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THE EFFECT OF FISH OIL SUPPLEMENTATION INTO THE RATION ON EGG PRODUCTION IN LOHMANN BROWN LAYING HENS

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ABSTRACT
The purpose of this study was to examine the effect of fish oil supplementation into the ration on egg production in Lohmann Brown laying hens aged 48-54 weeks. The laying hens used in this study were 160 Lohmann Brown layers aged 48 weeks with homogeneous body weight. The design used in this study was a completely randomized design with 4 treatments and 4 replications for each unit consisting of 10 hens with a total of 160 Lohmann Brown laying hens aged 48 weeks. The four treatments were: ration without fish oil as control (P0); ration+0.2% fish oil (P1); ration+0.3% fish oil (P2); and ration+0.4% fish oil (P3), respectively. The results showed that 0.20% fish oil supplementation in the ration gave significantly different results ($P \leq 0.05$) on hen day production (HDP), total egg weight, average egg weight, feed conversion, organic matter digestibility and crude fiber digestibility. On the other hand, there was no significant difference ($P \geq 0.05$) in feed consumption, dry matter digestibility and crude protein digestibility. It can be concluded that 0.2% fish oil supplementation in the ration can increase hen day production (HDP), total egg weight, average egg weight, feed efficiency, and organic matter digestibility.

KEYWORD: Fish oil, Feed efficiency, Digestibility, Laying hens.

INTRODUCTION
Laying hens are one of the poultry commodities that produce eggs. Eggs are a popular producer of animal protein because they have high nutritional content and are relatively inexpensive compared to other protein sources.[1] The laying hen industry has experienced rapid development due to the large number of requests from the public. Various groups consume eggs, starting from the lower class, the middle class, to the upper class, which causes the laying hen population to increase every year.[2] Indonesian national demand for chicken eggs in Indonesia will reach 5,044,394.99 tons in 2020. This gives an indication that laying hens have good potential to be developed.

Increasing egg production can be supported by providing nutrition according to their needs.[2] Maximizing the production of laying hens is by fulfilling their energy needs, as well as other nutritional elements, such as protein, minerals and vitamins.[3] One of the ways to fulfill protein, minerals and vitamins is to use fish oil. Fish oil contains about 25% saturated fatty acids and 75% unsaturated fatty acids.[4] Fish oil is a source of long chain omega 3 fatty acids and is very susceptible to oxidation. Fish oil contains omega 3, omega 6, squalene, vitamin A, vitamin D, vitamin E, and vitamin K.

The purpose of supplementing fish oil in feed is as a source of energy in preparing rations and also to obtain eggs that contain high levels of omega-3 fatty acids [5]. Fish oil supplementation is certainly expected to increase the productivity of laying hens which can be added to conventional rations. Based on this description, it is necessary to conduct research on giving fish oil to rations as an effort to increase egg production in Lohmann brown laying hens.

MATERIAL AND METHODS
Animal Treatments and Experimental design
The laying hens used in this study were 160 Lohmann Brown layers aged 48 weeks which were produced by PT. Japfa Comfeed Indonesia Tbk. The cage used in this study was a cage with a permanent battery system made of 80 plots of wire. Each plot was 35 cm long, 30 cm wide, 37 cm high at the front and 30 cm at the back, filled with 2 laying hens. All the pens were located in a building with a roof made of trimdek and a concrete floor. Each row of cages was equipped with a feeder from a paralon pipe and an automatic drinking water

container (nipple). Under the cage using a concrete floor sprinkled with sawdust to reduce the smell of manure and make it easier to clean chicken manure. The design used in this study was a completely randomized design with 4 treatments and 4 replications for each unit consisting of 10 hens with a total of 160 Lohmann Brown laying hens aged 48 weeks. The four treatments were: ration without fish oil as control (P0); ration+0.2% fish oil (P1); ration+0.3% fish oil (P2); and ration+0.4% fish oil (P3), respectively.

The ration used in this study was a conventional ration consisting of; Paial 242, corn, rice bran, concentrate for laying hens, minerals and fish oil. The composition of conventional ration ingredients is as shown in Table 1. Feed and drinking water are provided *ad libitum*. Every ration given was always recorded to find out the difference between the feed given and the remaining feed. Feed analysis was carried out in the Animal Feed Nutrition Chemistry laboratory, Faculty of Animal Husbandry, Udayana University, Denpasar-Bali, Indonesia.

Table 1: Composition of feed ingredients and nutritional content in diets of laying hens aged.

Ingredients	Fish oil level in feed (%)			
	0	**0.10**	**0.20**	**0.30**
Piala P241 concentrate, %	30	30	30	30
KLK S36 concentrate, %	10	10	10	10
Broiler concentrate, %	10	10	10	10
Yellow corn, %	30	30	30	30
Rice bran, %	20	19.8	19.7	19.6
Fish oilr, %	-	0.20	0.30	0.40
Total, %	100	100	100	100
Nutrients				
Dry matter, %	13,33	88,08	12,79	12,95
Ash, %	86,66	13,68	87,20	87,04
Organic matter, %	15,90	86,31	14,38	13,80
Crude protein, %	9,14	16,53	85,61	86,19
Crude fibre, %	4,01	8,47	17,00	16,19
Ether extract, %	45,62	5,90	7,88	8,52
Nitrogen-free-extract, %	61,18	43,49	5,78	5,22
Total digestible nutrients, %	3,14	64,76	42,14	43,29
Gross energy, kcal/kg	13,33	3,68	65,94	63,89

Fish oil

The fish oil used in this research is fish oil product (Scott's emulsion) which was commercialized. Can be found in pharmacies or super markets.

Feed consumption is the difference between the feed given and the remaining feed. Hen Day Production (HDP) is the daily number of eggs divided by the number of laying hens. The total egg weight is obtained by weighing the egg weight from the total number of eggs produced each day. Scales used with an accuracy of 0.001g. Average egg weight, obtained from the total egg weight divided by the number of intact eggs. Feed conversion, is the ratio between the amount of feed consumed and the weight of the eggs gram feed/gram egg mass).[6]

Measurement of nutrient digestibility

Measurement of the digestibility value of dry matter (DM), organic matter (OM), crude protein (CP), and crude fiber (CF), is basically an attempt to determine the amount of these nutrients that can be absorbed by the digestive tract, by measuring the amount of nutrients (DM, OM, CP, and CF) consumed and the amount of nutrients excreted in the feces. Measured by the total collection method for 1 week in the fifth week of the study period by calculating the amount of nutrients consumed by the amount of nutrients in the feces. Determination of the content of DM, OM, CP, and CF.[7] Crude proteins were determined by the Kjeldahl method.[7] For example, to calculate dry matter consumption, it is calculated by multiplying dry matter feed by feed consumption. Digestibility of dry matter of feed, namely the difference between the amount of dry matter consumed and the amount of dry matter of faeces divided by the amount of dry matter consumption multiplied by 100%.[8]

Statistic analysis

The data obtained were analyzed by means of one-way variance, if between treatments there is a significant difference ($P \leq 0.05$), then proceed with Duncan's multiple range test at the 5% level.[9]

RESULTS

The results of the research on the effect of fish oil supplementation at the level of 0.2%; 0.3%; and 0.4% in ration to feed consumption, hen day production (HDP), total egg weight, average egg weight, ration conversion, DM digestibility, OM digestibility, CP digestibility and CF digestibility are presented in Table 2.

The results of the study showed that fish oil supplementation was at a level of 0.2%. 0.3% and 0.4% in feed, did not cause a significant difference (P≥0.05) in feed consumption. The average hen day production in lohmann brown laying hens with 0.2% fish oil (P1) was 12.60% significantly (P≤0.05) higher than the control (P0). Likewise, the average total egg weight in Lohmann Brown layers with 0.2% fish oil (P1) was 12.80% significantly (P≤0.05) higher than the control (P0). Meanwhile, fish oil supplementation at the level of 0.3% and 0.4% showed no significant difference (P≥0.05). The average feed conversion value of lohmann brown laying hens with 0.2% fish oil (P1) was 11.81% significantly (P≤0.05) lower than P0.

Table 2: Effect of fish oil supplementation in the ration on egg Production and Nutrient digestibility in Lohmann Brown laying hens.

Variables	Fish oil level in feed (%)				SEM[2]
	0	0.2	0.3	0.4	
Feed consumption (g/hen/days)	123.62	118.15	121.06	119.12	1.012
Hen Day Production (HDP) (%)	85.70[a]	96.50[b]	86.70[a]	92.90[ab]	0.171
Total egg weight (g/egg)	546.80[a]	616.83[b]	553.88[ab]	605.53[ab]	11.90
Avarage egg weight (g)	63.08[a]	65.0 [b]	63.89[ab]	64.68 [ab]	0.31
Feed conversion (gram feed/gram egg mass)	2.20[b]	1.94[a]	2.17[ab]	1.98[ab]	0.04
Digestibility of DM (%)	75.47	77.55	76.86	76.51	0.35
Digestibility of OM (%)	77.09[a]	80.17[b]	78.20[a]	78.63[ab]	0.37
Digestibility of CP (%)	80.64	81.51	79.77	79.78	0.56
Digestibility of CF (%)	63.44[b]	58.37[a]	60.90[ab]	58.42[a]	0.67

Note: [a,b] Different superscripts in the same line show significantly different (P≤0.05).

The average digestibility of DM in Lohmann Brown laying hens with 0.2% (P1), 0.3% (P2) and 0.4% (P3) fish oil showed no significant difference (P≥0.05). The average digestibility of OM in Lohmann Brown laying hens with 0.2% (P1) fish oil was 3.99% significantly (P≤0.05) higher than P0. In contrast, the digestibility of CF in laying hens with 0.2% fish oil (P1) was 7.99% significantly (P≤0.05) lower than the control (P0).

DISCUSSION

The results showed that fish oil supplementation was as much as: 0.2%. 0.3% and 0.4% did not cause a significant difference in feed consumption. This is due to the relatively high metabolized energy content of fish oil, reaching 3,691 kcal/g,[5] so that the greater the amount of fish oil given, the maximum fulfillment of energy needs can be achieved. Suprijatna et al.[10] explained that the amount of feed consumed by livestock also depends on the quality of the feed ingredients used to prepare the ration, the compatibility of the feed composition, its nutritional value according to the needs for optimal growth and production, and maintained under the same conditions. Furthermore, according to [5] states that the addition of fish oil will cause a decrease in ration palatability, so that ration consumption decreases. In addition, other factors that affect daily ration consumption are the calorie content of the ration, ambient temperature, body weight, egg weight, and chicken activity.[11]]

Supplementation of fish oil in feed significantly increases HD. According to,[12] that rations containing omega-3 produce better production performance in laying hens. This omega-3 content can be found in fish oil. As in this study, rations with 0.2% fish oil significantly increased egg production. Providing good feed will certainly affect egg production, ration consumption, and also the conversion rate of the feed given. With the right balance between energy and protein, the performance of chicken production will be optimal.[13]

The effect of giving fish oil in the ration at the level of 0.20% in general can increase total egg weight and average egg weight. This is because fish oil in feed is not only a source of energy for egg production but also a source of fat-soluble vitamins, namely vitamins A, D, E and K. In addition, egg size and weight are influenced by linoleic fatty acids and amino acids. methionine. Fish oil as omega-3 linoleic acid.[14] Linoleic fatty acid is needed as a constituent of the lipoprotein complex which is synthesized in the liver by estrogen stimulation and then transferred for follicle formation and directly controls egg weight.[15]

Supplementation of fish oil as much as 0.2% in the ration was able to increase feed efficiency. This is due to the much different nutritional content, namely the difference in energy and protein levels in the rations. The lower the energy and protein given, the higher the ration consumption, because livestock will continue to eat until their energy is met. Feed use efficiency is interrelated with feed consumption and body weight gain, but high feed consumption is not always followed by high feed use efficiency. Feed efficiency is the amount of feed consumed at a certain time to produce body weight per head of livestock in the same time unit.[16] The smaller the feed conversion value, the better the feed efficiency, while the greater the feed conversion value, the smaller the feed efficiency. Feed conversion can be used as an illustration of production efficiency. A small feed conversion rate means that the amount of feed used to produce one kilogram of meat is less.[6]

The results of this study indicate that fish oil supplementation in rations has a significant effect on the digestibility of organic matter. This proves that the use of fish oil of 0.2% affects the digestibility value of organic matter. According to [17], the factor that affects the digestibility of organic matter is the content of nutrients in the ration. This is also reinforced by the statement by[18] which states that an increase in the digestibility of organic matter is in line with an increase in the digestibility of dry matter, because most of the components of the dry matter consist of organic matter, so that the factors that affect the high or low digestibility of dry matter will also have an effect on the level of organic matter. The P1 treatment had the highest crude protein digestibility, namely 81.51%. Digestibility of crude protein is influenced by ration consumption, ration protein content and ration dry matter consumption.[19]

Supplementation of fish oil at a level of 0.2% in the ration resulted in the lowest crude fiber digestibility compared to other treatments. According to,[17] that the digestibility of crude fiber depends on the content of crude fiber in the ration and the amount of crude fiber consumed. Too high levels of crude fiber can interfere with the digestion of other substances. The digestibility of crude fiber is influenced by several factors, including fiber content in the feed, the composition of the crude fiber constituents and the activity of microorganisms.[15] The value of digestibility of crude fiber in poultry generally ranges from 20-30%.[20]

CONCLUSION

Based on the results of the study it can be concluded that supplementation with fish oil as much as 0.2% in the ration can increase Hen Day Production (HDP), total egg weight, average egg weight, digestibility of organic matter, and increase feed efficiency in Lohmann Brown laying hens.

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