The use of cassava peel (Manihot utilissima) fermentation in the ration on the fat of local sheep

N Ginting* and I Sembiring
Animal Production Program Study, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Sumatera Utara, Indonesia.

E-mail: *nurzainah@usu.ac.id

Abstract. This study aims to investigate the influence of fermented cassava peel flour (Manihot utilisima) in the rations on fat percentage of local sheep. The design was Completely Randomized Design (RAL) with 4 treatments and 5 replications. This study used 20 local sheep with an average of 10.18 ± 1 kg. The four treatments were T0 (Cassava peel flour non fermentation), T1 (Cassava peel flour fermentation 20%), T2 (Cassava peel flour fermentation 40%), and T3 (Cassava peel fermentation 60%). The results showed that the highest percentage of subcutaneous fat was on T3 while there were no differences by all treatments on percentage of abdomen, heart kidney and pelvic fat. The use of fermented cassava flour (Manihot utilisima) with starbio to 60% level in ration increased the percentage of fat subcutaneous while abdominal fat, heart, kidney and pelvic percentage were remained. Subcutaneous fat enhance sheep external shape and improve meat quality.

1. Introduction
Feed is one factor that is very important and very influential on increasing livestock production. Provision of adequate feed ingredients with good quality is one of the elements that determine the success of livestock [1]. Seeing insufficient land availability as a forage provider, makes the availability of forages limited. The narrowness of forage land will have an impact on the growing needs of animal feed. To overcome this, it is crucial to find an alternative feed that can replace forage.

One of the agricultural waste that can be utilized as animal feed is cassava peel. Cassava peel (Manihot utilisima) are waste after the tubers are taken for certain purposes, causing pollution to the environment if not used or processed properly. Utilization of cassava waste is certainly provide a positive value to a farm [2, 3].

Sheep is one source of favourable meat and can be developed as a potential source for community nutrition. In general sheep are traditionally kept by the community with minimal feed and a relatively small number of each family. To get a high percentage of carcass and good meat quality, among others is by improving feeding and determination of appropriate cutting weight [4].

Agricultural waste processing such as cassava peel can be done by fermentation. Fermentation is one of the efforts to eliminate harmful substances for livestock and replaced with more useful substances such as increasing digestibility, protein content, lowering lignin and silage levels, adding flavour and aroma and increasing the content of minerals and vitamins in the diet [3].

Fat is part of livestock tissue that unstable. Fat could be collected on many walls of the abdominal cavity and kidney. According to [5] the amount of fat in the body was the most diverse and highly
dependent on the amount of feed consumed. This research try to investigate the influence of cassava peel flour (Manihot utilisima) fermentation in the rations on fat percentage of local sheep.

2. Materials and methods
This research were used sheep 20 heads with weight average of 10.18 ± 1 kg. Composition of research feed ingredients were forage and concentrate which had different percentage of fermented or non-fermented cassava peel flour. Starbio as fermentor of cassava peel flour (Manihot utilisima), medicines such as worm medicine (kalbazen), anti-bloat for bloating and vitamins. Drinking water to meet the water requirement given adlibitum.

Equipment used include: individual cages 20 units and equipments, live weight scale and carcass weighing 50 kg with sensitivity 10 g, 2 kg weight scale with sensitivity 5 g for weighing feed.

### Table 1. Composition of research feed ingredients

| Composition (%)       | T0  | T1  | T2  | T3  |
|-----------------------|-----|-----|-----|-----|
| Non fermented cassava peel flour | 60  | 40  | 20  | 0   |
| Fermented cassava peel flour      | 0   | 20  | 40  | 60  |
| Field grass              | 20  | 20  | 20  | 20  |
| Soybean meal            | 10  | 10  | 10  | 10  |
| Tofu waste              | 6.5 | 6.5 | 6.5 | 6.5 |
| Molasses                | 2   | 2   | 2   | 2   |
| Mineral mix             | 1   | 1   | 1   | 1   |
| Urea                    | 0.5 | 0.5 | 0.5 | 0.5 |
| Total                   | 100 | 100 | 100 | 100 |

2.1. Research methods
The experimental design used research was Completely Randomized Design (CRD) with 4 treatments and 5 repetitions. The treatment in this research were T0, T1, T2 and T3 and every sheep had 20% of concentrate with different percentage of fermented cassava peel flour and 20% of field grass.

Parameter of Research were Percentage of Subcutaneous Fat (%) = obtained from the comparison of subcutaneous fat weight with carcass weight 100%. Abdominal fat percentage (%) = obtained from the ratio of abdominal fat weight to carcass weight 100%. Percentage of heart fat (%) = obtained from fat covering the heart divided by carcass weight multiplied by 100%. Percentage of kidney fat (%) = obtained from the ratio of fat weight of the kidney with carcass weight 100 times. Percentage of pelvic fat (%) was obtained from the ratio of fat weight of the pelvic with carcass weight 100 times. The data was processed by the method of SAS and then continued with Duncan test.

3. Results and discussion

3.1 Percentage of Subcutaneous Fat

### Table 2. Average Percentage of Subcutaneous Fat of local sheep influenced by the use of fermented cassava peel on rations (%)

| Treatment | Repetition | Total | Average |
|-----------|------------|-------|---------|
|           | U1         | U2    | U3      | U4      | U5      |       |         |
| T0        | 1.02       | 1.10  | 1.20    | 1.02    | 1.18    | 5.52  | 1.10±0.08c |
| T1        | 1.13       | 1.82  | 1.13    | 1.10    | 1.15    | 6.33  | 1.27±0.31bc |
| T2        | 1.76       | 1.76  | 2.03    | 1.76    | 1.12    | 8.43  | 1.69±0.33ab |
| T3        | 2.48       | 2.38  | 1.11    | 2.47    | 1.74    | 10.18 | 2.04±0.60a  |

Note: Different superscripts in the same column show a significant different effect (P <0.05)
The highest percentage of subcutaneous fat was on T3 treatment. According to [6] the variation in body fat due to differences in body growth and development that depends on the species, age, sex and background of feed. The difference in this research was on feed as T3 was consisted of 60% fermented cassava peel flour. [3] mentioned that fermentation on cassava waste caused an increasing on protein content and improvement on crude fibre content. Improvement on nutrition content would followed by improvement on body growth include body fat. In this research, data collected by other researcher found that T3 caused higher carcass weight while according to [7] higher carcass weight caused either the percentage of meat or fat increased as well. Meanwhile [8] stated that in young sheep the percentage of bone was higher which caused percentage of meat / carcass and fat were lower. This was because the sheep were still experiencing growth in the building tissues, such as tendons, bones, brain bones, heart and all body tissues. However, even in this research the age of sheep were about 8 months, there was a difference on subcutaneous fat by the treatments. Subcutaneous fat is body tissue with a purpose to enhance sheep external shape. In addition, subcutaneous fat works as a carcass protector and improve meat quality [9].

3.2 Percentage of Abdominal Fat

Table 3. Abdominal Fat Percentage of local sheep males influenced by fermented cassava peel on ration (%)

| Treatment | Repetition | Total | Average |
|-----------|------------|-------|---------|
|           | U1  | U2  | U3  | U4  | U5  |       |         |
| T0        | 2.31| 1.74| 2.66| 2.48| 2.63| 11.820| 2.364±0.37a |
| T1        | 2.53| 2.63| 1.78| 1.74| 2.65| 11.330| 2.266±0.46a |
| T2        | 2.54| 2.08| 2.05| 2.06| 2.39| 11.120| 2.224±0.22a |
| T3        | 2.16| 2.16| 1.76| 2.16| 2.5 | 10.740| 2.148±0.26a |

Note: Different superscripts in the same column show a significantly different effect (P <0.05)

There were no differences on abdominal fat due to treatments. According to [10, 11] the accumulation of fat in the abdominal section is undesirable, because it will reduce the difference between living weight and body weight. One way to reduce fat is by varying ration nutrition, especially energy and protein. Increased ration energy content will also increase fat content and increase ration protein, the amount of abdominal fat will decrease. Fat weight is influenced by the amount of feed consumed and livestock age. This is in accordance with the statement of [6] which states the variation in body fat due to differences in body growth and development that depends on the nation, age, sex and background of feed.

3.3 Percentage of Heart Fat

Table 4. Percentage of Heart Fat of local sheep influenced by the use of fermented cassava peel

| Treatment | Repetition | Total | Average |
|-----------|------------|-------|---------|
|           | U1  | U2  | U3  | U4  | U5  |       |         |
| T0        | 0.210| 0.180| 0.220| 0.200| 0.210| 1.020| 0.204±0.01a |
| T1        | 0.200| 0.220| 0.180| 0.180| 0.210| 0.990| 0.198±0.02a |
| T2        | 0.200| 0.200| 0.200| 0.200| 0.220| 1.020| 0.204±0.01a |
| T3        | 0.210| 0.210| 0.200| 0.200| 0.200| 1.020| 0.204±0.01a |

Description: Different superscripts in the same column show a significantly different effect (P <0.05)

In accordance with [11] whom stated that the weight of fat that was found around the bottom of the skin, kidney, pelvic and heart had an effect on the quality of carcass, because with increased fat will result in reduced commercial carcass. In this research there were no differences among treatments on
heart fat even though data which were taken by other researcher on body weight, by T3 there was a significant increased of body weight.

### 3.4 Percentage of Kidney Fat

**Table 5.** Percentage of Kidney Fat of local sheep males influenced by use of fermented cassava peel

| Treatment | Repetition | Total | Average |
|-----------|------------|-------|---------|
| T0        | 0.230      | 0.250 | 0.240   | 0.240   | 1.210 | 0.242±0.01a |
| T1        | 0.230      | 0.370 | 0.250 | 0.250 | 0.270 | 1.370 | 0.274±0.05a |
| T2        | 0.350      | 0.290 | 0.270 | 0.300 | 0.290 | 1.500 | 0.300±0.03a |
| T3        | 0.280      | 0.280 | 0.260 | 0.280 | 0.350 | 1.450 | 0.290±0.03a |

Description: The same superscript in the same column shows an unreal effect (P> 0.05)

According to [12] fat collected in the walls of the stomach and kidney cavities was influenced by the amount of feed consumed, this was in accordance with [10] whom stated that the fatty tissue in the body was the most unstable and highly dependent on the amount of food consumed. Fat that was found on sheep kidney will decreased commercial carcass quality. There was no differences on kidney fat by all treatments in this research.

### 3.5. Percentage of Lamb's Pelvic Fat

According to [13] fat growth in sheep relative to carcass fat, if the weight of subcutaneous fat increases intermuscular fat, renal and pelvic fat remains. In this research, it was found that subcutaneous fat was increased and like [13] found, there was no increased of pelvic fat by all treatments.

**Table 6.** Percentage of Lamb’s Pelvic Fat of local sheep males influence by the use of fermented cassava peel

| Treatment | Repetition | Total | Average |
|-----------|------------|-------|---------|
| T0        | 0.250      | 0.260 | 0.250 | 0.290 | 0.260 | 1.310 | 0.262±0.06a |
| T1        | 0.250      | 0.280 | 0.270 | 0.260 | 0.260 | 1.310 | 0.262±0.01a |
| T2        | 0.270      | 0.280 | 0.280 | 0.260 | 0.260 | 1.380 | 0.276±0.01a |
| T3        | 0.290      | 0.290 | 0.280 | 0.290 | 0.270 | 1.420 | 0.284±0.01a |

Description: The same superscript in the same column shows an unreal effect (P> 0.05)

The percentage of fat was very diverse [10] fat will be higher during growth and development, in accordance with the growth pattern of body components that fat begins with growth, then after reaching puberty the growth rate of fat increased fastly.

### 4. Conclusion

The use of cassava flour (*Manihot utilisima*) fermented with starbio to 60% level in ration increased the percentage of fat subcutaneous while abdominal, heart, kidney and pelvic fat percentage were remained. Subcutaneous fat enhance sheep external shape and improve meat quality.
References

[1] Muqier, Qi S, Wang T, Chen R, Wang C and Changjin Ao 2017 Effects of flavonoids from Allium mongolicum Regel on growth performance and growth-related hormones in meat sheep Animal Nutrition 31 33-38

[2] Anyanwu C N, Ibeto C N, Ezeoha S L and Ogbuagu N J 2015 Sustainability of cassava (Manihot esculenta Crantz) as industrial feedstock, energy and food crop in Nigeria Renewable Energy 81 745-752

[3] Ginting N 2018 Comparison of isolate dadih with yeast dadih in improving nutrition quality of Cassava Waste (CW) IOP Conf. Series: Earth and Environmental Science 141 2018 012008

[4] Meira A N, Moreira G C M, Coutinho L L, Mourau G B, Azevedo H C, Muniz E N, Machado A L, Junior L P S, Pedrosa V B and Pinto L F B 2018 Carcass and commercial cut yield of Santa Ine sheep affected by polymorphisms of the LEP gene Small Ruminant Research

[5] Davendra C and Burns M 1997 Goat Production in The Tropics (Bandung and Bali: Bandung Institute of Technology and Udayana University Bali)

[6] Campbell J R, Kenealy M D and Campbell K L 2006 Animal Sciences 4th Edition (New York: MsGraw-Hill)

[7] Zhong R Z, Fang Y, Zhou D W, Sun X Z, Zhou C S and He Y Q 2018 Animal Feed and Technology 242 127-134

[8] Crouse J D, Busborn J R, Field R A and Feller C L 1981 Effect of Breed, Diet, Sex, Location and Slaugher Weight on Lambs Growth, Carcass Composition and Meat Flavour (New York: Mc Garaw Hill Book Company)

[9] Schoonmaker J P, Uharty F L Fl and Loerch S C 2004 Effect of source and amount of energy and rate of growth in the growing phase on adipocyte cellularity and lipogenic enzyme activity in the intramuscular and subcutaneous fat depots on Holstein steers J Anim Sci 82 137-148

[10] Soeparno 2011 Meat Science and Technology The 4th Ed (Yogyakarta: Gadjah Mada University Press)

[11] Fahad O and Aldosari 2018 Gender participation in sheep and goat farming in Najran, Southern Saudi Arabia Saudi Journal of Biological Sciences 251 144-148

[12] Sumaspratowo C D A 1993 Livestock of Lamb and Wool (Jakarta: Bharata Karya Aksara)

[13] Purbowati E, Sutrisni C I, Bialiarti E, Budi S P S and Lestariana W 2005 Tumbuh kembang karkas dan komponen karkas domba Lokal jantan yang dipelihara di pedesaan (Growth of carcasses and carcass components of local male sheep that are kept in the countryside) Pros: Seminar Nasional dan Teknologi Peternakan Veteriner (Proc. National Seminar and Veterinary Animal Husbandry Technology) pp 487-494