

Tofu Dregs Fermentation with Effective Microorganism-4 (EM-4) and its Implications to the Performance Ranks of Chicken Broiler+

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ABSTRACT

The purpose of this research is to study the effect of the addition of fermented tofu dregs with EM-4 in ration consumption, weight gain, and conversion of broiler chicken ration. The material used in this research is 75 broiler chickens that are not distinguished by gender. R0 = Ration control, R1 = Ration 5% Tofu fermented tofu, 95% commercial ration, R2 = Ration 10% Tofu fermented, 90% Rations Commercial, R3 = Ration 15% Tofu fermented tofu, 85% Commercial ration, R4 = Ration 20% Tofu fermented tofu, 80% Commercial ration. The method used is a Completely Randomized Design (RAL) consisting of 5 treatments and 5 replications so it takes 25 units of cages, each unit of a cage containing 3 chickens so required 75 broiler chickens. The data generated were analyzed using statistical analysis if there were significant differences in Duncan's multiple tests. The observed variables included feed intake, weight gain, and ration conversion. The results showed that the addition of tofu dregs fermentation with EM-4 did not give a significant effect ($P > 0.05$) on the consumption of ration to 20% while, the ration conversion was not significantly different ($P < 0.5$) to 15 percent but significantly different ($P < 0.5$) with 20 percent

INTRODUCTION

The broiler farming business has a good prospect to be developed because of the high demand of the community for meat. This chicken farming business also provides a high profit and can be a source of income for the chicken breeders (Effendi et al., 2023; Jamil et al., 2025). However, some factors hinder the development of animal production, besides from genetic issues and production systems, it also including food factors, types of food, and conservation methods (Frankham, 2010; Rege & Gibson, 2003). High-quality rations are an absolute requirement that must be met for optimizing livestock production, especially broiler chickens. The rations are one of the factors that affect production. The cost incurred for rationing is 70% of the total production cost (Afandi et al., 2020; Saleh et al., 2020). The high cost of this production has to be tackled by formulating rations themselves, using materials easily available, with prices relatively cheaper, but it still has a good nutrient content for production and animal health itself (Crini et al., 2020).

Efforts to reduce the cost of food are to find foods that do not compete with human beings. The food must have high nutritional value, it is cheap, available continuously, palatable, and not harmful to the animals that eat them (Crini et al., 2020). One alternative to overcome this is to use local materials that have great potential such as tofu dregs. The tofu industry can produce a large amount of soybean waste because the manufacture of tofu only uses juice from soybeans (Zheng et al., 2020). The use of pulp as a feed for livestock broilers should be more careful this is because tofu contains coarse fiber higher while crude fiber is a polysaccharide component of non-starch, whereas the digestive tract of poultry does not have the microorganisms to produce the enzyme cellulase that can break down the enzymes Glycosidic β 1-4 on cellulose. Crude fiber is a typical nutrient constituent of plant cell walls, most of which are cellulose (Gupta et al., 2021; Holland et al., 2020). Besides tofu also have anti-nutrients such as phytic acid which would interfere with the absorption of minerals monovalent 2, especially minerals Cu, Zn, Co, Mg, and Ca, in the presence of phytic acid which may interfere with the absorption of monogastric animals, so the use of tofu in chicken rations Broilers should be limited and more cautious.

Coarse fiber content is too hard in animal feed and cannot be digested causes that can bring food substances that can be ingested to come out with feces. In addition, the crude fiber content in the diet can lead to increase digestibility so that broilers are less able to utilize food substances (Gupta et al., 2021; Tejeda & Kim, 2021). This causes fat levels to fall. The provision of high coarse grain feed on broilers can reduce carcass fat content (Yin et al., 2020). Giving pulp out to determine the carcass quality of broilers, the administration of tofu into broiler chicken rations to the level of 36% does not degrade the quality of the carcass (Fajar et al., 2021; Sugiharto & Nuengjamnong, 2025). The dregs of tofu have been used in rations of livestock, poultry, and ducks with the provision of 10% (Bonde et al., 2021; Ginting et al., 2024). Dregs of tofu are one of the materials that can be used as ingredients for rations (Sari et al., 2024). Nowadays, dregs can be easily obtained at low prices, even on a freeway. Judging from the chemical

composition of tofu dregs can be used as a source of protein. Given the protein and fat content in the high tofu ie 8.66% protein; Fat 3.79%; Water 51.63% and ash 1.21%, it is very possible to tofu dregs can be processed into animal feed.

The result of research related to the utilization of fermentation of tofu pulp as a feed ingredient in poultry, among others, Fermentation can improve the color, and smell and remove toxic material (Terefe & Augustin, 2019). In another research of poultry chicken with 5% and 10% tofu dregs provide better productivity compared to the usual farmer maintenance pattern (Wolaver, 2021). The provision of tofu solid waste/dregs up to 20% in chicken grower phase grows to feed conversion to save production costs. The research result of feeding rations in poultry containing dregs of 30% dregs with 87% crude fiber ration still produces weight gain which is not different from the control ration (Damry et al., 2020; Jamil et al., 2025).

The tofu industry's development positively impacts food production centers' development fulfillment of the community's food products needs (Rosada & Sirajuddin, 2024; Thaliya & Amrina, 2023). However, a large amount of tofu dreg waste will become environmental pollution if it is not processed and appropriately utilized because of its foul smell, organic matter content, and putrefaction potential. Judging from the chemical composition of tofu dregs can be used as a source of protein. Tofu dregs are known to have a high-level protein has 22.2% protein content (Cherdthong et al., 2025). Characteristic dregs of tofu are particles or solids with whitish turbidity and a distinctive soybean odor. The chemical characteristics of tofu pulp are the organic content of carbohydrates, fats, and proteins. The solid waste of tofu manufactured in water is a suspended solid and is deposited.

The dregs of tofu were a waste of tofu manufacture, however, it still contained a high protein with amino acid lysine and methionine, and calcium (Stanojević et al., 2023; Zheng et al., 2020). If the dregs are not utilized, the tofu waste will become waste and pollute the environment. In the tofu industry, the tofu dreg waste generated is commonly 25-35% of the tofu products yielded (Sari et al., 2024; Study, 2024). Therefore, Tofu dreg waste can be applied as animal feed, the drawback of tofu dreg as an animal feed ingredient is its high water and crude fiber. The right technology used for this was a simple fermentation technique to process tofu pulp into fodder.

The application of tofu dreg waste as animal feed is a strategic method to increase the waste's economic value. Judging from the chemical composition of tofu dregs can be used as a source of protein since tofu dregs have higher quality than soybeans. Tofu dreg can be processed into animal feed. It was reported that livestock-fed tofu pulp-based feed grows more quickly. The dregs protein has a higher biological value than the soybean seed protein in its raw state since it comes from cooked soybeans. Recently, tofu dregs are quite easily obtained and cheaply, even can be obtained by freeway. The tofu dregs in the fresh state the water is about 84.5% of its weight. High water content can cause short shelf life. The wet tofu dreg cannot be stored for a long time and will become acidic and rotten in 2-3 days (Huang et al., 2022; Naeem et al., 2024), so the cattle do not like them anymore. The dried tofu waters contain about 10.0 - 15.5% so the shelf life

is longer than the fresh tofu pulp. Chemical composition of dried tofu dried, dry matter 88.35%, crude protein 23.39%, crude fiber 19.44%, crude fat 9.96%, ash 4.58%, BETN 30.48%. The wet tofu has a 25.96% dry protein composition, 11.22% crude fat, 42.49% BETN, 15.7% crude fiber, and 4.14% ash.

Fermentation of tofu with fermented yeasts produces fermented tofu waste with a crude protein content of 21.66%, crude fat of 2.73%, crude fiber of 20.26%, Ca 1.09%, P 0.88%, with metabolic energy of 2,830 kcal/kg, as well as containing lysine amino acids and methionine and vitamin B high enough complex. EM-4 activator is a material that contains several microorganisms that are very useful in the fermentation process (Eska & Nasution, 2022; Kurniawan et al., 2024). Based on the above description, it is necessary to study and information about fermented tofu waste with EM-4 (Effective Microorganism-4) and its application to broiler performance. EM-4 is a type of fermented microorganism that is easily found in the market at an affordable price (Kurniawan et al., 2024), it consists of beneficial and naturally living microorganisms that can improve the efficiency of feed and drinking water (Adetunji et al., 2022; Ezzulddin & Jwher, 2022). The composition of EM-4 includes about 80 genera of microorganisms consisting of 5 main groups, namely phosphate solubilizing bacteria, *Lactobacillus*, Yeast, Actinomycetes, and photosynthetic bacteria (Astutik et al., 2020; Kurniawan et al., 2024).

The development of probiotics in Indonesia has begun to be developed and one of the probiotics in the form of liquid culture media that can be stored for a long time is EM-4 (Effective Microorganisms-4) (Harefa et al., 2024). Further, EM-4 has been shown to increase poultry body resistance, productivity, feed efficiency, meat carcass quality, meat aroma, and egg quality. EM-4 can also improve the physical, chemical, and biological properties of the soil since it can digest cellulose, starch, sugar, protein, and fat. In animal husbandry EM-4 can be used as a mixture of herbs for livestock. The question arises of how much the use of fermented tofu with fermented EM-4 (Effective Microorganism-4) in rations can increase weight gain, ration consumption, and ration conversion. The objectives of the study were to obtain a dose of fermented tofu with fermented EM-4 (Effective Microorganism-4) in rations on weight gain, feed intake, and ration conversion. Usefulness the research of fermentation of tofu waste using EM-4 (Effective Microorganism-4) is expected to be used as a feed ingredient of poultry feed while simultaneously realizing awareness of environmentally sound development.

METHODOLOGY

The scope of the research is to increase the value of the benefits of tofu pulp through fermentation with EM-4 (Effective Microorganism-4) which will be used as broiler ration material, seen from the broiler chicken production aspect. The research place has been done at the experimental cage of STPP campus Gowa. Materials and Research Tools. Material: The ingredients used in the study are tofu, EM-4, sugar or sugar cane, commercial ration, and broiler age of 1 day, Tools: Equipment used is a plastic bag, feeding place, drinking place, sometimes chicken, Calculators, buckets, sacks, basins, scales, presses, and water.

Fermentation of Tofu

The water in tofu dregs is reduced by pressing until the moisture content reaches about 75%. Mix 50 ml EM-4, 50 ml drops of sugar cane or 50 g sugar, and 500 ml of well water. Combine the tofu 10 kg bag with the prepared EM-4 solution, stirring until the tofu waste and the solution blend flat. Put the dregs of tofu into the bucket and cover until airtight for the fermentation process for 7 days. Fermentation is characterized by the tofu-tofu odor that becomes fragrant and can be given to chickens.

Implementation of Research

The enclosures used during the study took the form of units made of wood and bamboo with the size of each unit being 100 x 50 x 50 cm and the height of the floor surface 40 cm. Each unit of the enclosure is equipped with a place to eat and drinking place made of plastic and given the code treatment and random replication code. In addition, each cage unit installed a 75-watt incandescent lamp as an artificial heating and lighting. Distance of 5 cm from the top surface of the chicken body tailored to the needs. The lamp is then raised gradually under the age of the chicken and remains attached throughout the day until the chicken is 3 weeks old. The next days until the end of the study not all lights are turned on, only a few are lit above the rows of cages as a means of lighting, especially at night and when the day is overcast at noon.

Parameters Measured

The parameters observed and measured in this study were ration consumption, body weight gain, and ration conversion.

Design and Analysis of Research Data

The research used an experimental method with a Completely Randomized Design (RAL) consisting of 5 treatments and 5 replications, each treatment placed 3 chickens so that the total number of chickens is 75 heads. The given ration treatment consisted of R0 = Ration control; R1 = Ration 5% Tofu fermented tofu, 95% Commercial ration; R2 = Ration 10% Tofu is fermented, 90% Commercial ration; R3 = Ration 15% Tofu fermented tofu, 85% Commercial ration; R4 = 20% Rations Potassium tofu fermented, 80% Commercial ration. The obtained data were analyzed by analysis of variance and continued with Duncan Multiple Range Test, that is, on the parameters that result in the real difference between the treatments.

RESEARCH RESULT AND DISCUSSION

Ration Consumption

Rations consumed by broiler chickens are composed of several types of feed ingredients that meet the basic needs of life and growth. The rations given to broiler chickens must meet several requirements, the nutrients to energy metabolism must be balanced according to the demands fulfillment optimization achievement production display, and does not endanger the health of the livestock in question.

The effect of treatment on the average consumption of broiler chicken ration per tail during the study is listed in Table 1. Average consumption of the lowest ration at R0 = 2847.11gram; Followed by R4 = 2919.98 grams; R3 = 2947.32 grams; R1 = 2967.96 gram; and the highest is R1 = 2977.32 gram. The analysis result showed that the level of giving fermented tofu and 20% did not show significant differences ($P < 0.05$) to ration consumption. This is due to the protein and energy content in the rations in each treatment being relatively the same.

Table 1. Average rations consumption in broiler chickens each tail during research (gram)

Repeat	Treatment				
	R0	R1	R2	R3	R4
1	2986.64	2906.65	3059.98	2973.33	2969.96
2	2426.65	2816.65	3099.98	3073.33	2749.97
3	3212.30	3076.65	2896.64	2716.64	3043.32
4	3025.65	2979.99	2829.99	3009, 99	2803.31
5	2583.32	3106.65	2953.31	2963.32	3033.32
Total	14235.56	14886.69	14839.50	14736.61	14599.88
Repeat	2847.11	2977.32	2967.96	2947.32	2919.98

Information:

R0 = Ration control

R1 = 5% tofu dregs fermentation, 95% Commercial ration

R2 = 10% tofu dregs fermentation, 90% Commercial ration

R3 = 15% tofu dregs fermentation, 85% Commercial ration

R4 = 20% tofu dregs fermentation, 85% Commercial ration

This research shows that cattle consume rations to meet energy needs in the body, so the nutritional value contained by the ration is closely related to the level of digestibility. Fermented foods have higher nutritional value compared with the original material because, at the time of fermentation, there is an increase in the number of microbial cell mass (Grudlewska-buda, 2022; Sharma et al., 2020; Terefe & Augustin, 2019). The increase was due to the fermentation process producing microbial cells from single-cell proteins, enzymes, microbes, and microbial metabolism of amino acids, nucleotides, and proteins. So it can be concluded that the tofu dregs that have fermentation will have a high energy content compared to the tofu pulp without fermentation. The tofu dregs that it has high moisture and protein content so when stored they will cause it to rot and mold easily. Processing of tofu dregs as flour can be done by drying or by

drying with sunlight or by oven at 45-50 °C, then ground into flour (Ye et al., 2025). The fermentation process will simplify the particles of feed ingredients, thus increasing their nutritional value. Feed materials that have been fermented will be of better quality than raw materials. Fermentation of tofu waste with yeast will convert the protein into amino acids and indirectly will decrease the crude fiber content of tofu (Mulyono, 2022; Somboonchai et al., 2022).

Fermentation can break down cellulose, hemicellulose, and the polymer into simple sugars or derivatives thereof and is capable of improving nutrition original material because the microbes are catabolic in addition can also synthesize vitamins such as riboflavin, vitamin B12, and pro-vitamin A. One material for fermentation is yeast-containing oncom *Neoposporos scatophilia*, this mold has a high lipolytic activity, which produces lipases that hydrolyze triglycerides into free fatty acids. Fermentation is a process of chemical changes in organic compounds of carbohydrates, proteins, and other organic materials both in aerobic and anaerobic conditions, through the work of enzymes done by microbes. Fermentation can occur due to microbial activity that causes fermentation on a suitable organic substrate (Aathika et al., 2021; Mengqi et al., 2023). Furthermore, it is said that the occurrence of fermentation can lead to changes like foodstuffs as a result of the breakdown of food content by microbial enzyme activity produced (Sharma et al., 2020). However, the term fermentation differs between biochemists and industrial microbiologists. Biochemical fermentation of construed as constituting energy through organic compounds, while the application in the fermentation industry is defined as a process to convert the base material into a product by the microbial cell mass (Sun et al., 2022).

Food processing by fermentation has been done from time immemorial, such as making tape, oncom, Tempe and so on which is typical Indonesian food. Fermented soybeans into soybean happened many quality improvements, including the increase in the digestibility of proteins and the formation of various vitamins B (Cao et al., 2024; Yan et al., 2022). Foods that have undergone fermentation usually have a higher nutritional value than the original material. This is not only due to the nature of the microbes' catabolic which transforms complex organic materials such as proteins, carbohydrates, and fats into molecules simpler and easier to digest, but also able to synthesize some vitamin complexes such as riboflavin, pyridoxine (vitamin B6), niacin, vitamin B12, pantothenate acid, and provitamin A. Furthermore, it also can change the taste and aroma unwelcome and be preferred, accelerating the maturation and in certain respects adding durability (Hossain et al., 2025).

Effective Microorganisms 4 (EM-4) is a mixed culture of microorganisms favorable to plant growth. Effective Microorganisms 4 (EM-4) is capable of increasing the decomposition of organic waste and waste, improving the availability of plant nutrients, and suppressing insect pests and pathogenic microorganisms. EM-4 contains selected species of microorganisms, among others; the dominant is lactic acid bacteria (*Lactobacillus* sp) which can increase the solubility of phosphate. Effective Microorganisms-4 (EM-4) also contains yeast bacteria, photosynthetic bacteria, actinomycetes, and other types of

microorganisms. All of these bacteria can live together and harmoniously in a liquid culture. Pathogenic bacteria in chicken manure are reduced after being given Lactobacillus regularly.

EM-4 is a mixture of various beneficial bacteria comprising Lactobacillus sp, Yeast, Photosynthetic, Actinomycetes, and Streptomyces. The EM-4 constituent structure is a beneficial microbial, able to survive under acidic conditions with a pH below 3.5. These microbes are capable of providing a wide range of functions that can affect the cultivation of livestock, crop production, and environmental protection. The results of research conducted at Beijing Agricultural University, Xuzhou region stated that the effect of treatment using EM-4 in broilers given in drinking water from age 8 to 56 days gave a positive impact that can increase body weight, reduce the ratio of the risk of residual drugs and antibiotics in meat that is consumed and increase income. Effective Microorganisms 4 (EM-4) not only increase the growth of animals and plants but can withstand diseases, can eliminate the smell of animal waste, and provide benefits to environmental ecological systems (Kurniawan et al., 2024).

Based on the results of the research of giving EM-4 in drinking water affects the performance of broiler chickens. EM-4 applications in feed and drinking water will improve the value of feed conversion where the amount of feed consumed is relatively little but still increase the weight of broiler chickens. Feed ingredients that have been fermented usually have higher nutritional value than the original material. This is not only due to the catabolic nature of microbes or breaking down complex components into simpler ones that are easier to digest but also synthesize some complex vitamins such as riboflavin, pyridoxine (vitamin B6), niacin, vitamin B12, pantothenic acid, And provitamin A. While thiamine decreases as it oxidizes to thiochrome and thiamine is also used by mold for its metabolism.

Broiler Chickens' Weight Gain

The effect of treatment on the average weight gain of broiler chickens on each tail during the study is listed in Table 2. The lowest rate of broiler weight gain was found in the treatment R4 = 1633.38 grams; R3 = 1707.80 grams; R1 = 1763.34 grams; R2 = 1804.11gram and the highest R1 = 1816.79 grams.

Table 2. Average weight growth rates in each broiler chicken tail over research (gram)

Repeat	Treatment				
	R0	R1	R2	R3	R4
1	1787.66	1774.73	1912.83	1642.85	1545.92
2	1608.04	1718.84	1788.38	1741.16	1484.92
3	1790.11	1841.51	1779.84	1670.22	1741.85
4	2034.57	1944.14	1703.15	1771.28	1682.66
5	1596.30	1804.75	1836.33	1713.49	1711.57
Total	8816.68	9083.97	9020.53	8539.00	8166.92
Repeat	1763.34 ^{ab}	1816.79 ^b	1804.11 ^b	1707.80 ^{ab}	1633.38 ^a

Information:

R0 = Ration control

R1 = 5% tofu dregs fermentation, 95% Commercial ration

R2 = 10% tofu dregs fermentation, 90% Commercial ration

R3 = 15% tofu dregs fermentation, 85% Commercial ration

R4 = 20% tofu dregs fermentation, 85% Commercial ration

The results showed that the effect of treatment was significantly different ($P < 0.05$) on weight gain. Furthermore, to identify the difference between treatments was done Duncan's multiple tests. Further test results showed that the weight gain between treatments R0, R1, R2, and R3 did not show any significant difference ($P < 0.05$). This happens because the chickens with the treatment of adding 5 to 15 percent tofu dregs fermentation can still be tolerated by broiler chickens. Fermented feed material usually has a higher nutritional value than its original material (Kurniawan et al., 2024). This is not only due to the catabolic nature of microbes or breaking down complex components into simpler ones that are easier to digest but can also synthesize some complex vitamins such as riboflavin, pyridoxine (vitamin B6), niacin, vitamin B12, pantothenic acid, And provitamin A. While treatment R4 there is a significant difference ($P < 0.01$) with R1 and R2 So the provision of tofu fermentation until giving 20 percent already cannot be tolerated by broiler chicken. This is due to tofu dregs having anti-nutrients in the form of filtrate acid that will interfere with minerals Ca, Zn, Co Mg, and Cu.

The rations are one factor that great influence on broiler growth and therefore needs special attention. Rations are a combination of food ingredients worthy of being eaten by animals that have been arranged according to a rule, namely the value of the nutritional needs of the animal (Panadi et al., 2022). The nutrient content in ration consumption is very important for optimal growth. Ration consumption is influenced by health, the form of ration, immorality, the balance of food substances, growth rate or egg production, and stress. While another research argues that the factors that influence the consumption of ration are the large body of the chicken, daily body activity, environmental temperature, quality, and quantity of ration (Barzegar et al., 2020). The quantity and quality of the given ration play an important role to support chicken growth. The high quality of the ration lies in the food substances contained in the ration to meet their needs. The optimal protein content is closely related to the rate of growth of chicks. Carbohydrates and fats are a source of body energy, while proteins are substances that help the formation and replacement of body tissues. Proteins can be used as an energy source, but usually only when the body is depleted of energy. If the chicken has excess energy then it will be stored as fat. Excess metabolic energy is not excreted by the animal's body; therefore the most efficient way of feeding the chicken is to make balanced rations between energy levels and other nutrients needed for growth.

The level of crude fiber in the ration is closely related to the energy level, the higher the level of crude fiber rations the ration energy decreases. Crude fiber cannot be used properly by chicken livestock therefore the provision in the ration should be limited. The crude fiber in chicken rations should be no more than 5

percent, while the level of crude fiber in the ration to 10-12 percent does not decrease the effect on production. The energy level in the rations determines the amount of food consumed. Chickens tend to increase their consumption when given a low-value ratio of energy. The energy consumed is used for bodily functions and launches reactions and synthesis in the body, while proteins and other food substances are used for body growth and regulation of conditions and processes in the body. For the ration to be consumed properly then the ration should be palatable. The palatable rations are expected to provide good growth for poultry.

Growth is the formation of new tissues resulting in changes in the weight, shape, and composition of animals. Growth is a very complex universal phenomenon ranging from conception, division of multiplication, and differentiation of cells. After that, it is followed by the addition of body weight and the growth of all parts of the body simultaneously. Pure growth includes the increase in the shape and weight of building tissues such as tendons, bone, brain heart, organs, and all other body tissues except fat tissue. Growth can occur due to the increase in the number of cells and can also occur with the increase of the cell shape. Growth is influenced by nation and chicken type, environmental temperature, sex, metabolic energy, and protein ration levels. In the growth process, in addition, there is the addition of water also there is the addition of protein, and minerals in the body.

The rate of growth is expressed by weight gain measurements by repeating the weights in time every day, week, or month (Id et al., 2020). The growth of broilers is very fast and the growth begins when the chicks hatch until the age of eight weeks, after which the growth rate will decrease (Kurniawan et al., 2024). Generally, cattle that consume more ration or higher ration energy content, have a faster growth rate. The quantity and quality of feed used will be commensurate with the expected growth. Excessive feeding of young cattle results in obesity and can inhibit bone growth and organ development. The level of nutrients that provide metabolic energy with adequate nutrient content can stimulate bone growth and muscle growth is excellent for poultry. The shape of the cage, the type of floor, and the number of chickens per unit of cages as well as climatic conditions can affect the rate of growth in cattle and poultry. Growth usually begins slowly and then progresses faster and eventually slowly again or stops altogether. The pattern produces a sigmoid-shaped growth curve. In normal chicken growth, when the chicken weight is projected against age, a sigmoid-shaped curve will be produced.

Conversion Rations

The conversion Ratio is a value that indicates how much efficient the use of rations is in a broiler farming business. Conversion of rations is the ratio between the amount of ration consumption and chicken weight gain. The lower the conversion value of the ration means the more efficient use of the ration. Chickens that consume more rations with a high weight gain also have the same conversion value as those who consume less ration and lower weight gain. The average conversion of each tail rations during the study is shown in Table 3. The best or lowest ration conversion is achieved at treatment R0 = 1.64; R1 = 1.64; R2 = 1.65; R4 = 1.72 and the highest achieved at treatment R3 = 1.79.

Table 3. Mean Conversion of Rations in Broiler Chickens Each Tail during the Research

Repeat	Treatment				
	R0	R1	R2	R3	R4
1	1.67	1.64	1.60	1.81	1.92
2	1.61	1.64	1.73	1.76	1.85
3	1.79	1.67	1.63	1.63	1.75
4	1.49	1.53	1.66	1.69	1.66
5	1.62	1.72	1.61	1.72	1.77
Total	8.18	8.20	8.23	8.61	8.95
Repeat	1.64 ^a	1.64 ^a	1.65 ^a	1.72 ^{ab}	1.79 ^b

Information:

R0 = Ration control

R1 = 5% tofu dregs fermentation, 95% Commercial ration

R2 = 10% tofu dregs fermentation, 90% Commercial ration

R3 = 15% tofu dregs fermentation, 85% Commercial ration

R4 = 20% tofu dregs fermentation, 85% Commercial ration

The results of the variance are identified to show a significant difference ($P < 0.05$) in the conversion of rations in broiler chickens. Furthermore, to identify the differences between treatments done further test Duncan did multiple tests. The results of further tests of rations conversion between treatments R0, R1, R2, and R3 did not occur significantly ($P < 0.5$) This is due to the level of dietary consumption and weight gain achieved in each treatment being almost the same. This is in line with Mihrani's opinion in 1998 which states that giving EM-4 can reduce the conversion of rations between 1.51 and 1.67. While the treatment of R4 is significantly different ($P < 0.5$) with R0, R1, and R2, this is due to tofu dregs on the limit of 20 percent cannot be tolerated by broiler chicken.

The best estimate for the quality of the rations is to look at their conversion or the efficiency of their use. Ration conversion is the amount required to increase one unit's weight or ration conversion is the ratio between the weight gains produced by the feed unit consumed over a while. The smaller the conversion value of the ration means the better because it is more efficient in its use. Ration conversion becomes more important when viewed in terms of economics because it affects the cost of production. Conversion of rations is one of the factors that

determine the benefits of broiler farms. Factors that affect the conversion of rations are metabolic energy and food substances, amount of consumption, sex, ambient temperature, large body and chicken health, growth rate, or egg production. Ration conversion increases with age, feed consumption, and weight gain. The conversion of broiler ration during the first 6 weeks ranged from 1.7 to 2.0. Rations with an energy of 3000 kcal/kg at the age of 6 weeks and above can achieve a conversion of 2.19 rations. For 6 weeks the maintenance of conversion rates for the rooster was 1.77 and for hens were 1.83 and for the mixture 1.8 and according to ranged from 1.79 to 1.85.

CONCLUSIONS AND RECOMENDATIONS

Based on the result of research and discussion it can be concluded that the provision of tofu dregs that are fermented with EM-4 with various contents does not affect the consumption of ration to 20 percent limit of weight gain and feed conversion is not significantly different ($P < 0.5$) to 15 percent but not significantly different ($P < 0.5$) with a 20 percent grant.

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