Klasikal: Journal of Education, Language Teaching and Science
Volume 4 Issue 2 August 2022
p-ISSN: 2656-9914 e-ISSN: 2656-8772

THE EFFECTIVENESS OF ADDING SEAWEED TO FEED IN REDUCING FAT AND CHOLESTEROL LEVELS IN BROILER CHICKENS

Rosdiana Ngitung[1], Patma Elis[2]
[1]Biology Department, Faculty of Math and Science, Universitas Negeri Makassar,
[2]Biology Department, Faculty of Math and Science, Universitas Negeri Makassar,
Universitas Negeri Makassar, Jl. Daeng Tata Raya, Sulawesi Selatan 90244
1)rosdiana.ngitung@unm.ac.id, 2)patmaelis42@gmail.com

ABSTRACT

This study aims to determine the effectiveness of adding seaweed to feed in reducing fat and cholesterol levels in broiler chickens. This type of research is experimental. This research method used a completely randomized design (CRD) consisting of 4 treatments with three replications. The treatments given were Ration without the addition of seaweed (K), R1 (Ration with the addition of seaweed 7 %), R2 (Ration with the addition of 9% seaweed), and R3 (Ration with the addition of 11%). The parameters observed were a decrease in meat fat content, a decrease in cholesterol levels, and the live weight of broiler chickens. Fat content was measured using the Soxhlet method, and cholesterol levels were measured using the Esey Touch GCU. The data analysis technique used is the Analysis of Variance (ANOVA) at the confidence level = 0.05; if the ANOVA results show a significant difference, proceed with Duncan's further test. The results showed that adding seaweed to the feed reduced broiler chickens' fat and cholesterol levels. Treatment with the addition of 7% seaweed reduced the fat content of the meat and cholesterol levels in broiler chickens and did not reduce the live weight of broiler chickens. Meanwhile, the 9% and 11% treatments reduced meat fat content, cholesterol levels, and reduced live weight of broiler chickens. So it can be concluded that the addition of 7% seaweed proved effective in reducing broiler chickens' fat and cholesterol levels.

Keywords: Broiler Chicken, Ration, Seaweed, Fat, Cholesterol.

INTRODUCTION

The death rate in the world due to excess fat and cholesterol is increasing every year. One of the reasons for this is that many foods consumed by the public contain high levels of fat and cholesterol, causing heart disease, stroke, hypertension, and obesity. This must be addressed gradually because the disease

does not appear spontaneously or quickly but gradually, so the reaction will be seen when it has accumulated. Fat and cholesterol are mostly from meaty foods such as beef, goat, shrimp, fish, and chicken.

Cholesterol is a fatty substance made in the liver and saturated fat obtained from food. If the level is too high, the cholesterol level in the blood will increase, which can cause the risk of coronary artery disease (Mahardika, 2017). Meanwhile, fat is an important energy source for the body to carry out daily activities. However, if the fat in the body is too high, it will cause obesity which in turn will cause various diseases (Santika, 2016).

The death toll in the world due to excess fat and cholesterol is increasing every year. High cholesterol is a condition of total cholesterol levels of 190 mg/dL or more in the blood (Kemenkes RI, 2017). Increased cholesterol levels cause 2.6 million deaths and 29.7 million disabilities yearly (Subanrate et al., 2019). In Indonesia, the number of high cholesterol sufferers in 2016 recorded at the integrated PTM coaching post and puskesmas that use the PTM surveillance information system totals 52.3% of the people who suffer from high cholesterol with 48% male sufferers while 54.3% female (Ministry of Health). RI, 2017).

Broiler chickens are superior breeds with high genetic characteristics, especially in growth. The development of broiler breeders is rapid because it has many advantages ranging from fast growth to much-loved, so the demand is great (Tumbal et al., 2020). Children, teenagers, and adults like to eat chicken, especially broiler chicken because it has affordable prices, soft meat, large size, dense, filled, and can be processed as meatballs, crispy chicken, and foods with other main ingredients of chicken meat. In addition, broilers have great business potential, so they can empower and reduce unemployment in Indonesia. But in addition to the advantages, broiler chickens also have weaknesses.

Broiler chickens have several weaknesses, namely high fat and cholesterol levels in the meat, especially in the thighs, which can cause many diseases such as coronary heart disease, stroke, and hypertension. The fat content of normal broiler chicken is 1.15%, water content is 75.24%, protein is 22.92%, and ash content is 1.145% (Rukmini et al., 2019). According to Ismoyowati and Titin (2003), chicken thigh meat has a higher fat content than breast meat. Meanwhile, broilers have HDL cholesterol content of more than 22 mg/dl; normal LDL levels should be less than 130 mg/dl. (Basmacioglu and Ergul, 2005). According to Erwan et al. (2007), normal cholesterol in good broiler chickens is 200-232 mg/dL, while according to Hasibuan (2021), normal cholesterol is 52-140 mg/dL.

Coronary heart disease can be caused by high cholesterol in the body, usually due to foods such as meat. Hypertension occurs due to high fat. If the fat consumed or enters the body increases, the blood will automatically be filled with fat, so blood pressure increases. This fat can also cause diabetes if it accumulates because it will slow down the work of insulin so that sugar levels in the blood

increase. The occurrence of hypertension and diabetes is the cause of stroke (Ngitung et al., 2020).

Many things have been done to reduce the consumption of foods containing sources of saturated fat and cholesterol because these sources of fat and cholesterol can lead to heart disease, obesity, stroke, and hypertension, especially those contained in broiler chicken which is currently very booming among the general public. Because of this problem, many people avoid foods containing high fat and cholesterol, while those who do not avoid these foods will have a greater risk of developing this deadly disease.

The high fat and cholesterol in broiler chickens are due to the feed given in the form of rations that contain high fat and cholesterol content. This feed will stimulate broiler chickens to grow quickly with thick meat rich in fat and cholesterol. Ways that can be done to reduce fat and cholesterol levels in chickens are by manipulating broiler chicken feed (rations) specifically through the gastrointestinal system approach, namely fat and cholesterol can be removed through excreta with the addition of fiber feed to the Ration. The fiber in the digestive tract of chickens binds most of the bile salts to be excreted through excreta, so the body needs to synthesize bile salts from body cholesterol so that cholesterol in the body is reduced (Ngitung et al., 2020).

Seaweed has a lot of nutrients and a high fiber content. Several studies have proven that seaweed containing alginate, agar, and carrageenan influences reducing plasma cholesterol levels. This agar component can help lower blood cholesterol levels by up to 39% (Ren et al., 1994). On the other hand, the alginate component has a high potential to inhibit cholesterol absorption in the intestine to reduce cholesterol levels in the body (Astawan et al., 2005). However, adding seaweed to this feed is still considered fat, and cholesterol is not lost in the meat but only reduced. According to Ngitung et al. (2017), seaweed can reduce fat and cholesterol levels in broiler chickens with the highest concentration of addition of 7% seaweed, which is significantly proven to affect cholesterol and fat levels in broiler meat.

Based on the results of earlier research using seaweed as a feed additive for broiler chickens, seaweed can reduce fat and cholesterol levels in broiler chickens. In this study, the concentrations used to reduce fat and cholesterol levels were 7%, 9%, and 11%. Therefore, this study was conducted to determine the effectiveness of adding seaweed to feed in reducing fat and cholesterol levels in broiler chickens.

METHOD

This research is experimental research conducted in Januari – April 2022. The maintenance and observation phase is carried out in Bulukumba Regency, Balleagging Village. The measurement of the fat content of the meat was carried out at the Animal Husbandry Integrated Biotechnology Laboratory, Hasanuddin

University, and the measurement of blood serum cholesterol levels was carried out independently at the rearing place. The research design used in this study was a completely randomized (CRD), consisting of 4 treatments and three replications to obtain 12 treatment combinations.

The experimental unit used in this study was broiler chickens aged 17 days who were healthy and had no different body weights. The treatment unit used was one control group and three experimental groups. The control group (K) feeds broiler chickens without using seaweed, which is used as a measure/comparison with broiler chickens fed with the addition of seaweed. There were three experimental groups, namely R1: 7% of seaweed, R2: 9% of seaweed, and R3: 11% of seaweed.

The tools used in this study were a basin, knife, bucket, 12-unit cage, ration box, drinking water container, scales, blender, Esey Touch GCU, desiccator, oven, soxchlet, boiling flask, ballast, stirring rod, 250 ml glass beaker. , condenser, heater, pipette, and syringe. The materials used in this study were seaweed waste, broiler chicken feed, light bulbs, broiler chickens aged 17 days, hexane, and 70% alcohol.

Data were obtained by measuring fat content using the Soxhlet extraction method to determine the difference in fat content of broiler chickens that were fed with the addition of seaweed and those that were not fed with the addition of seaweed. In addition, chicken blood cholesterol levels were measured using a cholesterol test kit (Esey Touch GCU) to determine the percentage increase or decrease in broiler cholesterol levels and to compare broiler chickens fed with seaweed and those not fed with seaweed. Finally, the average value of the three replications in each treatment group was used as raw data.

Data processing was carried out using the Analysis of Variance (ANOVA) technique at a confidence level of = 0.05 if the ANOVA results showed a significant difference, then continued with Duncan's further test.

FINDINGS AND DISCUSSION

The data were statistically tested for One Way Analysis of Variances (ANOVA) using SPSS, followed by Duncan's test with a confidence level of = 0.05. The study's results showed that adding seaweed to the diet on cholesterol had a significant effect (0.016<0.05) on blood cholesterol levels in broiler chickens. So it can be said that adding seaweed to broiler chicken rations significantly affects broiler chicken cholesterol.

Table 1 SPSS Results of Average and SD Data on Broiler Chicken Blood Cholesterol Levels (mg/dL)

Treatment	Cholesterol (mg/dL)	
	Initial	Final
K	255.00 ± 4.00^{b}	243.67 ± 6.80^{b}
R1	236.67 ± 23.96^{b}	196.67 ± 3.21^{a}
R2	223.67 ± 25.54^{b}	205.67 ± 31.94^{a}
R3	251.67 ± 20.20^{b}	218.00 ± 17.34^{a}

Note:
1. Different superscript letters in the same column show significant differences. However, the same letters in the same column indicate no significant difference between each treatment based on Duncan's test at the confidence level = 0.05.
2. Different superscript letters on the same line show significant differences. However, the letters on the same line show no significant differences in initial and final cholesterol levels based on Duncan's test at a confidence level of = 0.05.

Based on the study's results, it was shown that the addition of seaweed to the Ration of fat had a significant effect (0.24 <0.05) on the fat content of broiler breast meat. So it can be said that there is a significant effect of the addition of seaweed to broiler chicken rations on the fattening of broiler chicken meat.

Table 2 SPSS Results Average and Standard Deviation of Broiler Chicken Meat Fat Content (%)

Treatment	Fat (%)	
	Thigh	Keel
K	2.71 ± 0.17^{b}	1.66 ± 0.34^{b}
R1	1.92 ± 0.77^{b}	0.94 ± 0.03^{a}

R2	1.68 ± 0.12[a]	1.16 ± 0.13[a]
R3	1.70 ± 0.58[a]	1.02 ± 0.29[a]

Note: Different superscript letters in the same column show significant differences, and the same letters in the same column indicate no significant differences based on Duncan's test at the confidence level = 0.05.

The results of the One Way Analysis of Variance (ANOVA) statistical test for initial data showed that the average thigh fat had a significance (P>0.05) which meant that the average thigh fat of broiler chickens did not show a significant difference between each treatment. However, it can be seen that the treatment of broiler chickens with the addition of seaweed to the Ration of thigh fat content was lower than the treatment without the addition of seaweed to the Ration.

The results of the statistical test One Way Analysis of Variance (ANOVA) initial data showed that the average broiler breast fat had a significance (P < 0.05), which means that the average breast fat of broiler chickens showed a significant difference. The difference in data on average broiler breast fat in treatments R1, R2, and R3 was significantly different from treatment K.

Based on the results of statistical analysis, it can be concluded that the best treatment for reducing fat and cholesterol levels in broiler chickens is the treatment with the addition of seaweed 7% (R1) because this treatment reduces fat and cholesterol levels without significantly affecting the live weight of broiler chickens.

Decreased cholesterol levels occurred in each treatment, including control, because the amount of feed consumed by broilers was different. It is known that the R1 treatment showed the greatest decrease compared to other treatments, and the most effective in reducing broiler cholesterol levels was the R1 treatment seen from the average range of normal cholesterol levels of broiler chickens and the live weight of broiler chickens. The average final blood cholesterol level of broiler chickens was significantly different (p<0.05), meaning there was a significant difference between the control treatment and the addition of seaweed, according to Setyaji and Mulyati's (2013) finding that fiber can lower blood cholesterol levels by more than 5%; this is because the fiber in the digestive tract can bind bile salts, resulting in feces.

The increase in the excretion of cholesterol in the feces causes the amount of cholesterol that goes to the liver to decrease so that cholesterol uptake in the blood increases, which will be synthesized into bile acids. According to Sinulingga (2020), this decrease occurred due to the mechanism of water-soluble fiber fermentation by the small intestinal microflora, which in turn would modify

the production of short-chain fatty acids, thereby reducing acetate levels and increasing propionate synthesis. So it will reduce the endogenous synthesis of cholesterol and free fatty acids.

The results obtained were blood cholesterol levels of broiler chickens in the control treatment were significantly different from the R1 and R2 treatments, while the R3 treatments were not significantly different from the controls; this is because seaweed will stabilize cholesterol levels in the blood so that cholesterol is not too low or high. So increasing seaweed waste (Gracillari sp.) to 11% in the Ration reduces cholesterol levels.

In the SPSS results, the average fat content of broiler thigh meat was not significantly different ($P > 0.05$); this happened because the amount of feed consumed in treatment K and treatment R1 was more than that of treatment R2 and R3, where the amount of feed consumed by broiler chickens in this treatment was almost uniform. Following Ngitung et al. (2017), namely that air temperature greatly affects the ability of chickens to absorb nutrients; namely, if the temperature is high, the heat needed by chickens for body temperature defense is reduced so that chickens will reduce ration consumption. According to Ismoyowati and Titin (2003), chicken thigh meat has a higher fat content than breast meat.

In the SPSS results, the average fat content of broiler breast meat was significantly different ($P < 0.05$). It happened because of the addition of seaweed waste to the Ration, so the composition of the nutrients contained in the Ration consumed by each treatment was different. The low-fat content of broiler chicken treated with R1 was due to reduced absorption of fatty acids from the Ration, and the appetite of the chickens was also reduced because the constant temperature was difficult to provide. Accordance to Ngitung et al. (2017), the low levels of meat fat in broiler chickens with the addition of seaweed treatment to the Ration because the absorption of fatty acids from the Ration is reduced by the addition of seaweed which is rich in fiber and good for the growth of broiler chickens.

Seaweed significantly affects the live weight of broiler chickens, following Cristiani's (2019) research that seaweed with high content of carotene and fiber can increase gastrointestinal viscosity, thereby inhibiting the absorption of lipids and carbohydrates in the intestine. In addition, carrageenan can also form colloid ions and reduce serum lipid levels by inhibiting lipid absorption. According to Wahyu (1997), rations with the addition of seaweed have a high fiber content so that the absorption of other food substances will decrease so that the Ration cannot be fully digested, causing full caches; this is what causes the number of broiler chicken rations to be limited which causes their weight to decrease.

It was concluded that adding seaweed to broiler rations reduced broiler chickens' fat and cholesterol levels and their live weight. The higher the concentration of seaweed given to broiler chicken feed, the lower the live weight of broiler chickens. It happens because seaweed can reduce feed digestibility and

appetite for broiler chickens, causing the broiler's body weight to decrease. So it was concluded that the most effective treatment using seaweed with R1 treatment was the addition of 7% seaweed; this was seen from the positive effect of giving seaweed to broiler chickens in reducing fat and cholesterol levels close to normal cholesterol levels and normal fat levels in broiler chickens without reducing weight. Broiler lives weigh significantly.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that the addition of seaweed effectively reduces cholesterol and fat levels in broiler chickens and does not affect broiler body weight with the addition of 7% seaweed. The researcher's suggestion from this research is that it is necessary to do deeper research on the effects of excess seaweed on lowering fat and cholesterol. A more reliable laboratory test is also necessary to check cholesterol levels to determine HDL and LDL cholesterol levels.

REFERENCES

Astawan, M., Koswara, S., dan Herdiani, F. (2004). Pemanfaatan Rumput Laut (Eucheuma cottoni) untuk Meningkatkan Kadar Iodium dan Serat Pangan pada Selai dan Dodol. J Teknologi dan Industri Pangan. Vol XV. No 1. Hal 61-69.

Astawan, M., Wresdiyati, T., Hartanta, A.B. (2005). Pemanfaatan Rumput Laut Sebagai Sumber Serat Pangan Untuk Menurunkan Kolesterol Darah Tikus. J Hayati. Vol 12. No 1. Hal 23-27.

Basmacioglu, H., dan Ergul, M. (2005). Research On The Factor Affecting Cholesterol Content And Some Other Characteristics Of Eggs In Laying Hens. Turk. J Veteriner. Vol 29. No 1. Hal 157-165.

Erwan, E., Zulfikar., Saleh, E., Kuntoro, B., Chowdhury, V.S., dan Furuse, M. (2017). Orally administered D-aspartate depresses rectal temperature and alters plasma triacylglycerol and glucose concentrations in broiler chick. J Poult sci. Vol 54. Hal 205-211.

Hasibuan, R.M., Erwan, E., Elviriadi., Rodiallah, M., dan Maya, S. (2021). Total kolesterol HDL, LDL dan Trigliserida darah ayam broiler yang diberi tepung daun apu-apu (Pistia stratiotes) dalam ransum basal. J Ilmu dan Industri Peternakan. Vol 7. No 2. Hal 92-103.

Ismoyowati dan Widyastuti, T. (2003). Kandungan lemak dan kolesterol bagian dada dan paha berbagai unggas lokal. J Animal Production. Vol 5. No 2. Hal 79-82.

Kementerian Kesehatan RI. (2017). Profil Penyakit Tidak Menular Tahun 2016. Jakarta : KEMENKES RI.

Mahardika, A.B. (2017). Perbedaan Kepatuhan Mengikuti PROLANIS dengan Kadar Kolesterol Pada Penderita Hipertensi Di Puskesmas Banjardawa Kabupaten Pemalang. Skripsi. Program Studi Ilmu Keperawatan dan Kesehatan Universitas Muhammadiyah Semarang. Semarang.

Ngitung, R., Nurhayati., dan Arsad, B. (2020). Daging ayam broiler sehat dengan pengaturan ransum. J Sainsmat. Vol IX. No 1. Hal 29-38.

Ngitung, R., Nurhayati., dan Arsad, B. (2017). Penurunan Kadar Lemak dan Kolesterol Ayam Broiler Melalui Pengaturan Ransum Sebagai Upaya Guna Menghasilkan Daging Sehat. Laporan Akhir Penelitian PNBP Pascasarjana. Program Studi Pendidikan Biologi Program Pascasarjana Universitas Negeri Makassar. Makassar.

Rukmini, N. K.S., Mardewi, N. K., dan Rejeki, I. G. A. D. S. (2019). Kualitas kimia daging ayam broiler umur 5 minggu yang dipelihara pada kepadatan kandang yang berbeda.

Santika, I.G.P.N.A. (2016). Pengukuran Tingkat Kadar Lemak Tubuh Melalui Jongging Selama 30 Menit Mahasiswa Putra Semester IV FPOK IKIP PGRI Bali Tahun 2016. J Pendidikan Kesehatan Rekreasi. Vol 1. No 1. Hal 89-98.

Subandrate., Susilawati., Safyudin. (2019). Pendampingan Usaha Pencegahan dan Penanganan Hiperkolesterolemia pada Pelajar. J Arsip Pengabdian Masyarakat. Vol 1. No 1. Hal 1-7.

Setyaji, D.Y., dan Mulyati, T. (2013). Pengaruh Pemberian Nata de Coco terhadap Kadar Kolesterol LDL dan HDL pada Wanita Dislipidemia. Skripsi. Universitas Diponegoro. Semarang.

Sinulingga, B.O. (2020). Pengaruh Komsumsi Serat Dalam Menurunkan Kadar Kolesterol. J Penelitian Sains. Vol 22. No 1. Hal 9-15.

Tumbal, E.L.S., dan Simanjuntak, M.C. (2020). Pengaruh Penambahan Tepun Daun Kemangi (Acimum spp) dalam pakan terhadap perforans ayam broiler. J Para-Para. Vol 1. No 1. Hal 26-44.

.