IMPROVING THE LEVEL OF SERUM GLUTAMATE OXALOACETATE TRANSAMINASE (SGOT) AND SERUM GLUTAMATE PIRUVATE TRANSAMINASE (SGPT) DUE TO THE ADDITION OF PROBIOTIC POWDER IN PHASE LAYER CHICKEN

L. Adriani[1*], A. Darmadi[1], D. Latipudin[1], D. Rusmana[1], T. Widjastuti[1]

[1]Faculty of Animal Husbandry, Padjadjaran University, Jatinangor-Sumedang, West Java, Indonesia

Abstract

This research was conducted for a month, starting from February to March 2021 at one of the layer chicken farms, in Sumedang Regency, West Java. Blood analysis was carried out at the Physiology and Biochemistry Laboratory of the Faculty of Animal Husbandry, Padjadjaran University. This study aims to determine the effect and optimal level of probiotic powder to provide an optimal influence on the levels of SGOT and SGPT in layer-phase layer hens. Probiotic has given for a month to laying hens by mixing it into the ration. This study used 20 layer chickens aged 90 weeks and used an experimental method with statistical analysis using a completely randomized design (CRD) technique with four levels of probiotics (0%, 2%, 3%, 4%) and five replications. Based on the results of statistical analysis using Duncan's multiple range test, it showed that the addition of probiotic powder on the number of SGOT levels had a significant effect ($P<0.05$) and on the number of SGPT levels was no significant difference ($P>0.05$). The conclusion is the addition of probiotic powder until 4% has a positive on the SGOT level and has not an affect on SGOT of the layer phase laying hens.

Key words: Laying Hens, Probiotict Powder, SGOT, SGPT

INTRODUCTION

The increasing level of Indonesian people's consumption of protein needs, especially animal protein, has become the basis for business actors in the livestock sector to meet this demand. One of the highly developed livestock business sectors is poultry commodities such as laying hens. Laying hens are a very potential commodity, because the resulting egg product, can be a contributor to a protein source, but when laying hens enter the age of more than 80 weeks and have passed their productive period, the number of eggs produced will decrease and when at this age the chickens will experience setbacks. This decrease and setback can be pursued by giving certain active substances. One of the active substances that can play a role in maintaining production and increasing livestock productivity, it can be sourced from feed additives such as probiotics. Probiotics are additional feed ingredients in the form of live microbes that can benefit and balance the microflora in the digestive tract [1].

Giving probiotics has several goals, one of which is to increase and maintain egg production [2]. Provision of probiotics can be given in the form of liquid probiotics to poultry but its use is less effective because it is not consumed thoroughly and will be left in the drinking place, so to overcome this problem. Provision of probiotics in feed is usually as much as 2% in the ratio [3]. The probiotics used include *Lactobacillus bulgaricus, Lactobacillus acidophilus, Streptococcus thermophilus,* and *Bifidobacterium sp.* In addition, to maintain the physiological condition of laying hens in

[*]Corresponding author:
lovita_yoghurt@yahoo.co.id
The manuscript was received: 24.09.2021
Accepted for publication: 14.02.2022

optimal conditions, it is necessary to maintain the function of liver, one of the important organs needed to ensure metabolic processes in the body. The liver plays an important role in activities in the body such as metabolism, detoxification of toxins, and so on.

Liver function can be impaired caused by several factors, including free radicals in the body. With age, chickens will experience a decrease in organ function caused by increased cell degeneration. Free radicals are present as a by-product of metabolism in the body, in the process of energy formation [4]. Impaired liver function can be detected by indicators of the content of transaminase enzymes, namely serum glutamate oxaloacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) enzymes whose levels are increasing in the blood. In general, SGOT and SGPT are indicators to determine liver damage. The difference between SGOT and SGPT is SGOT reflects general damage such as damage to muscle cells, brain cells, liver cells, heart cells, etc., while SGPT reflects damage to cells in the liver.

The provision of probiotics can function as natural antioxidants that can ward off free radicals in the body of livestock. So that the layer phase laying hens that have passed their productive age can delay the dismissal and can maintain their production.

MATERIAL AND METHOD

The material used in this study is 20 laying hens Lohman Brown, which had a layered phase with 90 weeks of age with an average body weight of 1802.25 ± 5.48 grams. Samples were kept in semi-closed cages.

Trial ration: The experimental ration used was a mixture of corn, bran, concentrate, top mix, and macro minerals. The concentrate used is a commercial concentrate consisting of corn gluten, pollard, meat & bone meal, soybean meal, oil, calcium phosphate, calcium carbonate, sodium chloride, amino acids, vitamins, trace minerals, and antioxidants.

Table 1 Nutrient Content and EM of Feed Ingredients

Nutrient Content and EM of Feed Ingredients	Feed Ingredients				
	Corn	Bran	Top Mix	Macro Minerals	Concentrates
Matabolic Energy (kcal/Kg)	3370	1630	-	-	1921,947
Crude Protein (%)	8.6	12	-	-	37
Crude Fat (%)	3.9	13	-	-	6
Crude Fiber (%)	2	12	-	-	8
Calcium (%)	0.02	0.12	0.6	32.5	1
Phospor (%)	0.1	0.21	-	1	1.5

Source : Nutrient content based on Scott *et al.,* [5] in Wahju [6]

Table 2 The composition of the Basal Ration for Laying Chicken Research in Layer

Feed Ingredients	Total Usage (%)
Corn	58,42
Bran	13.41
Top Mix	0.5
Macro Minerals	1
Concentrates	26,67
Jumlah	**100,00**

Source : Formulation using AFOS (Software)

Table 3 Nutrient Content and EM Research Basal Ration

Nutrient Content of Feed Ingredients	Amount	Standard Requirement
Matabolic Energy (kcal/Kg)	2700	(Min 2700)
Crude Protein (%)	16.5	(Min 16.5)
Crude Fat (%)	4.57	(Max 7)
Crude Fiber (%)	5.25	(Min 3)
Calcium (%)	3.67	(3,25 - 4,25)
Phospor (%)	0.5	(Min 0.45)

Source: SNI 8290.5:2016. Quantity calculation using the AFOS app

***Probiotic Powder*:** The probiotic powder is made from liquid fermented milk with a consortium of bacteria *Lactobacillus bulgaricus, Lactobacillus acidophilus, Streptococcus thermophilus,* and *Bifidobacterium sp.* The total lactic acid bacteria after the drying process was 1.6 × 107 CFU/g

***Process Maintenance to Analysis*:** Laying hens were reared and treated with probiotic powder by mixing it into the ration for 30 days. Blood collection for laying hens was carried out on day 30. Blood samples were taken from one hen from each treatment unit in the morning, then analyzed using the spectrophotometric method with analytical techniques based on Biolabo (2017).

Observed variables: *Serum Glutamate Oxaloacetate Transaminase* (SGOT) and *Serum Glutamate Pyruvate Transaminase* (SGPT).

***Research methods*:** The study used an experimental method with a completely randomized design (CRD) with 4 treatments and 5 replications so that there were 20 experimental units. The data obtained were tested using an analysis of variance. The research treatments are:

P0 = Ration without probiotic powder
P1 = Ration with the addition of 2% probiotic powder
P2 = Ration with the addition of 3% probiotic powder
P3 = Ration with the addition of 4% probiotic powder

RESULT AND DISCUSSION

Effect of treatment on the level of SGOT. Based on the results of observations on the level of SGOT in the blood of laying hens with the addition of probiotic powder, it can be seen in Table 4.

Table 4 The number of SGOT and SGPT levels of Layer Phase in each treatment

Parameter	Treatment			
	P0	P1	P2	P3
Serum Glutamate Oxaloacetate Transaminase (SGOT) IU/L	38.586 ±9.613	38.428±0.978	64.879±4.246	48.132±6.288
Serum Glutamate Pyruvate Transaminase (SGPT) IU/L	24.968±9.762	24.544±1.028	18.437±3.364	17.633±3.765

Table 4 shows the difference in the average level of SGOT in the blood of laying hens. The average SGOT level in this study was 38,586 IU/L for samples not given probiotic powder, 38,428 IU/L for samples given 2% probiotic powder in the ration, 64,879 IU/L for samples given 3% probiotic powder in the ration, 48,132 IU/L for samples given 4% probiotic powder in the ration. The average results of the highest SGOT levels were found in laying hens that were given 3% probiotic powder in the ratio (P2) of 64,879 IU/L. The lowest levels of SGOT were found in laying hens that were given 2% probiotic powder in the ration (P1) of 38,428 IU/ L. The results of the variance test (ANOVA) showed that the administration of probiotic powder had a significant effect on the level of SGOT

in laying hens (P<0.05). This research showed that with the higher level of probiotic powder addition, the level of SGOT increased significantly. Then, Duncan's multiple-distance further test was carried out with the results showing that the average level of SGOT was significantly different (P<0.05) in each treatment.

Table 5 Duncan's Multiple Range Test Results Against Average SGOT Level

Treatment	Average SGOT (IU/L)	Duncan test*		
P0	38.586	a		
P1	38.428	a		
P3	48.132		b	
P2	64.879			C

Note: * Different letter notation shows a significant difference (P<0.05)

In Table 5 it is shown that the average level of SGOT in the blood of laying hens given probiotic powder as much as 3% in the ratio (64.879 IU/L) was significantly different (P<0.05) compared to the other treatment. It can be expected because to increase egg production it is necessary to increase organ work so that it can be given a good influence in terms of production. Also egg production that given probiotic powder increased compared to control. But the level of SGOT in laying hens in this study, you get increased results, this can occur due to fatigue in certain organs that cause free radicals in the body of laying hens. Free radicals can be sourced from within the body such as fatigue, stress conditions, inflammation, lipid peroxidation, infection, cancer, and aging while from outside the body caused by contamination [7]. However, probiotics can produce several antioxidant compounds that are useful in defending the body from damage caused by free radicals. So that the SGOT level appears to be increasing but is still at a normal level.

An increase in the level of SGOT in the blood of laying hens can be caused by cell damage. As stated by Price and Nelson [8] which states that the level of the SGOT enzyme will increase if there is acute cell damage (hepatocellular necrosis) such as disorders of the liver, bile ducts, heart disease, blood vessels, and impaired kidney and pancreatic function. According to Ramalah [9] disorders of liver function are caused by damage to hepatocytes. Damage to the hepatocytes causes changes in transport function and membrane permeability, resulting in the release of transaminase enzymes in the cytoplasm into the blood circulation. This is because the transaminase enzyme is an enzyme that acts as a catalyst in the process of transferring amino groups from alpha-amino and alpha-keto acids. In addition, disturbances in liver function can also be caused by oxidative stress caused by the presence of free radicals in the body. Efforts that can be made to reduce oxidative stress in the body are by providing antioxidants produced by probiotic powder.

The average value of the SGOT level of laying hens in the control treatment (P0) and other treatments (P1, P2, and P3) was still a normal level. When compared with Arvina's [10] research which researched laying hens related to the SGOT enzyme at the age of 29 months without being given chitosan, it had a value of 113.66 IU/L and according to Emadi and Kermanshahi [11] stated that the normal level of SGOT in broiler chicken blood was 37.8-311.0 IU/L. So it can be concluded that the administration of probiotic powder in this study can function as an antioxidant that can prevent and maintain cell conditions in the body of laying hens. According to Halliwell and Gutteridge [7] probiotics can produce antioxidants that function to ward off free radicals in the body of livestock. Thus, the function of probiotics in preventing cell damage can be maintained. So that the transaminase enzyme does not come out or migrate into the blood circulation. According to Selvam et al., [12] which states that low levels of SGOT and SGPT indicate that the cells are not damaged.

The effect of giving probiotic powder on the level of SGPT. Based on the results of observations on the level of SGPT in the blood of laying hens with the administration of probiotic powder, it can be seen in Table 4.

Table 4 shows that there is a difference in the average level of SGPT in the blood of laying hens. The average SGPT level in this study had a value of 24,968 IU/L for samples not given probiotic powder, 24,544 IU/L for samples given 2% probiotic powder in the ration, 18,437 IU/L for samples given 3% probiotic powder in the ration, 17,633 IU/L for samples given 4% probiotic powder in the ration. The average result of the highest SGPT level was found in chicken blood samples that were not given probiotic powder in the ratio (P0) of 24.968 IU/L and the lowest level of SGPT was found in chicken blood samples that were given 4% probiotic powder in the ration (P3) of 17.633 IU. /L. The results of the variance test (ANOVA) showed that the administration of probiotic powder had no significant effect on the level of SGPT in the blood of laying hens (P>0.05).

The average number of SGPT levels in chicken blood given probiotic powder decreased. This can happen because probiotics can produce antioxidants and counteract free radicals in the body so that liver cell damage reflected by SGPT decreases and there is no damage. Giving probiotics can produce antioxidant compounds such as Vitamin E, Superoxide dismutase (SOD) released by the Lactobacillus group, glutathione (GSH) released by bifidobacterium and lactococcus [7]. The mechanism of antioxidant compounds produced by probiotic powder is: (1) Vitamin E produced from probiotics can protect the FUPA phospholipid membrane by donating or donating one of its Hydrogen ions (H^+) to lipid peroxyl radicals. Lipid peroxyl radicals are the result of the HO* reaction in the lipid peroxidation process of the HO* attack reaction against PUFAs (Poly Unsaturated Fatty Acids / long-chain polyunsaturated fatty acids). Giving H* by an antioxidant in this case probiotic powder can stop further radical reactions [13], (2) Superoxide Dismutase (SOD) is an antioxidant enzyme produced by the Lactobacillus group which functions to catalyze the radical reduction reaction of superoxide anion (O2*) into hydrogen peroxide (H_2O_2) and oxygen (O2) [14], (3) Glutathione (GSH) is an antioxidant produced by the bifidobacterium group which functions to prevent hydroxyl radicals that can convert fat molecules into fat radicals or lipid peroxides. through two sides, namely preventing the formation of hydroxyl radicals reacting with fat molecules or preventing the formation of hydroxyl radicals by converting Hydrogen Peroxide (H_2O_2) into water molecules [14].

The mechanism of action of probiotics in maintaining cell damage due to free radicals is to provide unpaired free-electron molecules so that they can bind or cover molecules that have lost one electron from their lone electron pair and then become new and stable compounds as according to Halliwell and Gutteridge [7] which states that the mechanism of probiotics can be a barrier to reactive oxygen species (ROS) by antioxidants with compounds that have small molecular weights so that they can donate electrons to free radicals and form new stable compounds.

The SGPT level value of laying hens in the control treatment (P0) and other treatments (P1,P2,P3) is still considered a normal level when compared to the Arvina study [10] which researched laying hens related to the SGPT enzyme at the age of 29 months without being given chitosan. has a value of 155.48 IU/L and according to Emadi and Kermanshahi [11] stated that the normal level of SGPT in broiler chicken blood is 23.8-52.8 IU/L. So it can be concluded that low SGPT enzymes indicate no liver cell damage in the body of laying hens. According to Selvam et al., [12] which states that low levels of SGOT and SGPT indicate that the cells are not damaged.

CONCLUSIONS

The addition of probiotic powder (2%, 3%, and 4%) gave the same effect on SGOT levels and SGPT levels in the normal range.

ACKNOWLEDGMENTS

The author would like to thank the PTUPT project of the Directorate General of Higher Education (BRIN) through Prof. Dr. Ir. Lovita Adriani, M.S and FINder U Co-E who has funded the research and provided facilities during the research.

REFERENCES

[1] Hill, C., F. Guarner, G. Reid, GR. Gibson, DJ. Merenstein, and B. Pot. (2014). *The International Scientific Association for probiotics and prebiotics consensus statement on the scope and appropriate use of the term probiotic*. Nature Reviews Gastroenterology and Hepatology.

[2] Zurmiati, M. E. Mahata, M. H. Abbas, dan Wizna. (2014). *Aplikasi Probiotik Untuk Ternak Itik Jurnal Peternakan Indonesia*.

[3] Kumalasari, C., I. Setiawan, dan L. Adriani. (2020). *Pengaruh Pemberian Probiotik Kering Berbasis Susu Sapi, Kacang Hijau, dan Kedelai terhadap Performa Ayam Broiler*. Jurnal Peternakan Indonesia.

[4] Shen, HM, Shi, CY, Lee, Hp, and Ong, CN. (1994). *Aflatoksin B1-induced Lipid Peroxidation in Rat Liver.* Toxical Appl Pharmacology.

[5] Scot, M.L., M.C. Nesheim and R.J. Young, (1982). *Nutrition of the chicken.* 3rd Ed. Published by M.L. Scott and Associates. I theca, New York.

[6] Wahju. (2004). *Ilmu Nutrisi Unggas*. Yogyakarta: Universitas Gajah Mada Press.

[7] Halliwel, B. and Gutteridge, J.M.C., (1999). *Free Radicals in Biology and Medicine, Third Edition, 368-369, 839.* Oxford University Press, New York.

[8] Price, A.S dan Wilson, L. M. (1995). *Patofisiologi Konsep Klinis Proses-proses Penyakit.* Jakarta: Penerbit Buku Kedokteran EGC.

[9] Ramalah, S. K. (2007). *A Toxicologist Guide To The Diagnostic Interpretation Of Hepatic Biochemical Parameters*. Food Chem. Toxicol.

[10] Arvina, D. Diding, L. Darmawan, D. dan A. Mushawwir. (2019). *Profil Enzim Transaminase Ayam Ras Petelur Yang Diberi Kitosan Iradiasi*. Fakultas Peternakan, Universitas Padjadjaran, Bandung.

[11] Emadi, M. and H. Kermanshasi. (2007). *Effect of Turmeric Rhizome Powder on the Activity of Some Blood Enzymes in broiler Chickens*. International Journal of Poultry Science. College of Agri-cullture. Ferdowsi University of Mashhad. Mashhad.

[12] Selvam, NT, KK Yathi,Y. R. S.Kumar, VN Saraswathy, TN Venogoulan and N. Jaya. (2010). *Hepaticactivity of methanolic extract of Cinnamomum Tamala (Ness) against paracetamol intoxicated swiss albino mice.* International Journal of World Research.

[13] Hamid, A. A., Aiyelaagbe, O. O., Usman, L. A., Ameen, O. M. and Lawal, A. (2010). *Antioxidants: Its medicinal and pharmacological applications.* African J. of Pure and Applied Chemistry.

[14] Murray R. K., Granner D.K., Rodwell V.W., (2009). *Biokimia Harper*. Edisi 27. Penerbit Buku Kedokteran, EGC. Jakarta.