APPLICATION OF AUTOMATIC HATCHING MACHINE TECHNOLOGY IN SOLO DUCK CATTLE COMMUNITY AT DESA BALET BARU, KECAMATAN SUKOWONO - KABUPATEN JEMBER

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Submission date: 28-Jul-2021 08:00PM (UTC+0700)
Submission ID: 1625046895
File name: 14._1840-Article_Text-6304-1-10-20191227.pdf (791.24K)
Word count: 2010
Character count: 10230

ISBN : 978-602-14917-9-9

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Abstract. The demand for duck meat and egg in Jember district is quite high. This must be balanced with the production of high ducklings as well. Solo duck cattle community in Balet Baru Village, Sukowono Subdistrict, Jember District is engaged in the business of hatching both laying and broiler duck. In this business traditional hatching machines are still used and have a small capacity. The solution to the problem faced is to implement an automatic hatching machine that has high hatchability and production capacity. The results obtained from this activity are a technology package in the form of an automatic setter machine, a candling box, and an automatic hatcher machine. The setter and hatcher machine is equipped with an automatic control system and has a maximum capacity of 1200 eggs, while for the observation box has a maximum capacity of 49 eggs. In the setter machine is also equipped with a reversing lever to flatten the heat coming from incandescent lamps and heaters. The test results that hatchability for this machine is 82.6% with hatching time for 28 days. The partner of this community service is pleased with the technology applied in the area and hoping that his business is growing much better.

1. INTRODUCTION

The Solo duck cattle community in Balet Baru Village, Sukowono Subdistrict, Jember District was led by Mr. Suyono, the person who first started the duck farming in this area and succeeded. Its success was transmitted and made an example by the surrounding community so that at this time in this area there have been 20 fostered farmers. Demand for duck is very large and this area is only able to meet 20% of the total demand. Besides consuming eggs, Mr. Suyono has also pioneered for hatching eggs by raising 1500 ducks. This is done because the demand for hatching eggs, especially from other regions, is very large. The main problem faced by breeders is the limited procurement of DOD (Day Old Duck) seeds that cannot keep up with the large market demand.

Hatchery units owned by breeders are still very traditional and have several disadvantages, among others, it is difficult to control temperature and humidity in ideal hatching conditions, heat received by eggs is uneven, and has a small production capacity of 200 eggs. The effort to overcome the problems faced by farmers in the case of large-scale seed procurement is to create an integrated hatchery unit that can produce quality duck seeds for themselves. The technology that applied consists of the setter machine, candling box, and hatching machine with an automatic control system and has adequate capacity.

ISBN : 978-602-14917-9-9

2. METHOD

The method of activities used to solve problems with partners can be seen in the flow chart as shown in Figure 1 below :

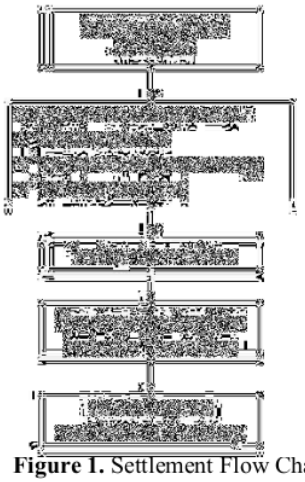

Figure 1. Settlement Flow Chart

The following is an explanation of the settlement flow chart conducted :

a. Survey on Partner Conditions
   The activity carried out is to coordinate with the head of the livestock group in order to obtain an overview of the types of technology application in accordance with the current conditions of the partners.
b. Design and Manufacture of Machine
   The Machine is designed based on the coordination with partners and refers to various references on existing egg incubation technology.
c. Testing the machine
   This activity is very important to be done so that the technology can solve the problems encountered. The test carried out is a functional test of the machine. This is to testing the main components of the hatching machine and the control system works as it should. It also to determine the hatchability of the hatching machine.
d. Handover the machine tested to the partner
   Hatching machine technology that has been successfully tested is submitted to the relevant partners. Furthermore, partners are given an explanation of how to operate and maintain the machine properly and correctly so that the machinery can be utilized optimally.
e. Monitoring and Evaluation
   The activities carried out to monitor the machinery that has been given either by telephone or direct visit to the location. In this activity partners can discuss about anything related to the operation or maintenance of the hatching machine. Evaluation activities are carried out to find out whether the technological assistance provided has had a real impact on both partners and surrounding residents.

3. RESULTS

Site surveys and coordination with partners have been carried out by directly visiting partner locations. A general description obtained by this activity is that the partner still using the conventional hatching machine. Some of the weaknesses of this conventional machine include temperature and humidity in the hatching chamber which changes at any time according to the ambient temperature, the hatching machine functions both as a hatching and hatching process, and has a small capacity of

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around 200 eggs. The limitations result the hatchability of conventional machines to be small, which is about 40-50%. Based on the results of coordination with partners, it was agreed that the applied technology package consisted of a setter machine, a candling box, and a hatcher machine.

The design is done by taking into account some of the requirements needed for the success of the hatching process. These factors include temperature, humidity, ventilation, and egg rotation. Temperature greatly affects the development of the embryo in the egg. The optimal temperature needed to incubate duck eggs ranges from 38 - 39 ^{o}C. Humidity is important to maintain the fluid in the egg and make the eggshell brittle. The ideal humidity of duck eggs for hatching processes ranges from 60 - 65%. Good ventilation is needed to allow the exchange of air that is oxygen intake and carbon dioxide. Egg rotation needs to be done so that the heat received by the egg is evenly distributed and to avoid embryos sticking to one of the egg shells.

The setter machine shown in figure 2, has dimensions of 90 cm long, 90 cm wide, and 120 cm high. The number of shelves is 6 units with an egg holding capacity in each rack of 200 eggs so that the maximum capacity is 1200 eggs. The heat source used in this machine is 6 x 60W incandescent bulbs. This machine also uses 2 x 150 W heaters which function to drain warm steam into the hatching chamber so as to create appropriate air humidity. Ventilation holes are on the bottom and top of the incubator. The hole at the top serves to remove hot air that carries carbon dioxide from the hatching chamber. While the hole at the bottom sucks air from outside which contains oxygen to replace the air that comes out through the upper hole. The egg reversal is done using a lever located on the top left and right sides of the incubator. The lever moves the brush made of rubber found on each rack. The brush can be rotated at an angle of 180^{o} back and forth so that it can sweep all parts of the incubator room. Duck eggs are in this incubator for about 25 days.

Figure 2. Automatic Setter Machine

The candling box, as shown in Figure 3, has dimensions of 60 cm long, 60 cm wide, and 20 cm high. Light source for observation is obtained from LED lamps which have a power of 80 W with a light intensity around 6800 lumens. This candling box can be used to observe 49 eggs at a time. The purpose of surveillance is to select infertile eggs that cannot develop into embryos and cannot be hatched. Observation is done by placing the egg on top of the viewing box with the blunt part of the egg facing up. If there is a black lump in the middle of the egg, the egg is categorized as a fertilized egg.

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Figure 3. Candling box to select infertile eggs

Duck eggs that are 26 days old are transferred to the hatching machine. This machine has the same dimensions as the setter machine, which is 90 cm long, 90 cm wide, and 120 cm high. The number of racks and capacity is also the same as the incubator, which is 6 racks with a maximum egg capacity of 1200 eggs. In the hatching machine there is no egg reversal process, because the position of the egg must be stable. The humidity in the hatching chamber must be increased 5 to 10% the humidity in the setter machine to facilitate the process of breaking up duck eggs.

A series of testing conducted on the hatching machine that have been made include functionality test, control system test, and hatching test. The results of the functional test show that all components on the setter machine, candling box, and hatching machine can function properly. The control system in the machine as shown in figure 4, uses an on-off control system programmed with an Arduino Uno microcontroller. The temperature and humidity in the setter and hatcher room can be kept constant according to the ideal hatching conditions. The results of hatching test using a hatching machine found that out of 500 duck eggs, there were 426 fertile eggs or 85.2% fertility. Of these fertilized eggs, the number of eggs that can be hatched by the incubator is 352 eggs or the hatchability reaches 82.6%. Hatchability produced by the machine is high because the average breeder is only able to hatch up to 70%.

Figure 4. Control system in the hatching machine

The hatchery technology that has been tested is then given to the duck cattle community in Balet Baru Village, Sukowono Subdistrict, Jember District and received directly by the community leader, Mr. Suyono. He welcomes this technology assistance and hopes to develop his businesses

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much better. The monitoring and evaluation process continues so that the activities carried out have a positive impact on the partners and the surrounding community.

4. CONCLUTION

Based on the results of the activities carried out, it can be concluded that :

a. The hatching technology applied consists of the setter machine, the candling box, and the hatching machine
b. The test results are all components can function properly, an automatic control system is able to keep the temperature and humidity in the room remains constant, and hatchability generated by the machine reaches 82.6%.
c. The community is happy to receive the applied technology and wish to develop their businesses much better.

Acknowledgments

Authors wishing to acknowledge assistance or encouragement from colleagues, special work by technical staff or financial support from organizations should do so in an unnumbered Acknowledgments section immediately following the last numbered section of the paper.

REFERENCE

[1] Ahaya, R. dan Akuba, S. 2018. *Rancang Bangun Alat Penetas Telur Semi Otomatis*. *Jurnal Teknologi Pertanian Gorontalo (JTPG). Vol. 3, No. 1. p-ISSN 2502-485X* pp. 44-50

[2] Incubators, S. D. 2019. *Sukses Menetaskan Telur Unggas Hingga 90 %.* PT. Agro Media Pustaka. Jakarta Selatan.

[3] Kaleka, N. 2015. *Beternak Itik Tanpa Bau Tanpa Angon*. Arcitra. Yogyakarta

[4] Karsid, Ramadhan, A. W., dan Azis, R. 2018. *Perbandingan Kinerja Mesin Penetas Telur Otomatis Dengan Menggunakan Kontrol On-Off Dan Kontrol PWM. Jurnal Matrix. Vol. 8 No. 1. Maret 2018* pp. 1 – 5.

[5] Mito dan Johan. 2011. *Usaha Penetasan Telur Itik*. PT. Agro Media Pustaka. Jakarta Selatan.

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