Proximate Analysis of Kijing Taiwan Carcass (*Anodonta woodiana*) in Wet and Dry Forms

(Analisis Proksimat Karkas Kijing Taiwan, *Anodonta woodiana*, Basah dan Kering)

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Abstract

Field practice activities conducted in laboratory incluiding the process of carcass removal from its shells was done in the Laboratory of Nutrition and Fish Feed Technology, and also analysis of Kijing Taiwan carcass chemical composition was done in the Research and Industrial Standardization Institute of Manado. The purpose of field practice are: Analyzing the Proximate composition, Vitamin C, Calcium, and Energy of Kijing Taiwan carcass taiwan in wet and dry form. Providing scientific information about the nutrient content of Kijing Taiwan in wet and dry form. Acquire skills in operating the Proximate instruments of Vitamin C, Calcium, and Energy in the laboratory. Based on the results of the Kijing Taiwan (*Anodonta woodiana*) carcass proximate analysis in wet form, the data showed, 11.59% of protein, 80.66% of water, 0.26% of fat, 3.06% of ash, 0.23% of crude fiber, 4.20% of carbohydrate, 65.5 kcal of energy, 0.59% of calcium, 3.86 mg/100 g of Vitamin C. While the dry form of the data showed, 54.84% of protein, 12.18% of water, 4.08% of fat, 14.92% of ash, 0.53% of crude fiber, 13.45% of carbohydrates, 309.88 kcal of energy, 0.55% of calcium, 14.88% of vitamin C mg/100 g.

Keywords: Carcass *Anodonta woodiana*, proximate analysis, vitamin C, calcium, and energy.

INTRODUCTION

Aquaculture has become the foundation of future by shifting the role of fisheries which is still facing fundamental constraints. Therefore, the world community needs of animal protein, especially fish continues to increase along with the world population's growth, especially supported by the slogan of fish as intelligence food. The reason is because fish contains high protein that is composed of essential amino acids and fat content of which 1-20% easily digested and directly usable by the body tissues. Therefore, the cultivation of fresh water, sea water or brackish water should be

developed to provide the world's needs for fish. Today's cultivation development mostly towards an intensive cultivation.

Intensive cultivation cannot be separated from the role of fish feed since the larval stage to be parents, and especially at the stage of enlargement. With the rapid development of aquaculture, feed requirements would increase. The availability of food in sufficient quantities, on time, nutritional value, and sustainable is one very important factor in the cultivation of fish.

In intensive farming, feed costs are the highest costs ranged between 60-80%. According to Khairuman and Amri (2002), artificial feed is intentionally feed made from several types of materials that contain specific nutrients. Raw material for fish feed can be obtained from materials derived from animal or vegetable material. According to Djajasewaka (1985), the nutritional value of animal ingredients is better than vegetable materials. So far, the main material in pellet formulation is fish flour. Fish flour tend to be expensive and still imported. To reduce dependency fish flour usage, a precaution step is taken by finding alternative raw materials that could potentially be used.

Kijing Taiwan *(Anodonta woodiana)* is a freshwater mussel that originated from Taiwan. This Kijing accidentally get in to Indonesia when Indonesia introduced the tilapia/Nila fish back in 1969. Economically, this Kijing has a fairly large portion of meat to be consumed which it can be a source of protein for the people, also can be used as raw material for animal feed, fresh water pearl producer, medicine ingredients and button's raw materials. Related to the potential of Kijing Taiwan's large portion of meat and high protein contents, so in this field practice activities, the examination of proximate composition, vitamin C, calcium levels, and energy in both wet and dry form which collected in Freshwater Aquaculture Center, Tatelu, were performed.

RESEARCH METHOD

1. Materials

The materials used for proximate analysis, vitamin C, calcium, and energy in wet form of Kijing aiwan Carcass (*Anodonta woodiana*) includes:

- Kijing Taiwan (*Anodonta woodiana*), used as a sample
- Tissue, used to dry the Kijing Taiwan carcass
- Plastic containers, to store the Kijing Taiwan carcass.

Figure 1. Kijing Taiwan

2. Equipments

The equipments used in Kijing Taiwan wet and dry form carcass sample preparation includes:

- Spoon, to take the Kijing meat from its shell.
- Ruler, to measure the morphometric of Kijing Taiwan.
- Ohaus Scales with 0.0001 mg of accuracy, to measure the weight of Kijing Taiwan carcass.
- Tray, used as a container to put the Kijing carcass which about to be dried in the oven.
- Oven, used to dry the Kijing Taiwan carcass.
- Destruction Tools and kejldhal micro distillation equipment, used to determine the protein content of the analyzed Basic material. In determining the protein content also using the titration as a volume measure instrument in which the tool is marked with circular line.
- Thimble and soxhlet extraction Tools, to determine fat content contained by the analyzed material. This tool is equipped with a Soxhlet tube and soxhlet flask, and thimble as a cooling devices that are connected to the electric current.
- Calorimetrik bomb, to determine the number of calories contained by the analyzed material. In the operating of this Calorimetrik Bomb, should be assisted with oxygen tubes and connected to the electrical current.
- Ash heater, an annealed tool that can reach temperatures of 1000°C. Basic material which to be analyzed the ashes levels, placed in porcelain bowls or aluminum voil and before use, the devices were dried in a drying oven first.
- Pipette, used to transfer a known volume of liquid from one container to another.
- Hot plate, is a tool to homogenize the solution with stirring. Plate (plate) contained in this tool can be heated to accelerate the process of homogenization.
- Titration, used to determine the concentration of the reactants
- AAS, used to read the calcium.

3. Sampling Method

Select a fish pond that had been harvested but still had water, because in dried fish pond the Kijing tends to decease. Locating the Kijing on the pool surface using our foot, then pick up the Kijing that we found. Collected only alive Kijing Taiwan. The number of samples was about 28 alive Kijing Taiwan. Then put the collected Kijing Taiwan into a container that was fill with water to keep the Kijing alive.

Figure 2. Collected sample of 28 individuals kijing Taiwan

Activities of field practice were carried out in Laboratories either in relation to remove the carcass from its shells and chemical composition analysis of Kijing Taiwan carcass in wet and dry conditions. Removing carcass of Kijing Taiwan performed in the Laboratory of Nutrition and Fish Feed Technology, Faculty of Fisheries and Marine Sciences University of Sam Ratulangi.

The steps are: first we washed the Kijing Taiwan with cold water, then measured themorphometric. The number of measured sample taken is 28 individuals. Then pull up the meat with a spoon, removed and rinsed, then dried using a tissue, weighed the meat and the shell, then put in a plastic bag. From the 28 individual samples, the result of carcass weight is 500 g, and prepared for proximate analysis in wet condition. Furthermore, for proximate analysis will be used 143 dry condition samples, the first step is similar to collecting carcass in wet condition. Next step, Kijing Taiwan thinly sliced and then heated in an electric oven at 105˚ C until it get dry. Drying process is 7 hours. When finished drying, the dried Kijing Taiwan meat is weighed to be prepare for proximate analysis of Kijing Taiwan carcass in wet condition at Baristand Laboratory. For total of 143 individual samples obtained after drying, total weight is 500 g.

Examination of Kijing Taiwan proximatein both wet and dry condition took place at Manado Research Office and Industry Standardization Laboratory analyze levels of protein, fat, carbohydrate, ash, crude fiber, water, energy, vitamins, and calcium.

4. Chemicals Analysis

Proximate Examination of Kijing Taiwan in wet and dry condition was worked in Industry Standardization Research Center of Manado for analysis of protein content, fat, carbohydrate, ash, crude fiber, water, energy, vitamins, and calcium. Examination of Kijing Taiwan meat in wet condition are using micro Kjeldahl method to analyze protein level, fat level analysis using Soxklet, water and ash content analysis by heating method, carbohydrates analysis by calculation, crude fiber analysis by gravimetric, energy level analysis by using Bomb Calorimeter tool (Sudarmadji 1984), Vitamin C analysis by Titrimetric, Calcium analysis by AAS (Absorption Spectrofotometric).

RESULTS AND DISCUSSION

Raw material is a one of composition that will be used to make artificial feed. Raw material of the fish feed formulation should be selected in advance to determine it's nutritional value. Quality of the fish feed is determined by the composition of the feed material, source of the material, digestibility, amount and balance of various amino acids (Asminatun, 2010). Proximate analysis dry condition carcass shows results of content: 54.84% of protein, 4.08% of fat, 13.45% of

carbohydrates, 12.18% of Water, 14.92% of Ash, 0.53% of Crude fiber, 308.88 kcal of Energy, 14.88 mg/100 g of Vitamin C, and 0.55% of Calcium. Very potential to be used as a raw material of fish feed ingredients from animal groups, because it has >20% protein content.

Since *Anodonta woodiana* produced in the tropical areas and as a cheap source of protein, it also contains 17 kinds of amino acids, which consists of 9 essential amino acids and 8 non-essential amino acids. Although there is no qualitatively detailed of name and the elements contained in this amino acid but the amino acid glutamate content is one that is owned by this Anodonta woodiana. In the manufacture of shell fish crackers industry this is used as an substitute ingredient for glutamate. Physical and chemical structures of this Anodonta carcass is possible as fish feed formulation which is the physical appearance of Kijing Taiwan flour particles and diameter is smooth, with a brownish-white color, fine fragrance, and not taste salty. From the analysis result in wet and dry condition, there are 3 types of fish-eating type suitable for the use of raw materials of Kijing Taiwan carcass as a substitute of fish flour,which is fish classified as Omnivores, carnivores, and herbivores. It will be matched to the needs of each fish and how to formulate or substitute this raw material into fish feed. Raw materials from Kijing Taiwan has >20% of protein content.

a. Protein

Protein is a nutrient element needed by aquatic biota in which the protein is use ful for growth, to replace damaged cells and as a source of energy (Halver, 1980). Range of required protein needed by farmed aquatic biota is between 35-50% (Harper, *et al.,* 1990). The amount of protein in the feed needed by fish depends on the type of fish and fish habitat. Like a gold fish requires 38% protein in feed, cat fish require protein content in the feed by 35%. (Djajasewaka, 1985).Such as goldfish need 38% protein in feed, catfish requires protein content in the feed by 35% (Djajasewaka, 1985). Protein content in Kijing Taiwan's carcass at dry form is 54.84%, a raw material of fish flour substitution in fish feed formulation.

b. Fat

Fat in the diet has a role as a source of energy compared to protein and carbohydrates, because the highest energy-producing fats in fish feed. Helps absorption of dissolved minerals, especially Ca and vitamins that are fat soluble (A, D, E, and K).

Fat can be stored as an energy stock for long-term during the absence of food and energy (fasting). Especially for aquatic organisms, fat plays a role in maintaining the balance system by density shrinking, so that the organism can float in the water. The result of fat content analysis was 0.26% in wet condition and 4.08% in dry condition. To fish, fat is recommended approximately 10%.

Fat for carnivorous fish requires no more than 8% in their feed. While herbivorous fish needs no more than 3% of fat. Bandeng fish needs about 7-10% of fat,

6-10% of fat for Nila fish, 6-8% of fat for gold fish, and 10% of fat for Kakap fish. While shrimp is depending on their stadium, a larva needs 12-15% >1 gram of 3-8% of fat, 8-12% of fat for juvenile. The negative impact of excessive amount of fat for fishis the difficulty digesting fat, slow growth of fish and reducing feed efficiency. The presence of fat in the diet can give a feeling of delicacy which is more interesting. However, excessive amount of fat can cause sourness of fish feed. (Mudjiman, 1984).

c. Carbohydrate

Table of Proximate analysis showed that the Kijing Taiwan carcass analysis at wet condition contains 4.20% of carbohydrate, and 13.45% of carbohydrate at the dry condition. As energy supplies fat, carbohydrate is also one of energy source in the feed for water biota. In this case, a carbohydrate has quantitatively and qualitatively role at third ranks after protein and fat. Carbohydrate content in the feed ranged 10-50 %, depending on the species of cultivated fish. For example, gold fish need 20-30 % of carbohydrate and cat fish need 10-20 % of carbohydrate in their feed (Djajasewaka, 1985). Carbohydrates can be useful as an adhesive or binder element, but if carbohydrates in the formulating of feed exceed the needs of aquatic biota, it will affect their growth (Mudjiman, 1984). Carbohydrates also as a source of calories or energy, as a source of fiber, source of flavor with sweeteners, stabilizers, fillers and forming, requires the absorption of calcium.

As shown by the result of chemical analysis, carbohydrate content of Kijing Taiwan in dry form, suitable as aquatic fauna's feed ingredient. Carbohydrates in the form of crude fiber was not included as a necessary nutrient. This is because the raw fiber is difficult to digest. In a certain quantity, crude fiber is also required to form lumps of dirt or feces making it easier to be issued (Mudjiman, 1984).

Prakarsi (1983) suggested that high crude fiber will reduce the efficiency of a feed. Crude fiber content less than 8% will positively increase the efficiency of a feed, but when exceeding 8% will reduce the feed value (Djajasewaka, 1985).

d. Water Content

Water content is needed by fish and shrimp to live, especially for the process of metabolism and body fluids production (Mudjiman, 1984). A good artificial feed generally contains from 10-12% water content range (Sutikno.E, 2011). In the feed ingredient and ready to use feed, when the moisture content is too high, it will be easily defect and will not hold up in storage due to the presence of fume and bacteria. The water contained in the Kijing Taiwan is 80-66% at wet condition. This is normal and possible because the wet condition allows Kijing Taiwan carcass to absorb a lot of water. However, Kijing Taiwan carcass in dry condition contains 12.18% range of water and makes it more suitable to be a basic ingredient in the manufacture of feed as a protein source.

e. Ash

A group of minerals from vegetable or animal obtained by cremate the material

is called mineral or inorganic substances. (Parakarsi, 1983). Although it is minerals that required in formulating feed to fulfill the needs of aquatic biota, but the contribution of minerals in the diet is very important. According to Djajasewaka, (1985) mineral or ash content ranges needed from 3-5%. Based on the results of the analysis shown in Table 1, ash content obtained in the form of wet ash was 3.06% and in the form of flour was 14.92%. In particular the results of the analysis of calcium in Taiwan gravestone carcass wet or dry form was 0.59% and 0.55%.

f. Energy

Farmed aquatic biota needs energy for growth, motion and reproduction derived from nutrients such as protein, fat, and carbohydrates (Djajasewaka, 1985). The same thing stated by Djuniawal (1991) that shrimp needs energy for body's defenses, movement and the rest for grow. Energy needs will decline parallel with the growing size of the fish and shrimp. According to Djajasewaka (1985), feed containing low fat and contain less energy than 3000 kcal, will not support a good growth for fish. Kijing Taiwan carcass in wet form containing 65.5 kcal of energy, and 309.88 kcal in the dry form. These results indicate that the opportunity to be used as feed ingredient material base for cultivated aquatic biota.

g. Crude Fiber

Crude fiber is part of carbohydrate which not considered as necessary nutritional elements, as difficult to digest. However, at certain amount, a crude fiber is needed to form clumps of feces, make it easier to come out from the intestine (Mudjiman, 1994).

Tillman et al (1989) stated that the consumption of feed which containing high crude fiber content can increase the volume, weight and energy of the feces. According to Mudjiman (1984), when the crude fiber content less than 8%, it will increase the value of a good feed, but when exceeding 21% would interfere with the growth of aquatic biota. Crude fiber content in the Kijing Taiwan carcass wet form is 0.23% and in dry form 0.53%. Crude fiber on Kijing Taiwan carcass is worthy enough as basic ingredients in the formulation of feed ration. Because it is on a normal free of nutritional composition.

h. Vitamin C

Vitamin C is often referred to as ascorbic acid (Lehninger, 1993). This vitamin has two forms: oxidized and reduced. Both forms have biological activity. But reduced form mostly found in food (Prawirokusumo, 1991). Vitamin C easily found in nature and commonly found in many foods such as fruits (Moehji, 1982). According to Linder (1985), fresh vegetables are also a good source of vitamin C but Widjajanti (1988) stated that vitamin C is contained in all animals and all high-level additional tissues. Therefore in the proximate analysis, Vitamin C analysis also included to evaluate how far the contribution of Kijing Taiwan carcass to the presence of vitamin C. The results of the analysis of vitamin C in the form of wet and dry is 3.86 mg/100g and 14.88 mg/100g. Vitamin C

appears to have a lot of roles to the organism, especially fish. The role of vitamin C are as anti-oxidants, sources of raw materials hydroxylation of steroid hormone biosynthesis in the accumulation of yolk (Horning, et al 1994), and contribute to the process of vitelogenesys and embryogenesis which is necessary for the growth of fish's bones and teeth, digestion process and enzyme systems (Matsumoto, et al. 1991). Lumenta (2000), also added that the vitamin C function is to boost immune, accelerate wound healing, decrease the risk of gastric cancer, and help in forming collagen. Vitamin C is rarely found in excessive amount in the body of the fish. Normally vitamin C will immediately metabolize and removed (excreted), when it exceeds the ability of body to store it. Vitamin C is needed by young fish and fingerlings reared in ponds with high density so often experience stress and limited muscle movement. Vitamin C will rapidly oxidize into dehydrogenate form which is biologically active. However, if it oxidizes furthermore, becoming inactive biologically. (Afrianto and Liviawati, 2005).

CONCLUSION

It could be concluded that wet carcass of Kijing Taiwan contained 11.59% of Protein; 0.26% of Fat; 80.66% of Water; 3.06% of Ash; 0.23% of Crude Fiber; 4.20% of Carbohydrate; 65.5 kcal Of Energy; 0.59% of Calcium; and 3.86 mg/100 g sof Vitamin C while dry carcass contained 54.84% of Protein; 4.08% of Fat; 12.18% of Water; 14.92% of Ash; 0.53% of Crude Fiber; 13.45% of Carbohydrate; 309.88 kcal. Of Energy; 0.55% of Calcium; and 14.88 mg/100 g of Vitamin C.

Kijing Taiwan carcass in dry condition was suitable to be used as raw material for fish food ingredient because its has a high protein content.

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