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Effect of Different Amount of Comminuted Goat Meat Added on The Quality of Crackers

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ABSTRACT: Crackers (Kerupuk) are popular snack food in Indonesia and other ASEAN countries and usually the tradisional crackers are prepared by forming a dough from a mixture of flour, comminuted fish or prawn and water. The dough of steamed, thin sliced and dried before deep frying. The possibility of using goat meat instead of fish or prawn in the production of crackers has been studied. Goat meat crackers were formulated with 10,20,30,40,50 and 60 percents comminuted goat meat(w/w of tapioca flour used) and without goat meat as control. The increased amount of goat meat added resulted in increasing protein,fat and moisture content,A_W, also score of organoleptic test on taste and flavour. However, it was found that expansion decreased with the increasing goat meat content. Crispiness acceptability decreased with increasing the meat content. Crackers with 40 percents goat meat had more acceptable taste and flavour.

Key Words: Goat Meat, Crackers

Introduction

Crackers which is known as kerupuk are a popular snack foods of Indonesia and other ASEAN countries. This product is traditionally prepared by deep frying the dried sliced mixture of gelatinized starch with comminuted fish, prawn or other ingredients(Yu, et al. 1981; Siaw, et al. 1985; and Haryadi, 1994).

Yu, et al. (1981) noted that crackers is traditionally prepared by forming a dough from a mixture of flour,comminuted fish and water, with a general ratio of flour to fish in the range of 70:30 to 50:50.

Various types of starch has been used in preparation of crackers. Siaw, et al.(1985) reported that crackers made from tapioca flour and a highly taste flavoured fish e.g. *Clupea leiogaster* was preferred by taste panelists. Haryadi(1994) noted that the widely used tapioca in crackers preparation possibly due to its availability and the cheapest price compare to other types of starch.

Crackers are classified based on the ingredients used such as fish cracker, prawn or shrimp cracker, snail cracker and onion cracker. Although crackers are normally made with good quality of fish or prawn, it is possible to produce a variety of traditional crackers using different protein sources such as goat meat.

Goat meat is only cooked to certain dishes and it is simply due to the presence of unpleasant smell given off when this meat is cooking or a stronger less pleasant flavour in the cooked meat . This is the reason often given for the lack of popularity of goat meat products in certain country.

Kirton as cited by Coop (1982) noted that goat meat had less desirable flavour than pork, but did not differ greatly from lamb which was slightly preferable. The goat meat was less tender and was regarded as less satisfactory than pork, beef or lamb.

The objectives of the present study were to find out if cracker could be made by using comminuted goat meat instead of fish or prawn, and to diversify the crackers and goat meat processed products.

Materials and Methods

Materials

Tapioca and goat meat(leg) was bought from local market. The meat was finely minced before used. The other ingredients used were whole egg (6 ml/100 g tapioca), garlic (1 g/100 g tapioca), cooking salt (2 g/100 g tapioca) and water(70 ml/100 g tapioca).

Methods

The comminuted goat meat was added in the amount of 10, 20, 30, 40, 50 and 60 percents to the

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flour (w/w of tapioca flour) respectively, and a sample without goat meat was prepared as control. The comminuted goat meat was mixed with tapioca flour and other food ingredients then processed as outlined in Figure 1.

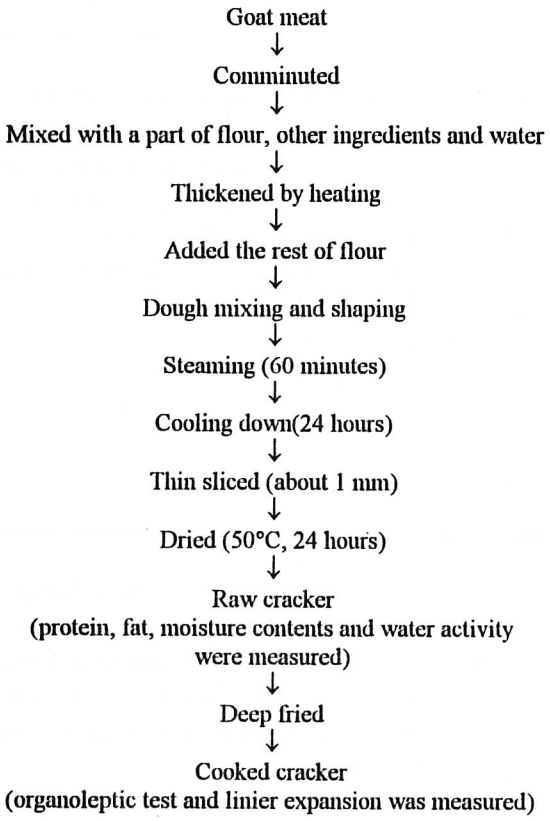

Figure 1. The outline of cracker preparation

Analysis for protein content were carried out according to Stoots (1987), fat and moisture contents were analyzed according to the procedure of Sudarmaji et al (1984), while the water activity was measured according to the procedure as noted by Purnomo (1992). The percentage linear expansion was calculated as describe by Yu, et al. (1981).

The acceptability of crackers produced by using various amount of communited goat meats was compared to the one without goat meat were tested following the method of Larmond (1984). Hedonic scale scoring relating to taste, flavour and crispiness were carried out by 25 panelists. The highest score (9) was given to the sample which was most acceptable, while the lowest score (l) was representing the unacceptable one.

Results and Discussion

Chemical analysis

Table 1 showed the protein and fat contents of goat meat crackers. There was an increase of protein content with increasing of goat meat content; and a similar pattern was also shown by the fat content.

The highest content of protein and fat were found in the carckers of 60 percent communited goat meat i.e. 12.528 ± 0.36 percents and 1.184 ± 0.039 percents respectively. Quality of crackers were did not only depended on the protein content, hence the using of 60 percent comminuted goat meat did not give the best product as it had the lowest linear expansion (Table 3). The decrease of expansion was probably due to the amount of comminuted goat meat which could attribute to differences in the degree of starch gelatinization. Yu et al.(1981) noted that the protein interacts in some way with starch to inhibit expansion.

Table 1. Protein and fat contents of crackers

The amount of communited goat meat added (%)	Protein (%)	Fat (%)
0	2.600 ± 0.21a	0.148 ± 0.011p
10	4.002 ± 0.28b	0.306 ± 0.009q
20	5.773 ± 0.30c	0.502 ± 0.005r
30	7.516 ± 0.12d	0.661 ± 0.031s
40	9.143 ± 0.23e	0.838 ± 0.025t
50	10.831 ± 0.28f	1.004 ± 0.008u
60	12.528 ± 0.36g	1.184 ± 0.039v

a. b. c. d. e. f. g. different superscript at the same column was significantly different (P<0.01)

p. q. r. s. t. u. v. different superscript at the same column was significantly different (P<0.01)

Table 2. Moisture content and water activity of crackers.

The amount of comminuted goat meat (%)	Moisture content (%)	Water activity (%)
0	9.333 ± 0.995a	0.468 ± 0.075pq
10	9.479 ± 1.140a	0.455 ± 0.073p
20	9.682 ± 0.847a	0.504 ± 0.067pqr
30	10.064 ± 0.504ab	0.506 ± 0.048pqr
40	10.253 ± 0.807ab	0.533 ± 0.043 qr
50	10.710 ± 0.512 b	0.550 ± 0.064 r
60	10.928 ± 0.569 b	0.553 ± 0.034 r

a. b.. different superscript at the same column was significantly different (P<0.01)
p, q, r. different superscript at the same column was significantly different (P<0.01)

Table 3. Linear expansion of crackers containing different amount of comminuted goat meat

The amount of comminuted goat meat (%)	Linear expansion (%)
0	7.72 ± 8.79a
10	60.41 ± 6.57ab
20	52.93 ± 10.27 b
30	48.75 ± 9.91 bc
40	38.26 ± 6.04 cd
50	29.14 ± 5.43 de
60	22.41 ± 8.34 e

a. b. c. d. e. different superscript at the same column was significantly different (P<0.01)

The other factor which might effect the expansion of the product is fat content. According to Harper as cited by Yu et al. (1981) that the presence of fat and oils when added to extruded products tends to weaken the resultant dough and reduce product strength. The fat content of comminuted goat meat employed in this experiment was 13.72 percents(dry weight basis).

Moisture content and water activity

The moisture content and water activity measurements(Table 2) indicated that the increased amount of comminuted goat meat added resulted in increasing of moisture content and water activity of crackers.

The increased of moisture content and water activity are assumed due to the water binding capacity within products. As the amount of comminuted goat meat used increased,the protein content also increasing; hence more water will trap in the protein gel structure and less water bound in starch granules gel structure. Winarno(1991) reported that the water binds on starch granules gel structure easily evaporated when heated at 50°C for 24 hours as this type of water is less firmly bound or "free water".

Linear expansion on frying

The percentage of linear expansion of crackers containing different amount of comminuted goat meat can be seen at Table 3.

Table 4. Effect of different amount of comminuted goat meat added on taste, flavour and crispiness of crackers

Amount of communited goat meat added (%)	Score of		
	Taste	Flavour	Crispiness
0	5.36 ± 1.12a	5.60 ± 1.32d	6.20 ± 1.32f
10	5.68 ± 1.31ab	5.68 ± 1.25d	6.24 ± 1.30fg
20	6.48 ± 1.53 bc	6.20 ± 1.22de	6.76 ± 1.16fgh
30	6.92 ± 1.29 c	6.08 ± 1.11de	7.12 ± 0.93 h
40	6.84 ± 1.05 c	6.52 ± 1.11 e	7.12 ± 1.01 h
50	7.00 ± 0.87 c	6.68 ± 1.22 e	7.08 ± 0.86 h
60	7.16 ± 1.03 c	6.60 ± 1.51 e	6.96 ± 1.51 gh

a. b. c. d. e. f. g, h. different superscript at the same column was significantly different ($P<0.01$)

The control sample, however showed the highest percentage linear expansion, whilst the increased amount of communited goat meat employed gave lower percentage linear expansion.

Yu et al (1981) noted the work of Siaw et al. that the presence of wheat protein also reduced expansion and it seems possible that this effect may be independent of the type of protein present. Whilst Siaw et al (1985) found that ungelatinized or semi-gelatinized starch granules will result in poor expansion.

The other possibility of this low percentage linear expansion is that goat meat crackers were prepared using traditional method. Siaw et al.(1985) also noted that traditional products have much lower expansion and it is due to poor mixing, variation in thickness of the sliced product and uneven drying.

Organoleptic evaluation

The results of the organoleptic evaluation were shown in Table 4 and it can be seen that by increasing amount of comminuted goat meat employed resulted in increasing score of organoleptic test especially taste and flavour of crackers, however crispiness acceptability decreased with increasing the meat content.

Although crackers with 60 percents comminuted goat meat affected the panelists rating for taste, but this level of meat did not effect the flavour and crispiness. As mentioned earlier that the higher the protein content the lower percentage linear expansion and this will affect the crispiness.

Crackers prepared using 30 or 40 percents comminuted goat meat were more acceptable from the organoleptic point of view.

Conclusion

Crackers with 40 percents comminuted goat meats gave more acceptable taste,flavour and crispiness. A similar quality of goat meat crackers as prawn crackers can be produced by using 40 percents comminuted goat meat and dried at 50°C for 24 hours.

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