Egg Men !! Daily Removal. One-third Weight. Little Odor. Better Product. Small Cost Hike

Automated Manure Disposal

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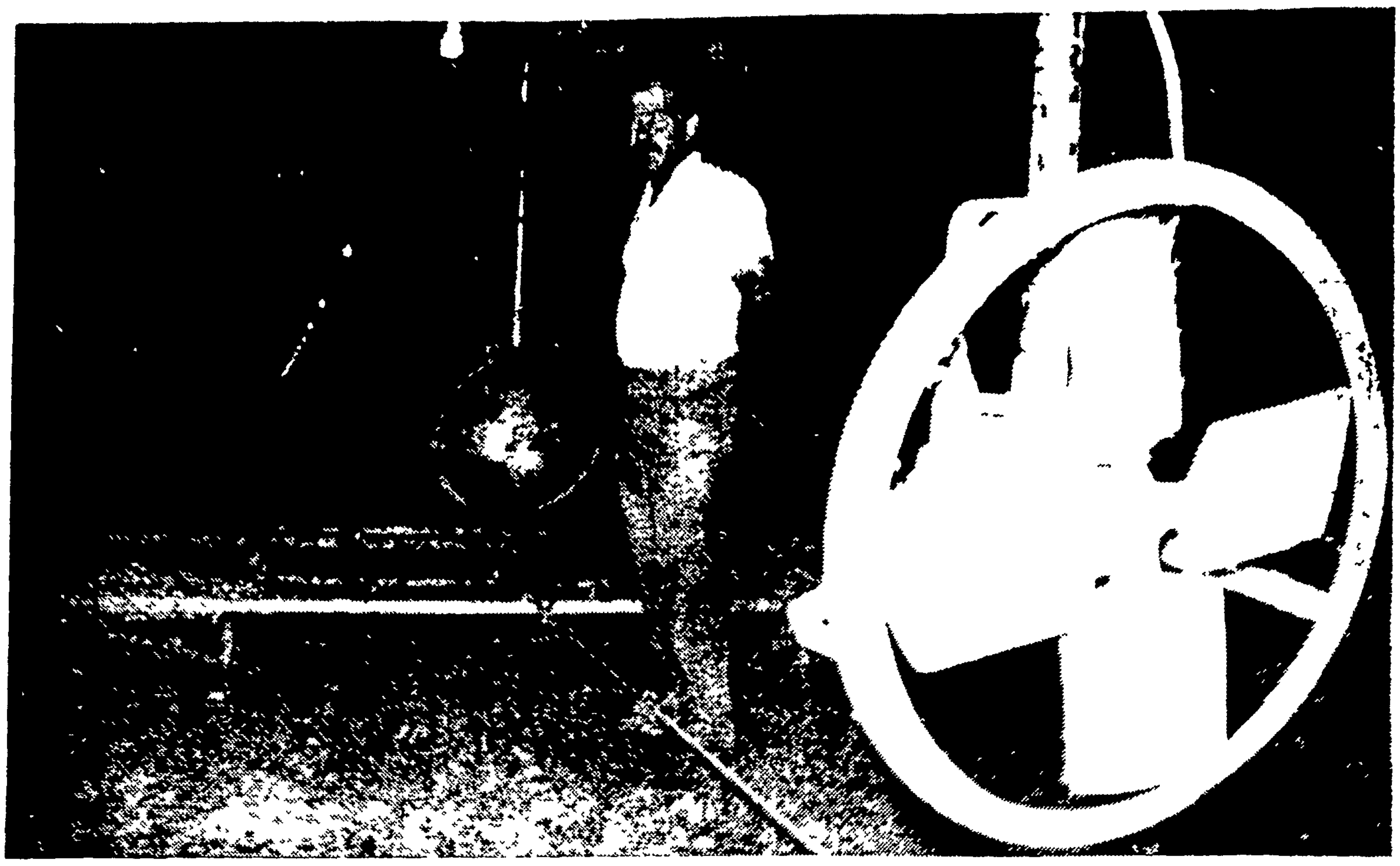

Ed Bowser, farm manager at Cloisterdale, inspects new manure system Fans dry the manure as it drops from the 30,000 caged hens above: the rig on the floor pulls the manure to the front of the building and dumps it into a channel, from which it is carried by conveyor directly to the waiting truck. No shoveling, it's a completely automated system. Bowser's job largely is to make sure the equipment functions properly.

Poultry manure handling and disposal, offensive odors, and flies have become problems of great magnitude in todays poultry industry

Increase in size of flocks and concentration of large numbers of chickens in limited areas have created these problems

When large poultry operations are located near residential areas, flock owners often have been forced to abandon their operations or relocate in less urbanized areas

Since 1963 research and development work at Penn State has been directed toward finding a solution to the various problems associated with poultry manure Because handling manure in a liquid or semi-liquid form is widely used without providing satisfactory solution to the problems the experimental approach used was dehydration The objectives were (1) to remove as much moisture as possible from the poultry manure inside the poultry house to lessen the weight of material to be handled (2) to eliminate odors and flies and (3) to develop an automatic system of manure handling to eliminate manual labor

Three basic drying principles were applied experimentally (1) application of high velocity air to the accumulating manure (2) stirring the manure as it accumulated to aid in bringing the rapidly moving air to the moisture in the manure and (3) use of supplementary heat in the floor to drive off moisture

The drying system was incorporated into the sloping wire floor system developed at Penn State for leghorn layers and breeders housed at 0 5 to 0 6 square foot floor space per bird With this system droppings are spread thinly over the entire floor area underneath the wire floor and are exposed to rapid air movement which starts the drying process immediately This is in sharp contrast to systems in which wet watery droppings are concentrated in limited pit areas where drying is considerably more difficult

Three flocks of leghorns were used in two manure dehydration experiments The first experiment, beginning August 1 1967 involved a flock of 3 000 pullets and 246 cockerels 20 weeks old housed in a 30 feet by 100 feet windowless house on an A frame sloping wire floor at 0 57 square foot per bird The experiment ended on June 24, 1968.

In the second experiment beginning August 12, 1968 and continuing for 12 months, involved two 30 feet by 100 feet windowless houses The A-frame sloping wire floor system was used in one house and the V frame in the other About 3050 pullets and 250 cockerels 20 weeks old were placed in each house at about 0 57 square foot floor space per bird

Experiment I 1967-68

Drying Methods Used

Ventilation

Circulating air at high velocities over the accumulating manure was a third dimension added to what is considered a normal poultry house ventilation system Most ventilation systems provide adequate air exchange for control of house temperature and to meet oxygen demand for the chickens and eliminate obnoxious odors

However, control of moisture has been lacking and this has increased the problem in all aspects of handling poultry manure

To determine the effect of high air velocities, four 1/4 H P single phase motor driven fans with a 3,000 cfm capacity were spaced about 22 feet apart along a center line in each pit underneath the chickens on the sloping wire floor and hung about 15 inches above the manure All fans were pointed toward the manure unloading end of the house This provided air velocities averaging about 250 feet per minute over the pit area

The air exchange portion of the ventilation system consisted of one 48-inch exhaust fan (20,000 cfm free air delivery) located in the end wall at the manure unloading end of the 100 feet long house This fan, thermostatically controlled, was louvred and provided actual delivery rates varying from 15,000 cubic feet per minute to as low as 3 000 cfm

Air inlets, 10 inches in diameter were spaced about 12 feet apart in the ceiling along a center line over each pit The air was drawn in between rafters. In hot weather doors in the house were opened to provide additional air inlets

Stirring Manure

Manure stirring was accomplished by pulling a spike tooth harrow type device through the droppings Partially dried droppings were drawn into the high velocity air stream with specially hinged boards on the stirring device Cleaning was accomplished with the same mechanism Stirring was done from one to ten times over a 24 hour period by using a time clock controlled limit automatic reversing switches

Supplementary heat

Heat cable matts 18 inches wide (40 watts per square foot capacity) thermostatically controlled, were installed in the concrete floor along the center of the pit directly underneath the water troughs

Procedures and Results

Three drying methods were used singly and in various combinations in 39 experimental periods varying in length from one to 44 days Stirring alone was an aid in drying but did not result in significant drying

Stirring plus use of the fans circulating air underneath the sloping wire floor to give a velocity averaging 250 feet per minute, did an excellent job of drying

When supplemental heat was used in the concrete slab with a heat cable, manure could be dried under all circumstances

Stirring twice daily, plus operation of the circulating fans to provide air velocities of 250 feet per minute, resulted in drying the manure to 30 per cent moisture in the September 14 to 25 period In the front pit where the heat cable was used the manure was dried to 19 per cent In either case the manure remaining which had to be handled was reduced to approximately 1/3 the original weight

An electrical cost analysis of these two methods indicated substantially higher costs with the heat cable Electrical requirements were metered separately for fans and heat cable

The electrical requirements for drying the manure were considered as the net increase for ventilation in kilowatt consumption over normal ventilation for a similar size flock and for a similar period of time, as a result of the additional fans used for air circulation The cost of electricity consumed was figured at 1½ cents per kilowatt hour

With heat cable drying manure from an assumed 75 per cent

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The 30 per cent dried manure leaves the Cloisterdale building and flows by conveyor directly onto a waiting truck. Only one of nine Cloisterdale buildings now use this system, but plans are already underway to convert the rest of the buildings to the drying system.