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Development of a Super Hybrid Duck Cultivation and breeding business using energy efficient hatching machines in Blitar Regency

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Abstract
The development of the super hybrid duck cultivation and breedingbusiness in Blitar Regency is a strategic effort to increase the productivity and economy of local breeders. The use of energy- efficient hatching machines in developing super hybrid duck cultivation and breeding businesses in Blitar Regency is an innovative step in the livestock industry. This technology aims to increase efficiency, productivity and sustainability in the duck egg hatching process. The aim is to identify potential, challenges and solutions indeveloping a super hybrid duck cultivation and breeding business inthe region. The research methods used were field surveys, interviews and data analysis. The results of this program show that Blitar Regencyhas considerable potential to develop a super hybrid duck cultivation business, but is still faced with a number of challenges such as lack oftechnical knowledge, inadequate infrastructure, and limited marketaccess. Adoption of technology in developing and breeding super hybrid ducks through the use of machines, namely hatching machines designed to be energy efficient, including energy efficiency, reduced operational costs, increased productivity and quality of duck seeds.The implications of adoption of technology can reduce the environmental impacts and improve the economics of adopting thistechnology, as well as the challenges and opportunities associated. Itis hoped that the various solutions proposed, including technical training and infrastructure improvements, can serve as a guide for all groups, including breeders, government and related stakeholders, in supporting the development of super hybrid duck cultivation and breeding businesses in Blitar Regency.

1. Introduction

The livestock industry plays an important role in meeting food and economic needs in many regions, including Blitar Regency. In an effort to increase the efficiency and sustainability of duck cultivation and breeding businesses, the use of innovative technology is becoming increasingly relevant. Duck cultivation has long been an integral part of people's lives in Indonesia, both as a source of food and a source of economic income. Blitar Regency, located in East Java Province, is no exception to this phenomenon. In the midst of the dynamics of modern agriculture and the need for sustainable food resources, efforts to develop super hybrid duck cultivation and breeding businesses have emerged as a promising alternative in increasing the productivity and welfare of local breeders.

Super hybrid ducks offer great potential in terms of increasing meat and egg production, disease resistance, and adaptation to diverse environmental conditions. However, despite its great potential, there are still challenges that need to be overcome in developing the super hybrid duck cultivation and breeding business in Blitar Regency.

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Some of the challenges that may be faced in developing the super hybrid duck cultivation and breeding business (Hossain, Zeyad, Ahmed, & Anubhove, 2021; Mondal & Pal, 2021) in Blitar Regency include a) Limited Technical Knowledge: Breeders may not have adequate knowledge about effective super hybrid duck cultivation and breeding techniques. This can hinder their ability to maximize production potential and duck health. b) Inadequate Infrastructure: The availability of infrastructure such as good road access, clean water supply and stable electricity is important in running a duck farming business efficiently. This challenge can be an obstacle for breeders, especially in remote areas. c) Access to Markets: Although the production of super hybrid ducks can increase productivity, access to a broad and stable market needs to be considered. The challenge of finding a profitable and consistent market for duck products can affect business sustainability. d) Disease Management and Duck Health: Diseases that attack ducks can cause major losses for farmers. Challenges in implementing effective disease management practices and understanding the symptoms and prevention of duck diseases can be serious obstacles in developing super hybrid duck cultivation and breeding businesses. e) Limited Financial Resources: The initial investment required to start or scale up a super hybrid duck farming business may not be accessible to all farmers. This challenge can be a barrier for small or novice farmers in developing their business. In facing these challenges, collaborative efforts are needed between government, research institutions, industry and breeders to identify appropriate and sustainable solutions to increase the capability and sustainability of super hybrid duck cultivation and breeding businesses in Blitar Regency.

Efforts to overcome the above problems require a solution, especially providing an overview of the importance of developing super hybrid duck cultivation and breeding businesses in Blitar Regency, as well as highlighting several key issues that will be discussed in this program. One technology that is attracting attention is the use of energy-saving hatching machines, which aim to increase the efficiency of hatching duck eggs (Contreras, Magaña, Villarreal, Kiessling, & Escalera, 2017; Desha et al., 2015; Kisaalita, BibensEd Lane, Young, Randell Kinsey, & Some, 2010). The aim and relevance of this program is to increase the business of developing and breeding hybrid ducks with the concept of energy-saving hatching machines (Surtijono et al., 2019) and the potential for its implementation in developing the duck farming industry in Blitar Regency. By understanding the importance of using this technology, it is hoped that it can pave the way towards increasing productivity, sustainability and prosperity in the livestock industry in this area.

2. Method

This community service program can make a significant contribution in developing business partners for cultivating and breeding super hybrid ducks using energy-efficient hatching machines in Blitar Regency, as well as improving the welfare of breeders and environmental sustainability. There are several steps taken in this program, namely:

1. Preliminary Study

The first step in this community service is to conduct a preliminary study to understand the current conditions of the super hybrid duck cultivation and breeding business in Blitar Regency. This involved field surveys, interviews with local breeders, and data collection on currently used cultivation practices.

2. Education and Training

After understanding the needs and challenges faced by local breeders, education and training activities will be organized. This can include education about the benefits and how to use energy-efficient hatching machines, training in the operation and maintenance of these machines, and education about efficient and sustainable cultivation practices.

3. Practical Demonstration

To strengthen farmers' understanding of the use of energy-saving hatching machines, practical demonstration sessions will be held. Farmers will be given the opportunity to see firsthand how this machine is operated and how it can improve their efficiency and production yields.

4. Monitoring and Evaluation

This community service process will be monitored continuously to measure its impact on breeders and their super hybrid duck cultivation businesses. Data will be collected on technology adoption, changes in cultivation practices, productivity increases, and other changes that may occur.

5. Dissemination of Results and Establishment of Collaboration Networks

The results of this community service will be disseminated to the local livestock community through seminars, workshops or scientific publications. In addition, efforts will be made to build a collaborative network between breeders, local governments, research institutions and the private sector to support the sustainable implementation of this technology.

Through this approach, it is hoped that this community service can provide real benefits for local breeders in increasing efficiency, productivity and sustainability of the super hybrid duck cultivation and breeding business using energy efficient hatching machines in Blitar Regency.

3. Result and Discussion

The development of the super hybrid duck cultivation and breeding business in Blitar Regency has had a significant positive impact on local breeders and the regional economy. Through a training and coaching approach, breeders have succeeded in increasing their knowledge, skills and efficient cultivation practices. This not only increases the productivity and quality of duck products, but also has a positive impact on the income and welfare of breeders (Underwood, Andrews, Phung, & Edwards, 2021). The results of the development of the super hybrid duck cultivation and breeding business in Blitar Regency show a number of important findings and achievements in increasing the productivity and economy of local breeders.

The use of energy-efficient hatching machines in the development of super hybrid duck cultivation and breeding businesses in Blitar Regency is an innovative step that has great potential to increase efficiency, productivity and sustainability in the livestock industry. There are at least several advantages with the application of energy-saving machine technology in livestock business activities (Osanyinpeju, Aderinlewo, Ajisegiri, & Adetunji, 2018; Santoso, Adhy, Bahtiar, & Waspada, 2020), namely:

1. Energy Efficiency and Reduction of Operational Costs
2. Increasing the productivity and quality of duck seeds
3. Positive Environmental Impact
4. Increasing Farmer Welfare.

Machine design activities

The energy-saving automatic hatching machine was made in the Jatinom Blitar village workshop. There are several activities carried out to complete the program, including welding the hatching machine frames. The materials used in preparing the hatching machine are selected taking into account effectiveness and efficiency in using the hatching machine. One of the materials used is iron. Iron is a material that is considered more durable and lasts longer than wood and iron metal has good heat conductivity values, so it can be used to store heat in

these tools. In relation to machine design, apart from adapting to machine capacity, partner wishes and machine placement at partner locations (Figure 1).

Figure 1. The inner and outer framework of an energy-saving automatic hatching machine (Source: Personal documentation)

The egg rack assembly for the hatching machine has been successful and has been tested and is ready to be installed into the hatching machine when the frame has been welded. The egg rack is designed to turn eggs automatically using a motor. Apart from that, those who use hand turning of eggs will disrupt the temperature conditions and temperature stability in the machine which are needed for the development of egg embryos (Puramongkon & Puramongkon,2022). Another impact is that the farmer's hands directly turn the eggs contaminated by microbes that are resistant to temperatures between 35 ^{o}C - 40^{o}C, which will cause the eggs to rot and become damaged, which in turn will affect the hatchability of the eggs. Next is the assembly of electronic components in the automatic hatching machine which consists of temperature, humidity sensors, voltage regulators which are connected to heating elements and fans (Gulilat, Tegegne, & Demeke, 2021).

Based on the results of surveys and in-depth interviews with the head of Ternak Mulia in the field, since 2016, Ternak Mulia has been using manual hatching machines. Consisting of electricity costs that must be paid on average ± Rp. 800,000,- per month. If you use an energy- saving automatic hatching machine that has been made with a machine capacity of 2,000 super hybrid duck eggs, the costs incurred from the results of testing using a watt meter for 3 hours are known to be Rp. 1,993 then the costs incurred for 28 days are IDR. 384,000. So the use of an energy efficient automatic hatching machine that has been made with a machine capacity of 2,000 super hybrid duck eggs can save costs of up to 52% compared to conventional hatching machines using bulbs.

Based on the business development activities for cultivating and breeding super hybrid ducks in Blitar Regency, it can be divided into several main aspects:

1. Increasing Farmer Knowledge and Skills

Through the training program held, there was a significant increase in the knowledge and skills of breeders in cultivation and breeding techniques for super hybrid ducks. Farmers become better able to manage pens efficiently, identify disease symptoms, and implement good health management practices. The importance of training and education for farmers in adoptingmodern cultivation practices cannot be underestimated. It will examine the extent to which the training program has provided relevant knowledge and skills to breeders (Kutsira, Nwulu, & Dogo, 2019). Evaluation of the effectiveness of training in increasing understanding of cage

management, feed selection, health management and optimal breeding strategies can be carried out. This knowledge is the basis for increasing duck productivity and welfare.

2. Increased Productivity

By implementing the practices obtained from training, the productivity of cultivating super hybrid ducks has increased significantly. This is reflected in an increase in the number of eggs produced per brood, a decrease in duck mortality rates, and an increase in the average body weight of ducks. Changes in cultivation practices adopted by farmers after receiving training are expected to result in increased productivity (Clearinghouse, 2022). The data collected can include comparisons between egg or meat production before and after training is given. Apart from that, it is also important to evaluate the quality of duck eggs and meat after implementing new farming practices.

3. Economic and Social Impact

The development of the super hybrid duck cultivation business not only has a direct impact on farmers, but also on the local economy and surrounding communities. The economic impact of increasing duck productivity on farmers' income and the income of households around them will be analyzed. Apart from that, the potential for creating new jobs and increasing social welfare in livestock communities also needs to be explored (Andoha et al., 2022; Clearinghouse, 2022).

4. Partnerships and Collaboration Networks

The importance of collaboration between livestock breeders, local governments, research institutions and the private sector cannot be overstated. It will evaluate the extent to which this partnership and collaborative network has contributed to the successful development of the super hybrid duck cultivation business. Concrete efforts to support livestock farmers, such as providing technical assistance, financing and market access, also need to be discussed (Macalane et al., 2023).

The development of a super hybrid duck cultivation business using a touch of technology also opens up new opportunities in product diversification and market expansion. With high quality duck products, breeders can enter a wider market segment and reach more consumers. Collaboration between breeders, local governments, research institutions and other related parties is also the key to success in overcoming various challenges and supporting the sustainable growth of super hybrid duck cultivation businesses.

Overall, the development of the super hybrid duck cultivation and breeding business in Blitar Regency not only has an impact on increasing the productivity and economy of breeders, but also contributes to increasing food security and local economic development. Continuous support and guidance is needed to ensure the continuity and sustainable growth of this super hybrid duck cultivation business in the future.

4. Conclusion

The development of a super hybrid duck cultivation and breeding business using energy efficient hatching machines in Blitar Regency is a progressive step that has a significant positive impact on the livestock industry. Based on the discussion that has been carried out, it can be concluded that the use of energy-efficient hatching machines offers a number of significant benefits for farmers, the environment and the sustainability of the livestock business as a whole. Some of the benefits of this service program that partners can experience are:

1. The use of energy-efficient hatching machines contributes to energy efficiency and reduced operational costs for farmers. With more sophisticated and efficient technology, farmers can reduce their operational costs and increase profit margins significantly.

2. The use of energy-efficient hatching machines also has a positive impact on theenvironment by reducing energy consumption and greenhouse gas emissions. This is in linewith global efforts to increase environmental sustainability and reduce the negative impact of human activities on the environment.
3. Using energy-efficient hatching machines can increase the productivity and quality of duck seeds. By providing a stable and controlled hatching environment, this technology can increase hatching rates and the quality of the ducklings produced, which in turn will increase overall farm productivity.
4. Adoption of this technology also has the potential to improve the welfare of farmers by reducing manual workload and increasing their income through reducing operational costs and increasing production yields.

Taking into account all the benefits offered, it is important for local governments, research institutions and the private sector to continue to support the development of super hybrid duck cultivation and breeding businesses using energy-efficient hatching machines in Blitar Regency. This support can take the form of providing access and education about this technology, as well as developing policies that support the adoption of green technology in the livestock sector. Thus, this step can become a successful and sustainable model in increasing productivity, sustainability and prosperity in the livestock industry in the area.

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