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To cite this article: P Patriani *et al* 2020 *J. Phys.: Conf. Ser.* **1542** 012029

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Effect of Kepayang (*Pangium edule*) Seed Extract on Meat Moisture Content, Drip Loss and Decay Test of Lamb Meat at Different Shelf Life

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Abstract. Kepayang also called Picung or *Pangium Edule* is a spice used to make dishes in Indonesia. Kapayang fruit seeds have a variety of benefits including being used as a natural preservative to replace the use of formaldehyde in fish preservation. Kapayang fruit seeds are also inhibitors of microbial growth and activity so that food stays for have a long shelf life- The purpose of this study was to determine the effect of the addition level of kapayang fruit extract on organoleptic characteristics, drip loss and meat rot at different shelf life. This research uses a completely randomized factorial design method with 3 replications. The material used was male lamb meat, kapayang fruit seeds extracted. Lamb meat was marinated in kapayang seed extraction with P0 as a control, P1 (3%), P2 (6%) and P3 (9%) were drained and the meat was stored for T1 (12 hours), T2 (24 hours) and T3 (36 hour) at room temperature. The results showed that kapayang fruit extract did not significantly affect water content and meat rot and drip loss. It was concluded that the use of Kepayang seed extract 3% to 9% is recommended because it can inhibit spoilage for 36 hours and reduce the characteristic odor of lamb meat.

1. Introduction

Kapayang or in Latin *Pangium edule* is a spice commonly used as a spice in Indonesian cuisine. Ripe fruits are round, brown and can weigh up to 1-4 kilos. Kapayang fruit seeds inside the fruit usually have a rough outer skin, grayish brown, hard like a coconut shell. To get the seeds, the seeds of kapayang seeds have to be broken down. Fresh kapayang seeds are white to yellowish like coconut flesh. Kapayang is used as a spice which has undergone 40 days of fermentation to reduce cyanide content. Kapayang seeds contain alkaloid, flavonoid, tannin and cyanide compounds (Sulistiani, 2005) [1]. In previous studies, kapayang seeds contained anti-bacterial properties of garlat acid, tannin and cyanide acid (Udarno, 2008)

[2] Meat quality after slaughtering needs to be maintained in order to reach consumers safely. To maintain the quality of meat, we can use a refrigerator, but for some cases such as in remote areas where frequent blackouts and difficulty getting ice cubes this is a problem (Mangunwardoyo, 2008) [3]. Meat preservation can use chemicals such as formaldehyde and borax, but it can interfere with consumers' health. The choice of ingredients as a meat preservative is based on the consideration that the material is cheap, easy to obtain and is natural so it does not interfere with health.



Previous studies, kapayang fruit seeds were used to preserve mackerel for 2 days and gave the same results as preserving ice cubes (Meylani et al, 2016) [4]. Mamunja and Lumoindong (2017) [5] Stated that the kapayang has the best inhibitory activity against microbial growth at extracts of 8% until the 3rd day with a total microbial 1.32×10^2 CFU / g in the range below the SNI standard. Kapayang fruit seeds are often used in preserving fish, meatballs and even eggs for that needs to be further investigated in livestock products, especially lamb meat. To find out whether the kapayang seeds are able to maintain the quality of the meat, it can simply be known through organoleptic, spoilage test and see the meat drip loss

2. Methods

This study uses a completely randomized design method with a 3x4 factorial pattern and 3 replications so that the total sample of the experiment is 36. Further tests in this study use the Duncan test which is used to determine the level of sample that is significantly different.

The material used in this study was male lamb meat, fresh kapayang was extracted using 96% ethanol at a ratio of 100 gram: 1 liter for 72 hours. Kapayang fruit extraction was carried out by the Maceration method using ethanol 96% (Sibuea, 2015) [6]. Then the meat samples were immersed in the extraction of kapayang fruit seeds at P0 as a control, P1 (3%), P2 (6%) and P3 (9%) during the shelf life of T1 (12 hours), T2 (24 hours) and T3 (36 hours). To find out whether the extra level of extra praise when the effect on the quality of meat, then tested using the following:

2.1. Meat moisture content

Meat moisture content is done by the AOAC method. Meat moisture content is very influential on the durability of meat storage (Kumalasari and Sulistiani, 2011; Astuti 2012) [7] [8]. Meat moisture content is 79.93% to 75.82%

2.2 Meat decay test (postma test)

Meat decay test is intended to determine the durability of the stored meat. Meat decay test using the Postma test. The postma test is an initial test of meat rot. Postma test is usually full sensitive compared to organoleptic test Yulistiani (2010) [9]

2.3 Drip loss

Drip loss is a drop of water from meat that falls during the process of storing meat, usually the meat is hung so that the water contained in the meat drips. The number of drops is called dripp. Drip loss measurements using method (Lukman et al, 2012) [10].

3. Results

The results obtained that the water content, drip loss and test there were no significant differences. The putrefaction test also showed a change between the meats which were treated with additional kapayang and control.

3.1 Meat moisture content

Lamb meat moisture content at the kapayang level can be seen in Table 1. The interaction between the sample and the length of the experiment (Hours) has no significant effect on the meat moisture content. Because the interaction between treatments is not significant, the next step is to look at the effect of each treatment on the meat moisture content.

The interaction between sample treatment and storage time did not significantly affect water content. There is no significant difference between treatment and storage time so no further testing is needed. In accordance with Afriyanti et al (2013) [11] research that the range of water content of meat soaked in Senduduk leaves does not significantly affect meat between 73.69% - 73.95%. The high water content in the study can be caused by the immersion of the kapayang extract material and the moisture content of the meat.

Table 1. Percentage of sample water content in the study

Level of kapayang	Storage Time (hours)		
	T1=12 hours	T2 =24 hours	T3=36 hours
P0= 0%	73.30±2.85	73.62±0.19	72.62±1.17
P1= 3%	70,16±5.80	75,19±0.43	74,10±1.60
P2= 6%	69,92±1.31	72,80±0.97	72,59±0.52
P3= 9%	71,25±0.58	72,46±1,25	73,56±0,72

The water content in meat can be influenced by the effects of livestock, feed given, and post slaughtering meat treatment. The average water content of meat does not different greatly from the results of the study Arizona *et al* (2011) [12] in beef that is smoked the average amount of meat water reaches 74.62% to 76.04%. Meat consists of water, protein, carbohydrate fat and other dissolved compounds. Water contained in meat is usually 70% to 80% (Toldra, 2003) [13]

3.2 Meat decay test (postma test)

The results of the postma control lamb were negative for 12 hours, but after 24 hours a change began. Changes in the meat begin to runny and into 36 hours the meat looks slimy and smelly. Meat that is immersed in the extraction liquid kapayang fruit at levels 3, 6 and 9% enter the shelf life of 12, 24 and 36 hours the condition of the meat is still fresh and odourless. This was tested using a postma test with the results, in control (P0) at the shelf life of 12, 24 and 36 hours the meat began to be slimy, runny and smell bad it can be seen in Table 2.

Table 2. Meat decay test (postma test)

sample	T1= 12 hours	T2= 24 hours	T3= 36 hours
P0= 0%	+	+	+
	+	+	+
	+	+	+
P1= 3%	-	-	-
	-	-	-
	-	-	-
P2= 6%	-	-	-
	-	-	-
	-	-	-
P3= 9%	-	-	-
	-	-	-
	-	-	-

The results of the postma test at the shelf life of 12, 24 and 36 hours showed positive results, it meant that the lamb without treatment showed signs of early rot which was marked with a pale, slimy and foul-smelling odours. According to Marsidah *et al* (2017) [14] the results of the postma test on meat which showed negative results could be caused by the bacteria in the meat that had not yet fermented so that ammonia had not yet formed. Because there is no ammonia in the meat, litmus paper does not change colour so the results are negative. In the positive control or P0 positive postma test results, this can occur because the fermentation process has occurred by bacteria to produce ammonia

and change the colour of litmus paper. NH_3 release due to denaturation of meat protein can be detected by the use of litmus paper.

After slaughtering, a decrease in meat pH occurs until a rigor mortis process occurs. Marsidah et al (2017) [14] Meat pH can increase due to the activity of some acid-producing microorganisms, it can occur due to the depletion of glycogen content and followed by the activity of microbial producing alkaline compounds. If the positive (+) postma test results have been indicated that an increase in pH of the meat becomes alkaline. In fresh meat NH_3OH is not formed because free NH_3 has not yet formed so that there is a change in the colour of litmus paper. Anti-microbial activity in the extraction of kapayang allegedly can inhibit microbial activity because in all the initial test treatment the rot produced negative results. Anti-bacterial compounds in kapayang seeds are thought to be able to inhibit bacterial activity due to several factors namely because of their concentration level, time of meat storage and its anti-bacterial media, air temperature and microbial properties.

3.3 Drip Loss of meat

Drip loss is water from meat that comes out or drips in the storage process, usually the meat is hung which indicates the weight loss of meat during storage. The average drip loss in this study can be seen in Table 3

Table 3. Average drip loss in lamb meat samples

Shelf life	Level of kapayang			
	P0= 0%	P1= 3%	P2= 6%	P3= 9%
T1= 12 hours	2.76±0.30	2.73±0.35	3.50±0.15	3.36±0.02
T1= 12 hours	3.83±0.36	3.23±0.03	2.25±0.90	3.80±0.35
T1= 12 hours	3.63±0.70	2.50±0.53	3.40±0.36	4.20±0.10

Interaction between meat samples and length of experiment (Hours) has a significant value of $P > 0.05$ in other words it can be concluded that the interaction between meat samples given kapayang and time of experiment (Hours) has no significant effect on Drip Loss. Because the interaction between treatments is not significant, the next step is to look at the effect of each treatment on Drip Loss.

The type of sample has a significant value of $P > 0.05$. In other words it can be concluded that the Sample Type has no significant effect on Drip Loss. Trial Duration (Hours) has a significance value of $P < 0.05$. In other words it can be concluded that the length of the experiment (Hours) significantly affects Drip Loss. Because there is a significant difference from the length of the experiment (hours), then the Duncan Test is carried out to determine the length of the experiment that is significantly different from the Drip Loss.

Table 4. Duncan's Test Results for Drip Loss

Drip Loss	Shelf life		
	T1	T2	T3
	3,09 b	3,53 ab	3,75a

Note: Numbers followed by the same letter are not significantly different according to Duncan's test at the 5% level.

The Duncan test results shows the drip loss is different significantly at 5% level at the different storage time of lamb meat, namely between T1 and T3. Drip loss of lamb meat is usually influenced by the length of hanging after cutting, the location of the muscle of the meat, and temperature. Drip loss range in lamb meat according to Gessink *et al* [15] that drip loss in sheep meat with a time of 14 days and different temperatures in the location of the longissimus muscle 3.84% to 6.64% while at 1 day

0.59% to 2.13%. Hoffmana *et al* (2003) [16] in their study found that drip loss of lamb in different nations drip loss of 0.751% to 1.154%.

According to Russo *et al.* [17] drip loss lamb meat drip loss lamb meat in the muscle longissimus lumborum 2.03% to 2.79%. Ekiz *et al.* [18] in their study got the result of Turkish merino lamb drip loss 1.46%. Morbidini *et al.* [19] stated that drip loss of sheep meat which was given organic feed intake for rams was 0.95% to and sheep was 1.24%. Drip loss in the study had a percentage between 2.25% to 4.50% this means that it is still in a fairly good range

4. Conclusion

The conclusion from the study of kapayang fruit extract did not significantly influence water content and meat rot and drip loss. It was concluded that the use of Kepayang seed extract 3% to 9% is recommended because it can inhibit spoilage for 36 hours and reduce the peculiar smell of lamb meat.

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Acknowledgements

This research was supported by funding from the ministry of research and Universitas Sumatera Utara and the Research Institute of the Universitas Sumatera Utara. Our thanks and best regards to Research Institute that provided the Talent Research Program with the Rector's Decree of the Universitas Sumatera Utara Number: 1389/UN5.1.R/SK/2019 Dated March 9, 2019. We also thank the Laboratory of Animal Husbandry, MIPA Laboratory and Science Laboratory Food Universitas Sumatra Utara.