

## UTILIZING WASTE PRODUCT OF TUNA (*Thunnus atlanticus*) FISH SILAGE AND ITS IMPLEMENTATION ON THE MEAT PROTEIN CONVERSION OF BROILER

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### Abstract

*The research was held to find out the effect and optimal of adding waste product of Tuna (*Thunnus atlanticus*) fish silage in ration on the meat protein conversion of broiler. The research used 100 broiler day old chicken, were divided into twenty cages, and each unit cage consists of five broiler chickens. The research was conducted with experimental method of Completely Randomized Design with four treatments, where each treatment was repeated five times and each repeated consist of five broiler chicks. The treatments consist of one ration without waste of Tuna fish silage ( $R_0$ ), and each level of ration contains waste of Tuna fish silage  $R_1$  (4%),  $R_2$  (6%) and  $R_3$  (8%). Variable analysis were final body weight, carcass percentage and the meat protein conversion of broiler. Conclusion of research showed that by using waste of Tuna fish silage until 4 percent level in ration had optimal response on the final body weight ( $R_1=1844.87$  gram,  $R_0= 1755.03$  gram,  $R_2 = 1654.84$  gram,  $R_3= 1439.53$  gram), carcass percentage ( $R_1=72.63\%$ ,  $R_0=69.20\%$ ,  $R_2= 67.85\%$ ,  $R_3= 65.90\%$ ) and the meat protein conversion of broiler ( $R_1=0.86$ ,  $R_0= 0.85$ ,  $R_2= 0.82$ ,  $R_3=0.78$ ).*

**Key words:** Tuna fish, silage waste, final body weight, carcass percentage, meat protein conversion

### INTRODUCTION

Rations are environmental factors that can affect the success of the poultry business, due to production costs incurred 60-70 percent. Increased production costs can be overcome by finding a quality alternative feed ingredients. One alternative feed ingredients that have good potential as a substitute for fish meal is the waste of processed tuna industry, which consists of head, viscera, flesh and bone whose numbers may reach 10-25% of the total catch and harvest fish, estimated at about 500,000 tons per year, can be utilized as a component of animal feed [8]. Waste product of fish if given directly to cause negative effects because the waste can be easily damaged and rotten, so need to be processed first, namely through the process of making silage.

Processing of silage did not cause environmental pollution because no part of fish is wasted. Processing of fish silage by using organic acids can work with higher pH, ie pH 4 and finally product can be given directly to livestock, while the mineral acid

must be neutralized first [11]. Addition of acid will accelerate the dissolution of fish, while it also inhibits spoilage by bacteria or fungi. On manufactory chemical silage, prior to the addition of acid, the pH of the fish was 6.8 and after addition of acid will drop to 3.2 and kept in a low pH for 5 days, then the pH will rise and eventually stink after the mushrooms growth [6],[12]. Enzymes contained in fish helped solve the peptide chains that are not solved by the acid. Composition of nutrients in fish silage is similar to fish meal fish. Silage made from whole fish water contained water 70-75%, protein 18-20%, fat 1 -2% and ash about 4-6% [11].

The digestibility of fish silage is higher and the amino acids that are available are better than fish meal [4]. Utilization of fish silage protein of almost 100%, whereas the fish meal only between 30 - 60% [7]. The content of lysine and methionine of chemical fish silage is 4.11% and 2.02% better than flour fish 2.33% and 1.12% respectively. [3]. But fish waste silage will deficiency for

tryptopan, and problems in storage and transportation because in liquid form and the volume is large enough. However, this can be overcome by drying the silage dry when way mixed with other feedstuffs such as corn or rice bran. Tuna fish silage consisting of the head and the remaining of flesh and bone, is made by adding 3% formic acid (90%) and propionate acid (99%) with ratio 1:1. Tuna waste has 20.17% crude protein, 1.17% crude fat, 1.01% crude fiber, 74.11% water and metabolizable energy 1002 kcal/kg. The water content of tuna silage (*Thunnus atlanticus*) is 63.75%, 34.97% crude protein, crude fat 0.55% and 2067.85 kcal/kg of metabolic energy [2]. While fish meal content of 63.05% crude protein, 0.89% crude fiber, 4.34% calcium, 2.80% phosphorus and 2853.20 kcal/kg metabolizable energy [3].

The carcass are consumed us fillet or whole carcass, and the carcass was related to weight gain. Carcass production associated with weight gain. Bone as part carcass whose condition will affect the meat, where the longer bones will produce more meat. Percentage of carcass components of broiler male were 58.60 % meat, 24.26% bone and 14.87% skin and the female were 61.14% meat, 22.17% bone, and 14.10% [12]

Tuna fish silage as good protein supplement can partially replace the fish meal in broiler ration [7]. The fish silage in broiler ration is recommended only up to

level 5% - 7% level [7] but more this 8% tuna silage have negative effect to growth broiler [10]. The aim of this experiment are to study the optimal percentage tuna fish silage in broiler ration that will raised the final body weight, the carcass percentage and meat protein conversion of broiler.

### MATERIALS AND METHOD

The research used 100 day old chick broiler, with average body weight 45.66 gram and coefficient variable 4.59%. The birds kept in litter system, as much as 20 flock, and each unit consist 5 chickens. Every flock is equipped with round feeder and waterer, and 60 watts hanging, bulb lamp as heater at the middle of each flock.

The ration consist of corn-meal, fish-meal, rice bran-meal, soy-bean meal, coconut meal, tuna fish silage, CaCO<sub>3</sub> and premix additive are 23% protein and 3200 Kcal/kg of metabolizable energy. Fish silage made chemically by adding 3% formic acid (90%) and propionic acid in the ratio 1: 1 on the fish waste. The formula rations were :

- R<sub>0</sub> Control diets
- R<sub>1</sub> Diets contain 4% of tuna fish silage and 11% of fish meal
- R<sub>2</sub> Diets contain 6% of tuna fish silage and 7% of fish meal
- R<sub>3</sub> Diets contain 8% tuna fish silage and 3% of fish meal

Table 1. Ration Composition (%)

Ingredients	Diets			
	R0	R1	R2	R3
Yellow corn	57.50	60.00	59.50	60.00
Soybean meal	19.75	16.50	17.25	18.25
Coconut meal	3.00	3.75	2.75	3.00
Rice bran	2.00	2.00	4.75	5.00
Fish meal	15.00	11.00	7.00	3.00
Tuna fish silage	0.00	4.00	6.00	8.00
Vegetable oil	2.00	2.00	2.00	2.00
CaCo <sub>3</sub>	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00

Notes : R<sub>0</sub> = Control diets, R<sub>1</sub> = Diets contain 4% tuna silage, R<sub>2</sub> = Diets contain 6% tuna silage, R<sub>3</sub> = Diets contain 8% tuna silage

The compositions of the rations and the metabolizable energy and nutrient content in Table 1 and Table 2 consecutively. Completely

Randomized Design (CRD) was used in this experiment with 4 treatments, and each treatment was repeated 5 times. Then the data

was analyzed by random simple test, and among treatments with Duncan's Multiple Range Test. Variable analysis were final body

weight, carcass percentage and the conversion of meat protein.

Table 2. The Nutrient and metabolizable energy content (%)

The nutrients	R0	R1	R2	R3
Crude Protein	23.03	23.27	23.04	23.01
Crude Fat	7.84	7.38	7.45	7.45
Crude Fiber	5.38	7.95	8.06	8.20
Calcium	1.19	1.09	0.99	0.80
Phosphor	0.98	0.87	0.81	0.73
Metabolizable energy (Kcal/kg)	3281.56	3254.81	3232.74	3214.25

## RESULTS AND DISCUSSION

The final body weight, carcass percentage and conversion of meat protein is showed in Table 3.

Table 3. Average of Final Body Weight, Carcass Percentage and Meat Protein Conversion

Variables	R0	R1	R2	R3
Final body weight (g)	1755.03 <sup>ab</sup>	1844.87 <sup>b</sup>	1654.84 <sup>a</sup>	1439.53 <sup>a</sup>
Carcass (%)	69.20 <sup>ab</sup>	72.63 <sup>b</sup>	67.85 <sup>a</sup>	65.90 <sup>a</sup>
Meat-protein conversion (index)	0.85 <sup>b</sup>	0.86 <sup>b</sup>	0.82 <sup>b</sup>	0.78 <sup>a</sup>

Note: The same letter on the same line show no significant difference (P<0.05)

### Final Body Weight

Diets contain of 4% of tuna fish silage and 11% of fish meal (R1) gave the best result on final body weight, and significantly different (P<0.05) from other treatments, but has no significant effect to feed consumption. which was not significant. R<sub>1</sub> ration and R<sub>0</sub> (control) was better than R<sub>2</sub> and R<sub>3</sub>, because

it contains complete amino acids. In R<sub>3</sub>, the amino acids was inbalance, so give the lowest final body weight.

The final body weight of broiler that feed with tuna fish silage is lower than fish meal, ever the processing didn't destroy the nutritional quality of the row materials [6], [12].

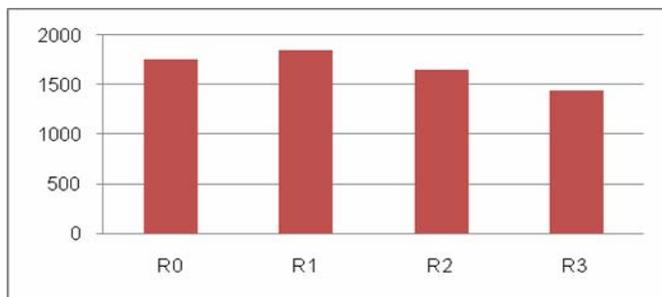


Fig. 1 Final Body Weight (gram)

### Carcass Percentage

Broiler carcass weight was determine after evisceration. The carcass weight percentage often used as meat production measurement, in this research (67.50 to 66.67%) were in the

normal range. According [9] that carcass weight ranged around 65-75% of live weight. In Table 3 be seen that the highest of carcass percentage was broiler that fed with R1 (72.63%) and the lowest was R0 (65.90%).

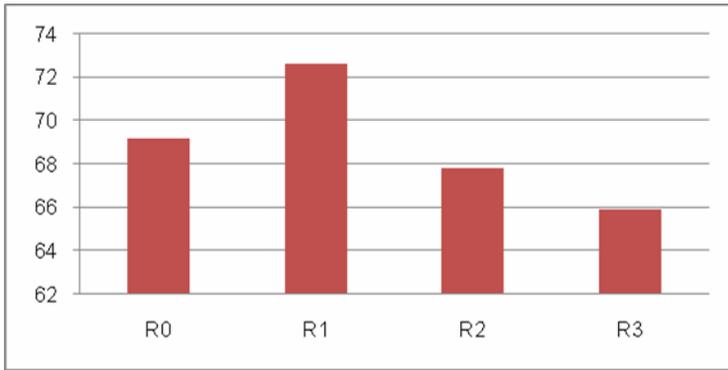


Fig. 2 Carcass Percentage (%)

Analysis of variance showed (Table 3) that silage tuna fish has significance ( $P < 0.05$ ) to carcass percentage. By giving 4% tuna fish silage in the diets gave the optimal affect on carcass percentage, because by giving 6% and 8% will decreased the carcass percentage. According [9] that influence carcass weight in addition to the nutrients in the diets.

**Meat-Protein Conversion**

The average of meat-protein conversion is showed in Table 3. The meat protein

conversion in R3 is lowest (0.76) and those R1 was highest (0.86). Analysis of variance showed that tuna fish silage that added until 6% into the diets has significance ( $P < 0.05$ ) to meat protein conversion. Because the content of amino acids in tuna fish waste silage well enough tuna fish silage to partially replace fish meal in the diets without affecting the conversion of broiler meat protein.

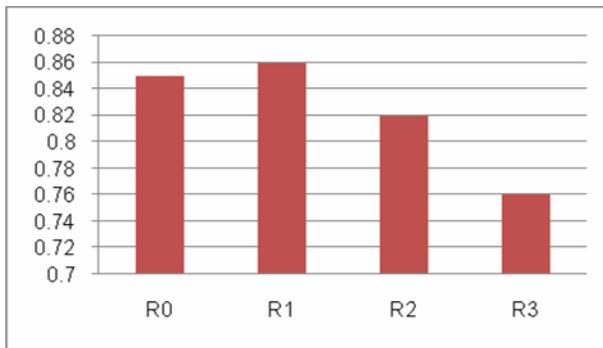


Fig.3. Meat- Protein Conversion

The digestibility of fish silage is higher and the amino acids that are available are better than fish meal [4]. Utilization of fish silage protein of almost 100%, whereas the fish meal only between 30 - 60%. Giving waste product of fish silage in broiler diets is recommended only up to level 5% - 7% [7].

**CONCLUSIONS**

1. Until 6% tuna fish silage have no significant effects on final body weight, carcass percentage and meat protein conversion.
2. R<sub>1</sub> diet (4% tuna fish silage) has the best results on final body weight, carcass percentage and meat protein conversion on broiler.

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