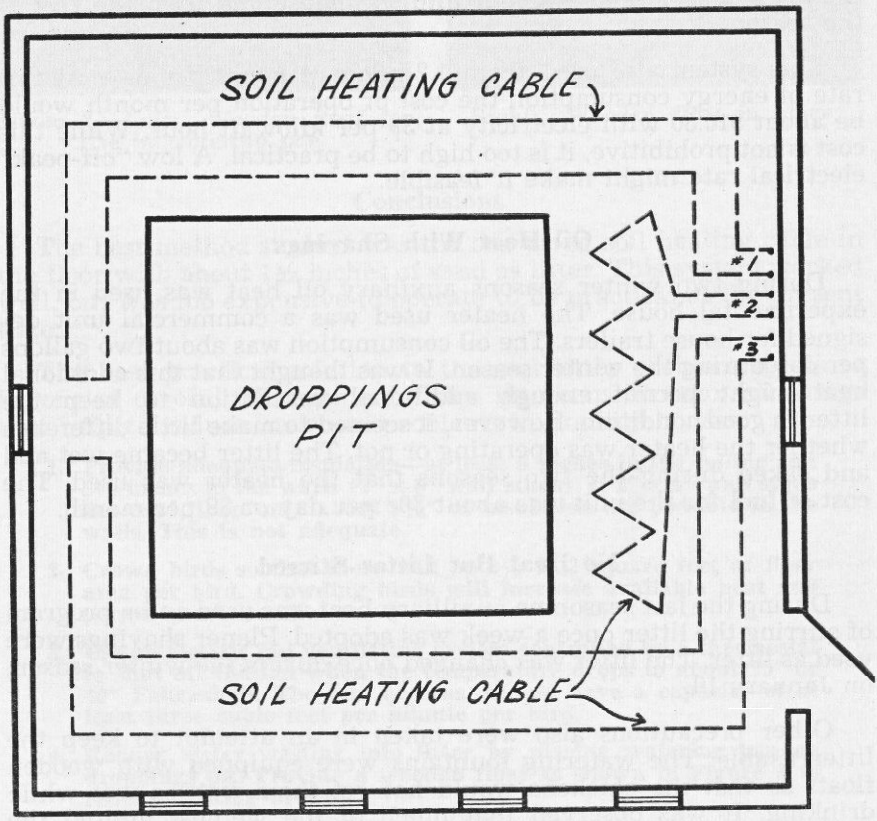

FIGURE 2.—*Three 400 watt soil heating cables used in concrete floor to help dry litter.*

About four inches of planer shavings were placed on the floor area not covered by the droppings pit. The heating cable was controlled by a time switch to keep the heat on 10 hours per day. This system did not work satisfactorily. The litter became wet on top,

although it was dry underneath. The shavings provided enough insulation to make the heating elements in the floor ineffective for drying out the litter except for about an inch of litter near the floor. This system used about 1.2 kilowatt hours per day.

Soil Heating Cable With Sand

Since the shavings insulated themselves from the heating cable, sand was tried as litter. About 1½ inches of sand was placed on the floor in the area not covered by the droppings pit. The three 400 watt heating elements were kept on about 10 hours each day. This system worked very well. The first batch of sand was used from November 15 to February 2. On that date the sand was removed, because it had become caked—especially around the water fountain. A new batch of sand was put into the house and used the rest of the season.

This system also used about 1.2 kilowatt hours per day. At this rate of energy consumption the cost of operation per month would be about $10.80 with electricity at 3¢ per kilowatt hour. While this cost is not prohibitive, it is too high to be practical. A low "off-peak" electrical rate might make it feasible.

Oil Heat With Shavings

During two winter seasons auxiliary oil heat was used in the experimental house. The heater used was a commercial unit designed for house trailers. The oil consumption was about two gallons per day during the winter season. It was thought that this additional heat might permit enough additional ventilation to keep the litter in good condition. However, it seemed to make little difference whether the heater was operating or not. The litter became wet and and caked during the two seasons that the heater was used. The cost of fuel for the unit was about 30¢ per day or $9 per month.

No Heat But Litter Stirred

During the last season no auxilliary heat was used and a program of stirring the litter once a week was adopted. Planer shavings were used as litter. The litter was changed once during the winter season, on January 19.

Other precautions also were taken in an attempt to keep the litter usable. The watering fountains were equipped with wooden floats so that the chickens would not get their wattles wet while drinking. It was observed that much of the wetness around the drinking fountain was due to water being thrown by chickens with wet wattles. Figure 3 shows the wooden float arrangement which helps keep wattles from getting wet.

The number of birds in the house was increased to 150 on January 21. This provided more heat, which should be conducive to better litter management. However, the short period from January 21 to

end of the winter season was not enough to permit definite conclusions to be drawn.

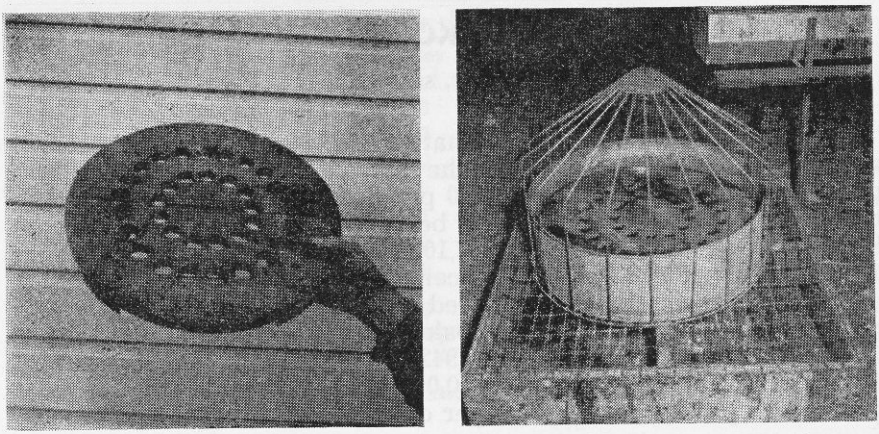

FIGURE 3.—*Left: Wooden float for Use in watering pan. Right: Wooden float in place.*

Conclusions

The best method studied was the one using soil heating cable in the floor with about 1½ inches of sand as litter. This system worked well, but was too expensive to operate to be practical at the present time.

The best practical solution to the wet litter problem seems to be one of careful management. Take into consideration all things that help to reduce moisture problems in poultry houses.

1. **Provide adequate insulation—at least 6 inches in the ceiling and 5½ inches in the walls (2" x 6" wall studs). If 2" x 4" wall studs are used, then only about 3½" of insulation are possible in the walls. This is not adequate.**
2. **Crowd birds so that there will be 2½ to 3 square feet of floor area per bird. Crowding birds will increase available heat and permit more ventilation.**
3. **Use an electric fan ventilating system controlled by a thermostat to shut off the fan when the temperature drops to about 35° or 40° Fahrenheit. The fan, or fans, should have a capacity of at least three cubic feet per minute per bird.**
4. **Reduce water wasting into litter by placing watering pan on droppings pit. Provide a wooden float as shown in Figure 3 to reduce wasting of water.**
5. **Use well broken, absorbent litter, 6 to 8 inches deep, and get it started well in advance of cold weather. Stir litter regularly and change it once during the winter season, if necessary.**
6. **Use storm windows.**

The above practices will go a long way toward keeping litter and poultry houses dry during our long and cold winter season.