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Growth Pattern Analysis of Crossbred Chicken Feed Different Level Protein

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Abstract:

Crossbred chickens are a new breed of chicken whose nutritional needs are not yet known. The protein content of the ration will affect the growth rate of poultry. Growth patterns are used to predict the nutritional needs of livestock including the need for protein, energy, minerals and the appropriate harvest age. Used 192 crossbred chickens. This study was conducted using the in-vivo method using a completely randomized design (CRD) consisting of 3 treatments and 8 replicates. The treatments were as follows: T1) Crude protein 18% for starter and 16% for finisher. T2) Crude protein 20% for starter and 18% for finisher.T3) Crude protein 22% for starter and 20% for finisher. The research data obtained were tabulated and analyzed using descriptive and quantitative. The results showed that treatment 3 achieved the best results with a body weight of 801 grams and a growth pattern of 466%. The use of feed with crude protein levels of 22% (starter) and 20% (finisher) produced the best body weight analyzed using growth patterns. This growth pattern can be used as a parameter of the suitability of protein feed given to the needs of local chicken crosses at each phase.

Keywords **—Crossbred Chicken, Different Protein Levels, Growth Pattern.**

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I. INTRODUCTION

Crossbred chickens are a group of non-breed chickens resulting from crosses between male local chickens and female laying breeds. Crossbred chickens are used as an alternative to fulfill the meat needs of native chickens because they have faster and more efficient growth [1]. Optimal growth can be achieved if the factors of seed selection, feed use and maintenance management go well. The success of the livestock business is influenced by the use of feed, because feed has a role of 60-70% of the total production cost. The use of high-quality feed tailored to the needs of chickens will increase productivity, this has an effect on reducing production costs [11].

Protein has a role to fulfill basic life needs, new tissue growth, repair damaged tissues, metabolism for energy and production. The level of protein and metabolic energy in the ration will affect the speed of poultry growth. Inappropriate feed protein composition will have a negative impact such as not maximizing growth and producing low quality chicken carcasses. A good ration should contain sufficient amounts of animal protein and essential amino acids [3].

Growth pattern is an interpretation of the ability to grow and develop an individual or

population from initial size to maximum size under certain environmental conditions [14]. Environmental factors that influence include the quantity and quality of feed, the ability to produce, location and general maintenance [16]. The results of growth patterns in the form of curves are used as a tool to evaluate and predict when there is a rapid or slow increase in growth during the livestock rearing period. This study aims to determine and analyze the growth pattern of local chicken crosses resulting from feed treatment with different protein levels.

II. RESEARCH MATERIALS AND METHODS

The research material used 192 crossbred chickens. This study was conducted using the in-vivo method using a completely randomized design (CRD) consisting of 3 treatments and 8 replicates in each treatment. The research was conducted at Berline Farm with open house cage type for two months. Chicken rearing was carried out from the age of 0 days to 60 days with ad-libitum feeding and drinking. The cages were mapped as many as 24 plots with each plot measuring 100 cm x 100 cm x 200 cm.

The composition of the treatment feed in this study included broiler concentrate, yellow corn, fish meal, soybean meal, coconut oil, corn DDGS, separator bran, copra meal, salt, DL-methionine, and premix. The mixing of feed ingredients used a vertical mixer. The treatments were as follows:

T1) Crude protein 18% for starter and 16% for finisher.

T2) Crude protein 20% for starter and 18% for finisher.

T3) Crude protein 22% for starter and 20% for finisher.

The variables in this study are growth patterns using body weight data and body weight gain of local chicken crosses. Chicken body weight data were taken weekly from the beginning of rearing until harvest using a digital scale in grams.

Data on the effect of treatment on the variables obtained were tabulated and analyzed descriptively. Body weight gain each week was interpreted using a growth pattern curve and then analyzed descriptively. The relative growth rate formula is as follows:

Relative growth rate = (Wt-Wo)/Wo x 100%

Description:

Wt = body weight at age t_2

Wo = body weight at age t_1

Estimating the optimal growth rate according to [6] using the following formula:

$$Wt = Wo \times e^{kt}$$

Description:

Wt = body weight at age t (g)

Wo = body weight age 0 (g)

T = age (week)

k = growth rate coefficient

e = constant (natural number = 2.7183)

The growth rate coefficient (k) was calculated using the formula:

$$k = (InWt-InWo)/((t2-t1))$$

Description:

k = growth rate coefficient

lnWt = body weight at age t2

lnWo = body weight at age t1

t1 = age one week before weighing

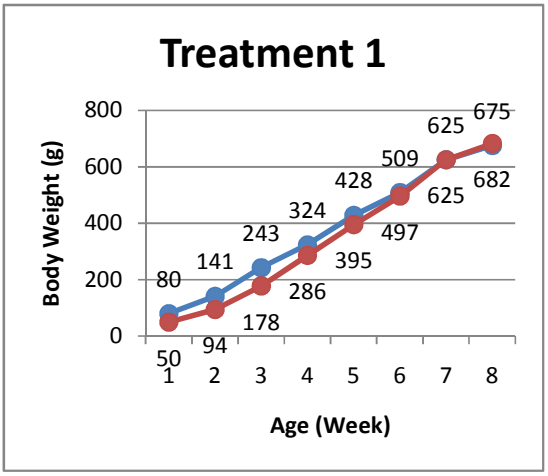
t2 = age at weighing

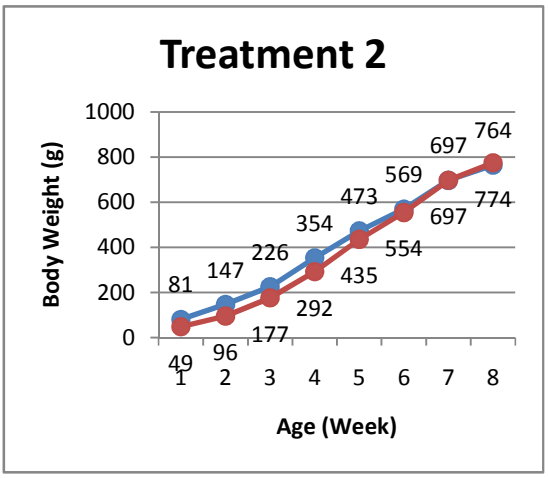
III. RESULT AND DISCUSSION

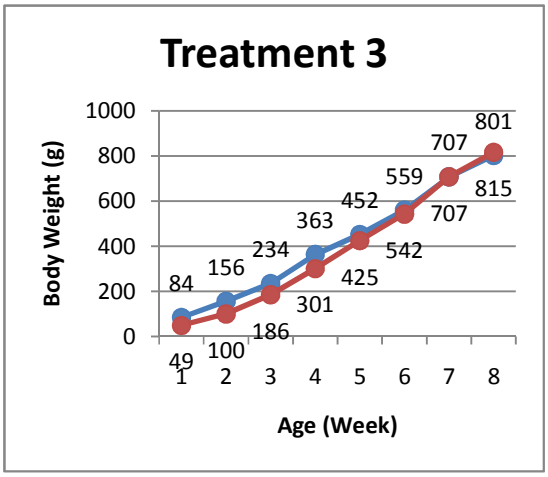
The period of raising chickens from DOC to 4 weeks of age is a critical period because environmental factors, especially feed and temperature, will greatly affect the formation and growth of body tissues. The increase in body weight of chickens in the starter phase looks very significant can be seen in Figure 1. Feed nutritional factors play an important role in increasing body weight so that it affects the growth pattern curve formed. Feed is declared good quality if it is able to meet all the nutrient needs of livestock in the right amount, type and balance of nutrients [7]. Feed protein requirements in the starter phase are higher than in the finisher phase. Large amounts of protein

in the starter phase of chickens are used for organ and skeletal formation. The increase in myofiber size during the early birth phase will have a positive impact on increasing muscle growth [5]. Setting the cage density according to the age of the livestock will affect the frequency of eating and drinking [18]. Appropriate feed nutrition but low feeding frequency will reduce chicken productivity.

The protein requirement of finisher phase feed in broilers will be used to fulfill the needs of life and production. Body weight gain in the finisher phase will lead to the development of body muscles. The accelerated increase in body weight and breast muscle mass is related to the number of myofibers in chicken muscles [15]. Amino acids contained in protein have a role in the growth and development of organ tissue.







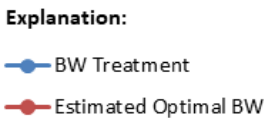
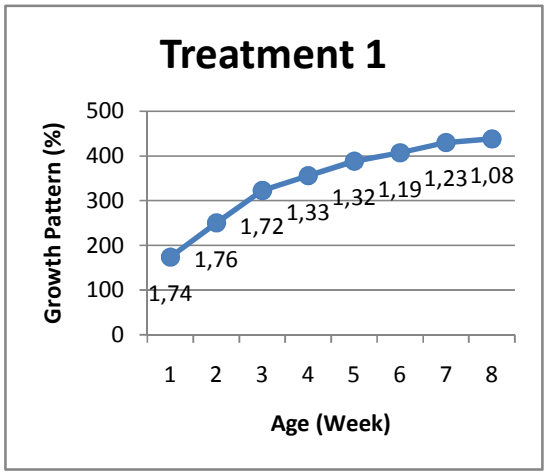


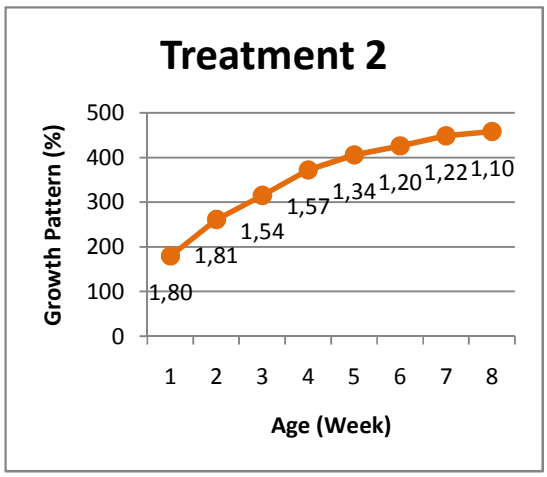
Figure 1. Body Weight Treatment and Estimated Optimal Body Weight Crossbred Chicken.

Body weight of crossbred chickens at week four showed the highest value was treatment 3 with a value of 363 grams (Figure 1). Treatment 3 contains 22% protein for the starter phase, this allows the protein needs of chickens to be maximally met. Genetic developments in broilers in recent years have led to an increase in body weight gain efficiency [2]. Increased feed conversion ability supported by fulfilled nutritional needs will increase the productivity of local chicken crosses. The lowest body weight in the starter phase was shown in treatment 1 at 324 grams (Figure 1). The protein content of treatment 1 feed was 18%, indicating that low protein will reduce the body weight of chickens.

The results of different feed treatments with different protein levels showed the best growth pattern in treatment 3 (Figure 1). Treatment 3 with a crude protein content of 22% starter and 20% finisher gave better weekly body weight growth than treatments 1 and 2. Nutrition not only acts as a metabolic substrate but affects the continuous

process starting from the genome to the transcriptome then the genotype and continued to the phenotype [8]. Protein in the metabolic process has an important role. The normal growth pattern in chickens accumulated from body weight will form a sigmoid curve, namely an increase slowly then quickly and continued slowly or stopped [6]. Data collection on growth patterns is carried out as one of the efforts to develop the productivity of local chicken crosses. Local livestock development runs optimally when able to obtain accurate and valid growth pattern models and population development models [14]. Growth patterns explain the increase in body size at a certain time through the parameters of age, growth weight and growth rate [9].





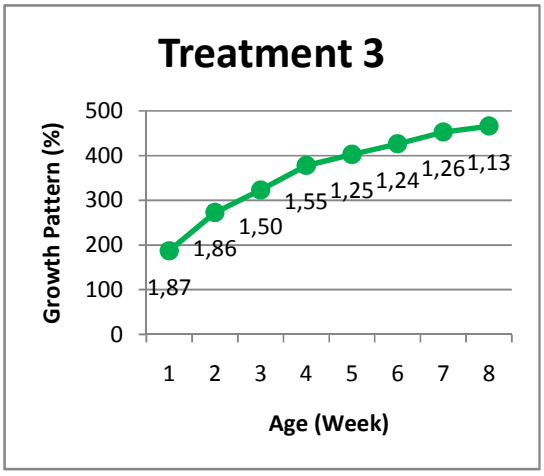


Figure 2. Growth Pattern Crossbred Chicken

Growth patterns that are not maximized are due to lack of feed nutrition, maintenance management and heat stress in chickens. Heat stress affects the decrease in feed conversion and chicken growth, this has an impact on the economic loss of a farm [10]. Treatment 1 with a crude protein content of 18% for starter and 16% for finisher gave the lowest growth pattern results. Body weight gain from week one to week eight in treatment 2 was slightly lower than treatment 3 (Figure 2). The function of growth pattern analysis in chicken farming is to predict feed nutrient requirements, predict body weight, determine harvest age and evaluate selection responses selections [12].Animal growth analysis using growth curves or mathematical equations will produce mathematical parameters that can be analyzed biologically [9].

Feeding with different amounts of protein during the chicken rearing period is more effective in influencing productivity [17]. Nutrients that must be considered in preparing feed are protein, carbohydrates, fat, vitamins, minerals, and water that are adjusted to the needs of livestock. Lack of one of the feed nutrients has the potential to cause health problems and reduce chicken productivity. Research [13] showed that high growth rates and high development of pectoral muscles of the most common genetic lines have been associated with the occurrence of other myopathies affecting the

pectoralis major muscle and other muscles, namely the white and brown lines. The growth process includes several changes including changes in structure, composition and body capabilities [12].

Growth is a complex physiological and morphological change starting from hatching to adulthood [9]. The growth pattern curve (Figure 2) shows the results of treatment 3 with crude protein content of 22% (starter) and 20% (finisher) reaching the highest curve, so it can be interpreted that the protein content of 22% for starter and 20% for finisher is able to meet the needs of local chicken crosses. Growth patterns can be used to predict the nutritional needs of livestock including the need for protein, energy, minerals, appropriate harvest age and age of sexual maturity [4].

IV. CONCLUSION

The use of feed with crude protein levels of 22% (starter) and 20% (finisher) produced the best body weight analyzed using growth patterns. This growth pattern can be used as a parameter of the suitability of the protein feed given to the needs of local chicken crosses at each phase.

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