[upbeat music] [announcer] Presenting "Electricity at Work". A story of heat, light, and power by means of electrical energy featuring Dr. Donald P. Brown of the Agricultural Engineering Department at the Michigan State campus. And now, here's Don. [Donald P. Brown] Ladies and gentlemen, we have Harry Hathaway back with us again today from our Poultry Department here and Harry's been on several of our programs recently when we've been talking about the use of electricity in the poultry enterprise. Well Harry, we've covered a wide variety of subjects in this series of programs. I think we started off with the poultry house lighting, didn't we? Then we went to providing water under pressure to the poultry enterprise, mechanical feeders, preserving egg quality, and a lot of other subjects. And today we're going to talk about ventilation in the poultry enterprise. There's so many problems involved, Harry, that I know that we're not going to be able to cover them all here in the 15 minutes that we have. So I'm sure that we're going to have to come back next week and finish up. But just to get underway today, you were mentioning to me just a moment ago a few figures that you have in mind there about the relative importance of the poultry enterprise in the state of Michigan. I wonder if it wouldn't be a good idea for you to pass some of those along to our people. [Harry Hathaway] Well Don, sometimes people don't realize just how large the poultry industry in Michigan is and of course I'm a relatively newcomer to Michigan and I haven't received the full impact yet but Michigan does all right for itself compared to the other 48 states when we speak of size. And, of course, when we speak of the poultry industry in Michigan from the farmer's standpoint we're speaking of chickens, eggs, and this takes in both the market egg and the hatching egg industry, and then we're talking about broilers and turkeys. Now don't put turkeys down last because they are of course the least important but because they're the ones that we think of probably the least. However, Michigan ranks in the high four or five states in the production of turkey for meat, and I think that, of course, speaks for itself. We have a very good market and a very good location for turkey production. Well, down in 1953, there was a gross income from chickens, eggs, broilers, and turkeys in the state of Michigan of $94 million. I think $94 million is quite a large quantity of money to be coming from one industry, especially an industry where most producers where they have 40 or 50 chickens or they have four or five thousand most of them think that the poultry industry as a whole is rather small, and I think this is quite an income from poultry for the state of Michigan [Donald P. Brown] When you say 94 million dollars, Harry, you stress the fact that that is a lot of money. I know it's certainly a lot of money in my language and I think it is in most of our viewers too. Well those are some things that I just thought that would be interesting for you to pass along to our people. Now to get down to our program for today, the matter of ventilation in the poultry house, let's move over here to where we have a little illustration set up that represents one of the big problems in poultry house ventilation, or one of the big reasons why we do need to ventilate a poultry house, and that is a matter of removing the moisture from the building. We were checking some figures the other day and various studies have pointed out that And actually 100 laying hens will release into the building 22 quarts of water. Now that water, of course, is eliminated into the building. It must either be absorbed by the litter, and if it is, we eventually do have to get rid of it through our ventilation system. 22 quarts of water, 20% of which is breathed out in the breath of the chicken. And there, I think, perhaps would be a good place for you to bring in this idea, Harry, that you mentioned to me a while ago about the chicken using a lot more air than some of the other animals? [Harry Hathaway] Yes, they do. Of course, the main reason is that they have a lot higher physiological rate, and I think I gave it a term one time of a high rate of living. They seem to have a high respiratory rate. They have a high, of course, pulse rate, and they have a tremendous body temperature, 105 to

107. Since they do not have any sweat glands, then the only way that they can keep their heat regulated, their body temperature regulated, is through expiration of a real warm moist air, and that's where the 22 quarts come from. [Harold P. Brown] That's where the the water is eliminated of course. A big percentage of it, 20%, and it does create quite a problem in our ventilation. So that's one of the big reasons why we do need to provide ventilation for our poultry houses. Now you mentioned this fast rate of living with our poultry and the tremendous amount of air that poultry does breathe, and that leads us into our next big reason for providing adequate ventilation. That is a matter of providing plenty of fresh air. Now you had some figures there I think on the amount of air that a chicken will actually breathe in 24 hour period or say perhaps the amount that a hundred birds would use. [Harry Hathaway] I think we better keep it in hundreds because if you don't it gets rather small. But a hundred hens that are perhaps in 60% production and through exploration of giving up through total means giving up 22 quarts of water. They should, of course, and they do, they actually breathe four and a half cubic feet of air per minute. [Donald P. Brown] Four and a half cubic feet per minute uh let's let's get that down here where we can remember it maybe we can put it right on the side of our box. [Harry Hathaway] 4.5 cubic feet per minute. [Donald P. Brown] Now that's per 100 birds, I believe you said, four and a half cubic feet of air per minute per 100 birds, and of course we really would need to multiply that by the number of birds that we have in the flock. What is our average size flock in Michigan? [Harry Hathaway] Well, the kind that I like to count on, I would say the average size is 500. [Donald P. Brown] 500, so it would be five times this figure would be actually the amount of air that the chickens really inhale and exhale. Now we know and of course all of our viewers know that the chicken we can't expect the birds in that house to use every bit of air that's in there. So we have to provide some extra for them. And that's where our recommendation for our ventilation systems come into play. And we're going to be stressing that more in one of our later programs on the the size fan that we need and the amount of air that we do need to move but just for the time being, let's say that we do need to provide about... what was that figure? [Harry Hathaway] 300 cubic feet or more per minute. So we need to move that much air from the inside of the house to the outside so the hen can have the fresh air and, of course, remove the moisture from the house. [Donald P. Brown] 300 cubic feet of air per minute for every 100 birds that we have in there. Now, maybe I've misspoken that a little bit. That's for a 100 bird flock. [Harry Hathaway] 100 birds. [Donald P. Brown] Now, that doesn't increase as rapidly as the size of the flocks do because once we get into larger houses, they can make a little more efficient use of it. Now that brings us up now to the point, Harry, of the temperature that we do like to provide. In other words, the optimum temperature that we like to keep the poultry house. What's your recommendation on that? Well, we find in the poultry research work that the critical temperature of the hen, where they do the optimum amount of labor, is at 56 degrees Fahrenheit. I think that at this 56 degrees, there happens to be one house at the present time where research work is being done where they're maintaining this temperature year in and year out and they're getting very good results at that temperature. [Donald P. Brown] 56 degrees now you say in this experimental house they're actually set up uh equipped to maintain that temperature. They have decided that that's the best temperature of that old hen to live and to lay eggs. [Harry Hathaway] That's right. [Donald P. Brown] 56 degrees. So that would be the goal for which we would would strive in our poultry house ventilation, which we realize that in the summer time without a ventilation or without a refrigeration system I should say, we can't keep it down that cool, but it gives us something to shoot at. In the wintertime, of course, it will drop below that. 56 degrees Fahrenheit then is the optimum temperature that we do like to

recommend for the poultry houses. That brings us up now, Harry, to the point of this thing that we always stress with ventilation is that we must have insulation in our farm buildings, not only with poultry, but with our dairy houses as well. all of our other houses that do house livestock we like to stress the point that along with a ventilation system goes an insulation system and I think that we can point out to them right here the reason why that is necessary. Most of our people I think know that warm air will hold a lot more moisture than cold air. For instance, warm air will soak up moisture like a sponge. But once that air becomes cooled it loses that moisture holding ability or that moisture holding capacity and the moisture is released, it condenses. Now if that be in a building we have a room full of warm moist air and the walls of that building are colder than the air within the room itself. That air, naturally, is going to circulate, it gets over and hits the cold side of that building and will condense. And that's where our insulation system comes into play. Roughly, we can illustrate it with this little piece of board here if we let this board illustrate the wall of the building and I have purposely darkened the edge of it here so it will show up then we can illustrate the insulation placed on the inside wall of the building by this piece of fiberboard here showing that we do endeavor to keep the inside wall of that building warm so that when that air circulates and comes over against it here it won't be cool to the point of where it will give up that moisture. Now insulation material, of course, comes in many many many different types and forms essentially what we're trying to do though is keep this wall warm. I think that we can illustrate very well for you. I think, Harry, we can do it with our ice cube tray here with our little steaming tea kettle of what does happen when that warm moisture-laden air comes over and strikes the surface of a cold wall. Now we're using the tea kettle here to illustrate the air or the moisture held in suspension in the air see the vapor coming out and just to illustrate it we're using an ice cube tray just to give us a good cold surface. Essentially on a zero or a sub-zero day you would have about the same thing in the wall of your building if it wasn't insulated. [Harry Hathaway] Especially on the roof, Don, if you had a metal roof. [Donald P. Brown] That's right now we'll hold this cold surface up there long enough I think that that moisture will condense on the cold area there and if we leave it there long enough it'll start running down and will drip off the end of the tray there. [Harry Hathaway] It doesn't take long for moisture to condense out of that warm air when it hits a cold object. In fact, I had a lot of poultrymen at this past winter series of meetings I held out in the state, Don, asked me repeatedly, why do I have this moisture on my roof? And when you question them, when you get to question them, they always have a metal roof. They have no forced ventilation. In fact, they have the house shut tight like so many do in Michigan in the wintertime. [Donald P. Brown] Well this is exactly the reason, Harry, and you can see here that water is running down there. You can see it dripping off as it condenses there and collects. Now actually, what's happening there, of course, this ice cube tray isn't leaking. That moisture is coming from the air that's carrying up there and condensing. And that's exactly what happens on the inside of those poultry houses. It happens in poultry houses, it happens in dairy barns, practically any building that we house livestock. If we let this wall get cold without... we provide no insulation material there, let the wall get cold, then we're going to have trouble. Well that, of course, means then, Harry, that we're going to have to move a rather large amount of air in poultry houses, dairy houses, dairy barns, and so forth. And that, of course, brings into play our mechanical ventilation systems. Now in some of our smaller houses, they do get by with a natural ventilation system. But as you indicated a while ago, the trend now is to bigger and bigger flocks, bigger houses, to make it an economical enterprise. And there, of course, is where our mechanical ventilation system comes into play. And there are a lot of features about a mechanical ventilation system, of course, that we do want to

discuss with you, but we won't have time today. So, as we indicated earlier in our program, we're going to come back on a later program and talk about ventilation systems, where the fans should be placed in relation to the prevailing winds coming in, whether they should be on the east to the west side on the ends of the building, or on the side of the building, the number of openings that we do need to provide, and a lot of other features there that will govern whether or not your ventilation system is going to operate satisfactorily. I know, Harry, that you've run into a lot of problems with your poultrymen around over the state and their ventilation system. We don't have time to go into our equipment today, but in case any of you people would like a bulletin on this particular subject, stop in and see your county agent or the farm service advisor with your local power supplier and I'm sure that if they don't have a bulletin on ventilation of laying houses in Michigan, they can pick one up for you. They may already have it, if they don't, of course, they can can secure them for you. There's also a very good bulletin on poultry house insulation that points up some of the things here that Harry and I were just discussing. So stop in and ask for "Ventilation for Michigan Laying Houses" or for "Poultry House Insulation." Either your county agent or the farm service advisor with your local power supplier. Well Harry, that just about wraps up all the time that we have available for today. We might just by a quick review stress that we need to remove the moisture from the house we need to provide plenty of good fresh air for those birds in the house. So, if you'll be back with us again on our next program, we'll go into some very definite recommendations on where to place the equipment. That's all we have time for today, so we'll see you next week. [announcer] This has been "Electricity at Work." Today's program was presented by the School of Agriculture and arranged by the Department of Agricultural Engineering, and the Michigan Committee of Rural Electrification. We had with us today Dr. Donald P. Brown of the Department of Agricultural Engineering. Dr. Brown's guest was Professor Harry Hathaway, extension poultryman at Michigan State. "Electricity at Work" is directed by Ken Richards. [upbeat music]