

AUTOMATIC CHICKEN EGGS INCUBATOR 216 CAPACITIES

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Abstract

Poultry animals such as chickens incubate their eggs in a three weeks to hatch their eggs, which sometimes the egg yields are not optimal so that a poultry eggs incubator and its system are needed to optimize the results of hatching in which this built-in incubator with capacity 216 eggs with a rack system that rotates automatically, using a digital temperature and hygrometer sensor so that the temperature can be set at 38-39 0C and the humidity can be set at 55-70% according to the egg hatching temperature and humidity, and from the test results obtained the number of eggs that do not hatch and hatch both that hatch normally, defective and die, the research conducted, for chicken eggs, which originally amounted to 216 eggs to be hatched, 207 eggs that hatched well, 5 defective eggs and 3 eggs that died and 1 egg don't have any embryos, and the result that this poultry egg incubator is capable of hatching poultry eggs normally above 96%.

Keywords: *Chicken Eggs Incubator, 216 Capacity, Rack System Rotating, Digital Temperature and Hygrometer Sensor.*

INTRODUCTION

Chickens farming is a promising business because people desperately need chickens meat and eggs as nutritional intake. To hatch large numbers of eggs with good quality, an egg incubator with a large capacity is needed. In hatching eggs, there are several things that must be considered in the hatchery, namely: temperature, humidity, air ventilation, frequency of egg screening and egg cleanliness [1]. Most of the egg incubators, the average is done manually, one of which is to turn the eggs over within a specified time, and check the temperature levels the eggs must receive each day. This machine is equipped with temperature and hygrometer digital sensor to match the temperature and the humidity required for eggs to hatch which is controlled by Arduino Uno [3]. This machine is expected to increase the amount of production so that it will greatly assist breeders, both as novice breeders and advanced breeders in continuing their livestock business in a more advanced manner because with this machine eggs that hatch well above 95% are able to increase the amount of poultry production that hatches and increase farmer income. The eggs incubator that can be hatched have a capacity of 216 eggs with a temperature that has been set at 38 - 39 0C by an automatic digital temperature sensor and the humidity can be set at 55-70% by an automatic hygrometer sensor with a rotating rack system to obtain heat and humidity evenly distributed to all eggs so that breeders make their work easier and produce optimal eggs in increasing their income.

LITERATURE REVIEW

Automatic chicken eggs incubator is a tool to create the best environmental conditions so that the eggs can be incubated which in the end the eggs can be hatched. The function of this machine will take over the role of a parent when it incubates its eggs naturally. In hatching eggs, there are several requirements that refer to the rate of increase in the hatching of eggs such as:

Eggs Selection

Chicken eggs to be hatched must be selected properly because it will determine the success of hatching. The following are the characteristics of good poultry eggs [4], namely:

- Has normal weight and shape (normal weight: 0.04-0.05 kg)
- The eggshell should be clean of dirt.
- The air cavity is clearly visible at the blunt side and does not move.
- The ratio between male and female is not more than 1: 8 [5].

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- e. The age of the male and female parent is at least 12 months [6].
- f. No defects such as cracks, too rough surface, soft shell, thickening of the skin in one part, more than
- g. one yolk, and others.
- h. The smell isn't bad or has been stored for a long time.

Before hatching eggs, there are several pre-hatch treatments [2], namely:

- a. The eggs to be hatched must be selected according to the characteristics of the eggs the good above.
- b. The eggs to be hatched are cleaned with a disinfectant such as water warm, alcohol 70%,
a. formaldehyde 40%, potassium permanganate (KMNO₄) or other type of disinfectant slowly with
b. use a sponge or cotton cloth as a cleaner.
- c. The correct way to store eggs is that the air cavity is at the top and should not be stored for more than
- d. 5 days after the eggs leave the mother.
- e.

Temperature

Embryos in poultry eggs will develop rapidly as long as the temperature of the eggs are stable and will stop growing if the temperature is less or more than required. Temperature stability can be achieved by utilizing a temperature control device installed in the incubator chamber. The heat in the hatching machine is produced by heating from an aluminum conductor plate that is connected to an electric current to produce heat energy, where the aluminum conductor plates are on the right, left, back and bottom of the machine. In this research, MH1210W is used as digital temperature sensor with all its spesification [7].

Humidity

The surface of the egg shell has pores that make it easier for water to enter / exit the egg. All eggs, whether incubated (incubated) or not, will slowly dry out. The amount of water that comes out of the eggs during the incubation process is very important to note. This amount is determined by the humidity level in the incubator chamber. Low humidity levels will cause the eggs to dry out faster so that the egg embryos stick to the inner surface of the egg shell. This is one of the triggers for poultry to fail to hatch. For this reason, humidity in the incubator space is obtained by inserting a container filled with water into the eggs incubator.

Air Circulation

Air circulation is also very important because it is related to humidity. If the air circulation is too little, the room humidity will be higher, and vice versa.

Hatching Period

The hatching period for poultry eggs can be seen in the following table

Table 1. Hatch Periode of Chicken Eggs

Poultry Eggs	Chicken
Hatch Period (Day)	21
Rotating Stop (Day)	18
Temperature (°C)	38 - 39
Humidity (%)	55 - 60

METHOD

System Design

System design can be seen in the following block diagram and flow chart figure.

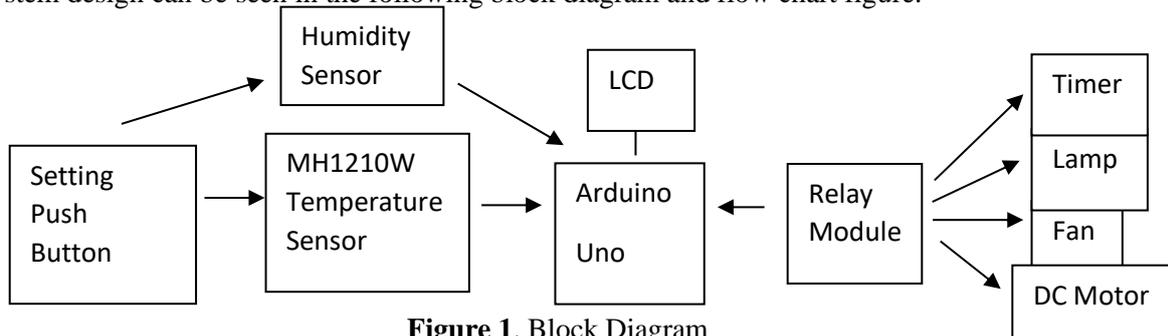


Figure 1. Block Diagram

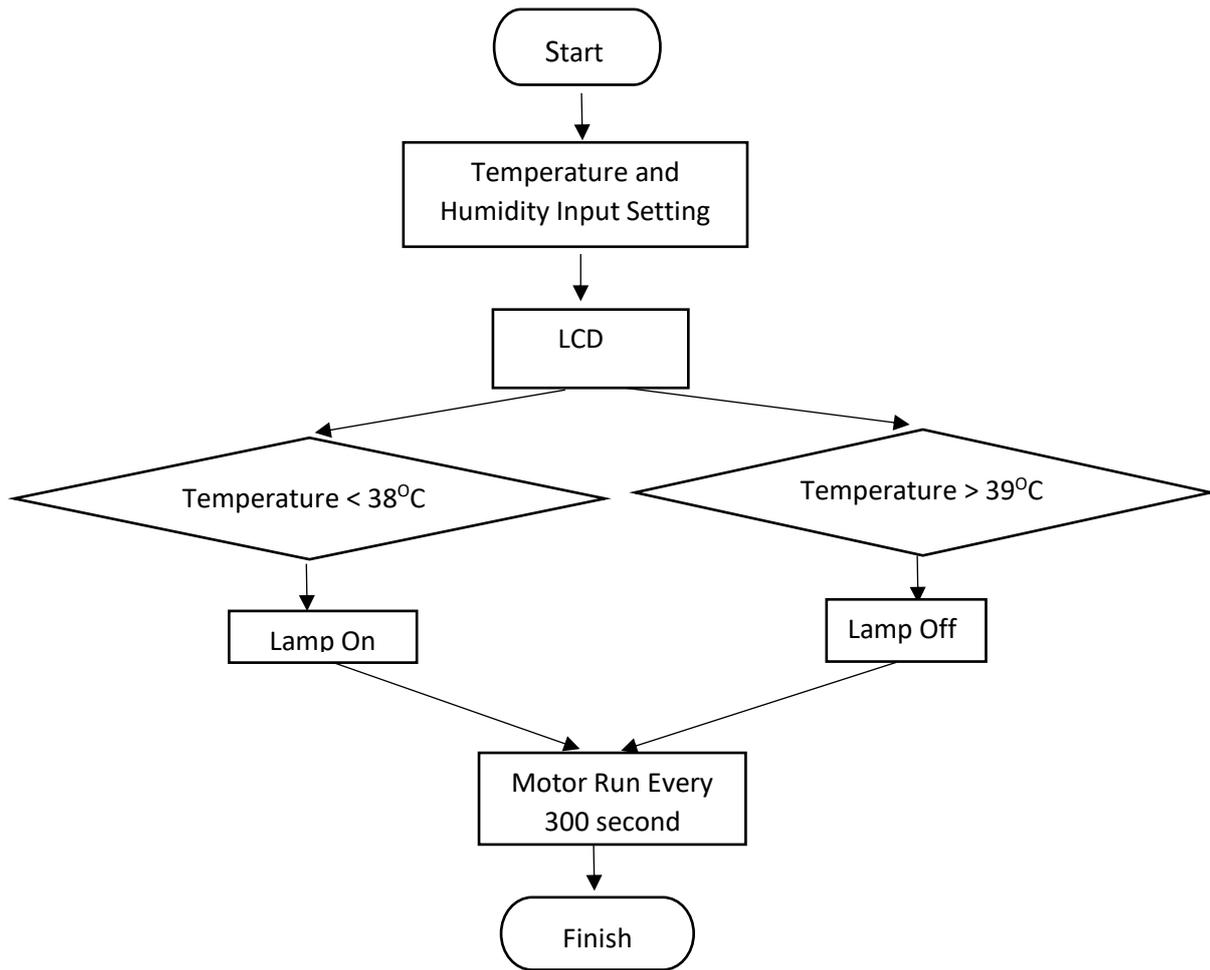


Figure 2. Flow Chart Diagram

Research Model

Research model of poultry eggs incubator can be seen in the following figure.

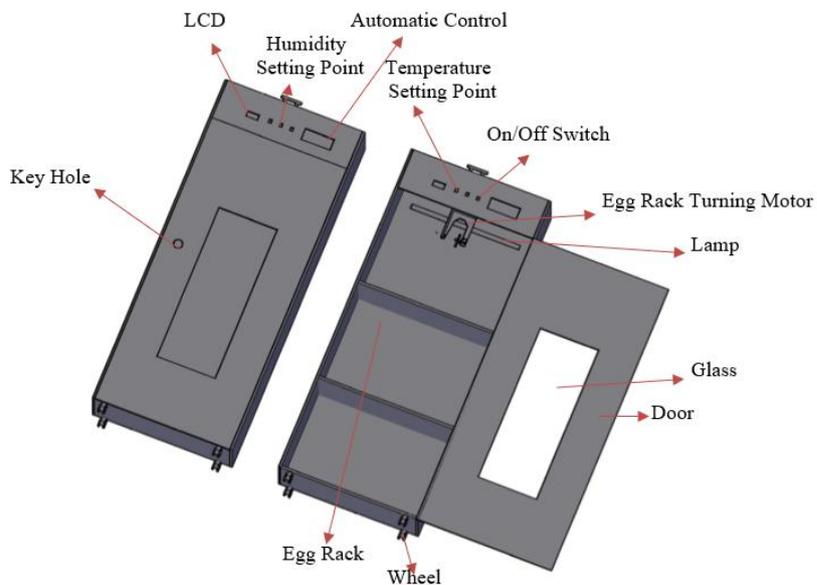


Figure 3. Research Model

Automatic Control Circuit

The overall circuit can be seen in the following figure.

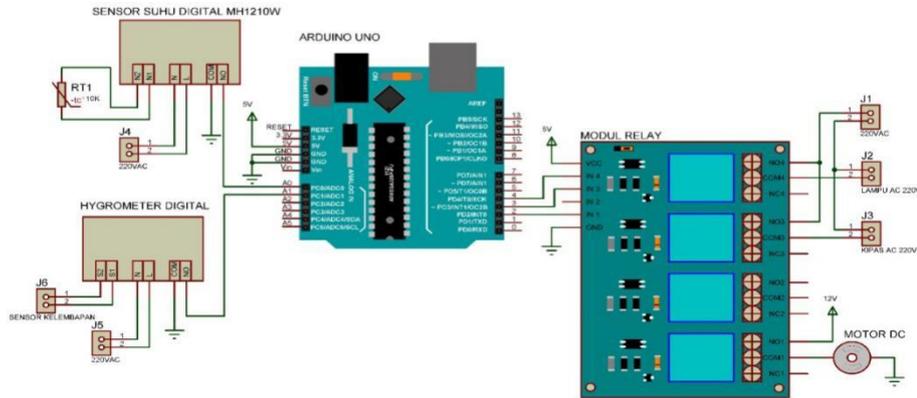


Figure 4. Automatic Control Circuit

RESULTS AND DISCUSSION

Research Result

The research result can be seen in the following table.

Table 2. Hatch Result of Chicken Eggs

Amount of Chicken Eggs (216 eggs)			
Hatch Chicken Eggs			No Embryo Eggs
Normally	Defektive	Dead	1
207	5	3	

Automatic poultry animals eggs incubator and the hatched poultry eggs can be seen in the following figure.

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Figure 5. Automatic Poultry Animals Eggs Incubator

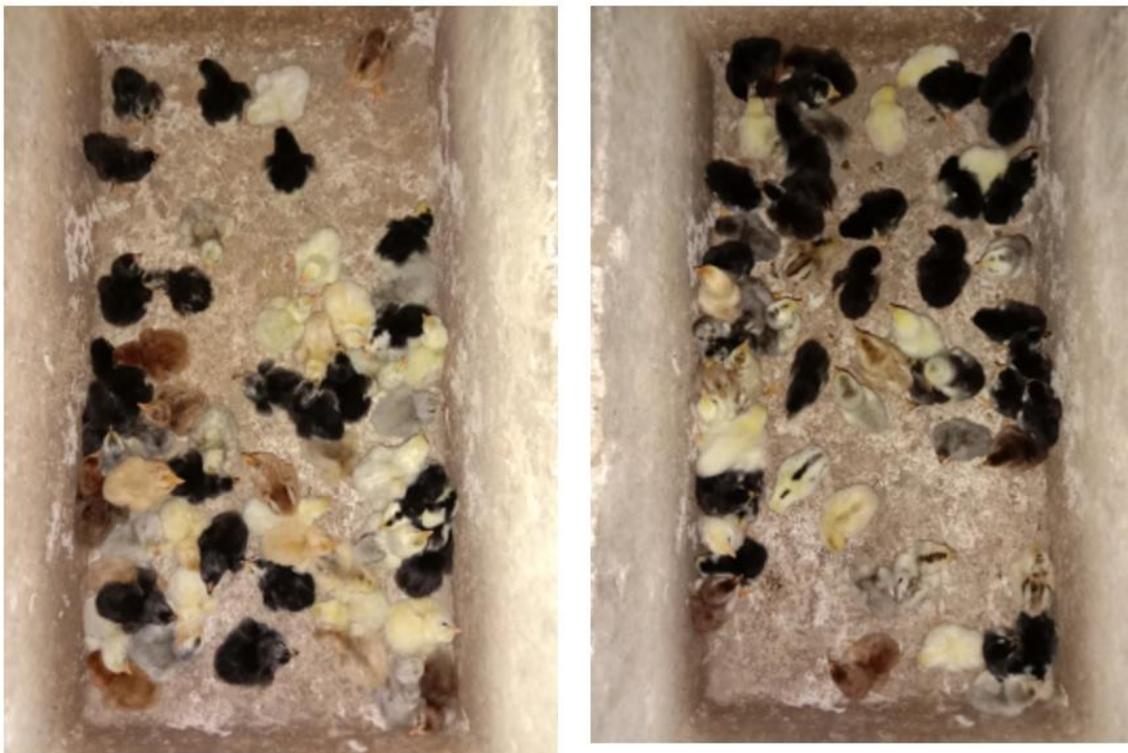


Figure 6. Hatched Chicken Eggs

Discussion

Chicken eggs have hatched for 21 days, the hatching is as follows:

1. Day 1: Put the eggs in the automatic egg incubator
2. Day 4 : Look at the eggs to see if they have any embryos. Eggs that do not have an embryo or are infertile are immediately removed from the incubator. The motor starts moving the egg rack according to the timer setting.
3. Day 5 to 11: The motor moves according to the timer setting. On the 11th day, eggs are monitored again to see the embryo development.
4. Day 12 to 17: Motor moves according to the timer setting. On the 17th day, another observation is carried out on the eggs to see the development of the embryo.
5. Day 18: The motor stops moving then checks the eggs.
6. Day 20: Check the eggs for cracks in the eggshells.
7. Day 21: The eggs hatch.

Duck eggs have hatched for 28 days with the implementation of the hatching are as follows:

1. Day 1: Put the eggs in the automatic egg incubator
2. Day 4 : Look at the eggs to see if they have any embryos. Eggs that do not have an embryo or are infertile are immediately removed from the incubator. The motor starts moving the egg rack according to the timer setting.
3. Day 5 to 11: The motor moves according to the timer setting. On the 11th day, eggs are monitored again to see the embryo development.
4. Day 12 to 24: Motor moves according to the timer setting. On the 24th day, eggs are monitored again to see the embryo development.
5. Day 25: The motor stops moving then checks the eggs.
6. Day 27: Check if there are cracks in the eggshells.
7. Day 28: Eggs hatch.

Manila duck eggs to hatch for 35 days, the hatching is as follows:

1. Day 1: Put the eggs in the automatic egg incubator
2. Day 4 : Look at the eggs to see if they have any embryos. Eggs that do not have an embryo or are infertile are immediately removed from the incubator. The motor starts moving the egg rack according to the timer setting.
3. Day 5 to 18 : The motor moves according to the timer setting. On the 18th day, eggs are monitored again to see the development of the embryo
4. Day 19 to 30: Motor moves according to the timer setting. On the 30th day, eggs are monitored again to see the development of the embryo.
5. Day 31: The motor stops moving then checks the eggs.
6. Day 34: Check if there are cracks in the eggshells.
7. Day 35: Eggs hatch.

To find the effectiveness of egg incubator is:

% Machine Effectiveness = Eggs hatch normally / Potential for hatching eggs x 100%

% Machine effectiveness on chicken eggs = $207/216 \times 100\% = 96\%$

CONCLUSION

From the results of the data observations made, the following conclusions can be drawn:

1. Chicken, duck and manila duck eggs require good temperature, humidity and circulation air so that it can hatch properly.
2. Eggs must have an embryo or fertile in order to hatch.
3. The chicken eggs incubator has considerable effectiveness by percentage minimum 96%.

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