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The Influence of Mixed Composition and Hole Mould on the Quality of Chicken Feed

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Abstract. This study aims to determine the effect of feed mixture composition and shape of mould hole on the quality pellets using a pellet moulding machine with the roller wheel system. Methods of testing were performed to obtain the composition of the feed mixture that was optimal. The method was following: 250 grams of feed ingredients are added to the adhesive (starch) of 50 grams and then mixed with warm water ($\pm 90^{\circ}\text{C}$) in quantities of 50, 100, 150, 200, 250 cc. Furthermore, the feed mixture materials printed on pellet machines with roller wheel system. Parameter testing is 400 rpm engine rev diameter mould hole 5 mm, and the shape of the hole to a second print. The test results on the optimal material composition testing the feed mixture will be used as a parameter to the next test is a variation form of holes. Measuring the quality of feed pellets based heavily shaped pellet intact and non-intact. A ratio of feed ingredients best to produce pellets occurred in the composition of the feed mixture of 250 grams of feed, 50 grams of adhesive, and 250 grams of warm water with percentage shaped feed pellets of 91%. While the best pellet quality resulting from pellet machine roller wheel system occurs in the form of mould 2nd hole with a percentage of 90% pellets.

1. Introduction

The animal feed is an important part on the farm. In an economic perspective, the cost for purchasing feed was highest cost for factory farming, so that such costs should be reduced as low as possible to maximize revenue. The high growth of the livestock industry will also increase the need for livestock feed. The businesses need techniques of farm animal feed ingredients are efficient to get around the high cost in buying fodder. The animal was requiring nutrients (carbohydrates, fats, proteins, etc.) to support life and improve products, such as meat, milk, and eggs. The nutritional requirements were met from various types of feed ingredients (corn, rice bran, soybean meal, and others) were mixed together in the suitable composition.

Generally, farmers use the broiler feed in granules shape. This form is preferred and not a lot of wasted compared with a powder feed (mash). In preparing feed for broiler chickens, you need to know the type of feed ingredients used, the needs of food substances, and the content of nutrients in order to get a good feed quality [1].

Pellet feed was compressed and compacted through mechanical processes. It found that feed in pellet form was a way topickling the feed for more secure level of supply and continuity preparation to maintain the feed quality [2]. Pellets can be made in clumps or small cylinders of different diameter, length, and strength levels [3]. Most poultry in many countries was produced in the form of granules or pellets. Advantages of pellet process was saving the time which it takes a chicken to eat pellets and increase the growth rate for consumption has more to grow faster. The stability of pellets was also



influenced by the moisture content of raw materials, particle size and temperature prior to processing. In addition, producing pellets in good quality with low operating costs to consider several things including the size of the thickness of the die (mold), the diameter of the die, the speed of rotation die and a ration size [4].

The purpose of this study was to determine the effect of the composition of the feed mixture and form mold holes on the quality of the pellets using a pellet molding machine with roller wheel system.

1.1. Pellet

Pellet is the result of raw material processing ration is mechanically supported by the factor moisture, heat and pressure, in addition to the two factors that affect the endurance and physical quality of the pellets are the characteristics and size of material particles [5]. Pellet quality must have a high nutrient such as improving feed intake and may increase the nutrient value [6].

The production of pellets is a process by compacted feed processing materials using the machine so that the die into a cylindrical shape or small pieces with a diameter, length, and different degrees of hardness. Large-sized pellets are generally made of green feed. Feed pellets are popular with horse owners or caretaker consists of pellet concentrates, hay pellets and pellet feed complete (a combination of hay with a concentrate) [3].

Feed in pellet form is a form of preserved because through preservation of feed material in the form of a more secure level of procurement and provision in terms of maintaining the quality of the feed [2]. Factors that affect the quality of the pellets include starch, fiber and fat [4]. Starch was heated with water; it will undergo gelatinization which serves as the glue that affects the strength of the pellets. Fibers act as a template pellets and fat serves as a lubricant during the process of forming pellets in pellet machines that facilitate pellet formation.

2. Experimental Method

2.1. Tools

Pellet molding machine roller wheel system (Figure 1a) which is used to measure the effect feed materials mixture and shapes of holes mold on the quality of the printout pellet has the following specifications: machine dimensions (600 x 470 x 1150 mm), a cylindrical tube (280 x 310 mm), disc printing (diameter 265 x 10 mm), wheel rollers (diameter 60 x 110 mm), the motor (1HP, 1450 rpm), the speed rotation (400 rpm). The shape of mold holes (diameter 5 mm) is shown in Figure 1b. The workings of this tool are a disc mold rotated by the motor and wheel roller rotates. The feed mixture was inserted into the hole-mold after crushed by the roller wheels. The pellets were formed after passing through the hole-mould.

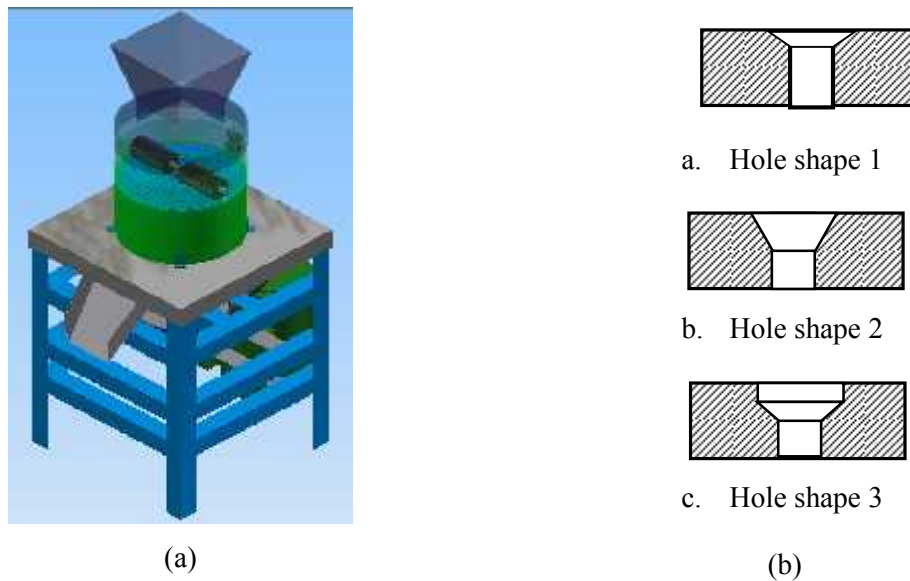


Figure 1. Machine pellet machine with roller wheel system (a), and the shape of hole-mould (b)

2.2. Stage of Testing Method

Testing was conducted to obtain the composition of the feed mixture that is optimal. The first stage is to prepare 250 grams of feed materials are added to the adhesive (starch) 50 grams and then mixed with warm water ($\pm 90^{\circ}\text{C}$) as much; 50, 100, 150, 200, 250 cc. The next stage, the feed pellets mixture are printed on the machine roller wheel system. Testing parameters are rotational speed of 400 rpm, hole-mould diameter of 5 mm, and the shape of the hole to a second print. The test results on the optimal material composition for the feed mixture will be used as a parameter to the next test is a variation form of holes. Measuring the quality of feed pellets based heavily shaped pellet intact and non-intact.

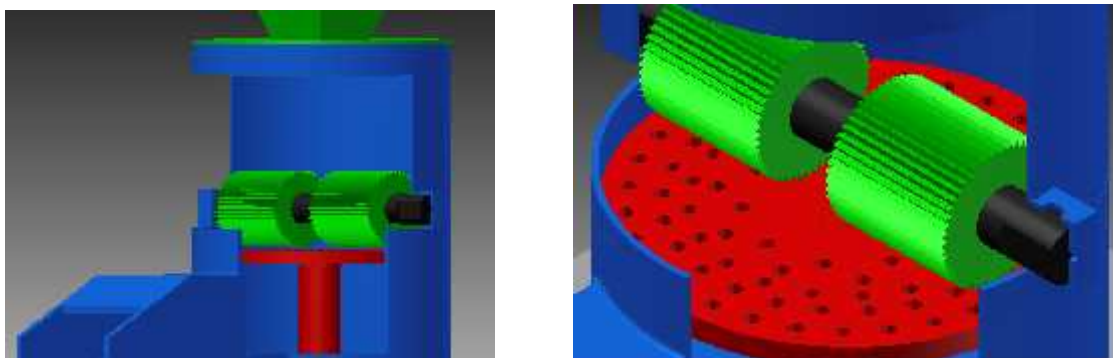


Figure2. Sketches of roller wheel system and disk-mould

3. Results and Discussion

3.1. Results

Methods of testing has been done previously and obtained several forms produced from testing such compositions as shown in Figure 3.



Figure 3. The test results for the composition of the feed mixture

Based on observations in Figure 3, it can be seen that the increase of adding water will be increasingly integrated feed mixtures. The result of mixing that has been tested will be printed on a printing machine roller wheel pellet system. It has obtained the test data as shown in Table 1 below.

Table 1. Data of test results for the mixed composition of feeds

| Weight of feed (gram) | Weight of adhesive (gram) | Weight of water (cc) | Total weight of feed (gram) | Weight of pellet (gram) | Percentage (%) | Length of Pellet (mm) |
|-----------------------|---------------------------|----------------------|-----------------------------|-------------------------|----------------|-----------------------|
| 250 | 50 | 50 | 210 | 25 | 12 | 4 - 5 |
| | | | 225 | 20 | 9 | |
| | | | 220 | 25 | 11 | |
| | | | <i>average</i> | <i>11</i> | | |
| 250 | 50 | 100 | 225 | 45 | 20 | 5 - 12 |
| | | | 210 | 35 | 17 | |
| | | | 190 | 40 | 21 | |
| | | | <i>average</i> | <i>19</i> | | |
| 250 | 50 | 150 | 220 | 145 | 66 | 10 - 17 |
| | | | 210 | 150 | 71 | |
| | | | 250 | 160 | 64 | |
| | | | <i>average</i> | <i>67</i> | | |
| 250 | 50 | 200 | 190 | 170 | 89 | 10 - 20 |
| | | | 180 | 165 | 92 | |
| | | | 185 | 160 | 86 | |
| | | | <i>average</i> | <i>89</i> | | |
| 250 | 50 | 250 | 220 | 190 | 86 | 10 - 23 |
| | | | 210 | 195 | 93 | |
| | | | 230 | 215 | 93 | |
| | | | <i>average</i> | <i>91</i> | | |

The percentage of pellet was obtained the comparing the weight of pellet between total weight of feed.

Table 1 shows the results of testing the composition of the feed mixture in which the feed composition is best obtained at a ratio of 250 grams of feed material feed, 50 grams of adhesive, and 250 grams of warm water with the percentage of pellet feed in the form of 91%. In this test also shows that the higher the amount of water added to the feed mixture, the greater the percentage of feed is formed. Testing parameters for the optimal composition of the feed mixture will be used to test the

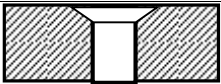
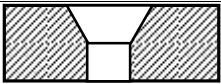
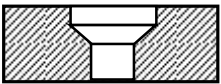
form of holes. The form of pellets in the composition of the mixture of feed materials can best be seen in Figure 4.



Figure 4. The shape of the pellets on the best composition of feed mixture

The next process was testing the quality of pellets with a variety of shape holes. The test results can be viewed in Table 2 and Figure 5 below.

Table 2. Result of pellet quality with a variety of shape holes

| Shape Holes | Hole Diameter (mm) | Total Weight of Pellet (gram) | Weight of pellet completed (gram) | Percentage (%) |
|---|--------------------|-------------------------------|-----------------------------------|----------------|
|  | 5 | 195 | 145 | 74 |
| | | 185 | 140 | 76 |
| | | 185 | 135 | 73 |
| | | Average | 74 | |
|  | 5 | 190 | | 89 |
| | | 180 | | 92 |
| | | 185 | | 86 |
| | | Average | 89 | |
|  | 5 | 185 | | 86 |
| | | 180 | | 81 |
| | | 185 | | 73 |
| | | Average | 80 | |

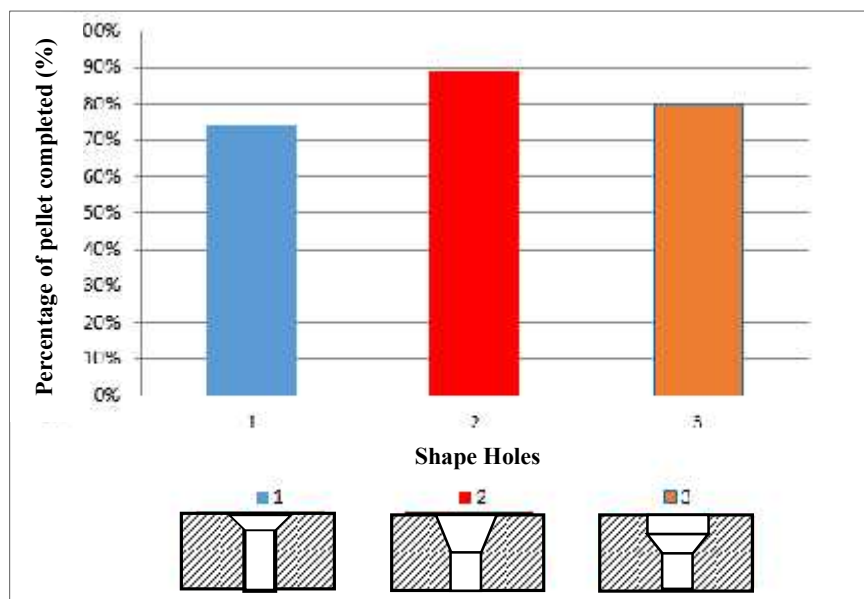


Figure 5. Percentage of result for pellet completed

3.2. Discussion

Based on the results of composition testing for animal feed that uses materials such as feed, adhesives, and water, and hereinafter it was tested by using a feed molding machine, it has acquired test data as shown in Figures 4 and 5. It shows the results of testing the quality pellet with a variety of shapes and diameter holes. Best pellet quality occurs in the form of hole 2 by 90% and respectively on the 3rd hole forms by 84% and shapes of holes to-1 by 74%. This can happen because of a hole second mold has the form of a hole that gradually tapers so that the pellet formation process occurs slowly and continuously. This is in contrast with the shape of the mold hole 1 and hole 3, wherein the hole diameter changes occur suddenly so that the pellet-forming process does not take place gradually.

In figure 4 shows that the higher the amount of water added to the feed mixture, the greater the percentage of feed which is formed into pellets. Percentage of the first-highest form for pellets was obtained in a ratio of 250 grams of feed material feed, 50 grams of adhesive, and 250 grams of 91% warm water. Percentage of feed in the form of pellets obtained the second highest in the feed mixture ratio of 250 grams of feed materials, 50 grams of adhesive, and 200 grams of warm water by 89%. Based on the results achieved in testing the composition of the feed mixture of this it can be concluded that the best composition of the feed mixture was 250 grams of feed, 50 grams of adhesive, and 200 grams of warm water, because the water content is less so that the drying process is faster. The water content can cause gelatinization during the molding process. Water can also serve as a lubricant to replace the function of fat, but the water content is too high can result in adverse printing results [4]. The form of pellets in the composition of the mixture of feed materials can best be seen in Figure 5.

4. Summary

From these results, it can be concluded that the ratio of the mixture of best feed to produce pellets occurred in the composition of the feed mixture of 250 grams of feed, 50 grams of adhesive, and 200 grams of warm water with the percentage of feed in the form of pellets by 89%, because the water content less so the faster the drying process. While the best pellet quality resulting from pellet machine roller wheel system occurs in the form of the second hole-mould with the percentage of pellets formed by 90%.

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