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The Effect of the Combination of Glucose Concentration with the Type of Extenders on the Quality of Native Rooster Spermatozoa during Storage

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Abstract

This study aimed to find the best combination of glucose concentration with the type of extender to maintain progressive motility and viability of Native Rooster spermatozoa, which stored for 48 hours at 5°C. This study used a completely randomized design (CRD) factorial pattern of 4 x 3. The first treatment was a different type of extender: LE (lactated ringer egg yolk), LS (lactated ringer skim milk), CE (coconut water egg yolk) and CS (coconut water skim milk), while second treatment was glucose concentration (20mM, 50mM, and 80mM). Native Rooster semen diluted with a ratio of 1:10, then sperm was stored in the refrigerator (5°C). Progressive motility and viability were observed at 0, 24, 48, and 72 hours. The results showed the type of extender treatment had a very significant effect (P <0.01) on the viability of spermatozoa, which were stored 24-hour. The treatment of extender type, glucose concentration, and interaction of extender type with glucose concentration had a very significant effect (P <0.01) on the quality of spermatozoa, which were stored 48 hours and 72 hours. The highest progressive motility of spermatozoa was maintained up to 46.67 ± 2.89% and spermatozoa viability up to 74.68 ± 4.51% in WE 80mM glucose extenders, so the conclusion of this study is the combination of egg yolk coconut water with 80mM glucose is the best extender to maintain progressive motility and viability of spermatozoa of Native Rooster which is stored for 72 hours at 5°C.

Keywords: glucose, extenders, spermatozoa, storage, Native Rooster

A. Introduction

Native Rooster is one of the chicken types that were popular in Indonesia. However, its rearing system is still traditional in the way it is spread so that the genetic quality of Native

chickens is not controlled, so to overcome this, it is necessary to improve the genetic quality of Native chicken. Some attempts have been made by researchers to improve the genetic quality of chicken, one of them by utilizing the latest technology that has been done in other countries such as artificial insemination (AI). One of the crucial steps to be done before AI is semen dilution. When semen is not be diluted, the number of the hen that would be recipients for AI is less and cannot long last for storage. According to Blesbois (2012), the critical factors that support the success of in vitro storage, including in vitro media, must be compatible with spermatozoa cell life.

Based on the previous study, the extender commonly used in mammalian semen contains various substances, for example, egg yolk, skim milk, or coconut water, while the lactated ringer is used for poultry semen. Each type of extender has a different effect on the quality of spermatozoa. The study of Daramola's, Adekunle, Oke, Onagbesan, Oyewusi & Oyewusi (2016) stated that the protective effects of coconut water on the viability of cryopreserved spermatozoa of bucks. Duck and quail egg yolks can be an abundant source of DHA for boar semen cryopreservation (Kaeoket & Chanapiwat, 2013). Duck egg yolk can be used to Boer goat semen extender, and it is a 10% minimum concentration in diluted semen (Ihsan, 2011).

Study by Galarza, de Guevara, Beltrán-Breña, Sánchez-Calabuig, Rizos, López-Sebastián & Santiago-Moreno (2019) describe that skim-milk had a decisive role in the regulation of boar sperm motility by influencing sperm protein modifications changes as well as increasing the GAPDH activity, mitochondrial membrane potential, and intracellular ATP content (Fu, Li, Wang, Zhen, Yang, Li, & Li, 2017). Ringer's solution consists of various mineral salts that have buffering and isotonic properties, which can support the spermatozoa motility for a longer time (Danang, Isnaini & Trisunuwati, 2012). The use of lactated ringers as extender results in higher fertility and fertile periods in free-range chickens when compared with NaCl 0.9% extender (Ridwan & Rusdin, 2008).

The energetic metabolism is one of the primary sources of problems during and after in vitro storage at birds' sperm. At the time of ejaculation, avian sperm contains very few intra-cellular energy reserves, and energy substrates may be added to the extender to prolong sperm motility and viability in vitro (Blesbois, 2012). Glucose is a type of carbohydrate that is commonly added in mammalian semen extenders as an energy source. According to Qiu, Li, Xie, Li, Dong, Sun, Gao & Tan (2016), spermatozoa metabolize glucose during long-term liquid storage of semen, and this is important not only in the goat but also in other species. Previous researchers have proven the effectiveness of the combination of extenders with carbohydrates on the quality of poultry spermatozoa, for example, Rochmi & Sofyan (2019) found a diluent containing a mixture of coconut water, egg yolk, and fructose can be added to rooster sperm to increase spermatozoa motility and viability for up to 7 days when the cement samples are stored at 5 ° C.

The use of lactated ringer-glucose extender induces higher post-thawing turkey spermatozoa motility when compared to lactated ringer only (Kuzlu & Taskin 2017). According to the study of Mayesta, Trilaksana & Bebas (2014), motility of spermatozoa with 0.6% glucose treatment gave the best results to maintain the motility of Native Rooster spermatozoa on phosphate-egg yolk extenders stored at 3-5 ^{o}C. Based on this description the research conducted aims to find the best combination of glucose concentration with the type of extender (lactate ringer egg yolk, lactate ringer skim milk, coconut water egg yolk, and coconut water skim milk) to maintaining progressive motility and viability of Native rooster spermatozoa stored for 48 hours at 5 ^{o}C.

B. Methodology

1. Research Design

This study used a completely randomized design (CRD) factorial pattern of 4 x 3 with three replications (semen collection). The first factor is the type of extender, which consists of CE, CS, LE, and LS. The second factor is glucose concentration consisting of 20 mM, 50 mM, and 80 mM.

2. Research Procedures

a. Extenders preparation

The composition of extenders was lactated ringer (PT Widatra Bakti) mature coconut water, duck egg yolk, skim milk (Tropicana Slim), D(+)-glucose anhydrous (Merck), penicillin, streptomycin (PT Meiji Indonesian) and tris hydroxyl aminomethane (Merck). LE (1.5 ml egg yolk mixed with 8.5 lactated ringer, centrifuged 2000 rpm for 20 minutes), LS (9 ml lactated

ringer mixed with 1 gram skim milk), CE (1.5 ml egg yolk mixed with 8.5 coconut water, centrifuged 2000 rpm for 20 minutes), CS (9 ml of coconut water mixed with 1 gram of skim milk). Glucose was added according to the treatment namely 20 mM (0.036 gr/10 ml), 50 mM (0.09 gr/10 ml) and 80 mM (0.144 gr/10 ml). Each extender was added penicillin 1000 IU/ml and streptomycin 0.1 mg/ml. The pH of the extender was adjusted using the tris hydroxyl aminomethane until a pH of 7 was obtained.

b. Semen collection and treatment

Semen was collected from Native roosters aged more than one year using the massage method. Semen was diluted according to the treatments by comparison of sperm with extender 1:10. Then the liquid semen was stored in a refrigerator with a temperature of 5 ^{o}C.

3. Research Parameters

Progressive motility of spermatozoa (%) and viability of spermatozoa (%) were observed in this study using a 40x magnification light microscope at 0, 24, 48, and 72 hours.

4. The technique of Data Analysis

Statistical analysis was performed by one-way analysis of variance (ANOVA) if found the effect of the treatment continued with the Duncan test.

C. Results Findings and Discussion

1. Sperm motility

Table 1. Progressive motility of Native rooster spermatozoa (%) with various extenders during liquid storage at 5 ^{o}C (Mean±SD)

Observation time (h)	Extender	Glucose concentration			Average
		20 mM	50 mM	80 mM	
0	LE	85.00±0.00	85.00±0.00	85.00±0.00	85.00
	LS	83.33±2.89	86.67±2.89	81.67±2.89	83.89
	CE	86.67±2.89	86.67±2.89	86.67±2.89	86.67
	CS	86.67±2.89	86.67±2.89	86.67±2.89	86.67
	Average	85.00	86.25	85.00	
24	LE	78.33±2.89	76.67±2.89	75.00±0.00	76.67
	LS	76.67±5.77	81.67±2.89	76.67±2.89	78.33
	CE	80.00±0.00	80.00±5.00	78.33±2.89	79.44
	CS	80.00±0.00	78.33±2.89	73.33±5.77	77.22
	Average	78.75	79.17	75.83	
48	LE	8.33±2.89^{aW}	6.67±2.89^{aW}	5.00±0.00^{aW}	6.67
	LS	8.33±2.89^{aW}	16.67±2.89^{bX}	65.00±5.00^{cX}	30.00
	CE	75.00±0.00^{aX}	71.67±5.77^{aY}	71.67±2.89^{aX}	72.78
	CS	8.33±2.89^{aW}	8.33±2.89^{aW}	68.33±5.77^{bX}	28.33
	Average	25.00	25.83	52.50	
72	LE	0.00±0.00^{aW}	0.00±0.00^{aW}	0.00±0.00^{aW}	0.00
	LS	0.00±0.00^{aW}	0.00±0.00^{aW}	11.67±2.89^{bY}	3.89
	CE	26.67±2.89^{aX}	35.00±5.00^{bX}	46.67±2.89^{cZ}	36.11
	CS	0.00±0.00^{aW}	0.00±0.00^{aW}	6.67±2.89^{bX}	2.22
	Average	6.67	8.75	16.25	

Description: Different lowercase letters (a, b, c) on the same line show very significant differences (P<0.01). Different capital letters (W, X, Y, Z) in the same column show very significant differences (P<0.01). SD = Standard deviation, LE = lactated ringer + egg yolk, LS = lactated ringer + skim milk, CE = coconut water + egg yolk dan CS = coconut water + skim milk.

a. Effect of type of extender

The use of the various kinds of extenders was not influenced (P<0.01) the progressive motility of rooster spermatozoa, which are stored for 0 hours as well as 24-hour storage. The average motility that was observed at 0-hour storage was 83.89-86.25%, almost the same as previously obtained in Sentul crossbreed rooster spermatozoa, which was 81.67% using lactated ringer egg yolk glucose extender at 0-hour storage (Khaeruddin, Arifiantini, Sumantri & Darwati, 2016). The motility average at 24-hour storage was 76.67-79.44% also higher than the previous report of 67.08% (Khaeruddin, Arifiantini, Sumantri & Darwati, 2016), 38 % using ringer's extender (Danang, Isnaini & Trisunuwati, 2012) and between 50 to 60 % using lactated ringer with egg albumin (Nugroho & Saleh, 2016).

Semen storage for 48 hours to 72 hours caused differences (P<0.01) in motility between types of the extender. CE was generally able to maintain progressive motility of spermatozoa better than LE, LS, and ES. It might be because coconut water contains sugar and antioxidants that are not presented at a lactated ringer. According to Reddy & Lakhsmi (2014), coconut water contains 95% water, 5% sugar consisting of glucose, fructose, and sucrose. Coconut water contains antioxidants such as phenol and ascorbic acid (vitamin C) (Santos, Vanderson, Bispo, Adriano, Filho, Isabella, Pinto, Lucas, Danta, Daiane, Vasconcelos, Fabíula, Abreu, Danilo, Isaac, Florencio, Osmar, Marisa, Marisa, Medeiros, & Humberto, 2013). Sugar in coconut water can be a source of energy for spermatozoa, and antioxidants can prevent damage to spermatozoa caused by free radicals. The results of Dwitarizki, Ismaya & Asmarawati's (2015) study stated that the addition of duck egg yolk in coconut water extenders increased the motility of Garut ram spermatozoa. LDL in the egg yolk interacts with BSP proteins in the seminal plasma factors and is responsible for sperm protection (Manjunath, 2012). Besides, egg yolks can be an additional source of energy for spermatozoa. It is consistent with the opinion of Ponglowhapan, Essen-Gustavsson & Forsbeg (2004), which states that the addition of egg yolk to extenders is considered necessary, even though this increases the glucose content because egg-yolk is an essential ingredient in semen extenders. And in 20% egg-yolk solution in distilled water, the glucose concentration was found to be 3-4 mM (Ponglowhapan, Essen-Gustavsson & Forsbeg, 2004).

b. Effect of glucose concentration

Based on the results of the study (Table 1), differences in glucose concentrations did not induce differences in progressive motility at 0 hours and 24-hour storage. The average motility 85-86.25% in this study was close to the results obtained by Mayesta, Trilaksana & Bebas (2014), which was 89% with the addition of glucose into phosphate egg yolk extenders. Differences in motility began to appear at 48, and 72 hours of storage, increasing glucose concentrations tend to increase sperm motility

The result of this study is similar with the research of Ponglowhapan, Essen-Gustavsson & Forsbeg (2004) that 1-3 days storage did not produce a difference in motility of canine spermatozoa between the addition of glucose concentration of 10 mM to 70 mM, but at the storage time of 4-23 days resulted a significant difference, increase ten mM to 70 mM was followed increase sperm motility. The results of this study are also similar to reported by Mayesta, Trilaksana & Bebas (2014) that an increase in glucose concentration of 0.3 w/v% to 0.6 w / v% increased motility of Native rooster spermatozoa at a storage 5 ^{o}C.

Glucose can be a good source of energy for spermatozoa during storage. Spermatozoa utilize energy on motility, which is primarily in the form of intracellular ATP generated by oxidation of substrates, fructose, glucose, sorbitol, lactate, or pyruvate (Misro & Ramya, 2012). According to Qiu, Li, Xie, Li, Dong, Sun, Gao & Tan (2016), glucose and pyruvate are better than lactate in maintaining motility of goat spermatozoa. The energy metabolites available to sperm vary between species, but they generally consist mainly of sugars (primarily fructose or glucose) and fatty acids found in seminal plasma and the oviduct (Blesbois, 2012). Added by the opinion of Ponglowhapan, Essen-Gustavsson & Forsbeg (2004) that when the motility was depressed by cold storage, dog sperm utilized more glucose for other cellular activities than fructose.

c. Effect of interaction of the type of extender with glucose concentration

The interaction of the type of extender with glucose concentration had a very significant impact (P <0.01) on the motility of spermatozoa at 48 hours and 72 hours of storage. The use of 80 mM glucose in extender was able to maintain progressive motility better at 72 hours of storage than other treatments. The progressive motility of spermatozoa in CS extenders was higher dramatically than the progressive motility of spermatozoa in LS diluents at increasing glucose concentrations from 50 mM to 80 mM (Figure 1).

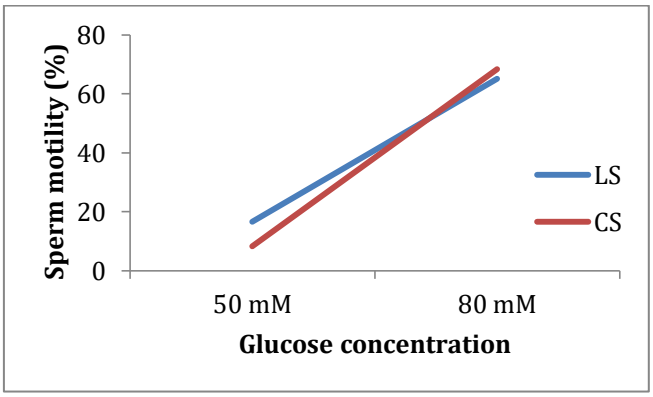

Figure 1. Graph of the interaction of glucose concentration with the type of extender on sperm motility in 48-hour storage at two levels of treatment.

CE extenders were able to maintain spermatozoa motility for up to 72 hours of storage, the combination of CE with 80 mM glucose induces the best spermatozoa motility. Whereas LE, LS 20 mM glucose, LS 50 mM glucose, CE 20 mM glucose, and CE 50 mM glucose extender were only able to maintain the progressive motility of spermatozoa for up to 48 hours. The spermatozoa motility in 80 mM glucose CS extender was 68.33 ± 5.77% at 48 hours storage, which was higher than previously obtained using coconut water + 9% skim milk extender which was 43.73% in the same type of chicken (Khaeruddin & Srimaharani, 2019).

2. Sperm viability

The average of spermatozoa viability at 5°C in the 0 hours storage was the range from 91.97 to 93.34%. In storage times of 24, 48, and 72 hours, sperm motility gradually decreased respectively in all extenders. At 72 hour storage, the average percentage of sperm viability was less than 75% in all extenders. Average viability values after dilution are presented in table 2.

Table 2. Progressive viability of Native rooster spermatozoa (%) with various extenders during liquid storage at 5 °C (Mean±SD)

Observation time (h)	Extender	Glucose concentration			Average
		20 mM	50 mM	80 mM	
0	LE	93.32±2.13	91.72±1.02	95.00±0.70	93.34
	LS	90.40±3.49	95.29±4.54	90.21±2.61	91.97
	CE	93.12±2.36	93.57±0.47	92.94±2.22	93.21
	CS	92.99±4.13	91.29±3.10	93.07±2.89	92.45
	Average	92.46	92.96	92.80	
24	LE	81.81±1.54	81.46±2.88	78.40±2.05	80.56^{A}
	LS	82.23±4.51	86.35±2.00	82.11±4.86	83.56^{BC}
	CE	84.22±0.89	86.66±2.92	84.92±1.37	85.26^{C}
	CS	82.45±0.57	81.95±1.89	81.98±2.03	82.13^{AB}
	Average	82.68	84.11	81.85	
48	LE	$38.93±1.53^{bY}$	$20.95±1.80^{aW}$	$19.52±0.92^{aW}$	26.47
	LS	$32.82±1.84^{aX}$	$47.47±3.06^{bX}$	$69.32±4.21^{cX}$	49.87
	CE	$80.76±0.56^{aZ}$	$83.70±1.97^{aY}$	$78.82±4.11^{aY}$	81.09
	CS	$12.77±1.25^{aW}$	$19.38±0.83^{bW}$	$71.70±3.57^{cX}$	34.61
	Average	41.32	42.87	59.84	
72	LE	$16.79±1.57^{cY}$	$10.65±0.58^{bX}$	$4.36±0.97^{aW}$	5.47
	LS	$7.09±0.70^{aX}$	$10.93±0.70^{bX}$	$30.36±2.30^{cY}$	16.13
	CE	$42.32±2.03^{aZ}$	$68.50±0.98^{bY}$	$74.68±4.51^{cZ}$	61.83
	CS	$3.41±0.83^{aW}$	$4.95±0.46^{aW}$	$12.69±1.53^{bX}$	7.02
	Average	17.40	23.76	30.52	

Description: Different lowercase letters (a, b, c) on the same line show very significant differences (P<0.01). Different capital letters (W, X, Y, Z) in the same column show very significant differences (P<0.01). SD = Standard deviation, LE = lactated ringer + egg yolk, LS = lactated ringer + skim milk, CE = coconut water + egg yolk dan CS = coconut water + skim milk.

a. Effect of type of extender

The kind of extender does not affect the viability of spermatozoa at 0-hour storage but changed at 24 hours, 48 hours, and 72-hour storage. CE extenders induced better viability than LE and CS (Table 2); this might be due to the CE content having a higher glucose content so that it allows spermatozoa to survive longer. Viability of spermatozoa in previous studies using skim coconut milk 9% in 24-hour storage was 79.90% (Khaeruddin & Srimaharani, 2019) was lower than in this study which was 82.13%, probably due to the presence of glucose content in this study. The viability average at 24-hour storage in the present study was also higher than the report of Danang, Isnaini & Trisunuwati (2012) that found 55.4% in ringer's extender.

b. Effect of glucose concentration

Glucose concentration in diluent affects the viability of spermatozoa in 48 hours and 72 hours of storage in some types of diluents. In general, 80 mM glucose concentration results in higher spermatozoa viability. Spermatozoa viability in 24 hours is in the average range of 81.85-84.11%, almost the same as that obtained by Mayesta, Trilaksana & Free (2014), which is 83.17-84.67% at the same time storage. Apart from being an energy source, sugar also has other functions for spermatozoa. Purdy (2006) stated that sugar is known to increase the osmotic potential of cells and protect the membrane from chilling-induced injury (Purdy, 2006).

c. Effect of interaction of the type of extender with glucose concentration

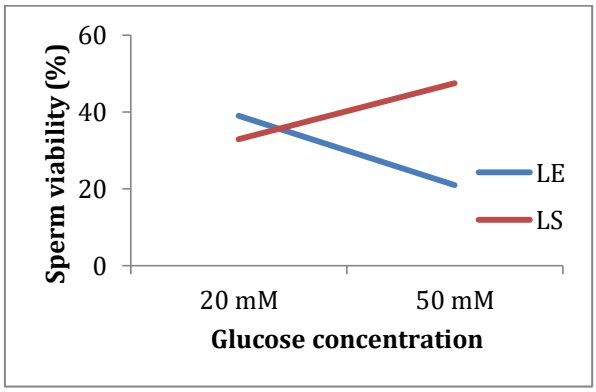

Figure 2. Graph of the interaction of glucose concentration with the kind of diluent on the viability of spermatozoa at 48 hours storage at each of the two treatment levels.

The interaction of the type of extender with glucose concentration had a very significant effect ($P < 0.01$) on the motility of spermatozoa at 48 hours and 72 hours of storage. The interaction graph (Figure 2) shows that the addition of 20 mM glucose-induced spermatozoa viability in RK extenders slightly higher than spermatozoa viability in LS extenders, but at 50 mM glucose concentrations induced much higher viability in LS when compared to LE at 48 hours of storage. It shows that the LS with 50 mM glucose extenders combination is better than a combination of the 50 mM glucose into LE extenders.

LE, LS, and CS extenders were still able to maintain the viability of spermatozoa within 72 hours of storage, but the spermatozoa have almost no progressive movement of spermatozoa but vibrate. CE is an excellent extender in storage for up to 72 hours, when combined with 80 mM glucose, can produce the best viability of spermatozoa. ROS accumulation can occur during semen storage when there are no antioxidants in the semen extender. According to Santos *et al.* (2013), coconut was able to reduce the concentration of intracellular ROS when compared to ascorbic acid. Coconut water contains L-arginine, ascorbic acid, and some minerals, which include calcium, magnesium, and potassium that may be vital for the sperm (Sandhya & Rajamohan, 2014).

D. Conclusion

The combination of egg yolk coconut water with 50 mM glucose is the best extender in maintaining progressive motility and viability of Native rooster spermatozoa, which are stored for 72 hours at 5^{o}C.

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Effect of Caffeine on Motility of Epididymis Spermatozoa of Bali Bull in Slaughterhouse Cibinong

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Abstract

Abattoir is the place to get meat but also a source of potential genetic sperm. Sperm from a slaughterhouse has low motility. Sperm motility can be improved by adding caffeine to the thinner before being used for fertilization. Caffeine is an alkaloid compound that can increase energy through a cAMP cycle. The method used is the testis of 12 cows Bali taken from a slaughterhouse Cibinong and do frozen sperm. Frozen sperm is analyzed using a computer-assisted sperm Analyzed (CASA) who had been treated caffeine 0, 2, 4, and 6 mg/ml. Fertility frozen epididymis sperm was tested using in vitro fertilization. Results were analyzed using a completely randomized design (CRD) with four treatments unidirectional pattern three repetitions. The results showed that the treatment with the addition of caffeine to the thinner of the yolk tris egg yolk epididymis sperm, there was no difference in motility, *recovery rate*, Curvilinear velocity (VCL), average path velocity (VAP), and straight-line velocity (VSL).

Keywords: cauda epididymis sperm, motility, caffeine

A. Introduction

Increasing population growth will be followed by an increased need for animal protein (meat). The fulfillment of meat pushed the number of slaughter cattle in particular. The level of cuts is excellent when the preservation of genetic resources does not follow. It will lead to

extinction. In Indonesia, Bali cattle are cattle who preferred because it has excellent performance and carcass were quite high (57%). Preserve the genetic resources would be utilized, then the sperm collected should be possible in doing the storage process. Frozen semen is the correct method and can be used for artificial insemination (AI) with unlimited time. Epididymis sperm is sperm that is still young, so it has low mobility. The storage process can also result in decreased motility. To overcome these problems, sperm, before it is used for fertilization, should be added compounds to improve motility.

Motility is the main factor in fertilization. Sperm can move progressively forward fallopian tube will quickly get to the point of fertilization. Sperm takes long enough to get to the fallopian machine, while epididymis sperm have low motility. In vitro, fertilization is an efficient method for epididymis sperm. However, to improve epididymis sperm after the freezing process, it must be added additive compound that functions as a stimulant. Caffeine is one of the compounds that can be added to the post-thawing frozen sperm.

Caffeine is an alkaloid found in plants formed of white powder with the mechanism of action to inhibit the activity of nucleotide phosphodiesterase, which naturally cAMP levels are relatively low due to the activity of nucleotide phosphodiesterase, so the addition of caffeine can suppress the activity of nucleotide phosphodiesterase that lead cAMP levels to increase (Hasbi et al., 2011). the cAMP is the energy used to move progressive sperm. Increased sperm motility will support the level of fertility of sperm.

B. Methodology

1. Research Design

This study used a completely randomized design (CRD) factorial pattern of 4 x 3 with three replications (semen collection).

2. Research Procedures

a. Semen collection and preparation

Bali cattle testes collected from a slaughterhouse. Testes incorporated into the physiological sodium liquid and transported to the laboratory. Testicular cleaned and cut into sections cauda epididymis. Slice cauda epididymis tris incorporated into the solution for one minute, grab the piece cauda epididymis. Add the egg yolk in a solution of tris and equilibration at a temperature of 5^0C for 2 hours. Pack in straw with 0.25 ml size, close the end of the straw with a hot plate and pressed with tweezers, then straw is placed in a Styrofoam plate in nitrogen vapor for 20 minutes and put in liquid nitrogen (-1960C).

b. Motility examination of spermatozoa

Frozen semen cauda epididymis in thawing in warm water temperature of 37^0C and then centrifuged at a speed of 1800 rpm for 5 minutes. Separate the plasma liquid then add tris solution of 1 ml and caffeine with T0 (0 mg / ml), T2 (2 mg / ml), T4 (4 mg / ml), and T6 (6 mg / ml).. Analysis of sperm motility by dropping a sample in a glass object that has been treated with a micropipette 1µl, then covered with a cover glass, is then observed by computer-assisted sperm motility Analyzed (CASA).

3. Research Parameters

The parameters of this research were motility of spermatozoa (%), curvilinear velocity (VCL); average path velocity (VAP); and straight-line velocity (VSL).

4. The technique of Data Analysis

The differences between concentrations were compared, and results were expressed as mean ± Sd. Analysis of variance (ANOVA) using the SPSS software version 18 with Tukey test was performed to verify statistical significance. The p-values of <0.05 were considered as statistically significant (Trihendradi, 2010).

C. Results and Discussion

Assessment using CASA in this study saw three variables are correlated with fertility that is curvilinear velocity (VCL) shows the velocity of sperm in a minute on the trajectory curve,

average path velocity (VAP) is the velocity of sperm in a minute on the track the average flow and the straight-line velocity (VSL) is the velocity of sperm in a minute straight trajectory (Sarastina et al., 2014). Calculation of post-thawing sperm motility with the CASE method shown in Table 1.

Table 1 Cauda epididymis sperm motility post-thawing

Variable	Caffeine Treatment (mg/ml)			
	T0	T2	T4	T6
Motility(%)	22,73 ± 6,39[a]	27,37 ± 2,14[a]	30,70 ± 0,34[a]	23.04 ± 5,60[a]
Recovery rate(%)	43,11±12,11[a]	51,91 ± 4,07[a]	58,23 ± 0,64[a]	43,70±10,62[a]
VCL (µm/s)	84,96 ± 1,37[a]	85,06 ± 4,68[a]	87,96 ± 11,73[a]	87,59 ± 2,39[a]
VAP (µm/s)	40,88 ± 3,68[a]	46,21 ± 1,72[a]	41,80 ± 2,34[a]	39,15 ± 5,39[a]
VSL (µm/s)	29,20 ± 3,28[a]	33,87 ± 2,63[a]	30,92 ± 1,39[a]	29,20 ± 4,15[a]

Description: The same superscripts in the same row showed no different (P> 0.05). T0 = 0mg / ml, T2 = 2 mg / ml, T4 = 4mg / ml, and T6 = 6mg / ml. Curvilinear velocity (VCL), average path velocity (VAP), and straight line velocity (VSL).

The addition of caffeine at levels of 0, 2, 4, and 6 mg/ml no effect (P> 0.05) to the cauda epididymis sperm motility post-thawing shown in Table 1. Epididymis sperm are immature sperm that still has granular cytoplasmic droplet and lets not resistant to changes in temperature (cold sock) during the freezing process, thereby granting post thawing caffeine does not affect motility. It is supported by a statement Sukmawati (2014), which states that the freezing process may cause a decrease in motility (50-60%) and viability (20-23%). Value motility resulting in Table 1 ranged from 23% to 30%, thus enabling the sperm can still fertilize. It is consistent with the statement Putranti (2016) treatment caffeine level 4 mg/ml have value fertilization 37,50%.

Recovery rate (RR) is the ability to recover sperm after freezing by comparing the percentage of fresh motile sperm with post-thawing (Garner dan Hafez, 2000). The results of further tests with Tukey showed that caffeine treatment in the cauda epididymis sperm was not different (P>0,05) in the RR of all treatments with T0 (43,11±12,11%), T2 (51,91 ± 4,07%) , T4 (58,23 ± 0,64) and T6 (43,70±10,62). These results indicate that the egg yolk tris of sperm in epididymis cauda is very efficient to use because it shows a *Recovery rate* of around 50%.

Value VCL, VAP, and VSL in Table 1 show the results did not differ (P> 0.05) among all treatments caffeine. It was because motile sperm have the same strength as it moved forward, so it has the average no different. VSL grades (29-33 µm/s) and the value of VAP (39-46 µm/s) shown in Table 1 is still within the normal range, so that they can move to fertilize the egg. Normal standards according Royere (1996) in Arifiantini (2012) is VSL> 30µm/s and VAP> 25µm/s.

D. Conclusion

The results showed that the treatment with the addition of caffeine to the thinner of the yolk tris egg yolk epididymis sperm, there was no difference in motility, *recovery rate*, Curvilinear velocity (VCL), average path velocity (VAP), and straight-line velocity (VSL).

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Effect of the Use of Noni Leaf Extract as a Natural Disinfectant on the Percentage of Hatchability and Day Old Quail (DOQ) Hatching

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Abstract

This study aims to determine the effect of noni leaf (Morinda citrifolia lignosae) extract as a natural disinfectant on the percentage of hatchability and the hatchability weight of quail (Coturnix-coturnix japonica). This study used 1,500 quail hatch eggs with a male and female parent ratio of 1: 4. This study used a Completely Randomized Design (CRD) method, with five treatments and three replications each repetition consisting of 100 quail eggs with 10-gram weight. The treatments used were: T0 (control treatment), T1 (commercial disinfectant), T2 (noni leaf extract 10%), T3 (noni leaf extract 20%) and T4 (noni leaf extract 30%). The results of variance showed the average percentage of hatchability produced during the study, namely T0 (85%), T1 (83%), T2 (86%), T3 (84%), and T4 (93%). Furthermore, the average weight of hatchability produced, namely T0 (6.67 grams), T1 (6.76 grams, T2 (6.89 grams), T3 (6.84 grams) and T4 (6.89 grams). Overall administration of noni leaf extract had no significant effect (P> 0.05) on the percentage of hatchability and DOQ hatching weight of the quail.

Keywords: quail, hatchability, Noni leaf, and hatching eggs

A. Introduction

The increasing need and human awareness of livestock products as a source of animal protein affect the demand for livestock products so that it is directly proportional to the

development of the industry in the livestock sector to meet the needs of livestock products. The livestock industry in meeting human needs certainly requires technological innovation to encourage quality and quantity of production, and humans must always think of creating changes by using technology such as the use of hatching machines to hatch poultry eggs.

Quail is a type of poultry that has the potential to be developed because it is one of the cattle that is quite easy in the process of cultivation. In addition to quail meat, eggs produced can also be consumed by humans, and its maintenance does not require extensive land because the quail farming business is currently in high demand by the community, and one of the business opportunities in the livestock sector is in the form of quail breeding.

Poultry egg hatching technology using a machine is capable of hatching eggs in large quantities, depending on the capacity of the hatching machine. The hatching machine provides a suitable environment for the development of the embryo (prospective child), which mimics the natural properties of the parent incubating the egg, i.e., adjusting the temperature, humidity, and turning the incubated egg. The application of egg incubation technology in the quail breeding business is expected to increase quail livestock populations in a relatively fast time and ensure continuity of seed availability (Subiharta & Yuwanta, 2012).

Things that need to be considered in hatching eggs using a hatching machine are eggshell hygiene because the shell is the outermost part that is very easily contaminated by several microorganisms mainly from quail excreta so that it has the potential as a source of pathogenic bacteria such as *Staphylococcus aureus* and *Salmonella* sp. which can damage the quality eggs that interfere with the development of quail embryos (Alkhakim, Huda, Fitri, Ambarwati, & Tistiana, 2016). Previously Ohl & Miller (2001) states that *Salmonella typhimurium* is one of the bacteria that often attack birds and can contaminate the product to be harmful to humans who consume them. Livestock that infected with *Salmonella typhimurium* can spread the disease through eggs.

Quail eggs have thin shells compared to other types of birds, and this needs to be a significant concern because thin eggshells will be more easily contaminated by various kinds of microorganisms that can attack the embryo, so egg cleanliness is a significant part in the hatching process.

Chemical disinfectant is currently a method that is still often used to reduce microorganism contamination in hatching eggs, but the use of chemical disinfectants can sometimes cause the death of an embryo, thereby decreasing the hatchability of eggs. Inappropriate use of disinfectants (improper application of doses and procedures) and some of the types of disinfectants are toxic, have an unpleasant odor, and can cause irritation. Types of disinfectants that are often used in sanitation processes generally use formaldehyde gas (Mahfudz, 2006).

Natural disinfectant is one of the solutions that can be used to kill microorganisms in the sanitation process of quail hatch eggs. Active substances in noni leaves include anthraquinone, which is a substance that can minimize the growth of bacterial and fungal cells, as well as the discovery of other materials such as aloin, emodin, barbaloin, saponin, tannin, and sterols that synergize with anthraquinone substances making these substances analgesic, antiseptic, anti-inflammatory, antibacterial and antifungal properties which are useful in healing various diseases (Setyawaty, Ismunandar, & Nurul, 2014). Based on the description mentioned above, research is needed to determine the effect of the use of noni leaf extract as a natural disinfectant on the percentage of hatchability and hatching weight of Day Old Quail (DOQ).

B. Methodology

1. Research Design

This study used a Completely Randomized Design (CRD) with three treatments and three replications, each consisting of 100 quail eggs so that the total quail eggs used were 900 eggs. The treatments carried out in this study are as follows:

T0: Maintenance Control

T1: Commercial disinfectant = 8 mL / 1000 mL water
T2: 10% concentration = 10 mL Noni leaf extract + 90 mL distilled water
T3: 20% concentration = 10 mL Noni leaf extract + 90 mL distilled water
T4: 30% concentration = 10 mL Noni leaf extract + 90 mL distilled water

2. *Research Procedures*

Preparation of the hatching machine includes cleaning the hatching machine from germs/germs attached to the hatching machine utilizing fumigation by spraying formalin solution into the hatching machine and then being able to ignite the hatching machine for 2 hours to get a stable temperature before the hatching eggs are hatched on the hatchery machine.

a. Making noni leaf extract

Noni leaf extraction procedure starts from adult noni leaf taken in Lemoa Village, Gowa Regency. Mature leaves that have been chosen as much as 2 kg are withered for 3-4 days, then in the oven for 36 hours at 60°C. Dry leaves are cut into small pieces and mashed using a blender to produce ± 500 grams of noni leaf flour. The flour-shaped sample is then mixed with a 90% methanol solvent in a ratio of 1: 5 (500 grams of noni leaf flour with 2,500 ml of methanol solvent). The mixture is macerated using a container that has been closed with aluminum foil, let stand for 24 hours, and placed at room temperature protected from direct sun exposure while occasionally stirring and then filtered to separate the pulp and filtrate (Wati, 2009). The results of the filter in the form of noni leaf extract (Morinda citrifolia lignosae) were evaporated using a rotary evaporator at a temperature of 50°C at a speed of 80 rpm for ± 5 hours until the methanol contained in the mixture evaporated. Furthermore, the extract obtained is then taken according to the concentration of 10%, 20%, and 30%.

b. Preparation of hatching eggs

The hatching eggs used in this study came from productive quails that were kept intensively in the Dijon Quail Makassar farm. Quail broodstock used is five months old, and before hatching, the first selection of hatching eggs will be used, such as the selection of fresh hatching eggs, smooth and flat egg surface, oval-shaped with the standard size of 10-11 grams/grain, egg storage a maximum of 7 days. Weighing of eggs is carried out to get uniform hatching eggs weighing so that it will get an average yield of Day Old Quail (DOQ) hatches of uniform quail

c. Cleaning hatching eggs

Quail eggs to be hatched are cleaned using cotton that has been moistened with Commercial disinfectants and Morinda citrifolia lignosae extracts as natural disinfectants with concentrations of 10%, 20%, and 30% and then aerated for ± 24 hours (Septiyani, Prakoso, & Warnoto, 2016).

d. Incubating hatching eggs

This study uses three incubators, each equipped with four lamps with a voltage of 15 watts as a heater, thermostat, and thermometer humidity indicator. Previously, the temperature of the hatching machine was set at ± 38.5°C, with a humidity of 70-80%. Quail hatching eggs, each of which has been given further treatment, is put into a hatching machine equipped with a tray filled with water, then laying the eggs with the position of the spine is below and blunt the top, and the first egg reversal is carried out at the age of 5 days incubation with The 45^{o} slope is then reversed four times a day, at 08.00 am, 12.00 noon, 4.00 pm and 8.00 pm, reversal is stopped on the 15th day

e. Percentage of hatchability and the weight of the hatching quail

The eggs that hatch on the 18th day are removed from the hatching machine, then the rate of hatchability and the importance of the hatching quail (Coturnix-coturnix japonica) are measured (North & Bell, 1990)

3. Research Parameters

The parameters of this research were the percentage of hatchability (%) and Hatchability weight (g).

4. The technique of Data Analysis

The data obtained in this study were processed statistically using a Completely Randomized Design (CRD), which is three treatments and three repetitions, each of which consists of 100 eggs and if it has a significant effect, the lowest real difference test (LSD) will be conducted for see differences in the observed variables (Gazpersz, 1994).

B. Results and Discussion

1. Results

The results of calculating hatchability percentage and quail hatching weight after 55 days of research were presented in Table 1.

Table 1. The results of the calculation of the average of the percentage of hatchability and weight of hatchability quail (Coturnix-coturnix japonica) in each treatment.

Variable	Treatment					P-Value
	T0	T1	T2	T3	T4	
Hatchability (%)	85 ± 14,42	83 ± 2,64	86 ± 5,85	84 ± 4,04	93 ± 2,30	0.47
Hatchability weight (g)	6,67 ± 0,22	6,76± 0,06	6,89 ± 0,10	6,84 ± 0,15	6,89 ± 0,37	0.06

Information: T0: Maintenance Control, T1: Commercial disinfectant = 8 mL / 1000 mL water, T2: 10% concentration = 10 mL Noni leaf extract + 90 mL distilled water, T3: 20% concentration = 10 mL Noni leaf extract + 90 mL distilled water, T4: 30% concentration = 10 mL Noni leaf extract + 90 mL distilled water and ±: Standar Deviation.

The results of the analysis of variance showed that the treatment of noni leaves extract at a concentration of 10%, 20%, and 30% had no significant effect (P>0.05) on the percentage of hatchability and hatching quail (*Coturnix-coturnix japonica*).

2. Discussion

a. Percentage of hatchability of quail eggs (*Coturnix-coturnix japonica*)

Based on the results of the study, the average calculation of each treatment showed that the treatment of 30% noni leaf extract had the highest average hatchability percentage of 93%, the noni leaf extract 10% had an average hatchability percentage of 86%, the control treatment had the average rate of hatchability of 85%, noni leaf extract 20% has an average speed of hatchability of 84%, and the results of the average rate of the lowest hatchability shown in treatment using commercial disinfectants has an average rate of hatchability of 83%.

Active compounds derived from noni leaves (Morinda citrifolia lignosae) with 30% noni leaf extract treatment can inhibit microorganisms in quail hatching eggshells because it has several active compounds that function as antibacterial substances. It is following the opinion of Setyawaty, Ismunandar, & Nurul (2014), which states that the noni plant (Morinda citrifolia lignosae) is a natural disinfectant because it contains several compounds that can kill several types of bacteria and are anti-inflammatory. Active substances in noni leaf include: anthraquinone which is a substance that can inhibit the growth of bacterial and fungal cells, as well as the discovery of other materials such as aloin, emodin, barbaloin, saponin, tannin, and sterols that synergize with anthraquinone substances making these substances analgesic, antiseptic, anti-inflammatory, antibacterial and antifungal properties which are useful in healing various diseases

The research data also showed that the higher the concentration of the noni leaf extract (Morinda citrifolia lignosae) used, the higher the percentage of hatchability produced. Noni leaf extract can be used as an antimicrobial, but the use of noni leaf extract up to a rate of 30% is

useful to increase the hatchability of quail eggs. According to Zamzamy, Sudjarwo, & Hamiyanti (2014), the use of the right disinfectant dose will optimize sanitation results because, in addition to pathogenic microorganisms, the use of disinfectants also affects embryo life. Meanwhile, according to Septiyani, Prakoso, & Warnoto (2016), the use of chemical disinfectants is very dangerous and can reduce egg fertility, because this disinfectant is poisonous, smells terrible, and causes irritation. Low-level sanitation programs do not kill germs, but high-level sanitation programs can kill egg embryos so that they can affect fertility and hatchability.

b. Day Old Quail (DOQ) hatching weight

Based on the results of the study showed that the treatment had no significant effect (P> 0.05) on the importance of Day Old Quail (DOQ) hatches. The use of 30% noni leaf extract and 10% noni leaf extract had the highest results with an average of 6.89 grams each hatching, 20% noni leaf extract had an average hatching weight of 6.84 grams, the use of commercial disinfectants had an average hatching weight of 6.76 grams and the lowest percentage hatching weight results are shown in the control treatment which has an average hatching weight of 6.67 grams.

Active compounds derived from Noni (Morinda citrifolia lignosae) leaves with 30% noni leaf extract treatment and 10% noni leaf extract can increase the hatching weight of the quail (Coturnix-coturnix japonica) treatment. It is influenced by the use of noni leaf extract (Morinda citrifolia lignosae) as a natural sanitary material, safely and effectively killing pathogenic bacteria that cause damage to eggs, so that embryo growth is not disrupted and cells undergo a better metabolic process, and the tissue that forms organs will be more healthy makes the organ function better will make the Day Old Quail (DOQ) body more healthy quail and has a higher hatching weight.

C. Conclusion

Based on the results of the study indicate that the use of noni leaf extract (Morinda citrifolia lignosae) extract has the potential as a natural disinfectant in the process of hatching quail eggs (Coturnix-coturnix japonica). The use of 30% Noni leaf extract gives the highest average hatching percentage (93%) and the highest hatching weight (6.89 grams).

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The Effect of Fermentation Feed Combination with Commercial Feed on Growth of Super Native Chicken

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Abstract

This study was aimed to determine the effect of providing a combination of tofu dregs fermentation with commercial feed on the growth of super native chickens. The research was being conducted in June-September 2019 at the Integrated Laboratory of the Faculty of Agriculture, Fisheries and Animal Husbandry, University of Sembilanbelas November Kolaka. The materials were used in this study were super native chicken, fermented feed, and commercial feed (Malindo). The fermented feed consists of tofu dregs, yellow corn, fine rice bran, starch, molasses. Tools that used were digital scales, pans, tarpaulins, cages, feed containers, drinking containers, cables, lamps, sacks, plastic polybags, sacks, feed grinding machines, gas, hoses, buckets, basins. This research was conducted using a Completely Randomized Design (CRD) 4 treatments three replications with each test consisting of 8 super native chickens. The parameters observed were Weekly Consumption, Weekly Body Weight Gain (WBWG), and Feed Conversion. The results showed that the influence of feed consumption was not significant (P> 0.05), while the WBWG and Feed Conversion were significantly different due to treatment. So it can be concluded that the use of a combination of fermented tofu pulp and commercial feed with a ratio of 60% and 40% can increase weekly body weight gain and decrease feed conversion so that the use of feed is more efficient.

Keywords: super native chickens, tofu dregs fermentation, feed consumption, feed conversion

A. Introduction

Super-native chickens are included in the category of non-race chicken, which is a cross between native roosters chickens with female race hens. This type of chicken is found in many areas, both rural and urban areas, besides super chicken can also be found in the highlands and lowlands. The widespread availability of super native chickens has made super native chickens a potential source to meet the needs of Indonesian animal protein.

Super native chicken has a flavor and appearance of the carcass that is almost the same as native chicken, and this is an added value from super-native chicken. The advantages of super-native chicken, when compared to native chicken, are higher body weight, lower feed conversion values , and lower mortality values (Gunawan & Sartika, 2001). For super-native chicken growth that needs to be considered is feed, because feed is one of the most significant components of all costs incurred. The supply of feed ingredients in Indonesia is still partly imported from other countries. This matter causes the price to be much higher due to intense competition and rising transportation costs. So, it needs to be the utilization of agricultural waste that can be used as an appropriate alternative feed to reduce the high cost of it. One of the industrial, agricultural waste that can be used as poultry feed material is tofu dregs.

Tofu dregs is a waste of tofu making, still contains protein with the amino acids lysine and methionine, and calcium which is quite high (Mahfudz, 2006). However, it provides high crude fiber, so it becomes a limiting factor for its use in poultry feed rations. Besides the high crude fiber, it also contains high arabinoxylan that causes its components in the formulation of poultry rations to be limited. Poultry incapable of digesting arabinoxylan, and this material generates the thick gel in the small intestine, which causes absorption of fat, and energy is inhibited (Adams, 2000), so that deposition of fat in the tissue is low. Therefore, to utilize the use of tofu waste needs to be treated and which one of it by fermentation biotechnology.

Fermentation biotechnology can improve the quality of feed ingredients, especially those that have high crude fiber and anti-nutrition. Fermentation can increase the digestibility of feed ingredients through the simplification of substances contained in feed ingredients by enzymes produced by microbes (Bidura, 2007). One of the inoculums that can be utilized in fermentation is Effective Microorganism-4 (EM-4). Because EM-4 will convert proteins into amino acids, and indirectly will reduce levels of crude fiber in tofu dregs. So, it is hypothesized that the utilization of a combination of fermented feed with commercial feed can affect the growth of super native chickens.

B. Methodology

1. The Materials

The research was conducted in June-September 2019 at the Integrated Laboratory of the Faculty of Agriculture, Fisheries and Animal Husbandry, University of Sembilan, November Kolaka. The materials used in this research are super native chicken, fermented feed, and commercial feed (Malindo). The fermented feed consists of tofu dregs, yellow corn, fine bran, starch, molasses. Tools used in digital scales, pans, tarpaulins, cages, feed containers, drinking containers, cables, lamps, sacks, plastic polybags, sacks, feed grinding machines, gas, hoses, buckets, basins

2. Research Design

This research was compiled based on a Completely Randomized Design (CRD). Consists of 4 treatments three replications for each treatment ration, each repetition consists of 8 super native chickens. The order of treatment is as follows :

P0: 100% fermented feed
P1: 40% fermented feed + 60% commercial feed
P2: 50% fermented feed + 50% commercial feed
P3: 60% fermented feed + 40% commercial feed

3. Research Procedures

Making fermented feed derived from a mixture of tofu dregs, milled corn, rice bran, starch, molasses, and EM-4. Before mixing, the tofu dregs are steamed for 30 minutes, then removed and cooled. After tofu dregs cooled, all the ingredients are mixed until homogeneous and then put in a polybag wrapped in a sack, then allowed to stand for 5-6 days. On the 6th day, the polybag was opened, and the results of fermentation were made pellets and dried to be given to super native chickens.

Rations and drinking water were given adlibitum according to treatment. Feed and drink measurements are carried out every day so that the availability of super chicken in the plot is not exhausted and well-controlled

4. Research Parameters

The parameters of this research were Feed Consumption), Weekly Body Weight Gain (WBWG), and Feed Conversion.

5. The technique of Data Analysis

Feed Consumption

Feed Consumption (Gram/Chicken/Week) = Total amount of feed (Gram/Week) - Total Amount of Leftover Feed (Gram/Week).

Weekly Body Weight Gain (WBWG)

$$\text{Weekly Body Weight Gain (WBWG)} = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{Duration of raising chicken (Week)}}$$

Feed Conversion

$$\text{Feed Conversion} = \frac{\text{Total feed consumption (Gram/Chicken/Week)}}{\text{Weekly Body Weight Gain (WBWG)}}.$$

C. Results and Discussion

1. Results

Average feed consumption of super native chicken on the combination of fermented tofu waste with commercial feed can be seen in table 1. The results of the analysis of variance showed no significant effect (P>0.05) on every experimental unit.

Table 1. Average feed consumption of Super Native Chicken on Different Combination of Fermentation Feed and Commercial Feed.

Repetition	Repetition				Sig
	P0	P1	P2	P3	
1	245,81	329,26	275,20	257,73	
2	172,90	288,78	314,68	289,25	
3	307,02	300,43	319,70	338,95	
Average	241,91± 67,15	306,16 ± 20,84	303,19 ± 24,38	295,31 ± 40,95	0,284

Based on the results of the F test, the consumption had no significant effect (P> 0.05) due to treatment. The average range of super native chicken consumption per week is 241.91 - 306.16 grams. The results feed consumption of this study are lower than those of Munira et al. (2016) using substitution fermented rice bran with different fermentors in super-native chicken average consumption of feed obtained ranged from 297.41 - 310.16 grams /head/week.

It shows that differences in the percentage of commercial feed and fermented feed do not result in different tastes and preferences for super native chicken so that the amount of feed consumed is relatively the same. Also, the feed given has the same shape, texture, and smell, so that there is no difference in feed consumption. It was explained by Anggorodi (1994), who stated that the palatability of feed was qualitatively influenced by the physical properties of the feed, which included its shape, smell, taste, and texture.

Based on the results of the analysis of variance showed a real effect (P<0.05) due to treatment. Different concentrations of tofu dregs cause the influence of the treatments on WBWG. It is following the state of Masruha (2008) that the provision of tofu dregs by 20% in the ration can increase the weight gain of super native chicken. The average weekly body weight gain of super native chickens can be seen in table 2.

Table 2. Average weekly body weight gain of Super Native Chicken Entity on Combining Fermented Feed with Commercial Feed.

Repetition	Treatment				Sig
	P0	P1	P2	P3	
1	36,00	60,00	65,83	76,67	
2	50,50	63,83	63,50	69,00	
3	36,67	60,00	62,25	75,58	
Average	41,06±8,19[c]	61,28±2,21[b]	63,86±1,82[b]	73,75±4,15[a]	0,000

Based on the results of further tests showed that there were differences between P0 and P1, P2, and P3, but P1 and P2 were not different, but P0 and P3 were different (P <0.05). The highest average WBWM in P3 is a combination of 40% commercial feed and 60% fermented tofu dregs. Increased bodyweight of super native chicken is caused by fermented tofu dregs that are easily digested. According to Wahyu (1992), solid tofu waste is a source of vegetable protein, high quality, and easy to understand to produce an upper body weight gain.

It is in line with Rasyaf (2006) which states that body weight is influenced by the quality and quantity of feed consumed; thus differences in the content of substances in the feed will have impact on the resulting weight gain because the balanced content of elements and sufficiently according to the requirements needed for optimal growth to get a low feed conversion value.

Feed conversion is one of the production standards used to find out the efficiency of feed in livestock or the effectiveness of feed conversion into the final product, namely meat. Feed conversion during the study was measured based on the comparison of total feed consumption with full body weight gain during the study. Average conversions are presented in table 3.

Table 3. Average of Feed Conversion of Super Native Chicken from Fermentation Feed Combination and Commercial Feed Combination.

Repetition	Treatment				Sig
	P0	P1	P2	P3	
1	5,83	5,49	4,18	3,36	
2	5,42	4,52	4,96	4,19	
3	6,37	5,01	5,14	4,48	
Average	5,87± 0,48[a]	5,01 ± 0,49[ab]	4,76 ± 0,51[b]	4,01 ± 0,58[b]	0,014

Statistical analysis showed that there was a significant influence (P <0.05) on feed conversion. Further test results showed that P0 was not significantly different from P1 but substantially different from P2, and P3. P1 is not considerably different from P0, P2, and P3. This difference is due to the differentiation between treatments on weekly body weight. The high and low feed conversion rates due to the differences that are getting greater or lower in the ratio of feed consumption and body weight gain.

The higher the feed conversion rate, the lower the level of feed efficiency. It is supported by Mulyono (2004), which states that high feed conversion rates indicate the use of inefficient feed. However, a number close to 1 means more efficient. In this study, the results showed that the higher the concentration of the use of tofu dregs in the combination of tofu dregs fermentation with commercial feed, the lower the feed conversion. However, utilization of 100% tofu dregs fermentation has higher feed conversion, which means the use of tofu dregs fermentation is less efficient because it is not balanced between protein and energy.

D. Conclusion

Based on the results of the study, it can be concluded that the utilization of a combination of tofu dregs fermentation and commercial feed with a ratio of 60% and 40% can increase weekly body weight gain and decrease feed conversion so that the use of feed is more efficient.

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Timor Deer (*Cervus Timorensis*) Arrest System Marind People with Tidal Local Wisdom

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Abstract

Deer are wildlife that has economic value because it can produce meat, leather, and velvet (young horn). Deer populations in nature have decreased due to uncontrolled wild poaching and damage to habitat. Indonesia has five types of deer, i.e., Cervus unicolor, Cervus timorensis, Axis kuhlii, Muntiacus Muntjak, and Axis axis (deer total). However, deer in Indonesia that have the opportunity to be empowered, there are several types, namely Cervus timorensis, Cervus unicolor and Axis axis, and in Merauke, especially in the had tribe0 has its distinctive characteristic in the process of catching deer. The purpose of the study was to know the pattern of deer arrest by the Malind tribe. The method used in this research is to conduct surveys and Wawan ways as well as observation of the field, the data in the analysis in a descriptive approach to conclude the investigation. The results showed that the pattern of deer caught in the Marind tribe traditionally done with snares, bamboo rinsing, as well as patterns carried out covering the forest burning Sawvana in the dry season of the cattle, besieged fire and dwelling on the land, and the season The community rained to the deck area (dense forest) that became the deer's dwelling and avoided the puddle of the sea, and the community captured it quickly. The chance of this research is the process of catching deer, in general, is done by the had in 2 ways that in the summer by burning and drought with the trap system.

Keywords: pattern of the coronation, the Timor deer, the marind people

A. Introduction

Deer are wildlife that has economic value because it can produce meat, leather, and velvet (young horn). The natural Habitat of deer consists of several types of vegetation, such as savanna used as the source of feed and forest vegetation that are not too tightly for shelter, mating, and self-feeding from predators. The forest up to 2,600 meters above sea level with grassland is the most liked habitat of deer, especially the type Cervus timorensis, Lecuali Cervus unicolor, which most of its daily activities carried out in the brackish area. Deer populations in nature have decreased due to uncontrolled wild poaching and damage to habitat, to prevent extinction and also make use of deer optimally and sustainably then one of the efforts that can be done is with captivity (conservation). Conservation can be done in two ways, in situ maintenance and ex-conservation. In-situ conservation is carried out by the captive deer in the forest habitat, while the ex-situ conservationist is carried out by moving the deer from its habitat and then handled in the designated place. Deer breeding can be done on a small scale (System/model Cage), especially for the community surrounding the forest in Merauke had a tribe to increase its income, and large-scale breeding can be done by system Cage Ranch. The ranch Cage made by the community is very narrow. It is in the right hand by (Nurcholis & Muchlis, 2018) that the deer that were nourished on traditional, in general, had a caged area ranging from 42-8 m2. According to Folks et al. (2014) that deer feed in the woods sometimes has low nutrients, a shocking thing that in the dry season, the type of feed given is dry grass or banana stem. Another opinion was stating that in summer, the quality of crude protein on feed forage can be decreased (Gann et al.,2016).

Deer can be an alternative source of income of communities around the forest by the development of its handling because the products produced by deer all have economic value, and the market for the resulting product is also available. According to Muchlis & Nurcholis, (2019), Deer have the benefits of them as a tourist attraction and as a food source other than the meat that is directly utilized some refined products such as salty egg supplement deer flavor. Semiadi & Nugraha (2004) increased interest in the maintenance of deer in addition to the promising market prospects, also due to the nature of deer; Relatively resistant to weather changes and diseases, the height of its child's productivity level, high-conversion value of its type (the number of feed becomes flesh), high production of its carcass and venison products that meet the specifications of today's consumer desires. It caused a lot of deer in a hurry, a lot of hunting process happening in Merauke is using firearms, but for the indigenous people who are the original had hunting has local wisdom according to the custom that existed. Therefore, this research aims to know the system of catching the Timorese deer will traditionally using local intelligence by paying attention to tidal seawater.

B. Methodology

This research was conducted in the district of Kimam Merauke District for one month. The research process begins with a field survey of respondents who will be interviewed and as primary data. The interview procedure is done by looking for information related to the way or the hunting system in a custom way by utilizing local wisdom on ten respondents as hunters and three meat collector merchants. The Data of interviews will be discussed in a definitive and stubborn with the reference.

C. Results and Discussion

Kimaam Island, which belongs to Dolok Island Wildlife Sanctuary, is a deer habitat in southern Papua. Forests in Kimaam Island are five types of vegetation, namely primary forest, Skunder forest, natural grassland, coastal forest, and mangrove. The topography of Kimaam Island is very flat so that when the tide of almost all the islands are flooded with water so that deer will find a place to live on rather high land and unflooded seawater that is known to the community as a deck (dense forest). According to local people's information, the population of deer is found in almost every location, which is the grassland and deck area of Kimaam Island. For the observation of deer population is very determined by the existing climate that is during the dry and rainy season. During the dry season, the spread of deer was almost evenly distributed in all parts of Kimaam Island, and in the rainy season, the Timor deer would gather on the deck to avoid the puddle of water, so that it would be seen a dense population on the floor. Based on people's habit of deer hunting more deer density in the middle of the forest than

the one on the beach, this is thought because many of the Kampong on Kimaam Island is located at Kampung Waan Beach, Konorau and Moi Hamlet. Pasture as a source of food for deer is also on the deck area, which is within the forest area to the north of Kimaam Island.

The result of direct observation of the breeding cage in the district of Kimam is that the pen is made of wooden wood that is neatly arranged with a height of 2 m – 2.5 m as Figure 1. The feed is given in captivity of grass and the rest of the ripe banana waste. Nurcholis et al. (2019) that the quality silage of the feed treatment has increased nutritional value, and the Timor Deer (Cervus Timorensis) in captivity gave a positive response to the alternative feed in the form of overall silage and response of the highest banana stem silage.

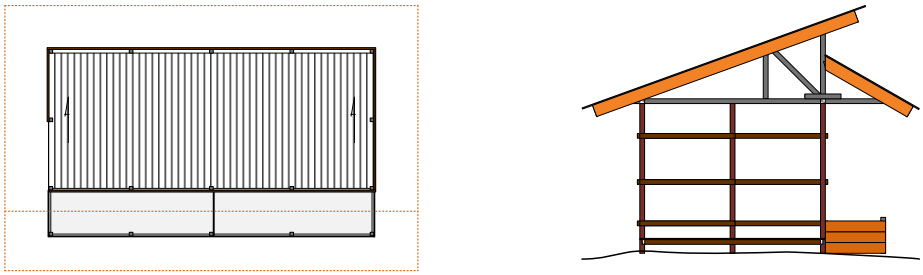

Figure 1. Enclosure development model performed by several Malind people had

The community hunting system is traditionally done by relying on simple equipment, including arrows, pointed bamboo, and meshes, with the help of dogs to hunt the Timorese deer (Cervus timorensis). The pattern of the model is like Figure 2. At the time of the dry season, the hunting community by burning the forest-savanna so that the deer will be confined fire and live in the arrows. It is what resulted in the dry season of many fire points and resulted in haze due to forest fires.

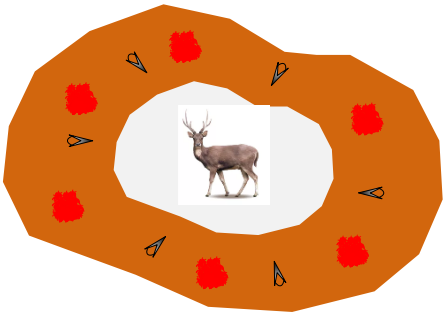

Figure 2. Hunting system by burning (fire-stung deer)

At the time of the rainy season, the people headed to the deck area (dense forest) that became the land of the deer from the puddle of the sea, and the community caught the deer quickly figure 3. In addition to the results of interviews with the people of Moi Island in a year, the collector can send deer meat 15 tons/year. All meats are sent to Merauke for sale in the market or made jerky by businessmen.

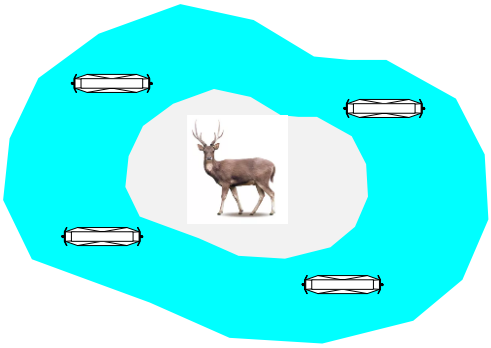

Figure. 3. The way to trap the hunting system (water-stung deer)

D. Conclusion

The spread of the Timor deer on the island of Kimaam shows that the population of deer is more commonly found in the northern natural grasslands on the deck area than the southern ones that are often flooded with seawater. Based on the results of the interview with the Deer collector on Moi Island, every year, the meat sent to Merauke ranges from 15 tons of deer population on the island ranged from 750 – 900 tails. Gender-based comparison of male and female deer is 1:5. Based on the age structure, the number of young deer is comparatively much more than adult deer. The deer flock generally consisted of 1 – 10 tails based on the sex of a herd of females without children being the largest herd.

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Study on Production of Male Peranakan Ettawa Goat Carcasses with Different Natural Feeding

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Abstract

Study on the production of male Peranakan Ettawa goat carcasses with different natural feeding. The purpose of this research is to find out the output of the Peranakan Ettawa male carcasses with mixed natural food. In this study used the Peranakan goat Ettawa males as many as six tails. The research data is analyzed by various print analyses using the complete random plan (RAL), and the measured parameters include cutting weight, carcass weight, and percentage of the carcass. The rate of cutting weight gained during the research of P1 (100% mulberry) amounted to 10537.50 grams, P2 (50% mulberry, and 50% Gamal) amounting to 10795.00 grams and P3 (100% Gamal) amounting to 12945.00 grams. The weight of carcasses gained during the research of P1 (100% mulberry) amounted to 4270.00 grams, P2 (50% mulberry, and 50% Gamal) for 4342.50 grams and P3 (100% Gamal) for 5380.00 grams. The rate of the percentage of carcasses gained during the research of P1 (100% mulberry) of 40.88%, P2 (50% mulberry, and 50% Gamal) amounted to 40.10%, and P3 (100% Gamal) amounted to 41.78%. Based on the analysis of the prints, the results were derived that the production of an Ettawa Peranakan goat with a different natural feed gave an unreal effect ($p > 0.05$) to the cut weight, weight of carcasses and the percentage of carcasses.

Keywords: Peranakan Ettawa goats, gamal leaves, mulberry leaves, carcasses

A. Introduction

Goat Livestock is one type of livestock that has good development prospects in supplying the needs of meat. The Peranakan of Ettawa was one of the local goats in Indonesia with a reasonably high population and widespread. One of the sources of meat that is already known by the people of Southeast Sulawesi is Peranakan goat Ettawa.

Goat productivity can be measured through the increase in body weight and the percentage of carcasses produced (Hafid et al., 2012). The interest and growth of livestock carcasses are influenced by several factors such as age, nation, and one of them is gender.

Gender is one of the most influential factors in livestock production performance. This is due to the influence of body tissues that also affects the growth and percentage of livestock carcasses and sexes, causing differences in growth rate (Hafid et al., 2012). At the same age, bulls usually grow faster than female cattle. It leads to the live weight of the bulls heavier than the living mass of females. This biological phenomenon also occurs in goat cattle.

The natural feed is a feed that comes from nature. But in its development, natural feed not only comes from life, but this food source can also come from cultivation. The average natural feed has a reasonably high protein content such as Gamal leaves and mulberry leaves. The leaves of Gamal are cultivated by one of the farmers in the Toari sub-district. Murbei is one of the high-potential crops for the quality of livestock feed.

Maintenance is intensive maintenance where the goat is maintained and fed with optimal nutritional value to increase the weight so that the weight of carcasses also increases and the health of the Goat Maximum.

Goat Carcass is a body part of a healthy goat that has been slaughtered, has been kneaded, ejected, separated between the head and legs ranging from the lower tarsus, reproductive organs, nudging, tails, and excess fats, another GA acquired carcasses consisting of meat (muscles), bones, and fats and connective tissues (Hafid et al., 2012).

Based on the explanation above, it will be researched to get the productivity of livestock carcasses of Peranakan Ettawa males by giving different natural feeds in the Ranomentaa sub-district of Kolaka district. The purpose of this research is to find out the production of the Peranakan Ettawa male carcasses with mixed natural feeding. The benefit of this research, is expected to be a reference material for farmers, to see how the production of livestock carcass of Peranakan Ettawa males with different natural feed in the district Toari Kolaka District and can provide information about the potential of Peranakan Ettawa goat as a producer of meat and efforts to increase its productivity.

B. Methodology

1. The Material

The material used in this study is a Peranakan goat Ettawa males as many as six tails with a range of ages of 4 months – 6 months, natural feed (Gamal leaves, and mulberry leaves), water, and medicine.

2. Research Procedures

Before the livestock research was first maintained for approximately one month with intensive maintenance system because goat cattle come from people's farms that previous maintenance is done traditionally and The given feed differs from the feed given at the time of the study, and after that, a new treatment is done.

Feeding is done three times a day, which is in the morning at 08.00 WITA, at noon at 13.00 WITA and afternoon at 16.00 WITA. With three treatment is one administration of 100% mulberry leaf, treatment two mixed feed in the form of 50% of the Gamal leaves, and 50% of mulberry leaves and the treatment of 3 administration of 100% of Gamal leaves with double-repeated treatment, drinking water is given adlibitum.

3. Parameters of Research

The parameters measured in this study are:

1. Cut weight.
2. Carcasses weight.
3. Percentage of carcasses.

4. Data Analysis

The research data was analyzed by various print analyses using the complete random plan (RAL), with the mathematical model (Steel & Torrie, 1991). As follows:

$$Yij = \mu + Pi + \epsilon ij$$

Description:

i = 1, 2, 3, ..., p

j = 1, 2, ..., u

Yij = Observation of the i-treatment and J-Deuteronomy

M = General average

Pi = The influence of the i-treatment

Єij = To-i error and to-J recurrence

To figure out the treatment effect, it is of the measured change, the data obtained is analyzed with variable and analyzed statistically if the treatment shows real influence, then it is recommended with the Tukey test (BNT) (Steel & Torrie, 1991).

C. Result and Discussion

Based on the analysis of the prints, then obtained the conclusion that the production of the male-ethnic Peranakan Ettawa with different natural feed does not have a noticeable effect (p>0.05) to the weight of cut, carcass weight and percentage of carcasses. It can be seen in Table 2.

Table 1. Weight rate, carcass weight, and percentage of carcasses in PE goat with a natural feed of Murbei and Gamal.

Variable	Natural Feed			Significant
	P1	P2	P3	
Cut Weight (gr)	10537,50	10795,00	12945,00	NS
Carcasses Weight (gr)	4270,00	4342,50	5380,00	NS
Percentage of carcasses section (%)	40,88	40,10	41,78	NS

1. Cutting weight

The average weight of the pieces is shown in table 2. The rate of cutting weight gained during the research of P1 (100% mulberry) amounted to 10537.50 grams, P2 (50% mulberry, and 50% Gamal) amounting to 10795.00 grams and P3 (100% Gamal) amounting to 12945.00 grams. The highest cutting weight of the P3 treatment is the 100% Gamal and the lowest average in the P1 treatment of 100% mulberry. It indicates that the addition of different types of natural feed to the level of 100% does not affect the increase in the weight of the breeds of Peranakan animal Ettawa males.

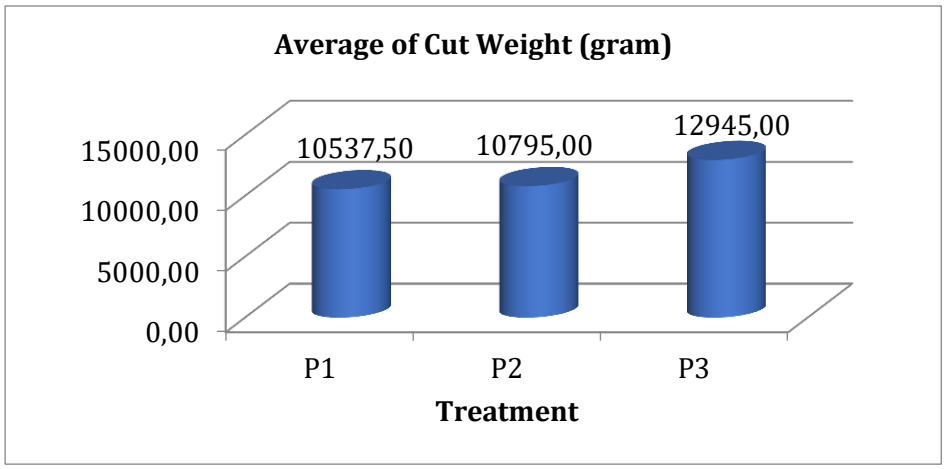

Figure. 1. Cut Weight Histogram

One factor that affects the weight of the cut is feed consumption. The absence of real influence (p > 0.05) among the three treatments is suspected because the feed gave the same

quality. It is reinforced by the statement of Adiwinarti et al. (1999) and Lestari et Al. (2001) that the same amount of feed nutrient consumption will produce the same cut weight.

The weight of the cut is also influenced by goat growth during maintenance. One that affects growth is the consumption of dry materials. The remarkable increase also results in a good cut weight, the other way around. These results are by Agnihorti ET's statement, et al. (2006) That livestock with the provision of only green feed without the complete feed addition, no effect on the weight of the cut.

Consumption and digestibility of feed treatment do not affect the increase of daily body weight (DBW) so that the cut weight obtained is also relatively the same. Tobing et al. (2004), the more feed consumed and undigested substances, the higher the Daily weigh addition so that it affects the weight of cut received.

2. Carcasses weight

The Peranakan flocks of Ettawa with different natural feed did not give a noticeable effect ($p > 0.05$) to the influence of carcasses in treatment. The importance of carcasses gained during the research of P1 (100% mulberry) amounted to 4,270.00 grams, P2 (50% mulberry, and 50% Gamal) for 4,342.50 grams and P3 (100% Gamal) for 5,380.00 grams. The highest rate of heavy carcasses in P3 treatment is that the feed is 100% Gamal, and the lowest average at P1 treatment is 100%, Mulberry.

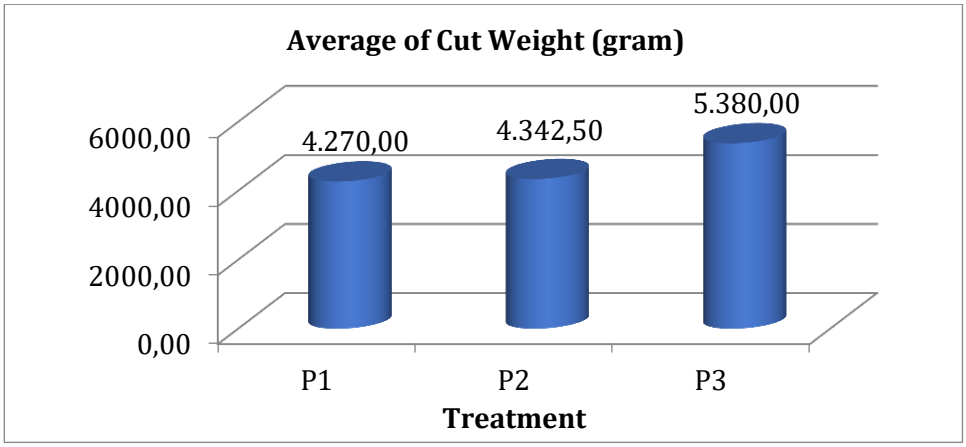

Figure 2. Histogram of Carcasses Heavy-rate

There is no difference in the natural feeding of the treatment group due to the weight of the piece that does not affect the treatment. This allegation is following the opinions of Berg and Butterfield (1976) in Ngadiyono (2014) that one of the factors affecting carcass weight is the cut weight. The higher the importance of the cut, the higher the importance of the carcass obtained (Tobing et al., 2004).

Soeparno (2009) that the variation of carcasses or the composition of carcasses is mostly dominated by body weight. Added by Tobing et al. (2004), each weight gain is always followed by a massive increase in carcasses, which can mean that the increase in cutting weight is related to the growth and development of the body part or carcass. Daily weigh addition will increase when the feed is given to meet the nutrients needs of cattle. This Daily weigh addition also affects the weight of the carcass produced.

3. Percentage of carcasses section

The rate of the percentage of carcasses gained during the research of P1 (100% mulberry) of 40.88%, P2 (50% mulberry, and 50% Gamal) amounted to 40.10%, and P3 (100% Gamal) amounted to 41.78%. The rate of the highest percentage of carcasses in P3 treatment is by feeding 100% Gamal and the lowest average in P2 treatment, i.e., 100% mulberry. The small percentage of carcasses in the P2 treatment compared to the treatment of P1 and P3 is suspected as a result of the different levels of feed degradation caused by the crude fiber content and lignin on the Gamal and Mulberry forage. Perry et. Al. (2003) In Setiawan et. Al. (2015) explained that feedstuffs containing high crude fiber would lower the digestibility value of other food substances because to digest the coarse texture is required a lot of energy so that it can affect the percentage of carcasses.

The percentage of the carcass section of the study showed no noticeable results (p > 0.05) between each group of treatment. It is due to the weight of carcasses, and weight cuts on all three treatments are also different, not real. The weight of carcasses heavily influences the percentage of carcasses, and this is because the rate of carcasses was derived from a comparison of the importance of cut carcasses (Wood et al., 2008) in Ngadiyono (2014). The research of Agnihorti et al. (2006), in Ngadiyono et al. (2014), was shown, got a percentage of carcasses amounting to 43-46% in goats given the complete feed, but in this study was only given treatment using forage feed without full addition Feed. This fact shows with local-based green pasture although having different protein levels and feed energy has no significant effect on cutting weight, and the percentage of carcasses can still be maximized with additional feed To meet the needs of livestock and increase the quality of carcasses

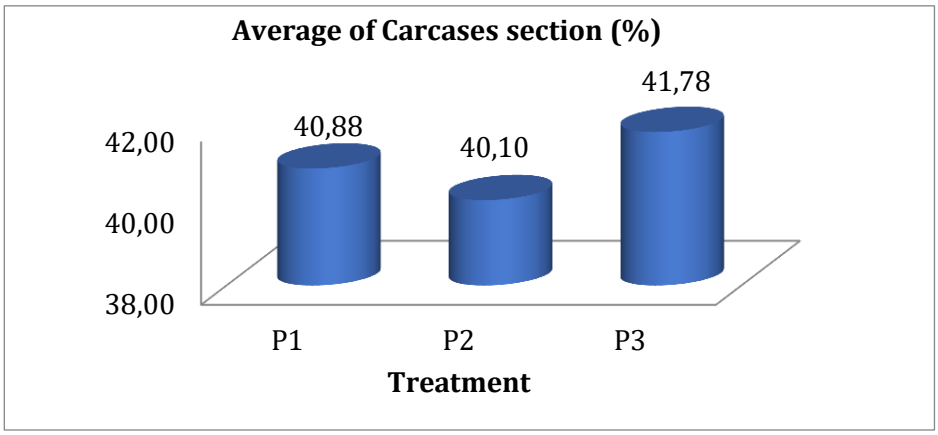

Figure. 3. The average rate of carcasses

D. Conclusion

From the results of this study can be concluded that the treatment in each group of livestock gives a real influence (p>0.05) to the weight of cut, the importance of carcasses, and the percentage of cattle carcasses of Peranakan Ettawa males.

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