The rice bran potential as local feed ingredient to support poultry feed mill development in Sidenreng Rappang regency, South Sulawesi, Indonesia

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Abstract. Rice bran is one of important ingredients in chicken diet as protein and energy sources. It accounts for 15 – 30% in chicken diet. Rice bran has great potential to be used as feed ingredient in tropical country. However, the data of rice bran potential in many areas are not available yet. The aim of this study was to observe the potential of rice bran in Sidenreng Rappang regency as local feed ingredient. This study used descriptive method and analyzed by simple statistical analysis. The sampling locations were five rice milling units according to production capacity. Production capacity, milling process, quantity of end and by-product were observed in this study to obtain the data of rice bran production as primary data. Harvested area and rice grain production were obtained from BPS (Statistics Indonesia) as secondary data. The results showed that milling process of rice grain was producing 60.35% of rice, 0.004% of broken rice, 6.54% of rice bran, and 33.09% of husk. Based on the data of rice grain production (667,523 ton), it could be estimated that rice bran production was 43,656 ton in Sidenreng Rappang. The highest rice bran production was in Pitu Riawa district (6,553.21 ton) and the lowest rice bran production was in Tellu Limpoe (2,071.47 ton).

1. Introduction

Sidenreng Rappang is one of regencies which has large production of rice in South Sulawesi. It is due to the large of planting areal and supported by some rice milling unit with modern technology. Premium rice and medium quality are coming from this area. It indicates that rice milling technology has been developed. In addition, Sidenreng Rappang is also center of egg production with high population of laying hen, therefore the requirement of rice bran as local ingredient for poultry feed is very high. Feed is urgent factor in farm industry. It accounts for approximately 60% of total production costs [1]. Thus, local feed resources should be explored to develop feed mill in this area.

Rice bran is by product of rice milling process which consists outer layer of rice grain (pericarp and tegmen) and rich in fiber, unsaturated fatty acid, protein, mineral, vitamin such as B1, B2, and B3 [2]. Rice bran contains 12% protein, 13.7% fat, 25.5% carbohydrate, 12.1% ash, and 14.4% fiber [3,4]. It has been widely used for poultry and livestock and become main ingredient for poultry in Asia especially in Indonesia. It is due to nutritional content. Fine rice bran (bekatul) was coming from rice polish which consist layer of cotyledon bran, small husk, and broken rice through the second process. The aim of this study was to observe rice bran potential as by product of rice milling unit. Data of rice production is
basic information to develop poultry feed mill in Sidenreng Rappang. The development of feed mill should be based on regional potency to assist the raw material supplies [5].

2. Methodology

The study was conducted in Sidenreng Rappang regency, South Sulawesi. The study used descriptive method and analyzed by simple statistical analysis. The sampling locations were five rice milling units according to production capacity. Production capacity, milling process, number of rice production and by-product were observed in this study to obtain data of rice bran production as primary data. Harvested area and rice grain production were obtained from BPS (Statistics Indonesia) [6] as secondary data. Data obtained was measured by simple equation below:

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\text{Rice Bran (ton) x 100} \quad \text{Rice Grain (ton)}
\]

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\text{Rice Bran Production (ton) = Rice Grain Production (ton) x % Rice Bran}
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3. Results and discussion

3.1. Rice milling process

This rice milling was done to produce rice for human consumption. Rice is main product in milling process and by-product of milling process is broken rice, rice bran, and husk. Data of five rice milling unit were taken when the milling process was running on the day of observation. They showed different production in each unit. Products of milling process are presented in table 1. Mill A produced 20,160 ton of rice, 0,050 ton of broken rice, 2,016 ton of rice bran, and 11.423 ton from 33,600 ton of husk from milled grain. Mill B produced 43,790 ton of rice, 0,675 ton of broken rice, 5,662 ton of rice bran, and 26,047 ton of husk from 75,500 ton of milled grain. Mill C produced 22,258 ton of rice, 0,055 ton of broken rice, 2,189 ton of rice bran, and 11,452 ton of husk from 35,900 ton of milled grain. Mill D produced 19,254 ton of rice, 0,043 ton of broken rice, 1,803 ton of rice bran, and 9,504 ton of husk from 30,562 ton of milled grain. Mill E produced 19,140 ton of rice, 0.015 ton of broken rice, 1,840 ton of rice bran, and 11,423 ton of husk from 32,872 ton of milled grain. The averages of milling products were 24,920 ton of rice, 0.167 ton of broken rice, 2,702 ton of rice bran, and 11,423 ton of husk from 41,286 milled grain. The rice milling is a crucial step in post-production of rice. This process helps in removal of grain hull to produced polished rice [7].

The highest of rice bran was in mill B, production capacity of machine is 4.5 ton/hours and equipped with artificial dryer. Kusumawati et al. [8] reported that artificial dryer affected and played important role to increase volume of dry grain and rice. Mill B equipped with modern equipment, therefore it produced larger number of milled rice, and the rice produced is polish rice which has highest quality. It is marketed out of Sulawesi such as Java, Kalimantan, and Papua. The rice bran quality and quantity are also higher than the others. Rahman et al. [9] reported that fine rice bran (bekatul) was obtained from rice polish which consist layer of cotyledon bran, small husk, and broken rice through the second process.

While others mills (A, C, D, and E) were relatively similar in production capacity, in range 2.8–3.5 ton/h and equipped with simple technology. The rice is only marketed in Sulawesi. Firdaus et al. [10] reported that certain technology in milling process should be selected based on characteristic of raw material (grain) such as polishing level, grain moisture, whole grain, broken grain, grout and foreign grain to achieve premium rice and medium quality.

The purpose of data sample from rice milling unit was to determine the percentage of product and by products in milling process. The percentage of each product such as rice, broken rice, rice bran and husk were 60.35%, 0.0004%, 6.54% and 33.09%, respectively. The variation of product number each milling unit was due to grain dry matter, planting location, machine type and production capacity of each milling unit. The result showed that conversion value was 6.54% of total milled grain of rice. It was obtained from ratio between rice bran production and milled grain.
Table 1. Number of milled grain, rice, broken rice, rice bran, and husk production.

| Rice milling unit | Number of milled grain (ton) | Production (tons) |
|-------------------|-----------------------------|-------------------|
|                   | Rice | Broken rice | Rice bran | Husk |
| A                 | 33.600 | 20.160 | 0.050 | 2.016 | 11.423 |
| B                 | 75.500 | 43.790 | 0.675 | 5.662 | 26.047 |
| C                 | 35.900 | 22.258 | 0.055 | 2.189 | 11.452 |
| D                 | 30.562 | 19.254 | 0.043 | 1.803 | 9.504 |
| E                 | 30.872 | 19.140 | 0.015 | 1.840 | 9.891 |
| Total             | 206.434 | 124.602 | 0.838 | 13.510 | 68.321 |
| Average           | 41.286 | 24.920 | 0.167 | 2.702 | 13.664 |
| Percentage (%)    | 100 | 60.35 | 0.0004 | 6.54 | 33.09 |

3.2. Production of rice bran

Agriculture sector is play important role for economic in Sidenreng Rappang, it is supported by wide land area and harvested area. Harvested area reaches 106,485.9 ha and produces 667,523 ton. It is also supported by large number of rice milling unit in this region. Table 2. shows data of harvested area, rice grain production and rice bran production. Rice production was obtained by measuring grain production and percentage of rice bran (6.54%) which was produced in milling process. The highest rice grain and rice bran were in Pitu Riawa district with 16,014.5 ha of harvested area, 100,202 ton of rice grain and 6,553.21 ton of rice bran production. The lowest district was in Tellu Limpoe with 5,062.2 ton of harvested area, 31,674 of rice grain and 2,071.69 ton of rice bran production. Total rice bran production is 43,656 ton in Sidenreng Rappang.

Table 2. Harvested area, rice grain production and rice bran production in Sidenreng Rappang.

| District           | Harvested areaa (Ha) | Rice grain productiona (ton) | Rice bran production (ton) |
|--------------------|----------------------|-----------------------------|---------------------------|
| Panca Lautang      | 9,434.6              | 59.032                      | 3,860.69                  |
| Tellu Limpoe       | 5,062.2              | 31.674                      | 2,071.47                  |
| Wattang Pulu       | 9,251.6              | 57.887                      | 3,785.80                  |
| Baranti            | 8,044.8              | 50.336                      | 3,291.97                  |
| Panca Rijang       | 5,678.1              | 35.528                      | 2,323.53                  |
| Kulo               | 7,555.8              | 46.776                      | 3,059.15                  |
| Maritentngae       | 11,997.3             | 75.066                      | 4,909.31                  |
| Wattang Sidenreng  | 14,244.3             | 88.638                      | 5,796.92                  |
| Pitu Riawa         | 16,014.5             | 100.202                     | 6,553.21                  |
| Dua Pitu           | 13,646.9             | 85.388                      | 5,584.37                  |
| Pitu Riase         | 5,555.8              | 36.996                      | 2,419.53                  |
| Total              | 106,485.9            | 667.523                     | 43,656.00                 |

According to rice bran data, rice bran is potential as local ingredient to supply feed mill for poultry feed production. In other hand, its potential as local feed ingredient is expected to meet the feed requirement of laying hen in Sidenreng Rappang. At least 15% of rice bran were used in laying hen diet [11] while in broiler diet is less than it [12]. Shaheen et al. [13] reported that protein digestibility of rice
bran was about 73% and could replace maize and wheat partially. It might be due to energy content was sufficient to meet the chicken need after maize.

4. Conclusion
In summary, milling process of rice grain was producing 60.35% of rice, 0.004% of broken rice, 6.54% of rice bran, and 33.09% of husk. Based on the data of rice grain production (66,7523 ton), it could be concluded that estimation of rice bran production was 43,656 ton in Sidenreng Rappang. The highest rice bran production was in Pitu Riawa district (6,553.21 ton) and the lowest rice bran production was in Tellu Limpoe (2,071.47 ton).

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