Content of Immunoglobulin G (IgG) and Layer Blood Glucose During Force Molting

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ABSTRACT

This study aims to determine the profile changes in levels of immunoglobulin G (IgG) and layer blood glucose being force molting. This study uses race 30 laying hens aged 17 months. Chicken is divided into two groups, each consisting of 15 tails. The first group was given force molting treatment, while the latter were given rations according to their needs. Force molting methods are applied to the combination of reduced rations in kualitatof with quantitative.

The results showed that the levels of IgG and blood glucose showed a sharp decline up to week 2 treatment (initial force molting), then returned at the end menigkat force molting (week 4) but still below the levels of IgG and glucose prior to treatment.

Keywords: immunoglobulin G (IgG), Glucose, Force molting, layer

INTRODUCTION

Poultry has a role in people's lives continue to be developed so that the chicken today and become a thriving industry. Please note that the chicken has an enormous potential in the fulfillment of people's nutrition, especially as a source of animal protein is readily available and affordable like eggs and chicken meat.

Poultry Industri currently growing rapidly, especially layer poultry industry (chicken laying) and this industry is very promising, but it is a constraint on a farm within the nutritional needs of cattle and the resulting production so that farmers can benefit more by extend the period of production so that production costs can be reduced and implementing a good maintenance system such as the force molting (feather fall force).

Force molting is a method in commercial farms, where chickens are forced to abort his feathers laying on afkir phase for six to eight weeks, so the hen can increase production again. Force molting than roll back the production of chicken and also improve the quality of her eggs. Therefore, this method is appropriate applied by the breeder when you want to extend the period of egg production, one of which was caused by the inability of farmers to buy the DOC (day old chick) or chicken growing (pullet).

Feed restriction on molting programs can lead to stress in chickens characterized by many changes in the body of chicken. One way is to decreased lymphocytes produced sum-sum spine, so that the immunoglobulin G decreased. One of the main tasks immun system. Glucose is a monosaccharide sugar, one of the most important carbohydrate used as a source of energy for defense ayam.un is formed against foreign substances that enter the body. Feed restriction causes absorption of food substances which decrease and eventually the blood glucose content was also decreased.

MATERIALS AND RESEARCH METHOD

I. Materials and Research Equipment

Materials

Research using layer chicken of Lohman strains that will in *afkir* (production has decreased) by the age of about 17 months. Used race 30 laying hens, which were laying chicken will be given force molting treatment.

Eguipment

Cages used in the study were battery cages.

2. Method

Research Design

Research method used was descriptive method and data obtained will be analyzed by using the calculated average and standard deviation.

The sample used was 15 laying hens were experiencing racial force molting. Observations were made during 34 days and blood sampling was done once before the treatment was given force molting and also every week (4 times making) during the given force molting treatment. The data obtained will be analyzed by using the calculated average and standard deviation.

Force molting techniques based on the results of research were treated Tanwiriah (2003), which is using the technique of fasting and then 12 days in the rations given to the 60 grams of protein content of 14.4%. Based on this technique Tanwiriah research shows the best production performance.

Research Prosedure

a. Preparation

- Preparing chicken will be laying the force molting treatment.
- Maintaining the beginning before force molting for 1 week free trial by providing rations to the normal dose (110 g /i).
- Acquisition of blood each from chicken laying before experienced force molting as much as lx sample.
- Acquisition of blood each layer of the chicken while experiencing force molting as 1x sample each week (as much as taking over 4 x 4 weeks).
- The composition and energy content and nutrient ration experiment, placed in Appendix 1 and 2.

b. Data Collection

- Giving treatment to groups that force molting chicken (Appendix 3).
- Sampling the blood of a chicken laying experiencing force during molting once a week for a month. Then the blood samples taken to the laboratory to analyze the level of immunoglobulin G (IgG), A (IgA), and the chicken blood.

3. How to Making Blood Sample and Serum

Way blood retrieval was conducted every week once a month (4 times a decision). Blood-making was done by using 5 ml syringe, first chicken wing sections that will take blood, cleaned with alcohol 70%. Then using a syringe rinsed with liquid berheparin, then stick a needle syringe use venoject berheparin tube in the direction of the vein so that blood will be drawn slowly by 4 mL, then placed in a tilted position. Then the tube on the move into the cooler box to get the serum and blood samples taken to the laboratory to analyze the level of immunoglobulin G (IgG) and Darah.Pengambilan Blood Glucose and Serum Preparation.

4. Parameters

a. Level of Immunoglobulin G (IgG)

Measured using photometric techniques. In measuring by using Micro Elisa Reader Imunology

b. Level of Blood Glucose

Measured using photometric techniques and electrolytes. In measuring by using Cobas instrument type C-11

5. Data Analysis

Research done with descriptive method, the data obtained were analyzed using the calculated average and standard deviation.

Results and Discussion

Effect of Treatment on Content of Immunoglonulin G (IgG)

The average content of immunoglobulin G from each treatment during the study can be seen in Appendix 4. In Appendix 4, can be seen that the average content of immunoglobulin G in a row that is at the research pre (3.27), week 1 (1.31), week 2 (1.53), week - 3 (1.97), week 4 (2.45). Preview profiles before and immunoglobulin G-force experienced during molting can be seen in Appendix 5.

In Appendix 5, it appears that levels of immunoglobulin G (IgG) prior to force molting treatment of 3.27 ± 0.18, this level is a normal level for laying chicken was produced, as Bell and Freeman (1981) reported that levels of immunoglobulin G (IgG) layer phase by 2 to 4.1 $mg.mL^{-1}$.

IgG concentration in the measurement period to the end of the 2 or the first week of force molting treatment was significantly decreased. This is because in these weeks of laying hens, so the experiment was dipuasakan intake of protein (amino acids) is stopped. Genovese et al., (1998) Force molting through feed restriction caused a marked stress with physiological and biochemical changes in the body of chicken. One indicator of this variable is the decrease in the level of blood cells and white so that immune substances (immunoglobulin G) also experienced a decrease.

Given that amino acids are the main precursors of the formation of immunoglobulin. Maynard et al., (1979) and Woodward (1998) Proteins whose

numbers continue to decrease in a long time will result in the weakening of cellular defense mechanisms and low antibody production. Trey reported that in a state of stress due to reduced intake of nutrient substances will cause the number of T lymphocytes, B lymphocytes, plasma cells and antibodies will decrease, while the Valbuena et al., (1996) argued that the lack of protein can also be decreased number of immunoglobulin G (IgG) and lymphocytes.

The phenomenon of decreased concentrations of immunoglobulin G (IgG) is actually the result of the hormone cortisol that meingkatnya suppress the production of T lymphocytes, particularly lymphocytes and B lymphocytes. Arai (1988) suggests that in a state of stress due to a prolonged food shortage caused increased cortisol levels. Furthermore, Khan (2008) reported that the production of cortisol suppress T and B lymphocytes Decrease in both types of lymphocytes causes the level of immunoglobulin G and M has decreased.

Dubey and Yunis (1996) also argued that restrictions on feed during molting programs can cause stress and will have an impact on the immune system in chickens. Proteins are nutrients that are of particular concern in the preparation of rations. Protein, carbohydrates, fats, vitamins, and minerals are needed for growth and maintenance of the body. Changes in quantitative and qualitative components of nutrients significantly affects the immune system. Things deficiency or excess nutrients can affect the synthesis of molecules that regulate immune function.

At week-2 up to 4 immunoglobulin G (IgG) increases again, this is because chickens have been given rations and drinking water 55gram/ekor/hari in adlibitum, so that the needs of amino acids for the formation of immunoglobulin re-met, as reported Barua, et.al (2001) that the levels of immunoglobulin G (IgG) in the

chicken again increased when intake began nutirien given at the end of force molting due to stress from beransur-ansur reduced and its constituent precursors start met.

Effect of Treatment on Level of Blood Glucose

The average blood glucose content of each treatment during the study can be seen in Appendix 6. In Appendix 6, can be seen that the average blood glucose content, respectively which is at the time of the study pre (279.3), week 2 (156.2), week 3 (219.73), week - 4 (249.2), week 5 (264.27). Clearer picture of the profile changes in blood glucose levels can be seen in Appendix 7.

In Appendix 7 was that the average blood glucose levels prior to molting force is 279.33 ± 5.81. These levels included in the normal category in accordance with the recommendation of Bell and Freeman (1981) 200-400 mg.100 ie-1 mL of blood. Can be explained that before the force applied to the molting of laying chickens, rations consumed primarily karbohohidrat sources still contain enough glucose. About the mechanism or the general synthesis of glucose from carbohydrate sources shown in Appendix 8.

It is known that glucose is the most important carbohydrate in relation to the provision of energy in the body. This is because all kinds of good carbohydrate monosaccharide, disaccharide and polysaccharide is consumed by the chickens will be converted into glucose in the liver. This glucose then will serve as one of the main molecule for the formation of energy in his body. Thus, in conditions where there is no environmental stress, both Climate and food restriction, then the glucose will be maintained in normal conditions as a source of energy. Anderson, et. Al.

(2002) and Webster (2003) reported that glucose from the ration is the main energy sumebr cattle under stress or without stress.

In Appendix 7 also indicated that the levels of glucose at the end of the week when force molting I have a very high drop until it reaches the level of 156.20 ± 5.21 for this week is a period pemuasaan rations, again increasing after the end of the week II force molting because two days earlier have been given ration to 55 grams /i / day.

This decrease in glucose levels can be argued that when done so pemuasaan energy supply from outside sources is not available so the blood glucose levels decreased. Mechanisms for nutrient adequacy mempertahakan energy primarily in order to maintain basic life laying chicken is through the mechanism feather fall, as Brake (1992) reported that the hairs fall for one of the mechanisms for energy sufficiency mempertahakan basic living.

Another mechanism is by increasing certain hormones to spur reform nutrient substances non karborhidrat to glucose and glycogen reforms. Attia, et. al (1994); Webster (2000) and Bar, et.al (2003) in a state of increased stress hormones adrenaline and cortisol. Increases blood glucose through a mechanism Glycogenolysis and gluconeogenesis by increasing the cellular cAMP which can result in increased blood glucose.

Note that although at the time pemusaan, laying chickens were not given ration experiments but has a spare chicken fat, amino acids and glucose in muscle and liver glycogen form, allowing glucose as an energy reserve is maintained even

in low levels. Mechanism of glucose production or anabolisme, conducted through Glycogenolysis (Appendix 9) and gluconeogenesis (Appendix 10).

In Appendix 8 it appears that the liver and muscle glycogen can be converted into glucose to be used as an energy source, besides lactic acid metabolism through a mechanism common to the Krebs Cycle path, it can be converted to lactic pyruvic acid to glucose with subsequent gluconeogenesis path (Fig. 10) . Puvadolpirod, et.al (2000) reported that glycogen can be converted into glucose in a state of shortage of energy sources and mechanisms malalui lactate into pyruvate further reforms to glucose.

In addition Glycogenolysis mechanism, glucose can also be obtained through the mechanism of gluconeogenesis, which is benefiting from precursors other than carbohydrates into glucose (Appendix 10).

In Appendix 10 it appears that amino acids and lactic acid can be dianabolisme pyruvate is then converted into oxaloacetic, and hold further converted into glucose. Fatty acids through a mechanism through lipolisis converted into acetyl co-A further involved in krebs cycle selanjutya oxaloacetic kemudiaan become involved in gluconeogenesis cycle to form glucose. Puvadolpirod, et.al (2000) suggested that under conditions of glucose shortage of rations, or, or in a state of stress berkepaanjangan then formed through the mechanism of glucose glukonogenesisi, where the precursor amino acids, lactate and fatty acids are involved, so the glucose remains a source of energy for monogastrik, although glukosanya levels decreased significantly.

Until the end of the study at the end of the week IV glucose levels had reached normal conditions (264.27 ± 3.83) but not the same as the glucose level

before the treatment force molting, it is because the provision of rations were limited to half of the need to produce.

CONCLUSION

Levels of immunoglobulin G (IgG) and chicken blood glucose are experiencing force molting, indicating decreased below normal levels to 1.31 ± 0.1 mg. mL-1 and 156.2 ± 5.21 mg.100mL-1, then increased again until the end of force molting in line with the provision of rations and a half of their needs.

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Appendix 1. Composition of rations

Bahan Pakan	(%)
Jagung	**80,80**
Dedak	**3,50**
Tepung Ikan	**8,20**
Bungkil Kedelai	**4,50**
MCP	**2,00**
Minyak Kelapa	**-**
Top Mix	**0,50**
Energi : ME* (kkal/kg)	**3133**

Appendix 2. The energy content of food rations Experiment.

Zat Makanan	(%)
Protein Kasar	**14,40**
Lemak Kasar	**4,23**
Serat kasar	**2,39**
Calsium	**1,22**
Phospor	**0,45**
Methionin*	**0,32**
Sistin*	**0,23**
Lisin*	**0,72**
Arginin*	**0,77**

Keterangan : Kandungan zat makanan ransum dihitung berdasarkan kandungan bahan pakan hasil analisa Balai Lab. Kesehatan Bandung (2009).
* Dihitung berdasarkan tabel Komposisi Zat Makanan Scott dkk. (1982).
Kandungan energi Metabolis ransum Moulting 3130 kkal/kg berdasar pada Hurwitz dkk. (1998).

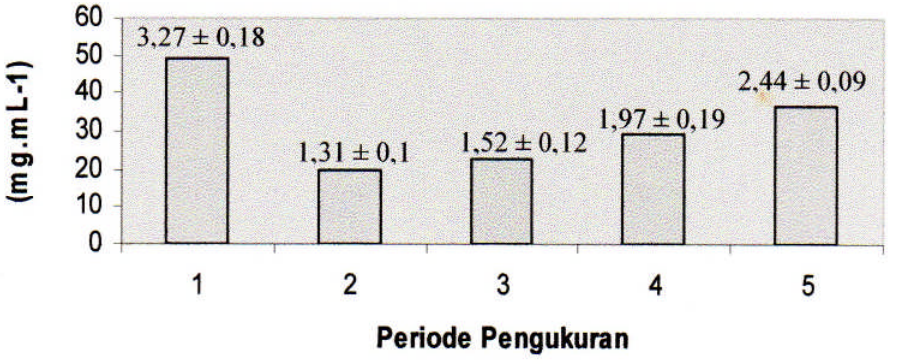
Appendix 3. Ration method of force molting chicken group force molting

Hari	Air Minum	Ransum
1-12	**Adlibitum**	**Puasa**
13-34	**Adlibitum**	**Diberikan 55 gram/ekor/hari dengan protein 14,4 %.**

Lampiran 4. Rata-rata Kandungan Immunoglobulin G (IgG) Ayam Petelur Sebelum dan Selama *Force molting*

N	Pra Penelitian	Minggu ke-			
		I	II	III	IV
	..... mg.mL^{-1}				
1	3,5	1,4	1,5	1.7	2.4
2	3,5	1,2	1,7	1.8	2.5
3	3,1	1,2	1,6	1.8	2.3
4	3,2	1,3	1,8	2.1	2.6
5	3,2	1,4	1,5	1.8	2.4
6	3,2	1,3	1,4	1.9	2.5
7	3,1	1,5	1,5	2.1	2.4
8	2,9	1,3	14	1.8	2.6
9	3,6	1,2	1.5	1.9	2.5
10	3,2	1,4	1.6	2.1	2.4
11	3,4	1,2	1.5	1.9	2.5
12	3,2	1,3	1.6	2.3	2.3
13	3,3	1,4	1.4	2.2	2.4
14	3,2	1,4	1.4	1.9	2.4
15	3,4	1,2	1.5	2.3	2.5
Jumlah	49	19,7	22,9	29,6	36,7
Rataan	3,266666667	1,313333	1.526667	1.973333	2.446667

Lampiran 5. Rata-rata kandungan Immunoglobulin G (IgG) ayam Petelur Sebelum dan Selama *Force molting*.

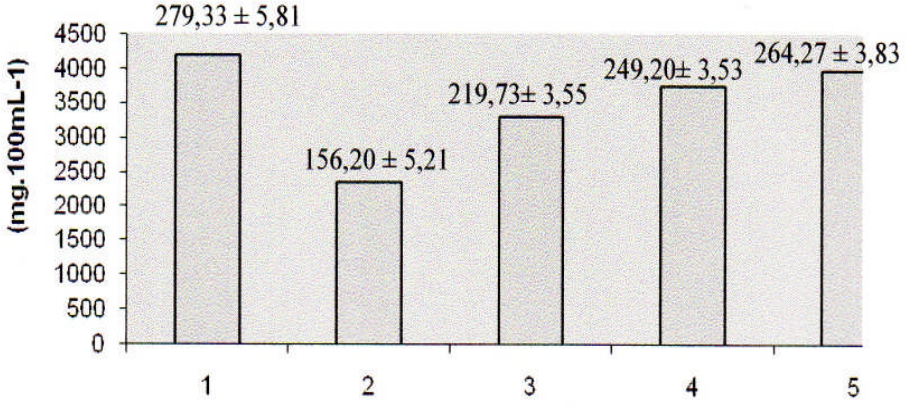


Keterangan 1 : Pengukuran Sebelum *Force molting*
2 : Pengukuran akhir minggu I saat *Force molting*
3 : Pengukuran akhir minggu II saat *Force molting*
4 : Pengukuran akhir minggu III saat *Force molting*
5 : Pengukuran akhir minggu IV saat *Force molting*

Lampiran 6. Rata-rata Kandungan Glukosa Darah Ayam Petelur Sebelum dan Selama *Force Molting*

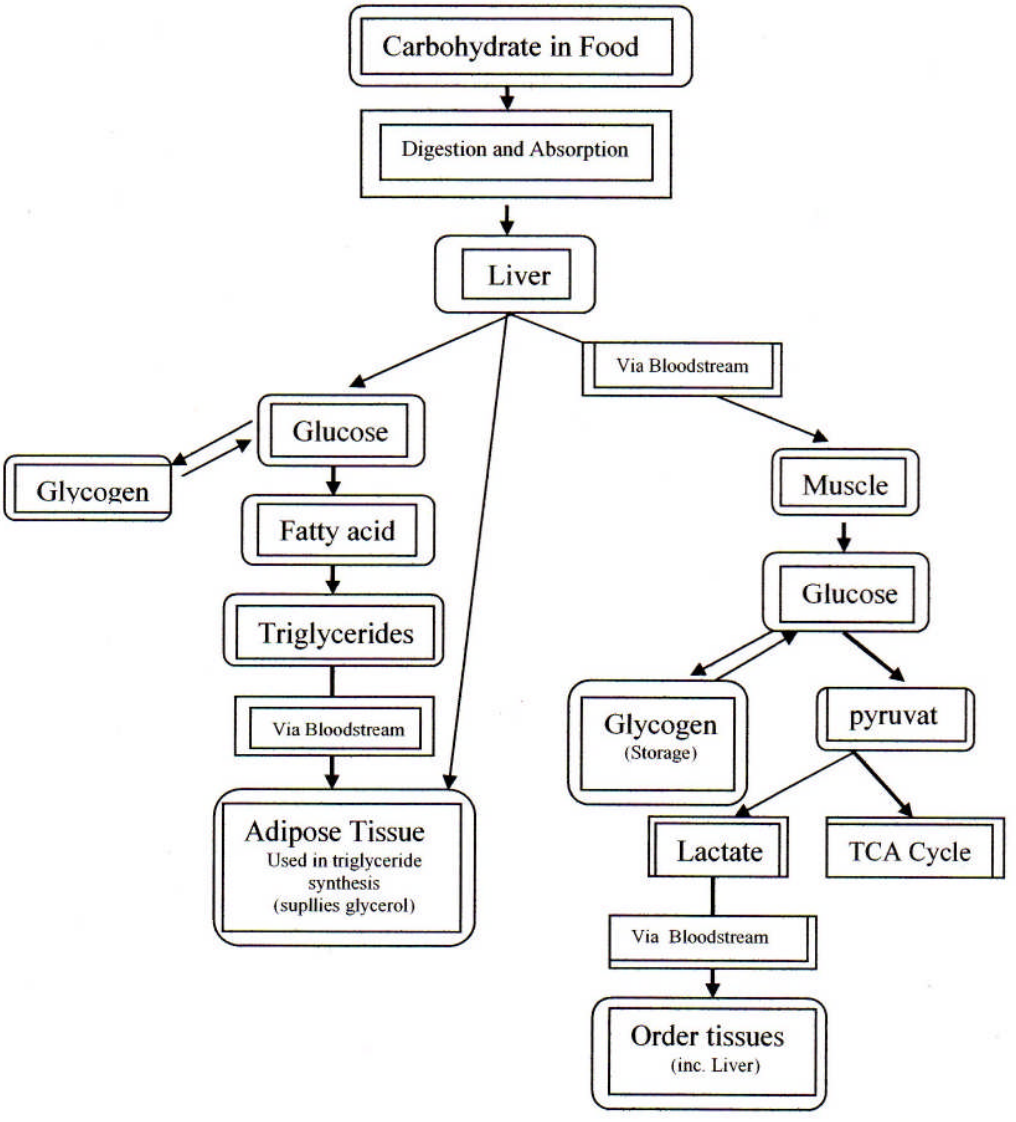
N	Pra Penelitian	Minggu ke-			
		I	II	III	IV
	..... mg.100mL^{-1}				
1	285	156	218	247	264
2	276	149	223	245	262
3	283	161	217	251	269
4	279	147	216	252	267
5	281	157	220	249	259
6	286	154	220	251	265
7	276	148	214	246	268
8	278	163	219	257	269
9	285	153	226	246	268
10	283	163	216	244	259
11	274	158	224	248	261
12	273	157	223	252	260
13	289	156	221	253	263
14	273	159	216	247	269
15	269	162	223	250	261
Rataan	4190	2343	3296	3738	3964
Jumlah	279.3333333	156.2	219.7333	249.2	264.2667

Lampiran 7. Rata-rata Kandungan Glukosa Darah Ayam Petelur Sebelum dan Selama *Force molting*



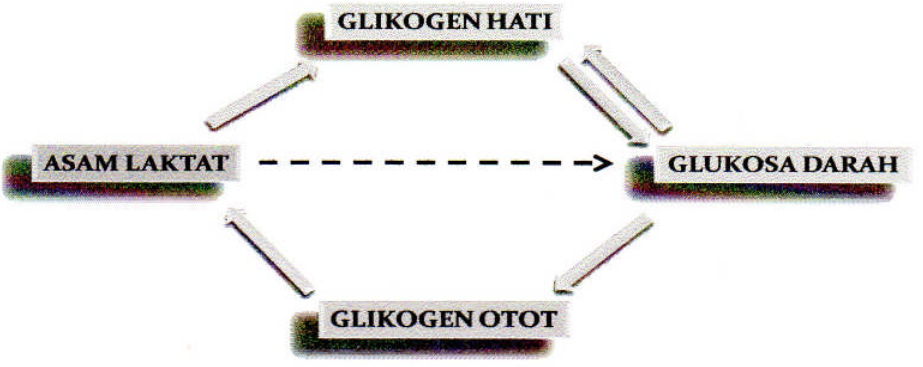
Keterangan 1 : Pengukuran Sebelum *Force molting*
2 : Pengukuran akhir minggu I saat *Force molting*
3 : Pengukuran akhir minggu II saat *Force molting*
4 : Pengukuran akhir minggu III saat *Force molting*
5 : Pengukuran akhir minggu IV saat *Force molting*

Lampiran 8. Sintesis Umum Glukosa



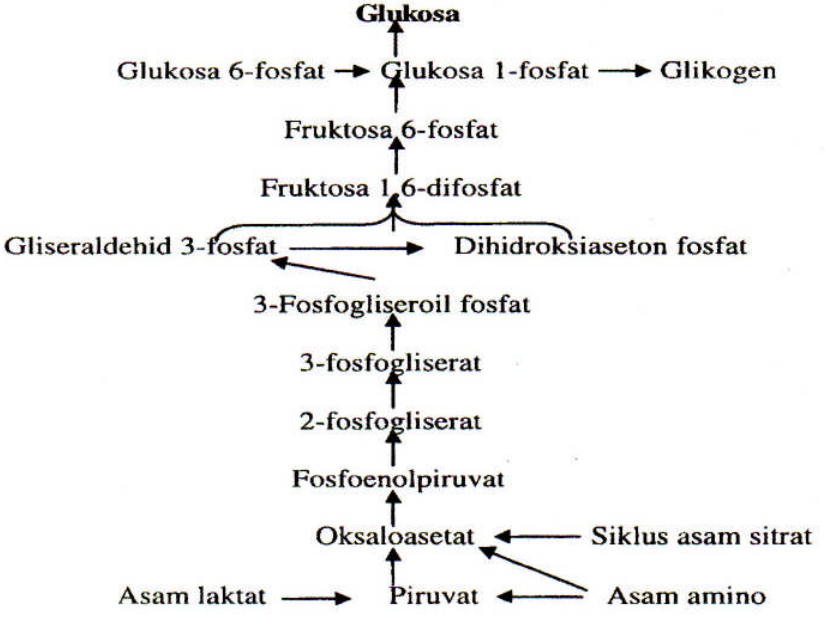
Sumber : Irawan, 2007.

Lampiran 9. Glikogenolisis (Perombakan Glikogen hati dan Otot Menjadi Glukosa)



Sumber : Brake, 1992.

Lampiran 10. Glukoneogenesis (perombakan prekursor non karbohidrat menjadi glukosa)



Sumber : Sherian, et.al., 1991