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# THE REJECT GREEN KALE SUBSTITUTION *(Ipomoea aquatica)* FERMENTED YEAST IN COMMERCIAL FEED ON PERFORMANCE AND CARCASS QUALITY OF SUPER NATIVE CHICKEN

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***ABSTRACT***

*The purpose of this study was to determine the reject green kale effect of substitution fermented yeast in commercial feed on the performance and carcass quality of super native chicken. The design of this study is a completely randomized design (CRD) factorial pattern 2 x 4. The first factor is gender, the second factor is 4 treatment of feed. Each treatment consisted of 4 replications, and each test consisted of 4 chickens. The treatment in question is:* $R_0$ *= (100%) basal ration without the reject green kale substitution (Control),* $R_1$ *= 95% basal ration + with the reject green kale substitution fermented yeast 5%,* $R_2$ *= 90% basal ration + with the reject green kale substitution fermented yeast 10%,* $R_3$ *= 85% basal ration + with the reject green kale substitution fermented yeast 15%. Conclusion the reject green kale substitution fermented yeast in commercial feed can improve the performance and carcass quality of super native chicken. The best performance results were obtained from the value of feed consumption in male* $R_3$ *treatment at 455.6 grams/head/week, body weight gain/week in male* $R_3$ *treatment at 295.5 grams/head/week, feed conversion in male* $R_2$ *treatment at 1,538, and carcass percentage at male* $R_3$ *treatment by 62.6%. While the best results of carcass quality obtained from the value of the water holding capacity is the treatment of male* $R_1$ *by 53.83%, cooking losses in the treatment of* $R_3$ *female by 12.63%, the potential hydrogen of the male* $R_2$ *treatment by 5.07%, and tenderness which is at the highest favorite level in the treatment of treatment. Male* $R_3$ *is 3.53%.*

***Keywords:*** *Native chicken, green kale, fermentation, performance, carcass*

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## INTRODUCTION

The problem of availability of animal feed is not caused by lack of production, but rather the factors of poor management. Another obstacle is the low quality but high-quality feed caused by inefficient feed processing technology. Therefore, the effort that needs to be done to overcome these problems is to explore the potential, local feed ingredients from agricultural and industrial byproducts quantitatively and qualitatively. In addition, it is also necessary to know the potential of agricultural byproducts, and their adequacy to meet the needs of animal feed in animal husbandry development areas, and economically oriented feed technology innovations that are able to complement feed at any time.

The reject green kale is one that can be used in poultry feed. This type of forage can be obtained throughout the year as a food source and often becomes household and market waste if the quality has declined. Kale is also known to have nutritional value, such as protein, minerals and vitamins which are relatively higher than other forages, but are still very low for the needs of poultry. Daud's research results (2015) prove that the use of fermented spinach water in the ration had a positive effect on the growth of Peking duck. The use of fermented spinach in 20% ration resulted in the best growth of Peking duck, and increased ration efficiency, as indicated by increased body weight gain, and low ration conversion value during 4 weeks of administration.

Fermentation is a biochemical process that takes place by involving microorganisms, one of which is to increase the digestibility of feed ingredients. Feed ingredients that contain high crude fiber can be fermented with cellulolytic organisms that have the ability to digest the cell constituent components of cell walls in the form of cellulose, making it easier to digest. The principle of fermentation is to activate the growth of microorganisms needed to form new products. (Munira et al., 2015). Nutritional quality factors greatly determine the physical quality of meat including pH, water binding capacity, cooking losses, and tenderness. Therefore, it is necessary to conduct a study on the utilization of forage kangkung afkir as a potential agricultural by-product as a substitute for commercial feed, to increase the productivity of super native chicken, and to produce good quality meat.

Based on the description above, a study has been carried out entitled: The Effect of the reject green kale substitution *(Ipomoea aquatica)* Fermented yeast in Commercial Feed on Performance and Carcass Quality of Super Native Chicken as an effort to utilize abundant local feed raw material sources, to meet the needs super native chicken feed and improve the quality of good meat.

## MATERIALS AND METHODS

### Time and Place of research

This research has been carried out in Kupang Tengah District, Kupang Regency, East Nusa Tenggara from February 8 to May 17, 2019. This research consists of two processes, the first is the process of forage fermentation of kale afkir kale with yeast tape, carried out on February 8 - March 7 2019, then the process of maintaining and taking data is carried out from March 8 to May 17 2019. Proximate analysis of feed is carried out in the feed chemistry laboratory of the Faculty of Animal Husbandry, University of Nusa Cendana.

### Super-native Chicken Cattle

Super native chickens used in this study were 128 DOC super-native chickens, consisting of 64 males and 64 females. The DOC was purchased from the Kupang Waris Store. Enclosure and equipment Cages, and equipment used in this study consisted of 32 chicken coops with a length of 1m x width 0.5m x height 0.8m. Each cage is equipped with a place to feed and drink. Other tools used in this study include scales (for weighing chicken body weight and feed ingredients), water liters, tarps for drying, sacks to hold feed ingredients, plastic drums for fermentation containers, and other assistive devices. Feed The feed used in this study is commercial feed BR1 for DOC super native chicks at the age of 1 day to 2 weeks.

The use of BR1 feed without the substitution of forage kale apples fermented yeast tape with the aim of triggering the process of livestock growth since the DOC. When chickens aged 2 weeks to 10 weeks are given feed of BR2 which has been substituted with forage water spinach yeast fermented yeast tape, clean water is used for livestock drinking water during the maintenance period. Research methods

The experimental design used in this study was a completely randomized design (CRD) factorial pattern 2 x 4. The first factor was gender (male, and female), the second factor was 4 feed treatments, so there were 8 treatment combinations, where each treatment consisted of 4 replications, and each test consisted of 4 chickens. The intended treatment consists of:

$R_0$ = 100% basal ration, without the reject green kale substitution fermented Yeast (Control), (male)
100% basal ration, without the reject green kale substitution fermented Yeast (Control), (Female)

$R_1$ = 95% basal ration + with the reject green kale substitution fermented yeast 5% (Male),
95% basal ration + with the reject green kale substitution fermented yeast 5% (Female)

$R_2$ = 90% basal ration + with the reject green kale substitution fermented yeast 10% (Male),
90% basal ration + with the reject green kale substitution fermented yeast 10% (Female

$R_3$ = 85% basal ration + with the reject green kale substitution fermented yeast 15% (Male),
85% basal ration + with the reject green kale substitution fermented yeast 15% (Female)

After raising cattle for 10 weeks the final body weight is measured, then slaughtered to determine the percentage of carcasses.

**Implementation Procedure**

1. This research was conducted in three stages:
2. The first stage of the research was the reject green kale fermentation using fermenting yeast. The fermentation process follows the procedure of Munira, et al. (2015) using microorganisms in the form of saccharomyces cerevisae or yeast. The reject green kale is first dried in the sun to reduce the water content, then cut along ± 5 cm, after cutting the reject green kale, yeast added with 210 grams of mashed yeast, then mixed until homogeneous. Furthermore, the reject green kale fermented in a plastic drum container, and tightly closed to avoid contact with air and light. The reject green kale fermented for 4 days, then dried. After drying the fermented water spinach leaves that have been fermented are ground until smooth, then mixed with commercial feed which has also been ground with a comparative amount according to the treatment. Chicken livestock feed is made in pellet form. After the substitution process of green kale fermentation of yeast into commercial feed, then the feed is analyzed for its nutritional content.
3. The second stage of research is the maintenance of super native chickens. Super native chicken is fed with commercial feed from the age of 1 day to 3 weeks. At the age of 3 weeks the chickens were given the reject green kale substitution fermented yeast on commercial feed. Super native chicken is kept for 10 weeks, ration is given twice a day, in the morning at 07.00, and in the afternoon at 17.00. Drinking water is given adlibitum. During maintenance the amount of daily feed consumption is weighed each time it is given.

4. The third stage of research is meat quality measurement

**Measurement of cooking meat shrinkage**

The cooking method follows the instructions of Bouton et al. (1971; 1976) quoted by Soeparno (2005) as follows:

1. Meat samples taken on the chest with a weight of 0.5 grams.
2. Meat samples boiled in waterbath with a temperature of 80ºC for 30 minutes.
3. The top of the unopened plastic bag is folded and hung on the surface of the clip. This is to prevent the sample in a plastic bag in direct contact with water.
4. After finishing cooking the sample is removed (still in a plastic bag) then the sample is removed from the plastic.
5. The meat sample is dried with tissue and weighed.
6. Weight the sample to a constant weight.

The percentage of cooking losses is calculated by the following formula:

Cooking loss (%) = $\frac{\text{first weight} - \text{last weight}}{\text{first weight}}$ X 100%

**Measurement of meat tenderness**

This meat sensory test follows the Prayitno (2010) procedure which uses a scoring method by 7 untrained panelists. Tenderness test was conducted to determine the tenderness of meat by calculating the number of scores.

The number of panelists needed in the study was 7 people, with the following conditions to become panelists:

1. Physically and mentally healthy.
2. Having normal sense of taste and sense of sight.
3. Not color blind.
4. Never consume alcohol and don't smoke.
5. Frequently or ever consume chicken meat.

**Measurement of Water Bounding Capacity (DMA / WHC = Water Holding Capacity)**

Measuring the capacity of water is carried out by the method of Hamm, (1960) cited by Merthayasa, (2015), which is as follows:

1. sample of 0.3 grams was weighed using sartorius scales.
2. The sample is then placed between 2 filter paper, then press with a load of 35 kg using a carper press for 5 minutes.
3. The wet area drawn on the filter paper is drawn on mica plastic, the area of the wet area is calculated using millimeter block paper. The weight of water released during pressing can be calculated by the formula:

Mg $H_2O$ = $\frac{\text{wet area}}{0.0948-8}$

So the free water content = $\frac{\text{Mg H2O}}{\text{sample weight}}$ X 100%

Total water content (KAT). Meat samples of approximately 5 gr (X) were weighed, then put into a weighing bottle that was known to have an empty weight (Y). Samples were roasted for 105ºC.

DIA = total water content - free water content

The more free water that comes out of the meat shows that the meat sample has low water binding ability.

**Measurement of meat pH (Potential Hydrogen)**

Potential Hydrogen measurements were tested according to (Prasetyo, and Kendriyanto 2010), as follows:

1. A pH meter is prepared.
2. The tip of the pH meter is inserted into the meat sample, then the pH value indicated on the pH meter display screen is read and recorded.
3. Measurements were made several times to obtain an accurate pH value.
4. Before the pH meter is used the tip of the pH meter is washed first using distilled water, then dried with a tissue. After that do the measurement of the other samples.
5. The calibration process is repeated if the pH meter is used again.
6. After finished using the pH meter tip washed with distilled water until clean, then dried with a tissue and the pH meter is stored back in place.

**Observed Variables**

Variables observed include:

1. Feed consumption/week
2. Feed consumption (g/head) = giving - (leftover feed + wasted feed)
3. Chicken body weight gain

Body Weight Gain measurements are carried out per week by means of a certain weekend's body weight minus the previous week's body weight. Weighing the weight until harvest.
4. Feed conversion ratio
FCR = (Feed Consumption) / PBB
5. Mortality
Mortality is calculated by comparing the number of chickens that died in the cage with the number of initial chickens in the cage.
6. Carcass percentage is calculated by:
Percentage of carcass =
(carcass weight) / (weight cut) x 100%
Physical quality of meat which includes (Water binding capacity, cooking losses, pH, and tenderness)

**Data analysis**

The data obtained in this study will be analyzed using the SPSS version 23 program, according to the Analysis of Variance (ANOVA) procedure, and to see the difference in effect between treatments was performed the Duncan Test (Steel and Torrie, 1995).

## RESULTS AND DISCUSSION

**General condition of research location**

The research livestock barn is located in the Tarus area, Kupang Tengah District, Kupang Regency, East Nusa Tenggara. Access to livestock raising locations is within ± 646 meters of the main road. The topography of the area where livestock is raised is hills, rocks and flat land. Climate and rainfall at the study site as well as in other areas on the island of Timor with a tropical climate with 2 seasons, the dry season and the rainy season, where the rainy season lasts for 3 months to 4 months and the dry season lasts for 8-9 month. During the research the temperature was measured 3 times a day, in the morning at 07.00 with an average temperature of 27 - 30ºC, at noon at 12.00 with an average temperature of 29.42 ° C and in the afternoon at 17.00 with an average temperature 26.10ºC. The chickens used in this study did not experience significant disturbances because if during the day the cage temperature had increased the chickens tended to consume a lot of water, and reduced movement and panting as an effort to adapt to a hot environment. At night tend to peck the feed and make more movements in an effort to adapt to cold temperatures. The results of proximate analysis of forage substitution for fermented yeast, kale, and forage kale without fermenting yeast tape. Based on the results of the proximate analysis test, obtained nutritional values of the reject green kale without fermentation, the reject green kale fermented yeast, and the reject green kale fermented commercial feed as shown in table 1.

From the proximate analysis result table, it can be seen that each sample has different nutrient content. Substitution of feed BR2 + Forage fermented kale contains quite good nutrition. Substitution of feed BR2 + Forage kale fermented yeast tape (15%) produced crude protein levels of 17.860%, crude fiber 16.915%, and crude fat 7.775%. Thus the nutritional content in commercial feed ingredients plus can improve feed quality. This is supported by the opinion of Munira (2015) which states that fermentation is a biochemical process that takes place by involving microorganisms, one of which is to improve the digestibility of feed ingredients. Effect of the reject green kale substitution, and sex on super native chicken performance Based on research that has been obtained, the results of substitution of modernized green kale, and the effect of sex on the performance of super native chicken.

**Feed consumption**

Based on the results of the study it was seen that the highest male feed consumption results were in treatment R3 for 455.6 g / head / week, followed by R2 treatment 452.7 g / head / week, R1 as control 450.4 g / head / week, and the lowest treatment in R0 was 446.6 g / tail / week. The highest yield of female chicken feed consumption was also found in treatment R3 444.1 g / head / week, followed by treatment R2 440.4 gr / head / week, R1 as 437.6 g / head / week, and the lowest treatment R0 was 434.5 g / head / week . From the results of consumption of feed obtained shows that gender differences have a real influence. The value of female chicken feed consumption tends to be lower than that of male chicken. This is thought to be due to the metabolic energy requirements for each sex of the different chickens to meet their basic living needs. The results of the study showed that male chickens had higher feed consumption values compared to female chickens. ANOVA test results showed the value of super native chicken feed consumption during the study was significantly different (P <0.05) from each treatment higher than the previous study of Munira (2015) which stated that the average feed consumption for 10 weeks maintenance of g / head / treatment ration weeks were R0 (307.80), R1 (310.16), R2 (302.41), and R3 (297.41) with an average value of 297.41 - 310.16g / head / Sunday.

**Table 1.** Chemical composition of the reject green kale before, and after fermentation and after substituting with commercial feed

| Types of Nutrients | Nutrition Content | | | | | |
|---|---|---|---|---|---|---|
| | Commercial Feed | CF + the reject green kale fermented(5%) | CF + the reject green kale fermented(10%) | CF + the reject green kale fermented(15%) | The reject green kale | The reject green kale before fermentation |
| dry ingredients (%) | 50,120 | 41,341 | 43,264 | 47,774 | 35,222 | 28,377 |
| organic matter (%) | 73,821 | 70,004 | 71,162 | 72,281 | 68,547 | 64,613 |
| crude protein (%) | 18,403 | 17,483 | 17,539 | 17,860 | 15,957 | 14,796 |
| crude fat (%) | 8,539 | 7,558 | 7,648 | 7,775 | 5,612 | 4,211 |
| Rough fiber (%) | 10,934 | 13,683 | 14,439 | 16,915 | 14,757 | 15,555 |
| CHO (%) | 48,019 | 47,003 | 47,118 | 47,746 | 46,978 | 45,605 |
| extract material without nitrogen (%) | 35,197 | 33,452 | 34,202 | 34,563 | 32,221 | 30,050 |
| Metabolic energy Kkal/kg | 2.900,64 | 2.601,33 | 2.610,22 | 2.643,08 | 2.486,07 | 2.231,42 |

Caption: (Proximate Analysis Result of Feed Chemistry Laboratory, Faculty of Animal Science, Nusa Cendana University, 2019)

**Table 2.** Effect of green kale substitution in commercial feed fermented yeast, and sex on the performance of super native chickens

| Variable | Gender | Treatment | | | |
|---|---|---|---|---|---|
| | | $R_0$ | $R_1$ | $R_2$ | $R_3$ |
| Feed consumption (grams / head / week) | Male | $446.6 \pm 4.12^a$ | $450.4 \pm 2.99^b$ | $452.7 \pm 2.37^c$ | $455.6 \pm 1.62^d$ |
| | Female | $434.5 \pm 5.97^a$ | $437.6 \pm 2.34^b$ | $440.4 \pm 4.71^c$ | $444.1 \pm 2.97^d$ |
| Increased Body Weight (gram / head / week) | Male | $287.6 \pm 4.55^a$ | $291.2 \pm 5.67^b$ | $294.4 \pm 7.56^c$ | $295.5 \pm 5.95^d$ |
| | Female | $277.9 \pm 4.32^a$ | $280.8 \pm 5.3^b$ | $282.7 \pm 6.73^c$ | $287.7 \pm 6.86^d$ |
| Feed Convertion Ratio | Male | $1{,}553 \pm 0.04^a$ | $1{,}547 \pm 0.03^b$ | $1{,}538 \pm 0.04^c$ | $1{,}542 \pm 0.03^b$ |
| | Female | $1{,}564 \pm 0.03^a$ | $1{,}559 \pm 0.03^b$ | $1{,}559 \pm 0.05^b$ | $1{,}544 \pm 0.04^c$ |
| Carcass Percentage (%) | Male | $53.04 \pm 8.27^a$ | $54.59 \pm 6.19^b$ | $57.95 \pm 6.01^c$ | $62.69 \pm 10.98^d$ |
| | Female | $57.38 \pm 9.88^a$ | $59 \pm 4.79^b$ | $61.84 \pm 6.24^c$ | $55.91 \pm 1.82^d$ |

Description: 1) $R_0$ = 100% commercial feed, $R_1$ = 95% commercial feed: green kale substitution 5%, $R_2$ = 90% commercial feed: green kale substitution 10%, $R_3$ = 85% commercial feed: green kale substitution 15%
2) Different superscripts on the same line show real effect (P <0.05)

**Weight gain/week**

Based on the results of the study it was seen that the results of the highest body weight gain were in the treatment of R3 roosters with a value of 295.5 grams / head / week, followed by treatment R2 294.4 grams / head / week, R1 291.2 grams / head / week, and the lowest treatment was R0 287.6 gram / tail / week. While the results obtained by female chickens are lower than that of male chickens, namely treatment R3 287.7 grams / head / week, R2 282.7 grams / head / week, R1 280.8 grams / head / week, R0 277.9 grams / head / week. The increase in body weight of research animals obtained from the beginning of treatment until harvest shows that male chickens have better results than female chickens. This is caused by the fact that roosters consume feed for the formation of muscle tissue, whereas hens consume feed for egg and feather production. This is in line with the counterpart Rumiyani (2011) which states that the sex of male and female broiler chickens when fed harmonious feeds then fillers and continued harmonized feeds have the same response. From the statistical analysis it shows that the interaction of feed treatment (K, DJ, P) and gender shows no significant difference.

ANOVA variance test results showed the value of body weight gain of super native chicken during the study was significantly different (P <0.05) from each treatment. The highest average body weight gain for research animals was found in male chickens in treatment R3 at 295.5 grams / head / week. This is due to the high level of feed consumption, the high value of consumption is due to the palatability of livestock to the feed given. Substances needed nutrients such as carbohydrates, proteins, fats, minerals and vitamins must be available in feed that will be given to livestock. Limited crude protein content in kale is not possible to meet the nutritional needs of livestock, so it takes a special treatment to increase the nutritional content (increase protein content and reduce crude fiber content). One way to treat it is the fermentation process.

**Feed conversion**

Based on the results of the study it was seen that the results of the lowest feed conversion in the treatment of R2 of male chickens was 1.538, followed by treatments R3 1.542, R1 1.547, and R0 1.553. Whereas female chickens produce higher conversion values in a row ie R3 of 1.544, R1 and R2 are equal ie 1.559, and R0 1.564. The lower value of research animal feed conversion is caused by genetic factors, and the quality of super native chicken feed. Super chicken is a result of crossing between native chicken and laying hens.

These crossed chickens have a faster growth than local native chickens. Feed contributes to basic survival and production, the feed given must contain protein in an appropriate amount, if the protein requirements are not met can lead to decreased growth and if excess protein causes the feed that is given to be inefficient. By providing quality feed regularly according to the needs of livestock can improve feed consumption so that maximum body weight growth can be obtained, thus minimal feed conversion can be achieved.

ANOVA test results showed the conversion value of super native chicken feed during the study was significantly different (P <0.05) between each treatment. The value of feed conversion obtained during the study was lower than that of the study (Husmaini, 2000) which stated the conversion of rations in 8-week-old native chickens using rations containing 17% and 20% protein content was 2.84 and 4.32. Lacy and Vest (2000), stated that several main factors influencing feed conversion are genetic, ration quality, disease, temperature, enclosure sanitation, ventilation, treatment, and enclosure management. Factors in ration administration, lighting also play a role in influencing feed conversion, the rate of ration travel in the digestive tract, physical form of the ration and nutritional composition of the ration.

**Carcass percentage**

Based on the results of the study showed that the highest percentage of carcasses of male chickens was in the treatment of R3 at 62.69%, followed by R2 57.95%, R1 54.59%, and R0 53.04%, while the results of the carcass percentage of chicken chickens were respectively 61.84%, R2 followed by R1 59%, R0 57.38%, and the lowest is R3 55.91%. This is due to the fact that since the beginning of the treatment the animals have been weighed in advance with the same average body weight, but after 10 weeks of maintenance, female chickens have a more dominant weight than other research animals. Substances - More nutrients are absorbed in the digestive tract so as to produce higher body weight and carcass with significantly different mean values between treatments (P> 0.05). The results of this study are better than previous research by (Munira, 2015) which states that feeding with substituted fermented rice bran with different fermenters produces an average carcass percentage value of 56.4%. One of the nutritional elements that is very important in the formation of carcasses is protein. The protein content the reject green kale substitution commercial feed fermented yeast is 17.48%, so the percentage of carcass is also higher compared to other treatments.

**Effect of forage substitution of fermented kangkung afkir kale (HKAT) yeast tape and sex on the quality of super native chicken carcasses**

Based on the research that has been obtained, the result green kale substitution fermented yeast, and sex on the carcass quality of super native chicken as shown in Table 3.

**Table 3.** Effect of the reject green kale substitution fermented yeast and gender on the carcass quality of super native chicken.

| Variable | Gender | Treatment | | | |
|---|---|---|---|---|---|
| | | $R_0$ | $R_1$ | $R_2$ | $R_3$ |
| Water Holding Capacity (%) | Male | $47.87 \pm 5.52^a$ | $53.84 \pm 5.30^b$ | $50.59 \pm 2.26^c$ | $47.35 \pm 5.54^d$ |
| | Female | $46.51 \pm 2.47^a$ | $53.44 \pm 1.77^b$ | $53.18 \pm 3.68^c$ | $51.57 \pm 2.53^d$ |
| Cooking Loss (%) | Male | $24.84 \pm 1.26^a$ | $19.69 \pm 2.72^b$ | $17.94 \pm 3.25^c$ | $13.63 \pm 3.27^d$ |
| | Female | $21.96 \pm 0.98^a$ | $18.52 \pm 1.33^b$ | $20.72 \pm 2.24^c$ | $12.63 \pm 2.79^d$ |
| Potential Hydrogen (%) | Male | $4.95 \pm 0.01^a$ | $4.91 \pm 0.04^b$ | $5.07 \pm 0.17^c$ | $4.99 \pm 0.05^d$ |
| | Female | $4.74 \pm 0.09^a$ | $4.87 \pm 0.03^b$ | $4.87 \pm 0.04^b$ | $4.97 \pm 0.09^d$ |
| Tenderness (%) | Male | $2.42 \pm 0.30^a$ | $3.14 \pm 0.23^b$ | $3.25 \pm 0.07^c$ | $3.53 \pm 0.08^d$ |
| | Female | $2.39 \pm 0.13^a$ | $2.82 \pm 0.24^b$ | $3.14 \pm 0.20^c$ | $3.46 \pm 0.24^d$ |

Description: 1) $R_0$ = 100% commercial feed, $R_1$ = 95% commercial feed: green kale substitution 5%, $R_2$ = 90% commercial feed: green kale substitution 10%, $R_3$ = 85% commercial feed: green kale substitution15%
2) Different superscripts on the same line show real effect (P <0.05)

**Water Holding Capacity**

Based on the results of the research, the highest value of water holding capacity of male chickens was in treatment R1 of 53.84%, followed by R2 of 50.59%, R0 47.87%, and R3 47.35%, while the highest water holding capacity of female chickens in treatment R1 amounted to 53.44%, followed by treatment R2 53.18%, R3 51.57%, and the lowest was R0 46.51%. Water binding power testing is a test to find out how much the ability of meat in binding free water. Meat with low water holding capacity will lose a lot of liquid, resulting in weight loss. (Lapase, 2016) states that the smaller the value of the water holding capacity, the greater the shrinkage of cooked meat, resulting in lower meat quality because many components are degraded.

Analysis of Variance (ANOVA) results showed that substitution (HKAT) in commercial feed with different levels during the study had a significant effect (P <0.05) on water holding capacity. The ability of meat to hold water is an important property because with the high water holding capacity, the meat has good quality. Soeparno (2009), states that the holding capacity of meat water around 20 - 60% is in the normal range, in connection with the explanation above, it can be concluded that the decreasing of meat water content, the protein's ability to bind water will also decrease. The decrease in water binding capacity is caused by the denaturation and depolymerization processes as well as an increase in protein solubility due to pressure and duration of boiling causing damage and changes in the structure of muscle protein, especially in actin and myosin. (Domiszewski, et al., 2011) states that the damage of actin and myosin causes a decrease in the ability of muscle protein to bind water.

**Cooking Loss**

The value of cooking shredded chicken super male in a row is R3 by 13.63%, followed by treatment R2 17.94%, R1 19.69%, and the highest is R0 24.84%, while the yield of cooking cooked shredded chicken super female is lower compared to poultry male. The value of cooking cooked female super-chicken meat in a row was R3 at 12.63%, followed by R1 treatment 18.52%, R2 20.72%, and the highest was R0 21.96%. Meat with lower cooking losses has relatively better quality than meat with greater cooking losses, because the loss of nutrients during cooking will be less so that chicken meat with low cooking loss will have a better quality compared to chicken meat with high cooking loss (Soeparno , 2005).

Statistical analysis of Variance (ANOVA) results showed that the substitution (HKAT) of yeast tape in commercial feed with different levels during the study had a significant effect (P <0.05) on cooking losses. This shows that the treatment influences the cooking losses of super native chicken meat. The average value obtained in this study is lower than previous studies by (Pratama A., et al, 2015) which states that the difference in body weight of broiler chicken slaughtered had no significant effect (P> 0.05) on cooking losses. The range of cooking losses in this study was 23.9 - 28.7%. Meat that has a low cooking loss has good quality meat because of less nutritional nutrients. This is in line with opinion (Soeparno, 2011). Which states that meat with a low average value of cooking losses has a relatively better physical quality compared to larger cooking losses, due to loss of nutrients during cooking.

**Hydrogen Potential (pH)**

The highest hydrogen potential value of super-native chicken meat at R2 treatment was 5.07%, followed by treatment of 4.99% R3, R0 4.95%, and the lowest was R1 4.91%, while the hydrogen potential value of hens was successively, namely R3 at 4.97%, followed by male R1 and R3 treatment at 4.87%, and the lowest was R0 $ .74%. The pH value is one of the criteria in determining meat quality by measuring the degree of acidity (pH), because it can affect the physical properties of meat. Animal muscle tissue while still alive has a pH in the range of 7.2-7.4 and will decrease after cutting (Prayitno., *et all*, 2010).

Analysis of Variance (ANOVA) results showed that the substitution (HKAT) of yeast tape in commercial feed with different levels during the study had a significant effect (P <0.05). Result data; research shows that the average pH value of super native chicken in the treatment increases with increasing levels of Forage Kale Watermelon Fermented yeast tape due to the presence of anti-oxidant substances such as phenols and eugenol which play a role to reduce the oxidation process. The pH value of chicken meat began to decrease at R1 and R3 in males. This is due to the long handling after cutting and the high temperature resulting in glycolysis and the accumulation of lactic acid. This is in line with the opinion of Lawrie (2003) which states that after slaughtering cattle, muscle will experience glycolysis and the accumulation of lactic acid which will affect the pH of meat. Soeparno (1998) states that high temperatures can accelerate the decrease in pH and the low capacity to bind chicken meat water due to increased denaturation of muscle protein and increased water transfer to the extracellular space.

**Tenderness**

Tests on the tendency of super native chicken meat using the Rating test method with 7 rather trained panelists. Each panelist filled in the softness test format, with the highest rating rating format 4 which showed very tender meat quality, 3 indicating soft meat quality, 2 indicating less tender meat quality and the lowest number 1 indicating non-tender meat quality. The panelists then gave an assessment based on the criteria determined in the tendency test. After getting the tendency rating results conducted by the panelists to assess tenderness, then the next step is to do a percentage of average tenderness value, so that the total average value of tenderness of super-native chickens is 3.08%, and females 2.95%, The results showed that the sex of super native chicken was statistically significantly different (P <0.05) to tenderness. This is thought to be due to the hydrolysis process of muscle protein in male chicken meat muscle which is higher than female chicken. This is in line with the opinion of Lawrie (2003) which states that during the immersion process in meat occurs the process of hydrolysis of muscle fiber proteins and binding fibers and changes - changes that thinning and the destruction of sarcoma, dissolved nucleus from muscle fibers and connective tissue and the release of muscle fiber attachment resulting in soft tissue.

Analysis of Variance (ANOVA) results showed that the substitution (HKAT) of yeast tape in commercial feed with different levels during the study had a significant effect (P <0.05). The result of the research data shows that the average value of tenderness of super-native chickens in treatment R3 is increased, this is because during cooking for a certain period of time it can cause protein denaturation. According to Winarso (2003) which states that protein denaturation is the breakdown of proteins into smaller units. Supported by (Soeparno, 2009) which states that one of the factors that affect meat tenderness is the postmortem factor, one of which is the cooking method by boiling.

The higher the substitution level of water spinach, the lower the value of breaking meat so that the quality of the meat is more tender This is in line with the opinion (Prayitno., Et al, 2010) which states that both the pH value, water binding capacity, and cooking losses have a relationship with meat tenderness.

**Mortality**

The mortality rate in this study was 0% or there were no deaths either in the control or treatment diets during the study. This indicates that the treatment feed has the same quality as the control feed. Mortality is affected by the maintenance system, especially hygiene and health, as well as quality feed. (Nurcholis et al., 2009). Stating that high mortality occurs due to chicken health problems caused by disease. Rivai's (2001) study found high mortality due to the presence of tetelo and pullorum and the presence of cannibalism. Research Nataamijaya (2008) found a high mortality rate caused by infectius coryza due to infection from Haemophillus gallinarum.

## CONCLUSION

Based on the results and discussion it can be concluded that the substitution (HKAT) of yeast tape in commercial feed can improve the performance and quality of super native chicken carcasses. The best performance results obtained from the value of feed consumption in male R3 treatment at 455.6 grams / head / week, body weight gain / week in male R3 treatment at 295.5 grams / head / week, feed conversion in male R2 treatment at 1.538, and carcass percentage at male R3 treatment by 62.69%. While the best results of the quality of the carcass obtained from the value of the water holding capacity is the treatment of male R1 by

53.84%, cooking losses in the treatment of R3 female by 12.63%, the pH of the male R2 treatment by 5.07%, and tenderness which is at the highest preferred level in the treatment treatment. Male R3 is 3.53%.

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