International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Poultry Incubation Chamber

M.I.C.A. Ernesto Mendoza Vazquez[1], T.S.U Alfonso Pastrana Petriccioli[2], T.S.U Luis Andrés Lugo De Fermin[3], T.S.U José Placido Gómez Juarez[4], T.S.U Carlos Romero Fernandez[5], T.S.U José Eduvi Lobaton Sanchez[6], T.S.U Luis Antonio Aguilar Hernandez[7]

[1]University Technological of Tlaxcala, Career: Maintenance Industrial Engineering
By Road to Carmen Xalpatlahuaya S/N, Huamantla, Tlaxcala

Abstract: ***The incubation of eggs is that offers a process artificial for replace the production of birds, with the same characteristics of the maternity natural through a control of temperature as well as humidity relative (RH) to each of the eggs. It is wooden projects with a capacity of 60 eggs; to be an alternative of solution in the production, for satisfy the needs food of the population consumer in homes. When the eggs are incubated the process has the following important details: A temperature 38°C, RH 60%, servomotor, fan, as well as a programming through Arduino.***

Keywords: Incubating, Eggs, Temperature, Humidity, Arduino.

1. Introduction

To get the optimal incubation, eggs require a careful handling since moment the process begins [1]. The environment conditions are extremely important during all the process that consists in the recollection, disinfection, transportation, storage, and pre-heating of the eggs [2]. The inadequate treatment of the eggs reduces the hatchability, also produces change in the mortality of the embryonic and can affect to the performance subsequent to birth of the chicks [3].

For to develop an incubator charge to monitors to stipulate they take consider different variables as temperature and relative humidity which is indispensable for the control of the growth timely in every one of the eggs [4].

The procedure of investigation descriptors in this prototype they can to incorporate to the rutting routine of the programs of control of the incubation [5].

2. Theory

The incubator is a device with the ability to create an artificial environment with the specific humidity and temperature necessary for the growth or reproduction of birds [1].

2.1 Types of incubator

2.1.1 Horizontal

This type of incubators was the first one in being used, they perform small capacity, from 50 to 500 eggs go; the eggs are placed in horizontal form. For the industry, it has already gone down in history. At present, only they are used in familiar or experimental developments.

The humilityis provided placing salvers with water. The temperature, it takes to approximately 5 cm of the egg, the bulb is placed and there measures itself the highest temperature that is 37. 8° Celsius. The flip are manual, this is a big difference with other incubators, and every 4 hours ago. The heat source can be an electricity company or with gas. Another difference is that there is no separation between the incubation phase and that of birth; it takes place quite in the same place.

2.1.2 Vertical

Almost all the current incubators are vertical; they occupy little space and have high capacity, which can change between 10. 000 to 300. 000 eggs, there are 3 X 3. 5 X 3 m closets, they enter 4 X 4 m spaces.

Internally they consist of a series of salvers joined by a toothed rod, in the salvers the eggs are placed with the major pole up. The salvers allow the movement of the egg up to 90th, or 45th on the horizontal one for every side, with flip every 30 minutes. The capacity of the area of incubation is the double that that of the birth.

Although there are two types of artificial incubators currently, these still have a manual control [2]. This can be very tedious for the user since the functioning of an artificial incubator is simple, but there needs of the poultry farmer a series of performances, more or less numerous, repetitive and precise, depending on the type of incubator that is possessed, to obtain the indispensable levels for the successful attainment of the incubation, it is a question of regulating simply and of controlling that the parameters that are inside those who are considered to be ideal.

In this work, we present an automated and controlled incubator with the DHT11 sensor (temperature and humidity sensor) and programmed in ARDUINO [3].

3. Development

3.1 Parameters of the incubator:

3.1.1 Temperature

The ideal temperature level in the course of the incubation in case of the hens is 37°C, while in the final stretch of the process last two or three days it is necessary to diminish the temperature. The regulation of the temperature is of vital importance during the incubation, since the changes, even

temperature minims can diminish the percentage of success, cause serious distortions and even the death in the embryo.

3.1.2 Humility

The ideal Humility levels range between 40 % and 50 %, while in the last stretch of the period of incubation, when the egg has exhausted all its water reservations, the humility one must raise up to 65 % for the membranes and facilitate the bloom of the bird.

3.1.3 Ventilation of the air

The ventilation of the air is an indispensable aspect, especially, when the embryos come to the last phase of its development. The air that circulates along the interior of the incubator provides the heat and moisture necessary for the development of the egg, by what to assure a circulation of efficient, air is needed to maintain the drafty incubator and that the interior air renews periodically. The rind of the egg is porous and the air and the oxygen will enter the embryo across the pores. Therefore, it is necessary to bear in mind that according to the embryo it is developing and increasing of size inside the egg, is going to need increasingly quantity of oxygen to breathe. It is very important to open the ventilation of the incubator to the maximum during the last days of incubation. To close the ventilation can cause the asphyxia of the embryo.

3.1.4 The flip of the eggs

The flip of the eggs is essential, since the eggs get in the incubator up to two or three days before the chick is going to emerge, so that the development of the embryos is carried out by entire normality. Therefore, during the artificial incubation, this procedure must be imitated making use of the mechanical devices, which the incubator has.

3.2.Building of the incubator

Several types of incubators exist on the market, they are of the horizontal and vertical type, between these two types of incubators its only difference is the type of flip of the eggs, but speaking about the type of automation or control of the parameters, at present, they are provided with a similar process.

For the building of the incubator we decide to do a design of 60x90x60 cm, which one has a capacity of 60 eggs, wood was used like material in the infrastructure by its characteristics of resistance and isolation of the thermal energyfigure 1.

Figure 1: building of incubator

3.2.1Step 1

The first thing that is done is to cut the wood in 6 faces with its corresponding measurements, later to join the faces to form a drawer as 1 appears in the figure 2.

Figure 2: Unity of wood

3.2.2Step 2

As soon as the wooden drawer was finished we go on to the building of the mesh (figure 3) which will serve to us for the birth of the chickens, also he will construct himself a base squared in 60 drills to place the eggs, the same way a side axis will be constructed between the base of the eggs and the structure of the incubator for the programmed movement of the eggs figure 4.

Figure 3: drills

Figure 4: Mesh

3.2.3Step 3

We will apply varnish since it has the action of a catalyst which was helping to the wood so that it does not absorb the humility in this case turned into steam.

3.2.4Step 4

For the building of the heat source one proceeds in installing a water resistance in a topper to cause heat and humility in the incubator figure 5.

Figure 5: Resistance

3.2.5Step 5

We will place the sensor of temperature and humility DHT11, for monitor the variables, such a sensor will be subject to the programming Arduino figure 6.

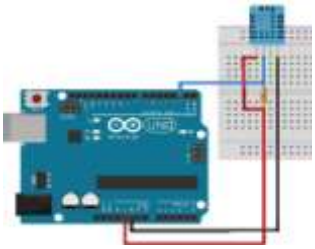

Figure 6: Sensor dht11 whit arduino

3.2.6Step 6

We will mount a water bomb to have a water bomb figure 7 filling without having a big loss of temperature and humility since this can affect the birth of the bird.

Figure 7: Bomb water

3.2.7Step 7

In the base constructed in the axis an engine will mount to steps servomotor that will be programmed this one by the card Arduino figure 8.

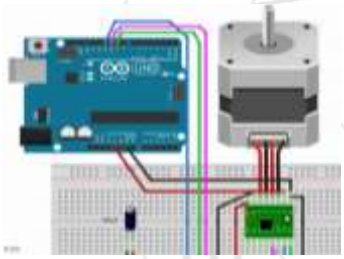

Figure 8: Servomotor whit Arduino

3.2.8Step 8

For the humiditycontrol, we will use an engine of ac placed in asidewall inside the incubator figure 9.

Figure 9: Motor universal

3.2.9Step 9

For the visualization of the parameters, we will programan LDC in the card Arduino figure 10.

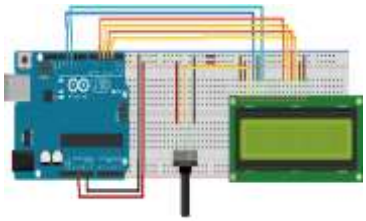

Figure 10: LCD whit Arduino y potenciometro

3.2.10Step 10

To create a program in card Arduino fan figure 11, resistance, and engine one could control engine of ac to steps, establishing times in each of the devices for its ignition and unemployment needed from incubation.

Figure 11: Arduino

4. Results

The results obtained in the construction and test of the incubator are satisfactory, since it was possible to verify that, if it is possible to do the described modifications, and not to alter the process of development of the embryos. The incubation conditions stayed controlled, the temperature ranged between 37 and 38ªC approximately, and the moisture maintained about 70 and 80 % figure 12.

For the moment in which this part of the report is written, the eggs put in the incubator take 18 days and it is possible to appreciate that the embryos are developing normally. One hopes that in 3 more days we should have the birth of the chicks.

Because this project is of innovation, it is subject to modifications to improve, for example, the industrial incubators they have plants of supply of energy, to set them to work in case there is a "blackout" in the area, and not to allow the egg to cool down and the embryos die.

In this case, to save this situation, and to suggestion of a teacher, in a next version of this incubator, we will use a transformer of voltage and current, to use 12 volts and direct current, so in case there is a cut in the energy supply we could use a car battery, while the supply is restored.

Figure 12: Graphic of humility and temperature

5. Conclusions

The incubators play a very important role in the food production in a country, because the egg is a commodity. It is possible to do egg incubation to small scale, to satisfy the food needs for families of scarce resources.

The investment in the construction of this type of incubator is less, compared with the TV/radio commercials. This incubator also can be used for academic ends, for example, in the classes of Biology in the part of embryonic development and in Physics for the topics related to the heat and the temperature.

References

[1] Artículo revista Proceso. "Bruno Ferrari y la ineptitud oficial en la crisis del huevo" Juan Carlos Cruz Vargas Reportaje Especial, 18 de septiembre de 2012.
[2] Incubadora de huevos de gallina de corral. Octavio Daniel Fúnez. Departamento de Ciencias e Ingeniería, Universidad del Caribe.
[3] Mucarcel, Marco, Orozco, L. Fernando, Ribera, Mauricio et al. Proyecto de incubadora artesanal de pollos parrilleros. Univ. Ciens. Soc., 2010, vol.1, no.2, p.33-36. ISSN 8888-8888.

Author Profile

Ernesto Mendoza Vazquez teacher researcher of time complete in the Technological Universityof Tlaxcala as well as academic corps in industry maintenance

Alfonso Pastrana Petriccioli received and titled like T. S. U. in maintenance industrial zone in the Technological University of Tlaxcala in 2016, respectively. During 2017, it continued its studies in the Technological University of Tlaxcala in the engineering career in industrial maintenance.

Luis Andres Lugo De Fermin received and titled like T. S. U. in maintenance industrial zone in the Technological University of Tlaxcala in 2016, respectively. During 2017, it continued its studies in the Technological University of Tlaxcala in the engineering career in industrial maintenance.

Jose Placido Gomez Juarez received and titled like T. S. U. in maintenance industrial zone in the Technological University of Tlaxcala in 2016, respectively. During 2017, it continued its studies in the Technological University of Tlaxcala in the engineering career in industrial maintenance.

Carlos Romero Fernadez (Fernandez) received and titled like T. S. U. in maintenance industrial zone in the Technological University of Tlaxcala in 2016, respectively. During 2017, it continued its studies in the Technological University of Tlaxcala in the engineering career in industrial maintenance.

Jose EduviLobaton Sanchez received and titled like T. S. U. in maintenance industrial zone in the Technological University of Tlaxcala in 2016, respectively. During 2017, it continued its studies in the Technological University of Tlaxcala in the engineering career in industrial maintenance.

Luis Antonio Aguilar Hernandez received and titled like T. S. U. in maintenance industrial zone in the Technological University of Tlaxcala in 2016, respectively. During 2017, it continued its studies in the Technological University of Tlaxcala in the engineering career in industrial maintenance.