

## EFFECT OF DIFFERENT PROTEIN CONTENT IN PELLET FEED ON THE TOTAL SERUM PROTEIN OF RAT (*Rattus norvegicus*)

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### ABSTRACT

The purpose of this study was to determine the effect of different crude protein content on feed in total serum protein of rat. In this research used 28 male rat aged four weeks old weighing 50-60 grams. Experimental animal were randomly divided into four groups. Crude protein content in feed which used in this research are 18.97 % as control feed, 15.01% for P1, 19.34% for P2 and 22.91% for P3. Treatments were given for four weeks. The result of this test, total serum protein level of rat in P0, P1, P2, and P3 are 5.54 g/dl, 5.77 g/dl, 5.91 g/dl and 5.77 g/dl respectively. One way ANOVA test showed non significant different among all of the experiment ( $p>0.05$ ). Duncan multiple range test showed the value of crude protein content that can maintain normal level of total serum protein of rat is in ranges 15%-22%

**Keyword:** Total Serum Protein, Crude Protein, *Rattus norvegicus*

### Introductions

The laboratory rat (*Rattus norvegicus*) is one of the most commonly used experimental animals, offering as it does the best 'functionally' characterized mammalian model system. It offers a number of unique advantages for modeling human diseases, developing new therapeutic agents, and in studying response to environmental agents. The size of the rat makes it ideal for certain physiological manipulations. With this wealth of recent information available on the rat and multiplicity of strains available with different characteristic that turn the laboratory rat into an indispensable tool for biomedical research (Hedrich, 2010).

At least 40 nutrients are required in the diet of laboratory rat. The diet needs to be controlled and optimized for the sex, physiological condition (i.e. maintenance versus reproduction/litigation) and age-specific needs of the rat, because dietary composition and manner of feeding can significantly affect the animal's physiology, metabolism and alter the effects of test substances on experimental endpoints (Keenan *et. al.*, 2010).

A nutritionally balanced diet is important both for the welfare of laboratory animals and to ensure that experimental result are not biased by unintended nutritional factors (Keenan *et. al.*, 2010).

One of the important nutrition in feed is crude protein. Protein has a role in the development of physiological structure and body immune system (Yudi *et.al.*, 2005).

Proteins in the diet are broken down by protease digestion to yield free amino acids and small peptides, the latter being finally degraded in the intestinal cells during absorption. The products of protein digestion enter the portal vein as amino acids. In the healthy animal, equilibrium is established between intake and synthesis of amino acids, on the one hand, and breakdown and excretion of excess nitrogenous material, in the form of urea, on the other (Eckersall, 2008).

Amount of total serum protein depends on quantity of N or amino acid which can be absorbed from diet and regulation of proteins in animal body. Animal's body will absorb those protein components in relative stagnant quantity and temporary saved in blood while waiting for an order from Central Nervous System through hipotalamus on its utilization (Putra, 2012). Adi *et.al.* (2012) stated that total serum protein can be used to determine amount of protein which absorb from diet and determine dietary status of the animals.

According to the research background above, the researcher will conduct a research about the formulated feed on how various complete feeds feeding can make the differences on the total serum protein in rat (*Rattus norvegicus*). This research will conduct formulated feed P1, P2,

and P3 compared to P0 as the control feed. These formulated feeds have different compositions each other. The composition of complete feed can't be exposed because it is patents right of the creator.

## Materials and Methods

This research conducted at Faculty of Veterinary Medicine, Airlangga University Surabaya. Experiment animal reared at Laboratory of Experimental Animal and for feed proximat analysis tested in Laboratory of Feed Technology. Total serum protein of rat tested in Balai Besar Laboratorium Kesehatan Surabaya. This research performed from Desember 2013 until January 2014.

Experimental animals that used in this study are 28 male three weeks old rats (*Rattus norvegicus*) weigh 50-60 gram. Experimental animals were divided into four treatments.

Materials that be used in this research are the commercials feed, broiler chicken feed 511 produced by PT. Charoen Pokhpand Surabaya, which will be used as control treatment, and 3 kinds of formulated rat pellet with different crude protein content which formulated by Prof. Romziah Sidik, drh., Ph.D. Rat feed given 30 gram per day and water given ad libitum.

The tools that used in this research include experimental cages for site maintenance made of plastic material with a size of 40 cm x 25 cm x 12 cm. Wire mesh as a cover individual cages, eating place,

drinking place, zeolite sand as individual base enclosure, digital scales, complete tool set for protein test using Biuret method and complete tool set for feed proximate analysis.

Twenty Eight Rats (*Rattus norvegicus*) that used in this study are divided into four treatment groups. Before get treatment, rats divided and put to twenty eight cages. Each cage contains one rat. The experimental animals adapted for seven days, fed and drank normally. Started on the day 8<sup>th</sup>, experimental animal given with formulated pellet for four weeks

1. First treatment (P0) as control given with commercial food as feed
2. Second treatment (P1) given with formulated rat pellet X as feed
3. Third treatment (P2) given with formulated rat pellet Y as feed
4. Fourth treatment (P3) given with formulated rat pellet Z as feed

At day 29<sup>th</sup>, experimental rats were anesthetized by chloroform and two ml blood sample was collected from all of the experimental rats. Blood collecting used heart puncture method from heart. Sample brought to Balai Besar Laboratorium Kesehatan Surabaya and tested with Biuret Method for checking total serum protein level.

### Data Analysis

The experiment used completely randomized design with four treatments and seven repetitions for each treatment. Data analysing using one way F test (ANOVA), followed by Duncan's multiple range test to determine the best treatment.

Statistical analyze using the Statistical Program Service and Solution (SPSS) 20 for windows.

### Result and Discussion

Results of research by providing formulated feed showed the following values of total serum protein in rat as follows

Treatment	Total serum protein level (g/dl) $\bar{x} \pm \text{SD}$
P0	$5.54 \pm 0.28$
P1	$5.77 \pm 0.53$
P2	$5.91 \pm 0.41$
P3	$5.77 \pm 0.77$

Table 1.1 Mean and Standart Deviation of Total Serum Protein of Rat Fed with Pellet Feed

Based on statistical analytic using one way ANOVA indicated that there was no significant different ( $p > 0.05$ ) among treatment. The range of total serum protein level according to Duncan's Multiple Range Test is around 5.54 to 5.91 g/dl.

According to Eckersall (2010), total serum protein is amount of the protein that circulating in blood. It serve many different function in the body with two major comonent, albumin and globulin. Concentrate of protein in serum can be affected by age, hormones, pregnancy and lactation and diet (Musmulyadi, 2011).

The test result showed that P0 have total serum protein level 5.54 g/dl. And then P1 with 5.77 g/dl, P2

with 5.91 g/dl, and P3 with 5.77 g/dl. According to Setyohadi *et.al.* (2008) an increasing in crude protein content will also increase total serum protein level in blood. This is the same with the experiment result which showed that there is an increasing in total serum protein level of P2 with 5.91 g/dl compared to P1 with 5.77 g/dl.

According to Rodwell (2003), nitrogen intakes matches nitrogen excreted. Excess amino acids are not stored in the body but rapidly degraded in form of urea through urine. There are two factors in the reduction of total serum protein on P3 compared to P2. First, it could be an effect of physiological condition of animal which always maintain equilibrium of protein synthesis and breakdown on the body. Increase in total serum protein due to increase in crude protein level of feed only visible for short period of time before animals body begin to digest to maintain nitrogen balance (Fathoni, 2008). Second, reduce of appetite is shown on animals which given with excess level of crude protein in feed. And it will effect on total serum protein level (Romziah, 2014). Hence, reduce in amount of feeds which eaten will effect on reduce of total serum protein level.

Lower result of control group compared to treatment group could be an effect of different source of protein on feed. As stated by Adi *et.al.* (2012), different source of crude protein resources on feed will effect on its amino acid value. Higher value of amino acids will increase rate of

crude protein absorbent in animal body.

The result of total serum which still in normal range (4.5-8.4 g/dl) according to Sharp and La Regina in Sihombing and Tuminah (2011) showing that concentration of crude protein in feed is enough to maintains rat daily protein needs.

## Conclusion

Based on research result, be concluded that P0, P1, P2 and P3 can maintain total serum protein of rat on normal level. Hence, it can be used as commercial pellet feed for rat. The value of protein content on pellet feeds ranges from 15-22%.

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