



## Feed Type and Level of Viterna on Body Weight, Percentage of Carcass, Non-Carcass and Abdominal Fat of Broiler Chickens

### *Jenis Pakan dan Level Viterna terhadap Bobot Badan, Persentase Karkas, Non Karkas dan Lemak Abdominal Ayam Broiler*

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#### ABSTRAK

Tujuan penelitian ini untuk mengkaji pengaruh jenis pakan dan level viterna yang berbeda terhadap bobot badan akhir, persentase karkas, non-karkas, dan lemak abdominal ayam broiler. Metode yang digunakan yaitu Rancangan Acak Lengkap pola faktorial 2x4. Faktor pertama yaitu 2 jenis pakan komersial (J1=A dan J2=B). Faktor kedua yaitu 4 level viterna (P0=0cc; P1=1,5cc; P2=3cc; P3=4,5cc/l air minum). Delapan kombinasi perlakuan diulang 4x, setiap ulangan terdiri dari 4 ekor ayam sehingga total broiler yang digunakan 128 ekor. Kombinasi perlakuan yakni; J1P0 = Pakan A tanpa viterna di air minum, J1P1=Pakan A+1,5cc viterna/l air, J1P2= Pakan A+3 cc viterna/l air, J1P3 = Pakan A+4,5 cc viterna/l air, J2P0 = Pakan B tanpa viterna di air minum, J2P1 = Pakan B+1,5cc viterna/l air, J2P2 = Pakan B+3 cc viterna/l air, J2P3 = Pakan B + 4,5 cc viterna/l air. Variabel yang diukur adalah bobot badan akhir, persentase karkas, non-karkas, dan lemak abdominal. Data dianalisis dengan uji sidik ragam pada taraf nyata 5%, jika perlakuan nyata significant ( $P \leq 0,05$ ) dilanjutkan dengan uji Duncan Multiple Range Test. Hasil penelitian menunjukkan tidak adanya interaksi ( $P > 0,05$ ) antara jenis pakan dan level viterna terhadap semua parameter. Kesimpulan, perbedaan jenis pakan dan level pemberian viterna, serta interaksi antar kedua faktor tersebut tidak memberikan perbedaan ( $P > 0,05$ ) terhadap bobot badan akhir, persentase karkas, non-karkas, dan lemak abdominal ayam broiler.

#### ABSTRACT

This study aims to examine the effects of different types of feed and level of viterna on the final body weight, carcass percentage, non-carcass, and abdominal fat of broiler chickens. The method used was a 2x4 factorial Completely Randomized Design. The first factor was 2 types of commercial feeds (J1=A and J2=B). The second factor was 4 levels viterna (P0=0cc; P1=1.5cc; P2=3cc; P3=4.5cc/l drinking water). There were 8 treatment combinations with 4 replications, and each replicate consist of 4 chickens, a total of 128 broilers was used. The treatment combinations were as follows: J1P0=feed A without viterna in drinking water, J1P1= feed A+1.5cc viterna/l water, J1P2 = feed A+ 3cc viterna/l water, J1P3= feed A + 4.5cc viterna/l water, J2P0 = feed B without viterna in drinking water, J2P1= feed B + 1.5cc viterna/l water,

#### KEYWORDS:

Broiler

Carcass

Non-carcass

Feed

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*J2P2=feed B + 3cc viterna/l water, J2P3= feed B + 4.5cc viterna/l water. The measured variables were final body weight, carcass percentage, non-carcass, and abdominal fat. Data were analyzed using a variance test at a significance level of 5%, treatments that were significant ( $P \leq 0.05$ ) followed by the Duncan Multiple Range Test. The results showed that there was no interaction ( $P > 0.05$ ) between feed type and viterna level on all parameters. In conclusion, differences in the type of feed, and viterna level, also interaction between the two factors did not make a difference to the final weight, percentage of carcass, non-carcass, and abdominal fat of broiler chickens.*

## 1. Introduction

The development of broiler chicken business to produce carcasses from year to year is increasing. This is influenced by advances in genetics, increasingly modern broiler management, and of course advances in nutrition. Complete nutrition can be obtained from local feed, feed made by farmers or from commercial feed that widely available in Poultry Shop. Common feeding given by broiler chicken farmers is commercial feed. Types of commercial feed for broiler chickens in Kupang City East Nusa Tenggara Province include various trademarks from different companies. Research on various types of commercial feed has been carried out (Septiani *et al.*, 2016; Ning *et al.*, 2017; Emamnuel and Deki, 2021). However, other factors also need to be considered, such as supplemental feeding to maintain livestock health, considering the development of modern broiler chickens today is more susceptible to various diseases, and more easily stressed (Mahmood, 2012). Various efforts are made to prevent the occurrence of disease in broiler chicken companies, including the addition of growth-promoting antibiotics, and chemical synthetic feed additives. However, the addition of antibiotics and synthetic feed additives made from chemicals can produce residues on livestock products, especially in chicken carcasses, so that if consumed in the long term it will interfere with health for consumers (Yuhu, *et al.*, 2023). Therefore, to maintain the health of livestock, and to produce good carcass products requires appropriate feed supplements. One of the supplement feeds that can be used is the viterna (Aquardo, 2016; Sutomo, *et al* 2016)

Viterna is a special supplement feed for livestock derived from a variety of natural ingredients that are useful for increasing nutritional content and accelerating chicken growth. Nutrients found in the viterna are easily absorbed by the wall of the small intestine (Francis *et al.*, 2023). Each litre of viterna contain fish meal 10g, monocalciumphosphate 2,5g, palm sugar 7,5g, urea 5g, sprouts 0,5g, dolomit 0,33g,

NaCl 1,25g, rice hulls 0,29g, honey 0,14g, and coconut water 0,21g. The nutrition content of viterna includes: amino acids, carbohydrate, vitamins (A, C, D, E, K, B complex) and minerals Ca, P, Mg, Cl (Supartini, 2008). Viterna added in drinking water is intended to optimize broiler production, increase feed efficiency and effectiveness, reduce the smell of chicken manure, it can also improve the quality of the carcass. Proving that giving viterna at a dose of 1-2 cc did not have a significant effect on broiler chicken carcasses (Supartini, 2008). In contrast to the results of the study, the best feed conversion was obtained at the administration of viterna 2cc/litre of drinking water (Sutomo *et al.*, 2016). It is expected that the level of viterna administration of more than 2 cc/litre of drinking water for chicken growth will be better, and in the end carcass production will increase. Therefore, the present study is aimed at evaluating the effect of type of feed and the level of viterna as a feed supplement on final body weight, percentage of carcass, non-carcass, and abdominal fat of broiler chickens.

## 2. Materials and Methods

This research was carried out for 5 weeks in Nusa Cendana University – East Nusa Tenggara Province from May to June, 2023.

### 2.1 Experimental diets

The experimental diets given were commercial feed A and B from different company. The treatment of adding viterna through drinking water as a supplement feed was carried out from days 7 to days 35. During the study, broiler feed was given *ad libitum* as well as drinking water. The nutrition content of feed A and B were: dry matter 84%, energy 3100 kkal/kg, crude protein 20%, crude fat 5%, crude fibre 5%, ash 8%.

### 2.2. Broiler cage

Preparation of the cage was carried out two weeks before the conduct of the study. Cage preparation begins with washing the cage and its equipment using antiseptic. The next step is the placement of clean feeders and drinkers, installing heating lights, numbering cages, and research treatment codes. Clean and dry rice husks as bedding were spread on the floor of the cage approximately 5 cm. Additional bedding was added to pens if needed. At day 1, the temperatures of brooder were provided on a

continuous basis and maintained between 33°C and 30°C and was lowered stepwise to 24°C by wk 1.

### 2.3. Experimental design

The method used was the Completely Randomised Design method of 2x4 factorial pattern. The first factor was 2 types of commercial feed (J1=A) and J2=B). The second factor was 4 levels of viterna in drinking water (P0=0cc; P1=1.5cc; P2=3cc; P3=4.5cc/litre of drinking water). There were 8 treatments combinations and 4 replications, and each replicate consists of 4 chickens. The combination of treatments were as follows:

J1P0 = Feed A without addition of viterna

J1P1 = Feed A + 1.5 cc viterna/litre of water

J1P2 = Feed A + 3 cc viterna/ litre of water

J1P3 = Feed A + 4.5 cc viterna/ litre of water

J2P0 = Feed B without addition of viterna

J2P1 = Feed B + 1.5 cc viterna/ litre of water

J2P2 = Feed B + 3 cc viterna/ litre of water

J2P3 = Feed B + 4.5 cc viterna/ litre of water

### 2.4. Research Variables

The parameters measured were:

- a. Final body weight is the weight obtained by weighing live chickens at days 35.
- b. Carcass percentage

Four chickens of average weight were randomly selected from each replicate, and sacrificed by cervical dislocation at 35 days of age after 12h fast to empty the intestine and avoid faecal contamination of carcasses. The chickens were then scalded at 75°C in a water bath for about 30s before defeathering, and manually eviscerated. Carcasses were manually dressed by removing liver, gizzard, heart, oil gland, crop, proventriculus, lungs, and viscera.

The relative weight of carcass were obtained using formula (% of carcass = [carcass weight/live body weight]×100)

$$\text{Carcass (\%)} = \frac{\text{carcass weight}}{\text{live body weight}} \times 100\%$$

- c. The non-carass components in this study were blood loss, feathers, viscera, abdominal fat, head, neck and legs (Ulupi et al., 2018)

$$\text{Non-carass (\%)} = \frac{\text{non-carass}}{\text{live body weight}} \times 100\%$$

- d. Abdominal fat is fat around the gizzard, reproductive organs and between the abdominal muscles, around intestines and cloaca.

Measurement of % abdominal fat using the ....method (2011) :

$$\text{Abdominal fat (\%)} = \frac{\text{Abdominal fat weight}}{\text{live body weight}} \times 100\%$$

### 2.5. Data Analysis

Data were subjected to analysis of variance (ANOVA) and if any means significant differences ( $P < 0,5$ ), the data were compared using Duncan test with the statistical package SPSS version 20.

## 3. Results and Discussion

The effect of different types of feed and levels of viterna on the variables measured can be seen in **Table 3**.

**Table 3.** The average value of final body weight, carcass, non-carass and abdominal fat of broiler chickens given different types of feed and different levels of viterna

Level Viterna	Types of feed	Final body weight (g)	Carcas%)	Non-carass(%)	Abdominal fat (%)
P0	J1	1.421,50	66,07	23,04	0,70
P1	J1	1.433,50	66,71	21,67	0,77
P2	J1	1.385,25	64,97	24,74	0,70
P3	J1	1.441,50	68,11	21,82	0,75
P0	J2	1.511,75	66,42	24,35	0,72
P1	J2	1.403,75	67,34	22,68	0,77
P2	J2	1.476,75	68,50	23,92	1,03
P3	J2	1.427,50	66,53	22,71	0,98
SEM		37,337	0,289	1,060	0,105
P-Value					
Types of feed		0,302	0,433	0,057	0,204
Level Viterna		0,621	0,564	0,136	0,412
Feed *Level viterna		0,071	0,749	0,317	0,231

SEM = *Standard Error Means*, P= *p-value*

The data in **Table 3** shows that the range of final weight, carcass percentage, non-carass percentage and abdominal fat of broiler chickens given different types of feed

and viterna levels were 1.385,25 – 1.511,75g; 64,97%-68,11%; 21,67%-24,74%; 0,69%-1,03% respectively. The results in this study showed no interaction ( $P>0.05$ ) between the treatment of feed type (J) and viterna level (P) on all parameters. This means that the influence of the feed type factor (J) did not depend on the level of viterna (P). Therefore, the influence of feed type and viterna levels can be evaluated separately (**Tables 4 and 5**). The type of feed had no significant effect ( $P>0.05$ ) on all parameters and also the viterna level had no significant effect ( $P>0.05$ ) on all parameters.

**Table 4.** The effect of feed type on variables measured

Variables	Types of feed		SEM	P-value
	J1	J2		
Body Weight (g)	1.420,44	1.454,94	18,668	0,302
Carcass (%)	66,47	67,09	0,415	0,433
Non-Carcass (%)	22,82	23,42	0,530	0,057
Abdominal fat(%)	0,73	0,86	0,053	0,204

**Table 5.** The effect of viterna level on variables measured

Variables	Level Viterna (cc)				SEM	P-value
	P0	P1	P2	P3		
Body Weight (g)	1.466,66	1.418,66	1.431,00	1.434,50	26,401	0,621
Carcass (%)	66,25	67,03	66,51	67,32	0,586	0,564
Non-Carcass (%)	23,67	22,16	24,34	22,27	13,330	0,136
Abdominal fat(%)	0,73	0,77	0,87	0,86	1,097	0,412

### 3.1 The effect of treatment on the final body weight of broiler chickens

The results of current study showed that there was no interaction between feed type and viterna levels ( $P>0.05$ ) on the final body weight of broiler chickens. The type of feed had no significant effect ( $P>0.05$ ) on the final body weight and also the viterna level had no significant effect ( $P>0.05$ ) on the final body weight.

Types of feed had no significant effect ( $P>0.05$ ) on the final body weight of broiler chickens, because the protein content (19%) and other nutrients in both types of feed have met the nutritional needs for broiler chickens during the study. These results agree with previous research that provides 4 different commercial feeds on the growth of broiler chickens having the same average final body weight (Emamnuel and Deki 2021). It was explained that this was influenced by the levels of nutrients in various commercial rations were the same so that the effect of the different types of feed on final body weight was not significantly different. However Septiani *et al.*, (2016) and

Ning *et al* (2017) obtained that weight gain, feed conversion ratio, and index production were different when broiler were given four different commercial feed. Ning *et al.*, (2017) stated that the differences in feed ingredients used resulted in different amino acid contents which have an impact on growth of broiler.

**Table 3** shows that the administration of different levels of viterna had no significant effect ( $P>0.05$ ) on the final body weight of broiler chickens. This is because the addition of viterna levels up to the level of 4,5cc/l drinking water has not been able to increase the digestibility of feed, so that the utilization of nutrients is the same in all treatments, which ultimately results in a relatively similar final body weight. It was expected that giving viterna would be able to increase body weight gain, however, the result of this study did not prove it. viterna as a feed supplement contains various kinds of ingredients originating from animals and plants and has various nutrients including the amino acids, ie. lysine and methionine. Lysine are considered as an important amino acid that increases meat production and efficiency of broiler chickens. In this current study digestible lysine might be should be added to increase protein synthesis, and improve overall chicken growth performance. Francis *et al.*, (2023) stated that one of the benefits of giving viterna is to improve the performance of digestive enzymes, so that nutrients can be easily absorbed. However, in this study, the dose of viterna administered up to 4.5 cc/l drinking water was not able to increase the activity of digestive enzymes, as a result body weight gain did not improve. Our current study is in agreement with study reported by Sutomo *et al.*, (2016), in which body weight gain did not improve when broiler gave viterna up to 3 cc/l drinking water

### 3.2 The effect of treatment on the percentage of broiler chicken carcass

This study demonstrated that there was no interaction between feed type and viterna levels ( $P>0.05$ ) on the percentage of broiler chicken carcasses. The type of feed had no significant effect ( $P>0.05$ ) on the percentage of carcass, and also the level of viterna had no significant effect ( $P>0.05$ ) on the percentage of carcass. This is because the final weight on all treatments also did not differ markedly. One of the factors that affect the percentage of carcass is the final body weight and protein content of the ration (Bansal, *et al.*, 2011). Feed A and B in this study have the same protein content (19%), therefore they have the same effect on percentage of carcass. The percentage of

carcasses in this study within the normal range (66-67%) of live weight. Meanwhile, according to Ulupi *et al.*, (2018) the average percentage of broiler carcasses aged 30 days is 68% for females and 69,5% for males. In the current study males and females broilers did not separated.

Viterna level administration did not have significant effect ( $P>0.05$ ) on the percentage of broiler chicken carcasses. This is because the addition of the viterna level to the level of 4.5 cc/l of drinking water has not been able to increase the final weight, so the percentage of carcass is also not significantly different (66,25 - 67,32%). Supartini (2008) and Sutomo *et al* (2016) also demonstrated that using viterna levels of 1 cc, 2 cc, 3 cc/l drinking water had no significant ( $P>0,05$ ) effect on body weight gain. Actually, viterna contain amino acids, carbohydrate, vitamins (A, C, D, E, K, B complex) and minerals Ca, P, Mg, Cl (Supartini , 2008), and each litre viterna contain honey 0,14g. Song (2022) stated that honey contains such active ingredients as flavonoids, and polysaccharides, that can improve carcass yield in broilers, and these effects may be closely related to improved growth performance. However, in this current study the active substance in honey contained in viterna has not been able to increase the carcass yields of broiler chickens.

### 3.3 Effect of treatment on non-carcass percentage

The current study showed that there was no interaction between feed type and viterna levels ( $P>0.05$ ) on the percentage of non-carcass broiler chickens. The type of feed had no significant effect ( $P>0.05$ ) on the percentage of non-carcass and also the level of viterna had no significant effect ( $P>0.05$ ) on the percentage of non-carcass.

The type of feed did not have a significant effect ( $P>0.05$ ) on the percentage of non-carcass broiler chickens (22,16 – 24,34%). Harisshinta (2009) states that small body weight in broiler chickens generally has a greater percentage of body part weight wasted than in chickens with large body weight.

Viterna level administration did not have significant effect ( $P>0.05$ ) on the percentage of non-carcass broiler chickens. However, empirically, the average value of the percentage of non-carcass broiler chickens in the P2 treatment of viterna administration showed the highest value of 24.34%.

### 3.4 Effect of treatment on abdominal fat percentage

This study shows that there was no interaction between feed type and viterna levels ( $P>0.05$ ) on abdominal fat percentage. The percentage of abdominal fat of broiler chickens given different types of feed and viterna levels ranges from 0.690-1.032%. Resnawati (2004) reported that the average percentage of abdominal fat of broiler chicken ranges from 1.50-2.11%

Type of feed did not have a significant effect ( $P>0.05$ ) on the percentage of abdominal fat due to the absence of a significant influence on feed consumption. Numerically, feed B show the highest percentage of abdominal fat. In poultry, the amount of fat that accumulates in the body depends on the available plasma lipid substrate, which originates from the diet or *de novo* lipogenesis in the liver (Fouad and El Senousey, 2014). Therefore, poultry feeds may affect their total body fat deposition. Dietary energy level, protein level, fat type in the feed, and amino acids affect body fat deposition directly (Fouad and El Senousey, 2014). Feeds were used in this study (feed A and feed B) have the same nutritional content, in which the energy level was 3100 kkal/kg, and protein was 19%, therefore the fat deposition were not significantly ( $P>0.05$ ) different among treatments. Fan *et al.*, (2008) found that abdominal fat percentage was reduced significantly by decreasing dietary energy level from 3.200 to 3.000 kcal/kg in broiler chickens from 21 to 42 days of age. Yalcin *et al* (2010) found that low protein diets caused a significant increase in the abdominal fat percentage.

The results of this study showed that viterna levels did not have significant effect ( $P>0.05$ ) on the abdominal fat percentage of broiler chickens. The inclusion of viterna in the diets of broilers did not promote fatty acid oxidation and depress fatty acid synthesis, so the abdominal fat percentage was not decreased significantly. It was hoped that viterna supplementation in drinking water beneficially regulate lipid metabolism, in fact inclusion viterna in this study did not reduce abdominal fat of broiler chickens. Different from the result reported by Aquardo (2016) who found that viterna up to 3 cc/l drinking water can reduce abdominal fat of broiler chickens. Homma and Shinohara (2004) also obtained that probiotics in the drinking water can inhibit lipid biosynthesis and promote fatty acid catabolism. Different result of this study from the previous research might be different strain of chickens. Genetics also contribute to affect body fat deposition in broiler chickens (Fouad and El Senousey, 2014). Also, male chicken

carcass fat is less than female chicken carcass fat. Abdominal fat weight tends to increase with increasing body weight. However, in this study the highest body weight (P0) did not provide the highest abdominal fat. Empirically the average value of abdominal fat percentage of broiler chickens in the P2 treatment of viterna administration showed the highest value of 0.87%.

#### 4. Conclusion

From the results of this study, it can be concluded that the difference in feed type and viterna level, as well as the interaction between the two factors have no effect on the final body weight, carcass percentage, non-carcass percentage, and abdominal fat of broiler chickens.

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