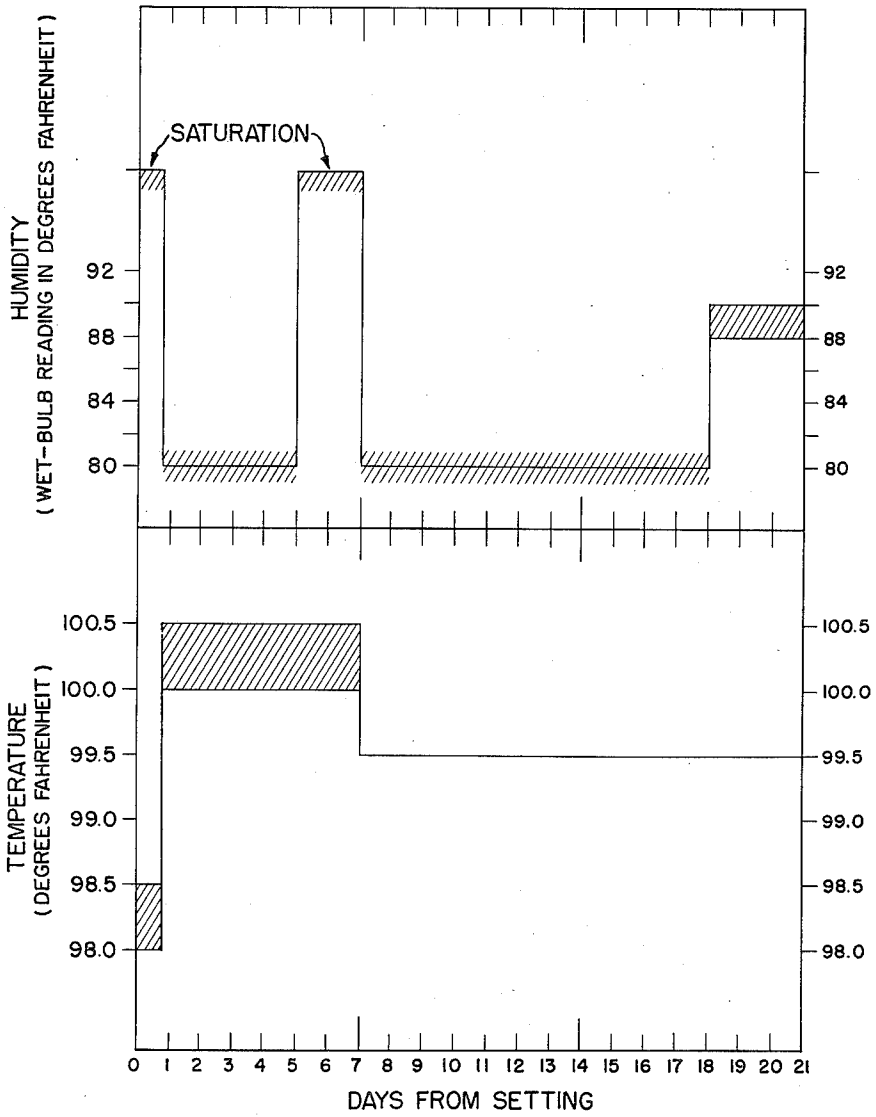
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INCUBATION

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METHOD OF INCUBATING EGGS



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INCUBATION

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This invention will describe a method whereby several advantages can be obtained by rigid control of temperature and humidity in the incubator, especially in the first seven days of incubation. The invention refers to no specific control devices, but only to the values at which the temperature and humidity must be held at the various stages of incubation.

Attached is a drawing which is intended to be self-explanatory. This drawing is a graph, showing the temperature and humidity (plotted vertically) against the time in days (plotted horizontally).

While this invention applies to hatching all eggs from fowl, allowances must be made for the differences in the periods of incubation, i.e. twenty-one days for chicken eggs, twenty-eight days for some duck eggs, and thirty-five days for goose eggs. All data set forth herein apply to chicken eggs.

Eggs are commonly incubated under uniform conditions of temperature and humidity throughout the incubation period. (The common values are 99.5 degrees Fahrenheit and 80 to 86 degrees Fahrenheit wet-bulb reading.)

In the method to which this invention pertains, the eggs are kept at a temperature within the range of 98.0 to 98.5 degrees Fahrenheit for up to the first twenty hours of incubation, with humidity held as near the saturation point as possible during this initial period.

For the remainder of the first seven days, the eggs are placed at a temperature of from 100.0 to 100.5 degrees Fahrenheit. (The actual temperature during this period depends on the breed and strain, and can only be determined by experimentation. Typical values are 100.0 degrees for White Leghorns of some strains, and 100.5 degrees for purebred Barred Rocks.) The humidity is controlled as follows: from the time the temperature is placed in the 100.0 to 100.5 degree range, the humidity is held at 80 degrees Fahrenheit wet-bulb reading until the end of the fifth day. Throughout the sixth and seventh days it is again held at the saturation point.

From the eighth day onward, the eggs are incubated under a temperature of 99.5 degrees Fahrenheit and a humidity of 80 degrees Fahrenheit wet-bulb reading, the humidity being raised to 88–90 degrees Fahrenheit wet-bulb reading for the nineteenth, twentieth, and twenty-first days, inclusive.

All incubation is done in incubators with continuous air circulation (what are commonly referred to as "forced-draft" incubators).

In incubation, it has been generally established that the peaks of mortality occur on the fourth, eleventh, and twentieth days.

In a fresh egg, the endosperm (the fertilized germ in an egg) is located near the outside of the yolk, about five sixteenths of an inch inward from the outside shell. This separation results, in the natural method of incubation (i.e. under a setting hen), in a lower initial temperature of the endosperm. This condition is more closely duplicated in the incubator by keeping the temperature at 98.0 to 98.5 degrees Fahrenheit (substantially lower than in the standard method of incubation) for the initial period of up to twenty hours. Furthermore, I have found experimentally that by maintaining the humidity as near the saturation point as possible, the percentage of live embryos is again somewhat increased.

The mortality peak on the twentieth day is caused by the chick's attempting to breathe through its lungs before it has broken the shell. An immediate consequence of the closer duplication of the natural process is that the chick will develop more uniformly. This substantially reduces the twentieth day mortality peak. Furthermore, I have found experimentally that chicks hatched not prematurely are far more resistant to bacillus pullorum disease.

The allantois starts spreading out inside the top surface of the shell about ten to twenty hours after the start of incubation. This part of the egg is at a higher temperature in the natural method, and by increasing the temperature at this stage of incubation, the natural method is more closely approximated. This practically eliminates the first peak of mortality occurring on the fourth day, together with the blood-rings that appear at that time, and furthermore assures more complete development of the embryo.

Sex differentiation takes place on the fifth day; the sixth and seventh days could be called the post-formative period. I have discovered that humidity at or near the saturation point during the post-formative period is very desirable. It affects the birds for life in increased disease resistance and unusually high rates of growth and productivity.

The method in general tends to result in ironing out the peaks of mortality as well as promoting faster growth and the production of more eggs than obtains with any other known method.

It will be understood that I desire to comprehend within my invention such modifications as may be clearly embraced within the scope of my claims and invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method for the incubation of eggs which consists of placing the eggs in an atmosphere of air at a temperature in the range of 98.0 to 98.5 degrees Fahrenheit and a humidity as near the saturation point as possible, but in any event with a Fahrenheit wet-bulb reading of not less than ninety (90) degrees, maintaining said conditions for the first twenty (20) hours of incubation, and then increasing the temperature to a value in the range of 100.0 to 100.5 degrees Fahrenheit and decreasing the humidity of the atmosphere to a Fahrenheit wet-bulb reading of eighty (80) degrees, and maintaining these new conditions until the end of the fifth day of incubation, and then maintaining the temperature in the range of 100.0 to 100.5 degrees Fahrenheit and increasing the humidity to as near the saturation point as possible, or with a Fahrenheit wet-bulb reading of not less than ninety degrees, and maintaining these conditions until the end of the seventh day, and then decreasing the temperature to 99.5 degrees Fahrenheit and decreasing the humidity to a Fahrenheit wet-bulb reading of eighty degrees, and maintaining these conditions until the end of the eighteenth day of the incubation period, and then maintaining the temperature at a value of 99.5 degrees Fahrenheit while the humidity is raised to a Fahrenheit wet-bulb reading of ninety degrees, and maintaining these conditions until the incubation cycle is completed.

2. The method of incubating eggs which comprises placing the eggs in saturated air with a temperature of ninety-eight degrees Fahrenheit for the first twenty hours of incubation, then reducing the humidity of the air to eighty degrees Fahrenheit wet-bulb reading and simultaneously increasing the temperature to one hundred degrees Fahrenheit and maintaining these conditions until the end of the fifth day, then throughout the sixth and seventh days holding the humidity at saturation but con-

tinuing the temperature at one hundred degrees Fahrenheit until the end of the seventh day when the temperature is reduced to ninety-nine and one half (99.5) degrees Fahrenheit and the humidity is simultaneously reduced to eighty degrees Fahrenheit wet-bulb reading which conditions are held until the end of the eighteenth day when the humidity is raised to ninety degrees Fahrenheit wet-bulb reading while the termperature is maintained at ninety-nine and one half (99.5) degrees Fahrenheit, which conditions hold until the eggs are hatched.

3. The method of incubating eggs which comprises placing the eggs in air with humidity as near the saturation point as possible with a minimum of ninety (90) degrees Fahrenheit wet-bulb reading and a temperature of ninety-eight (98) degrees Fahrenheit for the first twenty (20) hours of incubation, at the end of which time raising the temperature to one hundred (100) degrees Fahrenheit and simultaneously reducing the humidity to eighty (80) degrees Fahrenheit wet-bulb reading and holding these conditions until the end of the fourth day, when the temperature is lowered to about ninety (90) degrees Fahrenheit for the next twelve hours and then raised to one hundred (100) degrees Fahrenheit until the end of the seventh day, with the humidity continuing at eighty (80) degrees Fahrenheit web-bulb reading until the end of the fifth day, at which time the humidity is raised to as near the saturation point as possible with a minimum of ninety (90) degrees Fahrenheit wet-bulb reading which continues until the end of the seventh day, when the temperature is lowered to ninety-nine and one-half (99.5) degrees Fahrenheit and the humidity is simultaneously lowered to eighty (80) degrees Fahrenheit wet-bulb reading, which conditions continue until the end of the eighteenth day, when the humidity is raised to ninety degrees Fahrenheit wet-bulb reading and the temperature is maintained at ninety-nine and one-half (99.5) degrees Fahrenheit, which conditions continue until the eggs are hatched.

4. The method of incubating eggs which comprises placing the eggs in saturated air and keeping the air saturated while the eggs are warming up until the temperature reaches ninety-eight (98) degrees Fahrenheit, thereafter maintaining near saturation conditions or at least a minimum of ninety (90) degrees Fahrenheit wet-bulb reading until twenty hours have elapsed, at which time the temperature is raised to one hundred (100) degrees Fahrenheit, and the humidity is simultaneously lowered to eighty (80) degrees Fahrenheit wet-bulb reading, these conditions holding until the end of the fourth day, when the eggs are allowed to rest for six (6) hours without heat or air movement, then again maintaining the temperature at one hundred (100) degrees Fahrenheit and the humidity at eighty (80) degrees Fahrenheit wet-bulb reading until the end of the fifth day, when the humidity is raised to near saturation conditions with a minimum of ninety (90) degrees Fahrenheit wet-bulb reading, the temperature being maintained at one hundred (100) degrees Fahrenheit, which conditions continue until the end of the seventh day when the temperature is reduced to ninety-nine and one-half (99.5) degrees Fahrenheit and the humidity is reduced to eighty (80) degrees Fahrenheit wet-bulb reading, which conditions are continued until the end of the eighteenth day, when the humidity is raised to ninety degrees Fahrenheit wet-bulb reading, with the temperature continuing at ninety-nine and one-half (99.5) degrees Fahrenheit, these conditions continuing until the eggs are hatched.

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