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Organoleptic Test And Proximate Test Of Feed For Panulirus Homarus Using Canavalia Ensiformis As A Substitute Of Soy Flour

Reffi Aryzegovina[1*], Siti Aisyah[2], Ira Desmiati[3], Gusna Merina[4], Sri Yenica Roza[5], Indira Karina[6]

[1, 5]Aquaculture, Faculty of Science
Nahdlatul Ulama University of West Sumatera
Padang. Indonesia
*Email: reffiaryzegovina@gmail.com
[2,3,4]Management of Aquatic Resources
Nahdlatul Ulama University of West Sumatera
Padang. Indonesia
[6]Agribusiness, Faculty of Science
Nahdlatul Ulama University of West Sumatera
Padang. Indonesia

Abstract – One type of legume that is very suitable as a source of raw material for making lobster feed is *Canavalia ensiformis*. Soybeans, which are a source of vegetable protein, can now be replaced with *Canavalia ensiformis*. The purpose of this Research was to examine the quality of artificial feed using *Canavalia ensiformis* as a substitute for soybean flour for *Panulirus homarus*feed. The method used is the experimental method with RAL using 4 treatments and 3 replications. The treatments in this Research were A (artificial feed without *Canavalia ensiformis* (control), B (2.5% *Canavalia ensiformis* in 1 kg of artificial feed), C (3% *Canavalia ensiformis* in 1 kg of artificial feed), and D (3.5% *Canavalia ensiformis* in 1 kg of artificial feed). The research data were analyzed using the non-parametric statistical test Kruskal Wallis and were described. The test animal used was *Panulirus homarus*with a size of 8-10 cm with an average weight of 200-300 grams. The results of the physical tests showed that The parameters of speed of breaking (crushing), level of hardness, level of homogeneity (uniformity) and allure were significantly different from the use of *Canavalia ensiformis* flour while the parameters of sinking speed and delicacy were not significantly different.The proximate chemical test results of feed using *Canavalia ensiformis* flour were the best on feed B, which contains 9.34% water content, 11.87% ash content, 29.98% crude protein (N x 6.25), 6.84% crude fat , Carbohydrates 41.92% and Crude Fiber 5.00%.

Keywords – Feed Quality; Canavalia ensiformis; Panulirus homarus.

I. INTRODUCTION

One type of legume that is highly recommended to be used as a raw material for making animal feed (cultivation) is *Canavalia ensiformis*. In some food industries, soybeans, which are a source of vegetable protein, can now be replaced with *Canavalia ensiformis*. *Canavalia ensiformis* is one of the local plants that can be found easily in Indonesia. Koro sword has now spread throughout the tropics and has been naturalized in several areas, including West Sumatra. In terms of nutritional content, koro sword has all the nutritional elements with quite high nutritional value, namely 60.1% carbohydrates, 30.36% protein, and 8.3% fiber (Widiantara et al., 2021).

In intensive aquaculture operations, feed is one of the key factors in the successful operation of aquaculture activities. Because their participation can reach 70% of the total production costs (Junaidi et al., 2020; Irawani et al., 2019), especially the cost of feed protein ingredients (Bender et al., 2004). Artificial feed ingredients for fish Currently fish are dominated by the use of fish flour as the main protein main ingredient. This is because fish flour contains nutritional components that are very suitable for the needs of cultivated fish, especially the essential amino acid profile. At an FCR of about 1.5, the equivalent of 0.5-0.75 kg of fishflour or 1.8-3 kg of gutted fish (75% moisture content) is required to produce 1 kg of fish. This causes the cultivation based on artificial feed with fish flour as the main protein source, classified as an activity that is not ecologically profitable. Therefore, it is necessary to provide alternative sources of protein feed which have relatively the same nutritional performance as fish flour or which can meet the needs of cultivated fish for optimal growth (Junaidi et al., 2020).

The feed is processed using certain ingredients such as phytoplankton biomass, macroalgae waste, fish waste, crab waste, other marine products, golden snail waste, golden snail waste, and corn which is then grown based on local organic waste biotechnology from the sea. Utilizing vegetable waste, rice bran waste and other wastes to improve feed quality, and improve the quality of catfish produced organically to achieve export quality (Ganjar et al., 1979).

In this Research, one of the innovations that can be used as an alternative to soybeans is *Canavalia ensiformis* which is expected to be a more economical and affordable alternative to soybeans. The purpose of this Research was to carry out organoleptic tests and proximate tests on feed using *Canavalia ensiformis* as a substitute for soybean flour for feed *Panulirus homarus*.

II. RESEARCH METHOD

The method used is the experimental method with RAL using 4 treatments and 3 replications. The treatments in this Research were A (artificial feed without *Canavalia ensiformis* (control), B (2.5% *Canavalia ensiformis* in 1 kg of artificial feed), C (3% *Canavalia ensiformis* in 1 kg of artificial feed), and D (3.5% *Canavalia ensiformis* in 1 kg of artificial feed). The data were analyzed using non-parametric statistical tests Kruskal wallis and described. *Panulirus homarus*with a body length of 8-10 cm and an average weight of 200-300 g was used as a test animal. The experimental animals were obtained from the results caught by fishermen in the city of Padang. Stocking density of 5 individuals per container. 60 x 41 x 34 cm, 12 buckets of fiber function as containers, with a water level of 30 cm and a capacity of 215 l. Feed using artificial feed which is mostly made from *Canavalia ensiformis*. *Panulirus homarus*were reared for 3 months with a feed formulation according to the treatment given.During the experiment, lobster body weight was measured with an electronic scale every 10 days to determine the final weight gain of the test animals until the end of the experiment.

Table 1. The Nutritional Composition Of Each Feed Ingredient (% dry weight)

ingredient	Water	Ash	Fat	Proteins	Coarse Fiber	BETN	Source
Fish flour	6.34	16.65	4.9	50	1.5	17.82	*
Canavalia ensiformis flour	5.73	2.11	3.17	24.32	6.13	-	**
Fine bran	-	10.56	12.53	15.56	21.63	39.73	***
Cornstarch	-	2.06	2.35	10.88	0.01	84.70	***
wheat flour	-	0.64	1.21	10.59	3.41	84.16	***

Source: * Daris &Febri (2013), ** Marimuthu and Gurumoorthi (2013)., *** Hutabarat et al., (2015).

Table 2. Test feed formulations used

No	Ingredient	Total (%)
1	Cornstarch	15
2	wheat flour	15
3	Vitamins	1
4	Mineral	1
5	Fish flour	25
6	*Canavalia ensiformis* flour	28

7	Fine bran	15
TOTAL		100
Total poteins		21.76
Total Fat		3.62
Coarse fiber		4.19
Ash content		7.9
BETN		20.48

Test parameters:

Sinking speed

Five pellets were dropped into a measuring cup filled with water to a height of 20 cm and the rate of decline of the test pellets was measured. The time required for the test pellet to move from the surface of the water to the bottom of the measuring cup is calculated using a stopwatch and using units of minutes.

Delicious power

The delicious power of the test pellets was calculated by adding up the pellets consumed by the test prawns per day. The taste of the test pellet is given in grams.

Burst Speed

The pellet breakdown rate (breakdown rate) is the time (in minutes) it takes for the pellet to soften or dissolve in water. How to measure Put 10 sticks/pellets of the same size into a beaker filled with water. To see if the test pellet is soft and press it with the index finger. This observation was carried out by squeezing the pellet every 5 minutes.

Homogeneity level

Feed uniformity (homogeneity) is the uniformity of the raw material particles that make up the pellets. A total of 5 g of the test pellets was crushed with a mortar at the same pressure, but the particle size of the pellets making up the pellets was not reduced. The test pellet was then sieved using a 0.5 mm sieve. The percentage of test pellets that pass the 0.5 mm sieve is the homogeneity of the ration.

Hardness level

Pellet hardness was measured using a 1 meter PVC pipe, 0.5 mm sieve and 500 g weight. The diameter of the PVC tube is slightly smaller than the diameter of the weight. First, the PVC pipe was installed vertically and 1 g test pellet was placed in the bottom hole. The test pellets are placed evenly parallel to the bottom of the floor and the wide mouth of the PVC pipe so that the test pellets are at the same pressure. Then lower the load at a height of 1 meter or a length equal to the diameter of the PVC pipe. The crushed test pellets were filtered through a 0.5 mm sieve. The percentage of feed that does not pass through the 0.5mm sieve is a test for the hardness of the pellets.

Allure

Lure/attractiveness is closely related to the attractiveness and taste of the test pellets. To measure traction, test pellets were placed in the tank opposite the location of the test hummer on the bottom of the Vibertank. The distance between the tested lobsters and the location of the test pellets was 30 cm. The time required for the test shrimp to eat the test pellet for the first time is expressed in minutes and expressed as the pulling force of the pellet.

Statistical analysis of the data in this Research was carried out using SPSS 16 software using parametric and nonparametric statistics. For Kruskal-Wallis, feed chemical testing was based on qualitative descriptions which were analyzed for test results and compared with relevant references.

III. Results And Discussion

The results of the Kruskal Wallis test showed that the parameters Breaking speed, degree of hardness, homogeneity and allure had a P value <0.05, which was significantly different from the use of *Canavalia ensiformis* flour while the parameters of sinking speed and delicacy were not significantly different. To see which groups were different, the Mann-Whitney test was carried out which is presented in Table 3.

Table 3. Average physical parameters of commercial feed and feed containing *Canavalia ensiformis* flour.

No	Measurement Parameters	Commercial Feed	Feed using *Canavalia ensiformis* Flour		
			2,5%	3%	3,5%
		A	B	C	D
1	Sinking Speed	1.27 ± 0.458^{a}	1.33 ± 0.488^{a}	1.27 ± 0.458^{a}	1.27 ± 0.458^{a}
2	Delicious Power (gr)	4.47 ± 0.516^{a}	4.60 ± 0.507^{a}	4.47 ± 0.516^{a}	4.47 ± 0.516^{a}
3	Burst Speed (minute)	3.40 ± 0.737^{b}	2.60 ± 0.737^{a}	2.60 ± 0.737^{a}	2.60 ± 0.737^{a}
4	Homogeneity level (%)	1.53 ± 0.640^{b}	2.47 ± 1.060^{a}	2.60 ± 1.242^{a}	2.33 ± 1.175^{a}
5	Hardness Level (%)	1.53 ± 0.743^{a}	2.20 ± 0.862^{b}	2.53 ± 1.246^{b}	1.73 ± 0.799^{ab}
6	Lure (minutes)	2.07 ± 0.799^{a}	2.20 ± 0.775^{a}	2.20 ± 0.775^{a}	3.00 ± 0.378^{b}

Note: Different letters in the same line indicate a significant difference ($P<0.05$).

Based on Figure 1. it can be seen that commercial feed breaks longer than artificial feed using *Canavalia ensiformis* flour, this is due to the level of dryness and manual feed molding. However, feed using *Canavalia ensiformis* has a higher level of hardness and homogeneity than commercial feed. The results of the physical parameters also show that although the feed using *Canavalia ensiformis* flour cracks faster, the feed has the same sinking speed and delicious power as commercial feed, even the allure parameter shows that feed using *Canavalia ensiformis* flour attracts lobsters more than commercial feed.

Fig 1. (A) Commercial feed (control), (B) 2.5% *Canavalia ensiformis* in 1 kg of feed

Feed chemical tests using the proximate test method were carried out in the laboratory. This chemical test is used to analyze the nutritional content in lobster feed. Substitution of soybean flour with *Canavalia ensiformis* flour in feed shows a different nutritional content. Nutritional data for all treatments are presented in Table 4.

Table 4. Feed chemical test results

No	Parameters	Unit	Sample Code			
			A	B	C	D
1	Water content	%(g/100g)	8	9,34	12,28	9,65
2	Ash Content	%(g/100g)	11	11,87	12,07	13,08
3	Crude Protein (N x 6.25)	%(g/100g)	30	29,98	29,47	29,13
4	Crude Fat	%(g/100g)	5	6,84	6,62	5,92
5	Carbohydrate	%(g/100g)	-	41,92	39,41	42,15
6	Coarse Fiber	%(g/100g)	4	5,00	5,07	5,25

Based on table 4, it shows that the feed using cassava flour as a substitute for soybean flour has a nutritional value of 9.34-12.28% moisture content, 11.87%-13.08% ash content, 29.13%-29.13% crude protein content 29.98%, crude fat content 5.92%-6.84%, carbohydrate content 39.41%-42.15% and crude fiber content 5.00%-5.25%.

Fig 2. (C) 3% *Canavalia ensiformis* in 1 kg of feed, and (D) 3.5% *Canavalia ensiformis* in 1 kg of feed.

IV. Discussion

Pellets that use *Canavalia ensiformis* flour as a substitute for soy flour have a tendency to break faster than commercial feeds that use soy flour. Whereas in Saade et al., (2011) pellets that can last longer in water indicate that they can be used optimally by aquaculture farmers to increase feed intake, body resistance, or survival, growth, and aquaculture productivity. It is feared that the feed using *Canavalia ensiformis* which breaks down more quickly will settle to the bottom of the pond and become a pile of ammonia which will also affect the water quality of the rearing pond. Pond lobster requires temperature conditions of 26-30 °C and ammonia levels below 1.2 ppm (Rosmawati et al., 2019). Lobster poisoning can occur if the concentration of ammonia in lobster pond water is too high. In addition, the wrong water temperature can affect the growth and survival of the crayfish. This can reduce the amount of crayfish harvested (Prastowo, 2021).

The level of hardness and level of homogeneity in pellets B, C and D are harder and more homogeneous than feed A (commercial feed), this is a positive thing that is an advantage of using *Canavalia ensiformis* flour. By using peanut flour, all the particles that make up the bait stick together, increasing the hardness. In addition, the hardness of pellets can also be affected by the hardness of the types of raw materials that make up other pellets.

Parameters of settling speed and fineness of the pellets were the same for all test feeds. The faster the lobster bait sinks, the faster the losers digest the bait before the physical and chemical qualities of the pellets are degraded by the influence of water with solvent properties. In addition to the quality and quantity of nutrients, feeding in water for too long reduces the attractiveness and enjoyment of pellets. Under these conditions, feed utilization becomes less than optimal (Saade et al., 2011). There is no difference in the attractiveness of pellets using *Canavalia ensiformis* flour and commercial pellets, this shows that even though the pellets using *Canavalia ensiformis* disintegrate faster and have a higher level of hardness, they are still in demand and attract the attention of lobsters.

The results of the physical test showed that the parameters of speed of breaking, level of hardness, level of homogeneity and allure were significantly different from the use of *Canavalia ensiformis* flour while the parameters of sinking speed and deliciousness were not significantly different. The proximate chemical test results for the feed using *Canavalia ensiformis* flour were the best on feed B, with a moisture content of 9.34%, ash content of 11.87%, crude protein (N x 6.25) 29.98%, crude fat 6.84 %, Carbohydrates 41.92 % and Crude Fiber 5.00 %. The chemical tests showed that feed using *Canavalia ensiformis* flour (B, C and D) was no less competitive than commercial feed sold in the market (feed A). The chemical quality of *Canavalia ensiformis* flour is able to maintain or minimize the nutritional content of pellets so that they can be used as feed for raising lobsters. Koro plant can replace soybeans because it has a nutritional value that is almost the same as 27.6% dry matter supplied as feed (air). Nutrient content % of dry matter in the aerial part of Koro "Jack bean" *Canavalia ensiformis* (canopy) is as follows: Crude protein 19.1%, Crude fiber 35.0%, NDF 45.5%, ADF 31.1% , Lignin 10.3%, Ash 9.4%, ether extract 1.8% Energy 18.7 MJ/kg DM. The mineral content for Ca 24.4 g/kg BK, Phosphorus 2.6 g/kg BK, Potassium 15.6 g/kg BK, Magnesium 6.3 g/kg BK (Feedipedia A program by INRA, CIRAD, AFZ and FAO 2012).

Nutritional content, koro sword has all the nutritional elements with quite high nutritional value, namely carbohydrates 60.1%, protein 30.36%, and fiber 8.3% (Sudiyono, 2010). *Canavalia ensiformis* protein can be considered as a source of protein for food, because of its excellent amino acid balance, high bioavailability and low antinutritional factors. Koro beans have a source of B vitamins, several minerals and dietary fiber which is important for health. *Canavalia ensiformis*, has a relatively high nutritional value in the form of protein, carbohydrates and other nutrients as well as a good composition of amino acids (Kalaminasih & Pangesthi, 2013; Marifat, 2014; Nurohman et al., 2016).

V. CONCLUSION

Organoleptic test results showed that the parameters of speed of breaking (crushing), level of hardness, level of homogeneity (uniformity) and attractiveness were significantly different from the use of *Canavalia ensiformis* flour while the parameters of sinking speed and deliciousness were not significantly different. The proximate chemical test results for the feed using *Canavalia ensiformis* flour were the best on feed B, with a moisture content of 9.34%, ash content of 11.87%, crude protein (N x 6.25) 29.98%, crude fat 6.84 %, Carbohydrates 41.92 % and Crude Fiber 5.00 %.

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