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Abstract. The study evaluated the addition of edamame soy isoflavone concentrate (ISF) to improve quality of carcasses. 100 head of broilers were divided into four treatments, such as P0 was control, P1 was ISF 1 g/kg diet, P2 was ISF 2 g/kg diet, and P3 was ISF 3g/kg diet.The study used a completely randomized design with had five replications and had five broilers in each treatment. Edamame soy isoflavone concentrate was added from the fourth to the sixth week. Parameters observed in this study were feed intake, weight gain, final weight, feed conversion, carcass weight, carcass percentage, abdominal fat, abdominal fat percentage, meat fat percentage, and total cholesterol of meat. The results showed that the addition of edamame isoflavone soybean concentrate reduced meat fat percentage and total meat cholesterol significantly ($P < 0.05$), but there was no significant effect on ($P > 0.05$) were feed intake, weight gain, final weight, feed conversion, carcass weight, carcass percentage, abdominal fat, abdominal fat percentage.

1. Introduction

One of the determining factors for the livestock business success was the feed factor, in addition to genetic factors, and maintenance managements. The cost of feed in a livestock business especially broilers was the largest component of the total production cost, which around 60 - 70%. Therefore, for growth and produced optimally with maximum profit levels, the feed factor must receive serious attention, especially the quality and price of feed. Generally broilers used commercial feed to meet the need of animal feed, but the price was quite high. It needed efforts to reduce the cost of feed such as utilizing alternative materials available around which could increase livestock productivity, and one of them was used edamame soybeans for feed.

Edamame was one of vegetable soybean that contained highly nutritious and rich in phytochemicals beneficial. Fresh edamame soybean seed contained 35% to 38% protein (dry weight basis) and 5% to 7% lipid on fresh weight basis, and contains of 60% more Ca, and twice the P and K of green peas [1]. The most phytochemicals compound of edmamame soybean was isoflavones. Soybean isoflavones were one of potential phytobiotics that have antioxidant activity. It has been reported that soybean isoflavones can decrease the production of free radicals in plasma, liver, brain, testes, and kidney of male rabbits. In the poultry science, soybean isoflavones has been demonstrated could improve growth performance and antioxidative status to protect against lipid oxidation in breast muscles [2]. Lipid oxidation was one of the main factors limiting the quality and acceptability of meats and meat products. Oxidative damage to lipids occurs because of an imbalance between the

production of reactive oxygen species and the animal's defense mechanisms. This may be brought about by a high intake of oxidized lipids or poly-unsaturated fatty acids [3]. With antioxidative contained on edamame could protected against lipid oxidation.

There were several results of studies that examine the effects of soy isoflavones on broiler carcasses. [4] Reports that supplementation of isoflavone 200 mg/g in feed could increase growth performace and required to affect autocrine or paracrine functions of skeletal muscle cells. Similarly, [5] reported that supplementation isoflavone that contained on corn and soybean success increased weight gain, feed consumption, meat carcass and carcass characteristics, and reduced carcass fat of broiler chickens. Supported also by [2] that isoflavone supplements could reduce fat and increased antioxidants. Edamame soybean also has phytoestrogen activity which contained antioxidant and estrogen-like activity that could be used as feed supplements to reduced fat deposition on meat. This was appropiate the current condition of people nowdays that maintained a diet for healthy lifestyle who wanted low-fat meat in line with the increased of demand for animal protein. Although in vitro studies introduce many speculation of the true effects of soy isoflavones on growth used live animal studies that have investigated for studied the effects of dietary isoflavones including influenced on growth performance, carcass traits, and meat quality, but there was no research before that used of edamame isoflavon to influenced of broiler chicken. So with this research could conducted to evaluate the effects of edamame isoflavone concentrate on growth performance and carcass quality of broiler chicken.

2. Methodology

2.1. Chicken, diet, and management

The research was used 100 DOC of broiler chickens strain MB 202 PT Japfa Comfeed Indonesia production. The broilers were observe as meet the standard of broiler chickens management procedure. At the beginning of the experiment, Weighing of all broiler chickens to determine initial average body weight then placed in a brooder and gave sugar water. For first to the second week was gave feed BR-I (Charoen Pokphand Indonesia Tbk), while the third week used a mixture of feed between BR-I and BR-II for adaptation. A hundred head of broiler chickens divided into four treatment diets with five replications and it placed randomly in houses and total 20 equal size houses that was 80 cm x 80 cm, so each house had five broilers for treatment. Broiler chickens were start of treatment at age 28 until 42 days. Placement was based on a complete random design. Over period of 3 weeks, broiler chickens were given basal feed containing 24% protein and 2900 kcal/kg ME and the basal feed was mixed with edamame soy isoflavone with different concentrate. The treatments given were P0= diet without addition edamame soy isoflavone concentrate as a control, P1= 1 g/kg diet of edamame soy isoflavone concentrate, P2 = 2 g/kg diet of edamame soy isoflavone concentrate, and P3 = 3g/kg diet of edamame soy isoflavone concentrate. Experimental design was to determine the effect of treatments for study the growth and carcass quality using a directional completely randomized design (CRD) pattern.

The houses were cleaned and disinfected with a biodegradable, broad spectrum agent and completely with litter, feeders and drinkers. The broilers ascertained were able to eat and drink conveniently. A hundred watt electric bulb was hanged at a height of 2.8 metre in the middle of room. Feed and water were supplied *ad libitum* throughout the experimental period. Weight gain and feed intake were measured weekly. At the end of experiment, final body weight was measured and broiler chickens from each pen was randomly selected, weighed and slaughtered. After slaughter, carcass (chilled) weight was determined after removal of feather, head, lungs, gastrointestinal tract, liver, kidney and abdominal fat. Carcass yield was calculated as the percentage of fasted final weight.

2.2. Parameter of research

Parameter of research was growth performance parameters: Final body weight, total weight gain, total feed intake, and total food conversion ratio (FCR). Carcass quality parameters: carcass weight, carcass

percentage, abdominal fat, abdominal fat percentage, meat fat percentage, and total cholesterol of meat.

3. Results and Discussion

3.1. Growth Performance

Based on Table 1 showed that edamame isoflavone concentrate addition into feed treatments did not gave significantly effect (P<0.05) for growth performace were feed intake, weight gain, final weight, and feed conversion (FCR).

Table 1. Results of edamame isoflavone concentrate (ISF) addition on broiler's growth performance

Addition ISF (g/kg of diet)	Means			
	Feed Intake (g/bird)	Weight Gain (g/bird)	Final Weight (g/bird)	FCR
P0	2222.56	970.44	2156	2.32
P1	2178.64	940.28	2170	2.33
P2	2210.32	960.72	2150	2.33
P3	2198.28	969.72	2176	2.34

Growth performance is a primary factor for determining the productivity of broiler chickens. Table 1 shows that the edamame isoflavone concentrate addition did not significantly effect (P>0.05) on all of broiler performances such as feed intake, weight gain, final weight, and total food conversion ratio (FCR). It can be indicated that the edamame isoflavone with different concentrate 1 g/kg – 3 g/kg was not intensively metabolized in small intestine of broilers, and the doses of edamame isoflavon treatment were to small. It was also assume that the growth promoting effect of ISF were small attributed to supply of the essential amino acids and insufficient availability of nutrients. Edamame soybean was contain 0.5883 mg/g isoflavones [6], so the maximum concentrate of isoflavone from edamame that added in basal feed was 3 g/kg, it means added 1.7649 mg of isoflavone to 1 kg of feed. The treatment doses were too small and under the research by [5], that added 108.7 mg/kg - 436.7 mg/kg isoflavones to the basal feed had significantly increase of feed consumption and final weight of broiler chicken. [2] report that gave up to 80 mg of isoflavones/kg diet affected weigh gain, final weight and quality of meat by reducing fat and increasing antioxidants in broilers.

Feed intake was the major factor that influences both the weight gain and feed conversion. There were many factors that determined feed intake such as dietary were feed formulation, nutrient composition, and pellet quality ; managerial were environmental management, disease control, and feed-water availability ; physiological was controlling mechanisms limit and encourage consumtion of a particular nutrient; and physical was the maximum broilers eats to fill the gut [7]. Feed conversion ratio (FCR) was a comparison between feed intake and final weight. Edamame isoflavone concentrate addition of 3 g/kg in the treatment did not affect feed intake and final weight so it also did not affect the FCR. Our results agreed with research by [8] that isoflavones did not affect quail weights at doses of 1-5% (10-50 g/kg) in feed. Edamame isoflavone concentrate addition in treatment of 3 g/kg still used under doses. Feed conversion ratio (FCR) was a measured converts feed intake into live weight, profit at any given feed cost, and provides an indicator of management performance. The cost of feed in a livestock business especially broilers was the largest component of the total production cost, which around 60-70% of the total cost of broiler production. A low FCR was a good indication for a high quality of feed especially given feed price that impact on financial margins it means the efficient conversion of feed into live weight is essential for profitability [9].

3.2. Carcass Quality

Based on Table 2 showed that edamame isoflavone concentrate addition into feed treatments did not give significantly effect (P<0.05) for carcass quality were carcass weight, carcass percentage,

abdominal fat, and abdominal fat percentage, gave significantly effect (P>0.05) for fat content were meat fat content and total cholesterol.

Table 2. Results of edamame isoflavone concentrate (ISF) addition on carcass quality

Addition ISF (g/kg of diet)	Means					
	Carcass (g/bird)	Carcass (%)	Abdominal Fat (g/bird)	Abdominal Fat (%)	Meat Fat (%)	Total Cholesterol (mg / 100g)
P0	1694.26	71.254%	38.36	2.26	1.48[a]	88.91 [a]
P1	1582.44	70.388%	35.84	2.26	1.47[a]	77.48 [a]
P2	1551.88	66.826%	35.60	2.29	1.43[a]	70.94 [a]
P3	1454.62	65.665%	34.52	2.37	1.23[b]	66.20 [b]

[a, b] Different superscript at the same row indicated significant effect (P <0.05)

Table 2 showed that edamame isoflavone concentrate addition did not give a significant effect (P>0.05) on carcass weight, carcass percentage, abdominal fat and abdominal fat percentage. It because of edamame isoflavone concentrate addition was 3 g/kg, it means added 1.7649 mg of isoflavones to 1 kg of feed and the dose was too small so it not affected on the variable. Carcass weight was influenced by the final weight, if the final weight was large, the carcass weight was also large, and if the final weight was small, the carcass weight was small too. Table 1 showed that there was no effect of edamame isoflavone concentrate addition to final weight so that also not affected the carcass weight and carcass percentage too. Carcass was the part of livestock after beinged slaughter concisted of meat and bone that separated from head, leg muscles, wings, skin from the neck, skin with subcutaneous fat, abdominal fat and giblets (heart, muscular stomach and liver) [10].

The formation of body fat broilers occurs because of the excess energy consumed. The energy used by the body generally comes from carbohydrates and fat reserves. Sources of carbohydrates on the body produced fat that was stored under the skin and on the abdominal. Abdominal fat was included fat surrounding the gizzard, cloaca, and adjacent muscles. The percentage of abdominal fat was obtained by comparing the weight of abdominal fat with the final weight. The results of abdominal fat weight did not show a significant effect so it also did not affect the results of the abdominal fat percentage. The percentage of abdominal fat in the study was still relevant to the research of [10] that the average percentage of broiler chicken abdominal fat was 1.5 - 2.8%. Opposite with [11] that there was an effect to decreased of abdominal fat weight in the broiler chicken that was fed the low amino acid diet with isoflavones.

Table 2. showed that edamame isoflavone concentrate addition gave a significant effect (P<0.05) on meat fat and total cholesterol. The highest meat fat content of broiler was 1.48 in treatment P0 as a control and the lowest broiler chicken meat fat was 1.23 in treatment P3. The decreased of meat fat content was along with an increase of edamame isoflavone concentrate addition. These results were appropriated with [2] who reported that isoflavones could reduce meat fat of broilers. [5] stated that with dosed ranging from 108.7 mg/kg - 436.7 mg/kg of soy isoflavones could reduce abdominal fat and cholesterol in commercial broilers. [11] Have shown that soy isoflavones lowered the fat deposition in four fat depots measured that was feed the low amino acid diet with isoflavones. The highest meat cholesterol content of broiler was 88.91 in treatment P0 as a control and the lowest broiler chicken meat cholesterol was 66.20 in treatment P3. Isoflavones consist of genistein, daidzein and glicitein which could bind to the fat blood profile. In particular, soy protein causes of decreased in total cholesterol, lowers LDH cholesterol, trigliserida and fat. It was known that estrogen has been shown to reduced of LDL cholesterol, so the role of isoflavones could be suspected to estrogen-like, produced the same effect [8]. So edamame isoflavone concentrate addition in feed causes the decreased of cholesterol in broiler meat.

4. Conclutions

The addition of edamame isoflavone concentrate up to 3 g/kg could reduce fat percentage and cholesterol levels in broiler meat but did not show effect on feed intake, weight gain, final weight, feed conversion, carcass weight, carcass percentage, abdominal fat, abdominal fat percentage.

5. References

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