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Increasing Production Capacity Through Modification of Rhino Engine 14b as a Horse Feed Production Machine in Malang Area

Andika Bagus Nur Rahma Putra; Fadhila Wahyu Putri; Azhar Ahmad Smaragdina; Tuwoso; Ahmad Mursyidun Nidhom

Universitas Negeri Malang, Indonesia

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Abstract

The concentrated feed has a very important role in the livestock industry. The availability of feed will affect the productivity and behavior of horses. The availability of horse feed today still depends on imported feed. Royal Equine is one of the local producers of concentrated feed for horse livestock. In the production process, Royal Equine found obstacles, namely, engines that were not able to be used with high intensity caused thick smoke which had the potential to be the cause of the occurrence of air pollution. One of the efforts made as a solution to this problem is by doing community service in the form of modification of the rhino engine 14B as a concentrate feed production machine for horses. Service activities are carried out by socialization and demonstration methods located in Dinoyo village, Lowokwaru District, Malang City. The activity was attended by 10 participants consisting of 2 business owners, 4 workers, and 4 business owner partners. Through the activities carried out, several achievements can be produced including, 1 production machine that has been disseminated, 10 participants who have improved the ability to operate production machines, and an increase in the quantity of concentrate feed production at Royal Equine.

Keywords: *Concentrate Feed; Horse Feed; Production Machinery*

Introduction

Feed is one of the determining factors for success in the livestock industry and is a dominating component in the livestock industry, the percentage of feed domination as a determinant of this ranges from 50-70% (Katayane et al., 2014) in (Wardana, 2017). The existing feed supply will greatly impact the productivity of livestock (Subekti, 2009). Efforts to maintain the stability of feed availability are not only the responsibility of the livestock industry but also the responsibility of society and the government (Ismeth, 2007). There are still many livestock industry sectors that experience difficulties with the availability of feed, one of which is the horse feed industry (Wenda et al., 2020). There are 2 types of horse feed, namely green feed in the form of grass and nutritional feed or commonly referred to as concentrate feed which serves as an additional nutritional intake for horses (Akoso, 1996) in (Adrianto et al., 2018). Nutritional feed in the form of concentrate feed has a very important role in the growth of horses, this is because horses that are malnourished will experience digestive problems which will affect

horse behavior (Adrianto et al., 2018). The availability of concentrate feed for horses currently still depends on the import market, this is inversely proportional to the fact that Indonesia also has ingredients that can be used for the production of concentrate feed for horses (Pongoh et al., 2015).

One of the local horse feed producers is Royal Equine which is located in Malang City, precisely in the Dinoyo Village, Lowokwaru District. Royal Equine makes concentrate feed for horses by utilizing local ingredients such as polar, rice bran, palm oil, corn and coffee grounds. In one production process with 4 employees, Royal Equine is capable of producing 625 kg of concentrate feed or the equivalent of 25 large sacks. This amount is still relatively small when compared to the amount of horse feed needed. The low production quantity of Royal Equine horse feed manufacturers is due to the quality of production machines which cannot support massive feed production. The production machines used generate thick smoke which can trigger air pollution (Nizam & Syahrizal, 2018). In addition, production machines of the donfeng diesel type cannot be used with high-intensity production schedules. Donfeng diesel engines are known to have many drawbacks and can have a negative impact on the environment (Nizam & Syahrizal, 2018).

One of the efforts that can be made in order to increase the productivity of Royal Equine horse feed manufacturers is by making machine modifications that can be used in high-intensity production processes. The modification that will be carried out is a modification of the rhino engine 14B as the driving force for the horse feed production machine. Rhino engine 14B is one of the automotive engines, its use in the industrial world as a driving force will have positive impacts including increasing production capacity and minimizing adverse environmental impacts due to the production process.

Thus, the community service carried out present innovations in appropriate technological tools in the form of modifications to the 14B rhino engine as a production machine for making horse feed. This service also one of the contributions of the academic community in an effort to maintain the stability of the availability of concentrate feed for livestock horses. Further, this program is expected to be a solution for concentrate feed producers, wherein the tool innovations made can be developed massively.

The state is defined as the highest organization among a group of people who have aspirations to unite to live in a region and have a sovereign government. The purpose of the state, among others, is to expand power, organize law and order and to achieve public welfare. A country certainly in it there are citizens who take shelter in it.

According to the 2006 UUKI, what is meant by a citizen is a country that is determined based on statutory regulations (Hutabarat et al., 2022). It is the state that is the vessel for the growth of religion. In the relationship between the state and citizens are very closely related (Abdillah, 2013; Sadzali, 2020). Citizens play an important role in maintaining the integrity of a country. Muslims in Indonesia certainly have to be smart to be a pillar of inter-religious harmony. The plurality of Indonesian citizens in terms of religion, ethnicity, race and intergroup conflicts often occur which can have an impact on the integrity of the Republic of Indonesia (NKRI). However, it can be seen that the spirit of maintaining the integrity of the peoples as well as tribes and maintaining the integrity of the Unitary State of the Republic of Indonesia has begun to be forgotten by the successors of this nation (Shaleh & Wisnaeni, 2019).

Implementation Method

This activity was carried out through 5 stages, namely: 1) partner needs identification stage, 2) machine design stage, 3) technology manufacturing stage, 4) technology implementation stage for the community/partners, and 5) business legality assistance and standardization certification from the animal husbandry service.

In the first stage, identification of partners' needs was carried out by observing production sites and conducting discussion sessions with service partners. Observations were made in order to find out the obstacles faced by partners. Through the observations made, it can be seen that the problem faced by partners lies in the production machine used which has weaknesses, namely low production capacity and the result of residual production in the form of black smoke which has the potential to cause air pollution.

At the innovation design stage, a design is made which will later be used as the basis for the production machine being developed. The design was made by the service team using the Autodesk Inventor software. In addition to the design of the engine design, at this stage the components that will be used as the motor and the engine frame are also determined. Through this second stage, the engine design and the type of engine to be used, namely the 14B rhino engine, will be obtained.

In the third stage, namely the manufacture of machine technology, the process of realizing the design will be carried out into a physical form. The machine is made with components, namely: 1) a driving motor that uses a 14B rhino engine, 2) a spiral tube that functions to push the dough towards the dough mold, and 3) a molding part that functions to mold the dough into pellets or commonly referred to as pellets. The machine is made with 2 mold tubes, this is an effort made to increase the quantity of concentrate feed production at Royal Equine.

In the fourth stage, namely the implementation of technology to the community. This activity is an activity carried out by the service team at the production site which is located at Dinoyo Village, Lowokwaru District, Malang City. This activity uses socialization and demonstration methods. The socialization method is used to explain materials related to the machine being developed. The explanations given include: 1) the importance of industrial mechanization, 2) the impact of industry on the environment, 3) how to use the machine innovations that are made, 4) maintenance of the machines that are made, 5) the advantages of the machines that are made. Furthermore, the method used is the demonstration method. The demonstration method was chosen because one of the outputs generated from this activity is TTG (Appropriate Technology) in the form of a concentrate feed production machine for horses. The demonstration method is carried out by practicing the manufacture of concentrate feed using a 14B rhino engine production machine. the activity in the fourth stage involved as many as 10 participants consisting of 2 business owners, 4 workers, and 10 business owner partners. Activities at this stage are carried out within 2 months starting from the beginning of June to the end of July.

Results and Discussion

Service activities are carried out through 6 series of activities, namely: 1) machine design, 2) manufacture of concentrate feed production machines, 3) trials using concentrate feed machines, 4) demonstrations and socialization regarding the use of concentrate feed machines, 5) monitoring, 6) evaluation. In detail the stages carried out can be explained as follows:

1) Machine Design

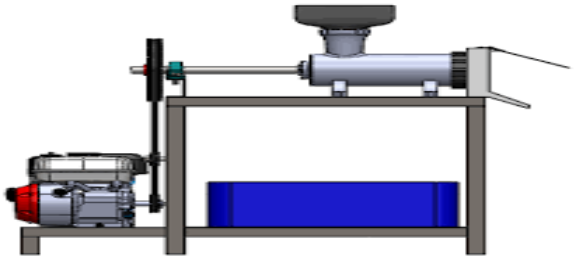

Figure 1. Modified Rhino Engine 14B engine design

The design stage is the first stage carried out in this activity. Making machine designs using Autodesk Inventor software. The design of the machine made will give an overview of the machine to be made. In the design that is made, the printer tube will be made as many as 2 tubes, this is in order to increase the quantity of production. In addition, the use of the 14B rhino engine is also shown in blue in the figure.

2) Creation of Animal Feed Production Machines

Figure 2. Machine manufacturing process

At this stage, the process of making the tool is carried out which is the realization of the machine design into a physical form. Making the machine takes approximately 1 month. The manufacturing process starts with assembling the dough tubes containing the spirals. This section serves to push the dough out into the printer tube. The next process is assembling the machine that utilizes the 14B rhino engine as the driving force. This machine is made equipped with 2 printing tubes, this is in order to increase the quantity of Royal Equine concentrate feed production. The final stage of assembling the machine is making power lines which will later become the driving force.

3) Engine Performance Test

The next step is to test engine performance. This step is taken to determine the performance of the machine before it is used in the production process.

Figure 3. Engine trial stage

The components tested included: 1) the performance of the 14B rhino engine as the driving force, 2) the function of the dough tube which has a spiral in pushing the dough towards the molding tube, 3) the function of the dough molder in making the dough into pellets or commonly referred to as pellets. Engine

performance trials were carried out by producing horse feed on a small scale. Through trials conducted, it is known that the machine is ready to be used in the concentrate feed production process.

4) Demonstration and socialization regarding the use of concentrate feed machines

The next steps taken after the trial phase were demonstration activities and outreach. This activity involved 10 participants consisting of 2 business owners, 4 workers, and 4 people who were partners of business owners. The activity begins with socialization. In this socialization material related to the implementation of industrial mechanization, the impact of industry on the environment, the advantages of using a modified 14B rhino engine, how to use a 14B rhino engine, and maintenance of a 14B rhino engine.

Figure 4. Demonstration stage

The session continued with a demonstration. This activity is carried out by carrying out small-scale production carried out by business owners and workers through assistance from the service team. Through socialization and demonstration sessions, it is known that business owners and workers have experienced an increase in industrial mechanization with the use of the 14B rhino engine.

5) Monitoring

The next step is to carry out monitoring which is carried out 1 week after the demonstration and socialization activities. Monitoring activities are carried out by a service team represented by 1 accompanying lecturer and 3 students by visiting the production site. The monitoring phase is aimed at observing and providing further assistance to partners, in this case Royal Equine.

Figure 5. Monitoring stage

The dedication team saw the production process that took place using a modified rhino engine 14B. Apart from seeing the production process, monitoring is also aimed at seeing the stability of engine

performance after a massive production process has been carried out. Through the monitoring phase carried out, it can be seen that the concentrate feed production process can run smoothly using a modified rhino engine 14B and engine performance remains stable in massive production.

6) Evaluation

The final stage of the activities carried out is to carry out an evaluation which is carried out 3 weeks after the demonstration and outreach activities or 2 weeks after monitoring. Evaluation activities are intended to find out the results of the programs carried out as well as the constraints that may occur during the production process. Evaluation activities are carried out by opening discussion sessions.

Figure 6. Evaluation Stage

Through this session the participants can convey developments and obstacles encountered during the production process. The evaluation activity was attended by the entire service team and 10 participants consisting of 2 business owners, 4 workers, and 4 business owner partners. Through the evaluation activities carried out, it is known that the production process has been running smoothly using a modified rhino engine 14B.

Table 1. Evaluation of the results of the implementation of activities

Indicator	Caption	Success (%)
Knowledge related to industrial mechanization	Increase	80%
The ability to use the 14B rhino engine	Able to succeed	100%
Maintenance capability of the 14B rhino engine	Able to succeed	100%
Increase in production quantity	Increase	100%
Industrial machines that do not produce waste	Exist	90%

Conclusion

Concentrated feed has a very important role in the livestock industry. The availability of feed will affect the productivity and behavior of horses. The availability of horse feed is currently still dependent on imported feed. This is the cause of the lack of availability of concentrate feed for local horse breeders. Royal Equine is one of the local producers of concentrate feed for horses. In the production process, Royal Equine encountered obstacles including machines that could not be used at high intensity and machines that caused thick smoke which has the potential to cause air pollution. One of the efforts made

as a solution to this problem is to do community service in the form of a modification of the 14B rhino engine as a concentrate feed production machine for horses. Community service activities are carried out using socialization and demonstration methods which are located in the Dinoyo sub-district, Lowokwaru District, Malang City. The activity was attended by 10 participants consisting of 2 business owners, 4 workers, and 4 business owner partners. Through the activities carried out, several achievements were achieved, including 1 production machine that had been disseminated, 10 participants who had increased ability to operate production machines, as well as an increase in the quantity of concentrate feed production at Royal Equine.

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