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Rabbit Food Pellet Formulation from Sustainable Resources

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Abstract: Food pellets are the best substitute for grass to provide complete nutrition for rabbits. As time goes by, rabbit food pellets are progressively getting more expensive and affect the breeders whom they can no longer afford to raise rabbits. *Mucuna bracteate* (MB) is planted abundantly in inter rows of rubber and oil palm in Malaysia. The goal of this research is to utilize MB as a new formulation in rabbit food pellets. The quality of the pellet will be tested according to its pellet durability and appearance. The pellet durability test will be carried out using a coating pan. The ingredients in these formulations are soybean meal, rice bran, wheat pollard, palm kernel cake, and DIY-Rabbit and MB. There are three formulations and each contains a different amount of MB. MB was used to substitute wheat pollard in the old pellet formulation. Each feed mix is 2kg and is inserted into the machine to produce a feed pellet. The pellet was cooled and dried after the pelleting process. Based on colour observation, the pellets get darker with the increment of MB content. The size of the pellet is similar which is 4mm. It was also observed that the pellet durability index increases with increasing MB content. Further research can be done to investigate the effect of MB in food pellets on rabbit growth.

Keywords: Feed Pellet, *Mucuna Bracteata*, Rabbit Food

1. Introduction

Rabbit bodies and digestions can survive on fresh grass diets, but the grass is not convenient for rabbit keepers [1]. Food pellets are the best substitute for grass to provide complete nutrition for rabbits [2]. The common pellet ingredients are wheat, sorghum, bran and pollard, hay, Lucerne crumbles, vegetable protein meals, vegetable or animal oil, limestone, salt, choline chloride, lysine, methionine, vitamin C, mold inhibitor, Riverina vitamin, and mineral premix. Rabbit food pellets are becoming increasingly expensive as time passes. Breeders can no longer afford to grow rabbits because of their exorbitant cost. Although each rabbit has a different number of pellets needed, as the rabbit ages, its daily calorie requirements will rise. It raises the cost of production for a rabbit farm.

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The domestic rabbit's daily feed intake levels of around five months after weaning and rises in direct proportion to metabolic live weight. Using an adult animal that is fed ad libitum as a comparison, a young rabbit at 4 weeks of age consumes only 14% of the overall of adult's live weight in food. The ratios are 62 and 42% at 8 weeks, and 100 to 110 and 87% at 16 weeks. The weight gain peaked between weaning and eight weeks of age while the feed conversion was at its best. For the hybrid classification lines of domestic rabbits, the feed intake levels off at about 12 weeks of age, increasing less quickly than the growth rate [3].

There are several resources related to oil palm plantation and palm oil mill has been studied as rabbit food. This included research on the nutritive values of palm-pressed fiber and palm kernel meal as rabbit food [4, 5]. There is also research done by [6] which formulate palm kernel cake in rabbit feed. In this study, *Mucuna bracteate* (MB) is chosen as an alternative raw material for rabbit feed pellet. MB is widely planted in the inter rows of rubber and oil palm in Malaysia. One of its intriguing traits is its capacity to generate three to four times as much biomass as traditional leguminous cover. Additionally, the help of this cover crop can stop insect and disease invasion in the fields. In this manner, a situation like this can benefit both parties. This abundant resource can be used as an alternative ingredient to make rabbit food pellets since it contains a high amount of protein. The goal of this research is to develop new rabbit food pellet formulations using MB to obtain low-cost pellets production. This study will also assess the physical quality of the pellet based on its appearance and durability. The study's findings will benefit society by promoting the use of sustainable resources. This research expects that performing sustainability will improve people's lives while protecting the environment.

2. Materials and Methods

2.1 Materials

The ingredients to produce the rabbit food pellets are soybean meal, rice bran, wheat pollard, palm kernel cake, MB, DIY rabbit, pellet machine (model IMP50) and coating pan. DIY rabbit is a mixture consisting of amino acids, vitamins, anti-oxidants, calcium, pellet binder, iron, potassium, manganese and copper.

From the materials that are mentioned in the list, MB will be used as a substitute for wheat pollard. MB will be dried and blended first before mixing with other ingredients. **Figure 1** shows the MB collected for the use in the formulation. **Figure 2** shows the pellet machine IMP50.

Figure 1: ***Mucuna bracteate.***

Figure 2: Pellet machine IMP50.

2.2 Methods

MB acts as a substitute for wheat pollard in the old pellet formulation. Then, all the ingredients are weight accordingly into three different batches. Three parts of the feed mix, each 2kg, were prepared.

Table 1: Formulations of the rabbit food pellet using MB

Ingredients	Weight (g)		
	Formulation 1 (0% MB)	Formulation 2 (5% MB)	Formulation 3 (10% MB)
MB	0	100	200
Wheat Pollard	200	100	0
Rice Bran	900	900	900
Soy Bean Meal	200	200	200
DIY-Rabbit	500	500	500
Palm Kernel Cake	200	200	200
Total (kg):	2	2	2

The formulation of pellets is as in **Table 1**. For the new formulations used to produce three different batches of rabbit food pellets, it is shown in **Table 1**. The machine is then fueled and warmed up first before starting the pelleting process. Next, the mix is inserted into the machine. The pellets resulting were gathered on a tray and dried. After that, the pellets were separated from the remaining powder. Afterwards, the pellet was weighed and the dimensions were taken. The test was then repeated for the other two batches. **Figure 3** shows the method of analysis of producing pellets with new formulation. **Figure 4** shows the pellet formation after the process.

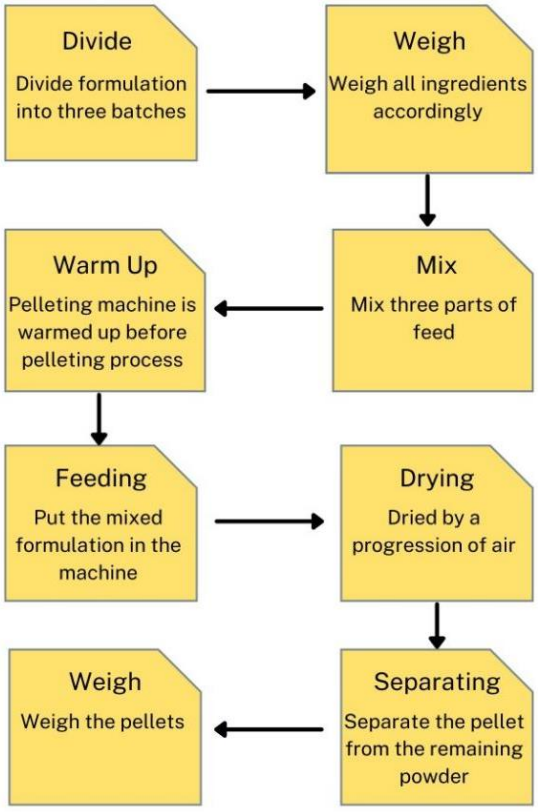

Figure 3: Method of analysis.

Figure 4: Pellets formation.

3. Results and Discussion

The nutritional content of feed ingredients can vary greatly depending on the ingredient. Some nutritional content will be harmed by heat, while other nutritional content will increase. Pelletizing can lead to an increase of feed consumption, and grinding can impact how easily proteins and carbohydrates are absorbed.

Table 2: Weight of pellet before and after sieving

Formulation	(0% MB)	(5% MB)	(10% MB)
Weight of Pellet and Powder (g)	1.9763	1.8702	1.8999
Weight of Pellet (g)	1.3315	1.5811	1.7250
Weight of Powder (g)	0.6448	0.2891	0.1749

The remaining powder were separated from pellet using the sieving method. The weight of the food pellets taken before and after sieving is shown in **Table 2**. The pellets were then proceeded for a physical quality testing. The physical quality testing is measured based on its appearance and durability.

3.1 Appearance

To ascertain the features of the food pellets by each formulation, this quality test has been carried out. The pellet that is created can be either dark brown, brown, or light brown in colour. The variations are brought about by the different concentrations of MB in the pellet. Animals, especially rabbits, cannot distinguish colours as well as humans can, so the various colours of the pellet biscuits supported human sight and judgement. It is observed that for the formulation with 0% MB content, the colour of the pellet is light brown, whereas the formulation with 5% content has a brown colour while formulation with 10% MB content has a dark brown colour.

As for the size of the pellet, all formulations have the same diameter which is 4mm as the machine used for the pelleting process is the same. Particle size is another factor that affects quality. The quality of the pellets improves generally as the particle is milled more finely. This is because the powders are more prone to the conditioning procedure, producing a pellet that is more tightly packed.

3.2 Durability

All pellet samples were rapidly circulated in an air stream around a coating pan with the speed of 2.2 kW. Total 1kg was used for each testing. The residual pellets were physically weighed after the test cycle, and the fines were sieved. The outcome of the calculation is presented in **Table 3** below as the "pellet durability index" (PDI). The PDI assesses the resistance of a pellet to deterioration caused by fine grinding, transportation, and farm machinery. The PDI also takes into account fines that may have a negative impact on diet. As a result, we can see that the pellet durability index increases with increasing MB content in the formulation.

Table 3: Physical quality measurement

MB Content (%)	0	5	10
Colour	Light brown	Brown	Dark brown
Size of pellet (mm)	4	4	4
PDI	85.52	91.45	92.63

The methods used to measure the quality of the pellet is by observing its appearance and calculating the pellet durability index. For colour evaluation, the pellets get darker with the increment of MB content. The next method is calculating the pellet durability index using the formula,

$$\frac{\text{Weight of food pellet after tumbling (g)}}{\text{Weight of food pellet before tumbling (g)}} \times 100 \qquad \textbf{Eq. 1}$$

4. Conclusion

In conclusion, it was proven that the food pellet formulation with the highest MB content produces the best physical quality of pellet among the other formulations. The formulations using MB can help to utilize the excessive amount of this resource. In a way, it also helps to reduce the cost of rabbit food pellet. In the future, this research can be continued by assessing the effect of this formulation to rabbit growth. It is also suggested that more physical quality measurements such as hardness test and the determining the porosity of the pellets will be done. More research is needed to improve the formulation by testing on rabbit.

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References

[1] "Feeding Your Rabbit | VCA Animal Hospital", *Vca*, 2022. [Online]. Available: https://vcahospitals.com/know-your-pet/feeding-your-rabbit. [Accessed: 01- Jan- 2022].

[2] "How to make rabbit pellets, rabbit feed pellets ingredients-victor pellet mill." https://www.pelletizermill.com/how-to-make-rabbit-pellets.htm. [Accessed: 01- Jan- 2022].

[3] T. Gidenne, F. Lebas, and L. Fortun-Lamothe, "Feeding behaviour of rabbits", *Nutrition of the rabbit*, pp. 233–252, 2020, http://doi.org/10.1079/9781845936693.0233.

[4] M.F. Houndonougbo, C.A. Chrysostome, S.E. Attakpa, A. Sezan, H.B. Dehou, "Growth performance of rabbits fed palm-press fibres-based diets", *ISRN Vet Sci*, 915729, 2012 http://doi.10.5402/2012/91572.

[5] S. Carrion, J.C. De Blas, J. Méndez, A. Caídas, P. García-Rebollar, 'Nutritive value of palm kernel meal in diets for growing rabbits", *Animal Feed Science and Technology*, pp. 79-84, 2011 https://doi.org/10.1016/j.anifeedsci.2011.02.009.

[6] I. Nurul, O. Nor Surayah, K. Izume, R. Nurul, H. Muhammad, R. Mohd, S. Norzahir. "Formulation of Rabbit Feed Pellet from Palm Kernel Cake (PKC)", *Material Today*, pp. 1810–1818, 2019, http://doi:10.1016/j.matpr.2019.11.220