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Development of Duck Farming in Gumuk Mas District, Jember Regency

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Abstract. The objective of this activity is to apply automatic system duck egg hatching machine technology to increase production capacity, reduce the mortality rate of day old duck (DOD), improve the quality of day old duck, be more efficient because the process of controlling temperature, humidity, reversal is done automatically, and is more energy efficient thus reducing production costs. . The development of a duck business has bright prospects in Indonesia, because duck eggs and duck meat are side dishes of staple foods that are popular with the public. This activity is carried out in small industry partners of UD Jawa Meri which is located in Menampu Village, Sub-district. Gumuk Mas, Regency Jember, which is engaged in the business of producing duck eggs and raising duck eggs. This industry has problems that are almost the same as other small duck industries, which are frequent and currently experiencing problems in duck egg incubators. The method of implementation in this activity uses the community empowerment method so that it can be accepted and beneficial to both user partners. The overall impact of this activity is the realization of community independence, namely people who are able to solve their own problems. The result of this activity was to develop and implement an automatic system duck egg incubator technology, providing training on the operation of an automatic system duck egg incubator. The application of one duck egg incubator has increased the production capacity of duck eggs from 15,000 seeds per month to 20,000 seeds per month. Hatchability of duck eggs increased from 65% to 85%. Production costs decreased from Rp. 2,900 per egg becomes Rp 2,500 per egg. The quality of the duck seeds produced is better. The results of this activity will be published through making videos of the results of the activities uploaded on YouTube, the Jember Pos print media, and participating in the ICoFA international seminar. An additional output is the creation of ISBN textbooks.

1. Introductions

Small industry of UD. Jawa Meri is located in Krajan RT 001. RW. 006. Menampu Village, Gumuk Mas Subdistrict, Jember Regency is engaged in the business of producing duck and duck breeding. Selection of small industry UD. Jawa Meri as a partner in this community service proposal, because this

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small industry has been in the duck farming business for more than five years and duck and duck breeding production have been marketed around Jember, Bondowoso, Banyuwangi, and Surabaya. UD. Jawa Meri started pioneering duck farming business since 2014. So far, UD. Jawa Meri has used simple egg hatching technology. Duck farming is a superior product in Menampu Village, Gumuk Mas District, Jember Regency, in this area a duck farming community has been formed and this community functions as a medium of communication and cooperation in overcoming existing problems both in production and marketing activities.

The Jember State Polytechnic has developed a better and more efficient automatic and automatic egg incubator. This machine is made with a larger capacity, better quality, higher success rate, easier to manufacture and maintenance because it uses components that are on the market and easy to obtain, the design is simpler, but its capabilities exceed those on the market. The proposed dedication will diffuse this technology into the small duck farming industry in Jember, especially the small industry of UD Jawa Meri.

UD. Jawa Mery has almost the same problems as other small duck industries, namely currently experiencing problems in duck egg incubators. Machines purchased from manufacturers in the market are expensive, have limited capacity, maintenance is more difficult and complicated. The use of labor in this job is less efficient because it requires continuous observation and treatment, the more difficult it is to find workers, and the production capacity is difficult to increase.

The general purpose of the activities of applying technology to UD small industries. Jawa Meri is to increase the production capacity of duck seedlings and duck slaughter production, while the specific objectives are application of the duck egg incubator developed by the Jember State Polytechnic, and Operation and maintenance training for the tools to be applied

2. Literatur

Rido S[9] explained that based on the results of the tests that have been done, it can be seen that the hardware has been successfully made using the ATMega 328 microcontroller system. In temperature sensor testing, there is an average error in the temperature sensor reading of 37 ^{0} C and humidity of 73%. The stepper motor for sliding the egg rack has worked in HIGH and LOW conditions. Overall it has worked well and according to the function that has been determined, namely taking temperature and humidity readings, adjusting the timing of the lights and shifting the egg rack. Performance test The tool has successfully hatched eggs on time (for 22 days) with a success rate of 90%. Anthony J, *at all*.[2]. The development of hot spring heat source incubator for duck eggs was deemed necessary to design the utilization of hot spring as heat source for incubating duck eggs, to reduce the use of electricity.

Supriyadi D, *at all*.[10] The system is designed to use an incandescent lamp and humidifier as an actuator and the sensors used are temperature and humidity sensors. In testing, this system can work well, it can be shown that the system can maintain the temperature and humidity of the incubator space in the temperature range of 36°C - 38°C and humidity of 60% - 70%. In addition, the conveyor can work automatically at 07:00, 10:00, 13:00, 16:00, 19:00, 21:00. The hatch success rate in the first test was 91.6%, while the hatch success rate in the second test was 41.6%. Karsid *at all*.[6]. The results obtained that, after the test, the performance of the egg hatch machine with PWM control is better than using the on-off control. Transition response using PWM control is faster, that is 120 seconds, while the on-off control is 240 seconds.

Dewanti R, *at all*.[4]. the treatment did not affect fertility and hatchability, but influenced hatching weight. The highest of hatching weight eggs was in the large weight (B3: 46.44 g). There was no interaction between eggs weight and turning frequency on fertility, hatchability and hatching weight of DOD. In conclusion, the eggs weight and turning frequency had no effect on fertility and hatchability, but egg weight influenced hatching weight.

Pratama RA, *at all*.[8]. hatch period at humidity 70% is 655,8 hours, humidity 75% is 647,2 hours and humidity 80% is 672 hours. And weight at hatch at humidity 70% is 66,13%, humidity 75% is 66,17% and humidity 80% is 67,45%. Darmawati1 D, *at all*.[3]. The process of hatching the egg ducks held for 28 days. The percentage fertility and hatchability results duck eggs *alabio* higher than *cihateup* duck

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eggs. Death embryonic the biggest occurred on the day to 26-28 days. Greater egg weights produce larger DOD.

Fuazen, *at all*.[5]. Machine dimension incubate capacity 100 with longing machine incubate are 600 mm, with Broad 450 mm, and Tall 450 mm and can keep temperature 38 o C until 41 o C so gets to be utilized on duck egg brood. kalor's charges on spatial incubator machine is as big as 47,48 kcal / h and energy that is given on incubator machine as big as 72,6 Watts. So gotten by happening calor efficiency on incubator machine room of charges compare count calor that needful incubator machine with calor's charges that is given on incubator machine is as big as 76%.

Kurniawan, *at all*.[7]. The results of weight loss and air sac change showed a significant difference (P<0,05) between H and UH eggs on 7 to 25 DOI, while the temperature of egg shell was only different on 25 DOI. The average characteristic of H group (temperature of egg shell, weight loss, and air sac alteration) on 25 DOI was recorded 38,46ºC, 11,84%, and 51,03%, respectively. It can be concluded that 3 characteristics of eggs influence hatchability of local duck. Weight loss and air sac alteration parameters can be applyed to estimate the hatched eggs between 7 and 25 DOI, but the temperature of eggshell can be administrated after 25 DOI

Abd El-Hack EM, *at all*.[1] Peking eggs have greater hatchability than Muscovy eggs. The eggs of Muscovy have presented values lower than 22.7% of hatchability. The hatchability of Peking duck eggs was 78.0% in the spring, while in summer it was around 46.5%. The best hatchability is observed during the winter (57.68%), as in the summer it decreases to 54.14%. The reproductive characteristics of flocks, age, external and internal quality of the egg, sexual ratio male female relation, and presence of lethal genes are factors that directly involve breeders. Larger sexual ratios between males and females of 1:4 to 1: 10 cause reduced egg fertility from 75.9% down to 49.6%.

3. Methodology

In order for this activity to be accepted and beneficial to user partners, the approach and steps to be applied is the community empowerment approach. The overall impact of this activity is the realization of community independence, namely people who are able to solve their own problems.

Community empowerment is a process in which people - especially those who lack access to development resources - are encouraged to increase their independence in developing their lives. In principle, communities assess their main development challenges and propose activities designed to address these problems. Community empowerment is a continuous cyclical process, a participatory process in which community members work together in formal and informal groups to share knowledge and experiences and strive to achieve common goals. So Community Empowerment is more of a process than a blueprint approach.

Based on the concept of community empowerment, the stages of implementing these community service activities are as follows:

- Coordination and preparation of activities by activity executors
- Socialization of activities to the duck farming small industry
- Preparation of a work plan between the executor and UD. Jawa Meri
- Making duck egg incubator unit
- Diffused machine tool training
- Monitoring and evaluation of activities
- Preparation of reports, scientific publications and mass media

4. Prototype

The prototype of duck egg incubator with the automatic system has the following specifications:

- Size (LXWXH): (240 x 240 x 260)cm
- Sensors: temperature and humidity
- Egg capacity: 5040 eggs
- Exhaust fan : 125 watt

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- Actuator : 60 watt
- Heat source: LPG stove
- Water pump: 125 watt
- Material: galvalum
- Actual weight: 280 kg

The component parts of the incubator are shown in figure 1.

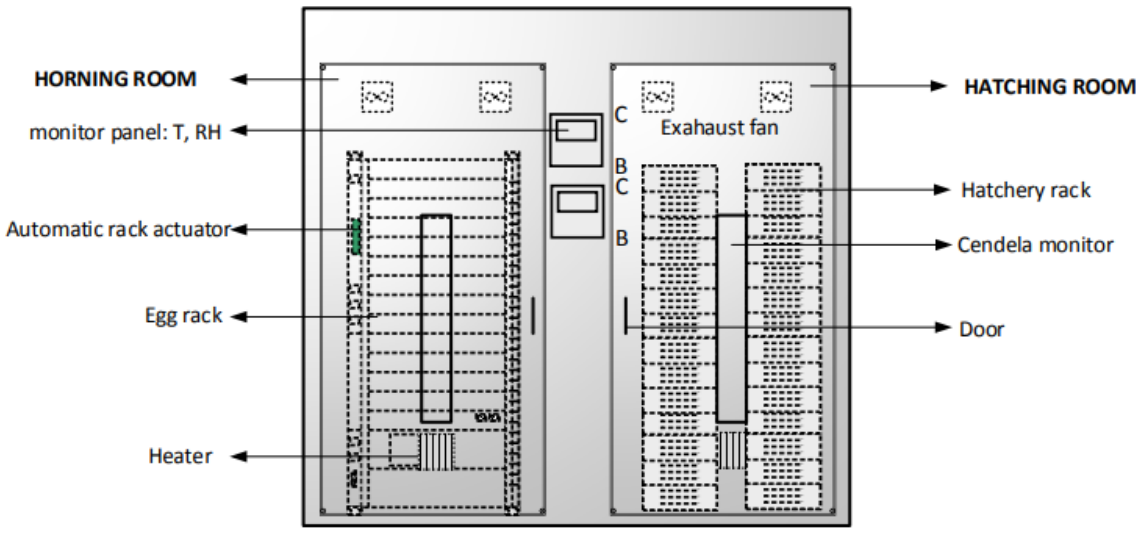

Figure 1. Duck egg hatcher with automatic system

5. Result and discussion

The application of one duck egg incubator has increased the production capacity of duck eggs from 15,000 seeds per month to 20,000 seeds per month. Hatchability of duck eggs increased from 65% to 85%. Production costs decreased from Rp. 2,900 per egg becomes Rp 2,500 per egg. The quality of the duck seeds produced is better.

This incubator works automatically to control temperature and humidity because it is equipped with temperature and humidity sensors. If the temperature is too low with the setting it will turn on the gas stove heating source, conversely if the temperature is too high it will turn off the gas stove and turn on the exhaust fan. Meanwhile, to adjust the humidity, if the humidity is too low from the setting, it will turn on the water pump to spray water in the hatchery chamber, otherwise if the humidity is too high it will turn on the exhaust fan and gas stove. This incubator has a precision level of about 95%, this has met the requirements for the performance of an incubator.

6. Conclusion

The prototype of duck egg incubator with the automatic system has the following specifications: Egg capacity: 5040 eggs, Size L 240 cm, W 240 cm, H 260 cm, Electricity 250 Watt, Material Galvalum, Actual Weight 280 kg. The application of one duck egg incubator has increased the production capacity of duck eggs from 15,000 seeds per month to 20,000 seeds per month. Hatchability of duck eggs increased from 65% to 85%. Production costs decreased from Rp. 2,900 per egg becomes Rp 2,500 per egg. The quality of the duck seeds produced is better.

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