Utilization complete feed fermented based waste peel cassava (Manihot esculenta Crantz) on quality meat of male Kacang goat

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Abstract. The purpose of this study was to determine the effect of the utilization of complete feed fermented based waste peel cassava (Manihot esculenta Crantz) on the quality meat of male kacang goat. This research method uses a completely randomized design (CRD) with 4 treatments and 3 replications, while the diets used in this study include P0 (complete feed fermented with 75% cassava dried and 0% cassava peel), P1 (complete feed fermented with 55% cassava dried and 20% cassava peel, P2 (complete feed fermented with 35% cassava dried and 40% cassava peel) and P3 (complete feed fermented with 15% cassava dried and 60% cassava peel). The results of this study indicate that the utilization of complete feed fermented based on cassava peel waste is not significantly different (P> 0.05) on pH, water holding capacity, cooking losses, water content, protein content and fat content, but significantly different (P <0.05) in the colour of meat. It can be concluded that the utilization of complete feed fermented based on cassava peel waste does not affect the pH, water holding capacity, cooking loss, water content, protein content and fat content but it does affect the colour meat of the male kacang goat.

1. Introduction
Goats are one of the potential livestock to produce meat in considerable amounts with good nutrient content so it can be used as an alternative producer of meat other than beef cattle, one of the goats were developed in Indonesia is Kacang goat, where Kacang goats has the advantages of easy to adapted to the type of low-quality feed. Cassava peel waste is one that can be used as goat feed because the amount is quite abundant both from the remainder of the manufacture of tapioca, cassava chips or other cassava processing industries where from each cassava peels obtained about 16% of the total weight of cassava [1].esides cassava peel is a good source of carbohydrates, according to nur richana [2] the starch content of cassava peel around 44-59% but the protein content is still less than the maximum which is about 1.5-3.7% therefore the need for technology processing feed in the form of complete feed fermented. Complete feed is a mixture of concentrate and forages into a single ration that can avoid feed selection and can increase efficiency in the management of feed supply and feeding [3]. Fermentation is one of the feed processing technology to increase the nutritional value of a high fiber feed [4], so that it can increase the quality of the feed nutrient. Munawaroh added [5] which stated that complete fermented feed had a low crude fiber content caused by fermentation of feed. Based on the above it is necessary to research the utilization of complete feed fermented based
waste peel cassava (*Manihot esculenta* Crantz) on the quality male kacang goat.

2. Materials and methods

2.1. Materials and tools
The study was conducted in Sihopuk Baru Village, Halongonan District, Padang Lawas Utara Regency in April 2019 until July 2019. Materials used in this study were 12 male kacanggoats with 10 kg ± 1.30 kg body weight. Feed ingredients used include molasses, rice bran, cassava peel, cassava dried, soybean meal, urea and minerals. The equipment used is 12 units of individual cages with a size of 1 x 0.5 m² equipped with a place of feed and drinking places, besides that there are scales and tools for mixing and drying the feed ingredients used. Slaughtering of livestock is carried out at the end of the maintenance period, by randomly taking as many as two heads per treatment then samples are taken to test the quality of meat in the longissimus dorsi (LD).

2.2. Research methods
Methods This study was carried out experimentally using a completely randomized design (CRD) with 4 treatments and 3 replications. The treatments studied are as follows:

- **P0** = Complete feed fermented with 75% cassava dried + 0% cassava peel
- **P1** = Complete feed fermented with 55% cassava dried + 20% cassava peel
- **P2** = Complete feed fermented with 35% cassava dried + 40% cassava peel
- **P3** = Complete feed fermented with 15% cassava dried + 60% cassava peel

| Feed Ingredients (%) | Treatments |
|-----------------------|------------|
|                       | P0         | P1         | P2         | P3         |
| Molasses              | 5          | 5          | 5          | 5          |
| Rice Bran             | 6          | 6          | 6          | 6          |
| Cassava Peel          | 0          | 20         | 40         | 60         |
| Cassava Dried         | 75         | 55         | 35         | 15         |
| Soybean Meal          | 12         | 12         | 12         | 12         |
| Urea                  | 1          | 1          | 1          | 1          |
| Minerals              | 1          | 1          | 1          | 1          |
| Total                 | 100        | 100        | 100        | 100        |
| CP (%)                | 12.14      | 12.44      | 13.50      | 14.15      |
| CF (%)                | 6.91       | 7.02       | 7.10       | 7.37       |
| EE (%)                | 0.58       | 0.54       | 0.63       | 0.77       |
| ME (kcal/kg)          | 2,320.4    | 2,392.8    | 2,464.8    | 2,536.8    |
| TDN (%)               | 64.15      | 66.16      | 68.15      | 70.14      |

2.3. Observed variables
Variables observed in this study included physical quality and chemical quality meat of male kacang goat. Physical quality includes pH, water holding capacity, cooking losses and colour while the chemical quality of meat includes water content, protein content and fat content in male kacang goat meat.

2.4. Research implementation
This study begins with a complete feed rations according to the composition specified. The first weighing is done according to the table feed composition that has been determined then feed overlaid on a tarp and then mixed until homogeneous and last moistened with EM4 that has been mixed with
water, molasses and urea. Continued after being mixed evenly and slightly wet put in a silo and then closed tightly to remain anaerobic. All feed ingredients that have been mixed into complete feed fermented are stored for 7 days. Before the research began, cage preparations and equipment were cleaned using an antiseptic, whereas in goats the animals were prepared by giving worm medicine. Feed given in accordance with each treatment with a dose of 3% of livestock body weight. Feed given 2 times a day in the morning and afternoon while drinking water supplied ad libitum. Slaughtering of livestock is carried out at the end of the study period by taking meat samples in the longissimus dorsi (LD) section and then testing the physical and chemical quality meat of male kacang goat.

2.5. Data analysis
Data obtained were analysed with a Completely Randomized Design (CRD) with 4 treatments and 3 replications, if there is a difference it will be followed by the Duncan test.

3. Results and discussion

3.1. Meat physical quality
The physical quality of meat observed in this study included pH, colour, water holding capacity and cooking losses, as for the data presented in Table 2.

| Treatments | pH      | Colour | Water Holding Capacity (%) | Cooking Losses (%) |
|------------|---------|--------|-----------------------------|--------------------|
| P0         | 5.51±0.33 | 5.30±0.14 | 21.10±0.31                   | 44.12±0.36         |
| P1         | 5.47±0.11 | 4.97±0.05 | 22.00±1.64                   | 45.99±1.40         |
| P2         | 5.60±0.16 | 5.17±0.05 | 22.34±0.59                   | 44.35±1.01         |
| P3         | 5.41±0.10 | 5.07±0.09 | 22.26±2.78                   | 43.99±0.36         |

Note: Different superscripts on the same column show significantly different effects (P<0.05)

pH value in this study showed results between 5.28-5.60. This is consistent with Lawrie's statement [6] which states the pH of fresh meat ranges from 5.4 to 5.8 at which time the glycolytic breakdown enzymes in meat have stopped so that under these conditions glycogen is no longer found in meat. Based on the analysis of variance showed that the effect was not significantly different (P> 0.05) in treatment provision of complete feed fermented based cassava peel waste that differs between the treatment of male kacang goat meat pH.

Meat colour range in this study between 4.97 to 5.30. Based on the analysis of variance showed significantly different effect (P<0.05) in treatment provision of complete feed fermented based cassava peel waste that is different between treatments where P0 indicates a value of 5.30 ± 0.14 4.97 ± 0.05 and then P1, P2 5.17 ± 0.16 and P3 of 5.07 ± 0.10. This difference is caused by the effect of different feeds given because the feed will determine the concentration of meat pigment, namely myoglobin [4]. Another factor that can cause colour differences is the intensity of marbling in meat, this can be reflected in the levels of fat contained in meat which in this study although the fat content of meat is not significantly different but the level of meat fat at P0 has the highest level of 9.98 ± 0.53 while P1 has the lowest fat content, which is 9.43 ± 0.76.

Water holding capacity was showed values between 21.10 to 22.34%. Based on the analysis of variance showed not significantly different (P>0.05) in treatment provision of complete feed fermented based cassava peel waste that differs between the treatment of the water holding capacity in meat kacang goat male. Water holding capacity is directly proportional to the protein content, it can be proved even if the results of analysis of variance in water holding capacity and protein levels were not significantly different but the value of water holding capacity and protein levels in treatment P2 has a higher value than other treatments at 22.34 ± 0.59 and 19.03 ± 0.08. Besides, the water holding capacity is also affected by pH of the meat where the pH of meat shows that P2 is the highest value...
compared to the others, which is $5.60 \pm 0.16$. This is in accordance with the opinion of Soeparno [7] who states that meat which has a high pH value will usually also have a high water holding capacity, and vice versa.

Cook losses in this study showed values between 43.99 - 45.99%. This is still in normal values because according to Soeparno [7] in general the value of cooking losses varies between 1.5 - 54.5%. Based on the analysis of variance showed that the effect was not significantly different ($P>0.05$) in treatment provision of complete feed fermented based cassava peel waste that differs between the treatment of male kacang goat meat cooking losses. This shows cassava peel can be used as an alternative feed to conventional feed because it does not have much effect on the physical quality of meat.

3.2. Meat chemical quality
The chemical quality of meat observed in this study included water content, protein content and fat content of meat, as for the data presented in Table 3.

| Treatments | Water Content (%) | Protein Content (%) | Fat Content (%) |
|------------|-------------------|---------------------|-----------------|
| P0         | 75.54±2.53        | 17.89±1.05          | 9.98±0.53       |
| P1         | 77.88±1.26        | 18.48±0.75          | 9.43±0.76       |
| P2         | 76.50±2.29        | 19.03±0.08          | 9.86±0.68       |
| P3         | 77.24±0.23        | 18.05±0.63          | 9.85±0.19       |

The water content in this study showed similar results ranged between 75.54 to 77.88%. According to Soeparno [7] the normal water content ranges from 65 - 80%, therefore the water content in this study is still in the normal level. Based on results of analysis of variance showed that the effect was not significantly different ($P>0.05$) in treatment provision of complete feed fermented based cassava peel waste that differs between the treatment of the water content of the male kacang goat meat. The results of the water content is almost the same and quite high is because the animals used have almost the same age or are still young, which is around 8-12 months. At the age of young animals, the formation of less fat has an impact on many of the water content of meat produced [8].

The protein content in the study ranged from 17.89 to 19.03%. These results are similar to the results of research Agnihorti [9] who get the protein content of 18.7 to 20% in goatsbarbari fed complete feed. Based on results of analysis of variance showed that the effect was not significantly different ($P>0.05$) in treatment provision of complete feed fermented based cassava peel waste that vary from treatment of the protein content of male kacanggoat.

Fat content in this study ranged from 9.43 - 9.98. Based on the analysis of variance showed that the effect was not significantly different ($P>0.05$) in treatment provision of complete feed fermented based cassava peel waste that differs between the treatment of fat content of male kacang goat. This is suspected because the age of livestock in this study is relatively uniform so that it causes almost the same fat content, this is in accordance with the statement of ngadiyono [10] which states the fat content is affected by age. Overall the results of this study provide a positive response to the quality of meat, this is in accordance with the statement of Ginting [11] which states the provision of complete feed produces meat quality that is comparable to the use of conventional feed.

4. Conclusions
The effect of the use of complete feed fermentation based on cassava peel waste does not affect the pH, water holding capacity, cooking losses, water content, protein content and fat content, but it does affect the difference in the colour meat of the male kacanggoat.

References
[1] Supriyadi 1995 Pengaruh tingkat penggunaan hasil fermentasi kulit ubi kayu oleh jamur
Aspergillus niger dalam ransum terhadap performan ayam pedaging periode starter [Effect of level use of fermented cassava peel by Aspergillus niger mushrooms in ration on starter period broiler performance] (Bandung: Universitas Padjadjaran)

[2] Richana N 2013 Menggali potensi ubi kayu dan ubi jalar [Exploring the potential of cassava and sweet potato] (Bandung: Nuansa Cendikia)

[3] Ngadiyono N, Budisatria I G S and Sadeli A 2014 Pengaruh penggunaan complete feed terfermentasi terhadap karkas dan kualitas kimia daging kambing bligon [The utilization of fermented complete feed on the carcass production and meat chemical quality of bligon goat] Buletin Peternakan 38 2 109-15

[4] Sadeli A 2014 Penggunaan complete feed berbasis pakan lokal terhadap karkas dan kualitas daging kambing bligon [The utilization of complete feed based local feed on the carcass and meat quality of bligon goat] (Yogyakarta: Universitas Gadjah Mada)

[5] Munawaroh L L, Budisatria I G S and Suwignyo B 2015 Pengaruh pemberian fermentasi complete feed berbasis pakan lokal terhadap konsumsi, konversi pakan dan feed cost kambing bligon jantan [The effect of fermented complete feed based on local feed resources on consumption, feed conversion and feed cost of male bligon goats] Buletin Peternakan 39 3 167-73

[6] Lawrie R A 2003 Ilmu daging [Meat Science] Ed Aminuddin Parakkasi (Jakarta: Universitas Indonesia Press)

[7] Soeparno 2009 Ilmu dan teknologi daging [Meat science and technology] 5th edition (Yogyakarta: Gadjah Mada University Press)

[8] Rika D N, Tahuk P K and Kia K W 2019 Pengaruh penggunaan beberapa pakan sumber energy terhadap komposisi kimia daging kambing karang jantan yang digemukan [The effect giving some feed energy source to meat chemical composition of male karang goat fattened] Journal of Tropical Animal Science and Technology 1 1 32-9

[9] Agnihorti M K, Rajumar V and Duta T K 2006 Effect of feeding complete rations with variable protein and energy levels prepared using by-products of pulses and oilseeds on carcass characteristic, meat and meat ball quality of goats Asian-Aust. J. Anim. Sci. 19 10 1437-49

[10] Ngadiyono N, Murtidjo G, Agus A and Supriyana U 2008 Kinerja produksi sapi peranakan ongole jantan dengan pemberian dua jenis konsentrat yang berbeda [Performances of male ongole crossbred cattle on two kind of concentrate with different quality] J. Indon. Trop. Anim. Agric. 33 4 282-9

[11] Ginting S P 2009 Prospek penggunaan pakan komplit pada kambing: Tinjauan manfaat dan prospek bentuk fisik pakan serta respon ternak [The prospect of using complete feed in goat production: A review on its utility and physical form and animal responses] Wartazoa 19 2 64-75

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