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SUMMARY

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TECHNOLOGIES OF ANIMAL HUSBANDRY

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PALM SUGAR (*Arenga pinata*) IMPLEMENTATION AS BIOSECURITY PRE-TRANSPORTATION SYSTEM ON BLOOD GLUCOSE AND GLYCOGEN ON BROILER

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Abstract

Transport of broiler chicken pen to the slaughterhouse can lead to stress. Transportation stress substantially unavoidable, but it does not mean that the negative effects of stress can not be reduced. Efforts to suppress the detrimental effects of stress alternative transportation one can do with management prior to transportation, through provision of drinking water containing palm sugar (Arenga pinata). The objective of the study is to obtained the implementation and delivery of palm sugar pre-transportation to maintain the stability of broilers performance. The study was conducted on thirty five days in the Sumedang, West Java Indonesia. The transportation routes are held from the village carried Bentar Cibitung - Cipadung - Nagrag or 2 hours, Village Bentar Cibitung - Cipadung - Nagrag - Cipadung - Tanjungkarta - Cipadung - Nagrag or 3 hours, Village Bentar Cibitung - Cipadung - Nagrag - Cipadung - Nagrag - Congeang - Nagrag or 4 hours. Each car transport speed 50-60 km/hour. Research carried out by using the method of factorial experimental design Completely Randomized Experiment 3 x 3 x 3, Statistical tests performed to the influence of variance and differences between treatments were examined using different test real honest. A factor is the transportation of animal with three replications, namely A_1 is a 2 hour transportation, A_2 is a 3 hour transportation, A_3 is a 4 hour transportation ; anti stress factor B with three replications, namely B_1 is palm sugar 2%, B_2 is palm sugar 3%, B_3 palm sugar 4%. The study found that by implementation of palm sugar in different rations and drinking water makes a decreased of blood glucose ranges from 4.72 up to 8.75 mg/dL, glycogen ranges from 120.27 up to 130.34 mg/g.

Key words: *Palm sugar, transport stress, performance production, broiler chickens.*

INTRODUCTION

Transportation of broiler chickens stricken areas of origin destination can cause stress. Factors that could be cause stress during transport, among others, mileage, time, duration, effects of temperature and humidity during transport. Stress transportation of broiler can make negative effects that cause high shrinkage of weight and slowing even cessation of body weight gain after arriving at the location of dismantling and cutting (Budinuryanto et al., 2000). There are several things can do to reduce the negative effects of transportation stress, namely: provision of adequate nutrition ration before transportation, selection of broilers before transport, density of broiler chickens in a box, setting ventilation and transport time. One function to maintain the biological safety of poultry especially broilers are ready to cut the traffic control system regarding biosecurity, so that all the way until the end of the journey is still obtained optimal performance. Transport to be one of the major factors in trading system is as well as the storage and processing of livestock (Mubyarto, 1982).

Palm sugar as a source of glucose is the energy source of non-ruminant livestock or energy for living organisms, and is absorbed in the bloodstream through the digestive tract. Disaccharide, sucrose or simultaneously absorbed more quickly as glucose and fructose when broken down in the 'brush border' intestinal mucosal cells. Some glucose goes into fuel and then to the brain cells, while the rest to the liver and muscles to be stored as glycogen or animal starch and fat cells are stored as fat. Glycogen is stored in energy source to be converted back into glucose when energy is needed more. Palm sugar release energy slowly or slow energy release, so there will be an increase or decrease in blood sugar

suddenly, too high, or too low, as the main content of palm sugar is sucrose and then glucose and fructose.

The chemical composition content of palm sugar: 9.16% moisture, 84% sucrose, 0.11% fat, 2.28% protein, 1.35% calcium, 1.37% phosphorus, and when palm sugar specificity compared with other sugars because they contain levels of higher sucrose 84%, 20% sugar cane, sugar beet 17% (Burhanuddin, 2005). Palm sugar is believed more lenient towards the stomach or indigestion and expedite metabolism (Susilowati, 2002). Excess glucose can be stored as glycogen. Glycogen is stored in the liver and a lot of muscle. Glycogen any time reformed into monosaccharides and serves as a source of energy through glycogenolysis process. Glucose and fatty acids can be absorbed by the cells of intestinal wall and blood transport it to the liver, then stored in the fatty tissue which contained in the various layers and organs. Glycogen is the stored as energy source that will be converted back into glucose when needed as energy. Some carbohydrates eventually broken down into glucose or other monosaccharides in the small intestine and transported to the liver to be converted into glycogen (Minka and Ayo, 2009).

MATERIALS AND METHODS

Implementation of the research carried out for 35 days (28 days of maintenance and day to 29-35 given treatment palm sugar in drinking water at day 35 before transportation), the amount of which as many as 162 transportation broiler chickens shaped 'straight run' Cobb Strain, obtained from the breeder in Sumedang District. Palm sugar used in this study was purchased a palm sugar makers farmer from the village of Kakas Rinondor District.

Method of administration: Rations (TN-2) given twice a day i.e. morning and afternoon during the study, brown sugar mixed in drinking water supplied ad libitum (300 mL water + 20 grams or 2%, 300 mL + 30 grams, or 3%, 300 mL + 40 grams or 4%) given for 8 days (2 days and 6 days pre-study research) then do transportation for 2 hours, 3 hours and 4 hours treatments.

Broilers were randomly marked in accordance with the treatment then included in the 24 boxes were made from a mixture of bamboo and wood box that has provided 432 broilers. Each box contained 9 broilers for 2 hour transportation research, and has three times replication, and also for 3 hours transportation and 4 hours of transportation.

Treatment of broiler chickens fed palm sugar in water, marked and observed in accordance with existing treatments. The number of broiler cut 54 heads for analyzing the glycogen (liver) 27 heads palm sugar in drinking water (each replication were taken one broiler chicks), the number of treatment studies carried as many as 18 boxes with 162 broiler chickens.

Each treatment unit then marked according to randomized treatment has worn so well treated animals had marked. Placement on the car already randomized treatment according to the serial number on the car is sort from front to back and so on until the top. Variables measured: Decrease in glycogen (mg / g), obtained from liver samples at the end of the study, and analyzed the laboratory (Peungvicha, 1998); decrease in blood glucose (mg / dl), obtained from blood samples beginning with the final blood sample. Blood samples were obtained before the beginning of transportation while final blood sample after transport. Blood sampling on the wing vein with the smallest needle (venojec) heparin the blood does not build up (Barham and Tinder, 1972.).

The study was conducted using a completely randomized design Factorial Experiments 3 x 3 (Gaspersz, 1995). A factor is the transportation of livestock, anti-stress factor B with three replications. Factor A = Transport namely: Livestock Transport A1 = 2 hours. Livestock Transport A2 = 3 hours. Livestock Transport A3 = 4 hours. Factor B = Anti Stress namely: B1 = 2% palm sugar. B2 = 3% palm sugar. B3 = 4% palm sugar.

RESULTS AND DISCUSSIONS

Influence Graph Blood Glucose Treatment of Broiler Chickens.

Results of analysis of variance (Figure 1 and Table 1) shows that the average blood glucose broilers receiving drinking water containing sugar palm (*Arenga pinata*) (G2), (G3), (G4) significantly ($P < 0.05$) decrease in blood glucose. Percentage used of palm sugar levels

in drinking water can lead to differences on blood glucose content due to long transport (T2, T3, T4) in broiler chickens.

Table 1. Test BNJ Treatment Effect of Palm Sugar on the Decrease of Blood Glucose.

Treatment	Decrease Blood Glucose	Significance 0.05
	.....(mg/dL).....	
$G2_{2.2}$	7.11	a
$G2_{2.3}$	7.91	a
$G2_{2.4}$	8.75	a
$G3_{3.2}$	5.40	a
$G3_{3.3}$	7.55	a
$G3_{3.4}$	5.96	a
$G4_{4.2}$	7.91	a
$G4_{4.3}$	5.37	ab
$G4_{4.4}$	4.72	c

Description: Values with different letters significantly (P <0.05).

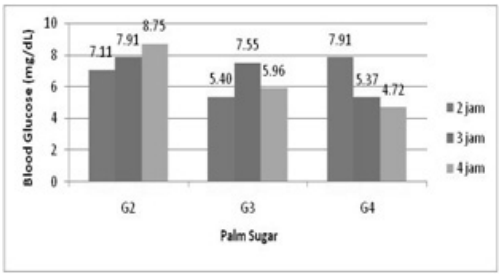

Figure 1. Grafik Influence Blood Glucose Treatment of Broiler Chickens.

Glucose found in the blood stream or blood sugar levels and serves as a provider of energy to all cells and tissues. Glycogen is stored in the liver and muscles as an energy reserve which at times can be converted back into glucose when needed. By order of the most rapidly absorbed are galactose, glucose and fructose (Hutagalung, 2004.). The decrease in average blood glucose results indicates that administration of palm sugar in water before transport can respond to heat stress during broiler chickens transportation. The results of the analysis of the effects of the use of anti-stress between the percentage of palm sugar in treatment of drinking water to the duration of transport showed no interaction (P>0.05) on the decline of blood glucose, but in single-use brown sugar in the drinking water significantly (P<0.05) due to long transportation of broiler chickens (Figure 1).

Hormones epinephrine secreted on the situation when the body is under stress or danger. Ration of carbohydrates consumed through drinking water or through excess body needs and then stored in the muscles as glycogen and the remaining hearts. Capacity is limited glycogen formation or maximum 350 mg / dl, and if in the form of glycogen accumulation has reached its limit, then the excess carbohydrate is converted into fat and stored as fat adipose (Hutagalung, 2004.).

Normal blood glucose levels in chickens is 200-250 mg / dl (Austic and Nesheim, 1990). Palm sugar or brown sugar is an alternative to loss of electrolytes in the body and the physical condition of broiler stable avoid dehydration (Burhanuddin, 2005). The results of this study that the average magnitude was decrease in blood glucose low of 4.72 mg / dl from 159.26 mg / dl before declining transportation and be 154.54 mg / dl after transport, as well as the highest 8.75 mg / dl from 145.25 mg / dl before transport, and then decreased to 136.51 mg / dl after transport in fact is much lower than the results of previous studies.

Decomposition reaction of glycogenolysis or glycogen produces glucose 6-phosphate, the 1-4 bond breaking or glycogen phosphorylase to produce glucose 1-phosphate. By catalyzed with the enzyme fosfo-glucomutase, glucose 6-phosphate can be formed from glucose 1-phosphate. Glucose 6-phosphate is converted into glucose by the enzyme phosphatase catalyzed, thus facilitating the diffusion of glucose from the blood into the cells cause an increase in blood glucose levels (May, 1999).

Table 2. Effect of Treatment of Glycogen Graph Broiler Chickens. Results of analysis of variance (Figure 2) shows that the average glycogen broilers receiving drinking water containing sugar palm (*Arenga pinata*) (G2, G3, G4) had no significant effect (P> 0.05) to glycogen. Mean glycogen is from 120.27 to 130.34 mg / g. The difference in the percentage of palm sugar in water with long transport showed no interaction (P> 0.05) on glycogen levels in the blood (Figure 2). Provision of 2% palm sugar in drinking water is good enough to overcome the transport for 2 hours and up to 4 hours.

Table 2. Test BNJ Treatment Effect Of Palm Sugar Levels in the Blood Glycogen

Treatment	Glycogen	Significance 0,05
	.....(mg/g).....	
$G2_{2.2}$	120.27	a
$G2_{2.3}$	125.70	a
$G2_{2.4}$	130.34	a
$G3_{3.2}$	120.43	a
$G3_{3.3}$	128.97	a
$G3_{3.4}$	126.84	a
$G4_{4.2}$	121.19	a
$G4_{4.3}$	125.84	a
$G4_{4.4}$	127.02	a

Description: Values with the same letter are not significantly different (P> 0.05).

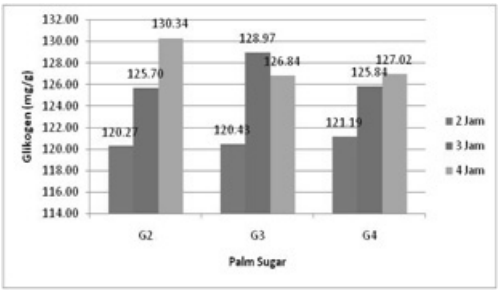

Figure 2. Effect of Treatment of Glycogen Graph Broiler Chickens.

During avian activity, primary energy for muscle contraction are glucose and fatty acids from the blood (Wirahadikusumash, 1985). If the muscles run out of the main energy source in the form of carbohydrate energy reserves in the form of glycogen or intramuscular muscle glycogen utilized. Muscle glycogen is useful as an indicator to evaluate the fatigue or stress on livestock. Plasma glucose is one that is commonly used as an indicator of physiological stress in transportation. The stress of transport has been reported cause an increase in plasma glucose concentrations because the liver glycogen breakdown (Kannan et al., 2000). Increased plasma concentrations of glucose mainly because glycolysis is associated with increased of catecholamines and glucocorticoids released during stress transport (Tadich et al., 2005).

Glycogen is formed through trajectory glycogenesis then stored in the liver and in the muscles, is used as a fuel reserve and outlined through the process of glycogenolysis. On the condition of cattle are stressed, circular system can not carry oxygen and glucose into skeletal muscle at speeds sufficient to meet the needs of such a high muscle to ATP, in the circumstances described glycogen quickly through the process of glycolysis to form lactic acid and ATP as an energy source high (Lehninger, 1994; Aberle et al., 2001).

CONCLUSIONS

Palm Sugar is a source of antioxidants that supplementation into pre-transport drinking water systems can reduce the stress level biosecurity of broilers after transport. Utilization of palm sugar in drinking water 2, 3 and 4 per cent to cope with changes to: blood glucose decreased from 5.37 to 11.13 mg / dL, and serves as an energy reserve or glycogen from 120.27 to 130.34 mg / g, when purposes of cell glucose increases followed the process glyconeolysis decreasing glycogen reserves in the liver and muscle of broiler chickens on a long transport 2, 3 and 4 hours.

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