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Chemical Composition, Colour and Sensory Characteristics of Commercial Serunding (Shredded Meat) in Malaysia

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Abstract: Serunding (shredded meat) is one of the traditional meat based-product popular among Malaysians. Eight commercial serunding prepared using beef, chicken and fish as raw material were collected from markets and analyzed to determine their chemical composition, colour and sensory characteristics. The results showed that moisture, fat and protein contents were within the range of 8.60-13.56, 3.20-31.14 and 19.86-30.15%, respectively. Serunding ayam or shredded chicken was the lightest in colour followed by serunding daging or shredded meat and serunding ikan or shredded fish. Sensory evaluation showed that panelists preferred shredded fish with darker colour. However there was no significant difference between the overall acceptability for shredded meat and chicken.

Key words: Serunding, shredded meat, chemical composition, colour characteristics, sensory analysis

INTRODUCTION

Serunding (shredded meat, meat floss, meat fibre, desiccated meat) is one of the traditional meat based-product popular among Malaysians and the Asian community. It is known by different names such as *abon* in Indonesia, moo yong in Thailand, mahu in Philippines, rousong in China and thit heo kho tieu in Vietnam. In Nigeria, a similar product to serunding is known as danbunama (Ogunsola and Omojola, 2008). Popular raw materials for making serunding are chicken and beef, however some fish species are also suitable for serunding preparation. The preparation of serunding generally starts with steaming of washed meat until it is tender. The meat is then shredded into fine particles and mixed with spices and coconut milk. Afterwards the mixture is fried and stirred constantly under heat until the mixture is dry. Excessive oil is removed and the product is packaged (Fachruddin, 1997). In Malaysia, serunding is consume as part of the daily dish or consume with lemang (glutinous rice cooked in bamboo tubes). Currently, serunding is also incorporated into buns as product called shredded bun.

Due to the lower moisture content, shredded meat can keep without refrigeration and will not drastically change in room temperature storage (Ockerman and Li, 1999). In order to reduce the cholesterol level in shredded pork with minimum changes in sensory attributes, Lin *et al.* (1999) suggested a method uses supercritical CO_2 extraction at a pressure of 340 atm and a temperature of 50^{o}C. Heterocyclic Aromatic Amines (HAAs) are mutagenic food compounds produced in meat cooked at high temperature such as serunding preparation. Tai *et al.* (2001), concluded that coconut oil contributed to the highest level of HAAs observed in fish fibre, followed by lard and soybean oil. Antioxidant such as vitamin C, tocopherol and BHT (Butylated hydroxytoluene) did not show any consistence effect on HAAs formation. However, incorporation of vitamin E reduced Norharman, PhIP, AaC and MeAaC concentration in the pork floss (Liao *et al*., 2009).

There is lack of data on quality characteristics of commercial serunding (shredded meat) marketed in Malaysia. This study was carried out to determine the chemical composition, colour and sensory characteristics of commercial serunding available at Malaysia. The data resulted can be used as reference for the development and improvement of serunding quality.

MATERIALS AND METHODS

Sample preparation: Eight commercial serunding were collected from markets located in Penang, Northern part of Malaysia. The samples were serunding daging or shredded beef (Beef 1, Beef 2 and Beef 3), serunding ayam or shredded chicken (Chicken 1, Chicken 2 and Chicken 3) and serunding ikan or shredded fish (Fish 1 and Fish 2). The samples were picked randomly and brought to the Laboratory for further analysis.

Chemical composition: The chemical composition for moisture, protein, fat and ash was determined according to the AOAC method (2000). The crude protein content was determined by the Kjeldahl method and the crude lipid content was determined by the soxhlet method. The

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ash content was determined by ashing the samples overnight at 550°C. Moisture content was determined by drying the samples overnight at 105°C.

Colour: The colour of serunding samples were measured using a colorimeter (Minolta spectro-photometer CM 3500d, Japan). The colour reading includes Lightness, Redness and Yellowness.

Sensory evaluation: Panels of 25 students from the Food Technology Programme, Universiti Sains Malaysia participated in sensory evaluation of commercial Malaysian serunding. A 7 point hedonic scale method - which ranged from 1; dislike very much to 7; like very much - was used to evaluate colour, odour, taste, texture and overall acceptability (Abdullah, 2000).

Statistical analysis: Data obtained were analyzed by using one-way Analysis of Variance (ANOVA) and followed by DUNCAN Multiple range test of statistical package for social science version 15.0 (SPSS Inc., Chicago, Illinois, USA). Statistical significance was indicated at 95% confidence level.

RESULTS AND DISCUSSION

The chemical composition of serunding is presented in Table 1. The moisture content of serunding samples were within the range of 8.60-13.56%. Fish 2 had the lowest moisture content of 8.60% while Chicken 1 has the highest moisture content of 13.56%. Ockerman and Li (1999) reported that the moisture content of pork floss ranged from 3.47-0.235. Lower moisture content (6.50-7.37%) was reported in Nigerian shredded meat danbunama (Ogunsola and Omojola, 2008). Laksono and Syahrul (2001) prepared shredded fish with moisture content around 3.64-9.78. In Indonesia the standard SII-0368-85 for abon requires that the moisture content of shredded meat product should be lower than 7% (Fachruddin, 1997).

The fat content of serunding samples were significantly different ($p<0.05$) and varied from 3.20-31.14%. All shredded chickens showed lower moisture content within the range of 6.04-6.11%. The wide variation of fat content correlated with the level oil added to the product or the application of processes by the producer to remove excessive oil during serunding preparation. Ockerman and Li (1999) reported that the addition of 2% and 12% lard produced meat floss with a fat content of 16.89 and 31.33%, respectively. Higher fat contents (35.57-40.85) in Nigerian shredded meat danbunama were reported by Ogunsola and Omojola (2008). In Indonesia, the standard fat content for abon shredded meat product should be lower than 30% (Fachruddin, 1997).

The protein content of serunding samples were within the range of 19.86-30.15%. Indonesia's standard for abon requires that the protein content of shredded meat product should be more than 15% (Fachruddin, 1997). Higher protein content (38.92-41.21%) in shredded meat was reported by Ogunsola and Omojola (2008). Similar result was also reported in pork floss with the protein content around 34.09-42.90% (Ockerman and Li, 1999). Liao *et al.* (2009) found that the total amino acid in shredded pork was lower (361.91-482.59 mg/100 g) compared to that of raw pork (748.81 mg/100 g) due to the formation of HAAs during stir frying processing at higher temperature. Glutamic acid, alanine and glycine was considered to be the highest amino acids in pork floss (Liao *et al*., 2009). while glutamic acid, taurine and lysine were found to be the highest amino acids in fish floss (Tai *et al*., 2001).

The ash content of serunding samples were within the range of 3.17-5.16%. Serunding prepared from chicken showed lower ash content compared to serunding prepared from beef and fish. The higher ash content in fish serunding could be related to the incorporation of soft bone during serunding preparation. Laksono and Syahrul (2001) reported the ash content of shredded fish to be within the range of 5.52-6.80%. Indonesia's standard SII-0368-85 for abon requires the ash content of shredded meat product should be below 7% with non detection of heavy metals such as Hg, Pb, Cu, Zn and As (Fachruddin, 1997).

Table 2 shows the colour characteristics of commercial serunding. Serunding prepare from chicken showed lighter colour (51.40-53.54) compared to serunding prepared from beef (29.19-35.24) and fish (23.26-37.40). Generally said, desirable colour of shredded meat correlates with golden brown colour. Any difference in colour characteristic is contributed by the ingredients

Table 1: Moisture, fat, protein and ash content of Malaysian commercial serunding (shredded meat)

Sample	Moisture (%)	Fat (%)	Protein (%)	Ash (%)
Beef 1	9.48±0.18^{b}	4.31±0.21^{b}	24.74±0.18^{b}	5.16±0.09^{d}
Beef 2	12.12±0.00^{c}	3.20±0.22^{a}	19.86±0.20^{a}	4.08±0.03^{c}
Beef 3	9.94±0.04^{b}	30.39±0.07^{e}	25.50±0.07^{b}	4.12±0.05^{c}
Chicken 1	13.56±0.75^{d}	6.04^{c}±0.08^{c}	30.13±0.02^{d}	3.17±0.03^{ab}
Chicken 2	12.10±0.16^{c}	6.11±0.11^{c}	30.15±0.03^{d}	3.36±0.08^{b}
Chicken 3	12.01±0.05^{c}	6.07±0.05^{c}	30.06±0.02^{d}	3.31±0.08^{b}
Fish 1	12.15±0.03^{c}	31.14±0.03^{f}	27.65±0.25^{c}	4.93±0.06^{d}
Fish 2	8.60±0.08^{a}	18.31±0.20^{d}	25.86±0.14^{b}	4.14±0.03^{c}

*Results are means±standard error (n = 3). Means within the same column that have no common letters are significantly different ($p<0.05$)

Table 2: Colour characteristic of Malaysian commercial serunding (shredded meat)

Sample	Lightness	Redness	Yellowness
Beef 1	29.19±0.05^{b}	24.01±0.10^{h}	18.77±0.05^{c}
Beef 2	35.24±0.18^{b}	13.58±0.03^{e}	16.38±0.09^{b}
Beef 3	34.81±0.00^{c}	13.06±0.04^{d}	23.74±0.01^{d}
Chicken 1	53.54±0.09^{g}	12.98±0.06^{c}	33.62±0.17^{g}
Chicken 2	51.40±0.05^{f}	15.84±0.06^{g}	35.93±0.06^{h}
Chicken 3	51.61±0.24^{f}	11.84±0.04^{b}	32.12±0.00^{f}
Fish 1	23.26±0.00^{a}	10.48±0.03^{a}	13.11±0.32^{a}
Fish 2	37.40±0.01^{e}	14.56±0.25^{f}	29.40±0.29^{a}

*Results are means±standard error (n = 5). Means within the same column that have no common letters are significantly different (p<0.05)

Table 3: Sensory characteristics of Malaysian commercial serunding (shredded meat)

Sample	Colour	Odour	Taste	Texture	Overall
Beef 1	5.16±0.19^{bc}	4.60±0.34^{a}	4.76±0.30^{ab}	5.24±0.26^{abc}	5.00±0.27^{a}
Beef 2	5.12±0.21^{bc}	4.72±0.32^{a}	4.76±0.32^{ab}	5.32±0.24^{abc}	4.92±0.26^{a}
Beef 3	5.48±0.25^{c}	4.52±0.39^{a}	4.60±0.35^{ab}	5.08±0.28^{ab}	4.76±0.32^{a}
Chicken 1	5.12±0.21^{bc}	4.16±0.29^{a}	4.72±0.37^{ab}	5.00±0.27^{a}	4.88±0.37^{a}
Chicken 2	3.88±0.40^{a}	4.16±0.31^{a}	3.96±0.33^{a}	5.16±0.30^{abc}	4.36±0.34^{a}
Chicken 3	4.76±0.30^{bc}	4.84±0.31^{a}	4.96±0.27^{b}	5.68±0.18^{abc}	5.12±0.22^{a}
Fish 1	6.32±0.11^{d}	6.20±0.18^{b}	6.04± 0.18^{c}	5.96±0.19^{c}	6.44±0.14^{b}
Fish 2	6.32±0.16^{d}	6.12±0.19^{b}	6.04±0.21^{c}	5.84±0.22^{c}	6.28±0.16^{b}

*Results are means±standard error (n = 25). Means within the same column that have no common letters are significantly different (p<0.05)

and stir frying temperature used. Lin *et al*. (1999) reported the lightness, redness and yellowness of shredded pork to be 43.9, 13.9 and 19.3, respectively. Supercritical CO_2 treatment successfully improved the lightness, redness and yellowness of shredded pork to 45.2, 15.7 and 20.2, respectively. Li *et al*. (2000) reported that improper handling or over-done cooking will cause an abnormally dark colour of the product. Liao *et al.* (2009) showed that increasing stir frying temperature will decrease the lightness value of shredded pork. The lightness value of shredded pork stir fried at temperature 100, 125 and 150^{o}C was 60.99, 55.93 and 41.62, respectively. The deep brown colour of shredded meat developed at higher cooking temperature correlated with the nonenzymatic browning and caramelyzation reaction during serunding preparation.

Table 3 shows the sensory characteristics of Malaysian commercial serunding (shredded meat). There were significantly different (p<0.05) in all sensory characteristics among all the serunding samples evaluated. Serunding prepared from fish consistently received higher sensory score for all parameters evaluated. Panelists showed higher appreciation for lighter colour of serunding as shown by higher acceptability of fish 1 and fish 2. Li *et al.* (2000) reported that shredded meat which was darker in colour was unacceptable by costumer. The lighter colour of fish samples were related to higher fat content due to the addition of coconut oil during sample preparation. The higher fat content was also associated with the higher score for serunding odour, taste and overall acceptability. This finding is in line with previous reported by Ockerman and Li (1999). They mentioned that pork meat floss containing 12% lard showed higher flavor and overall acceptability compare to those containing 2% lard. Source of fat/oil used may not affect the sensory characteristic of shredded meat. Ogunsola and Omojola (2008) found that sensory characteristics of Nigeria shredded meat showed no significant difference among samples prepared with different types of oil (palm oleic oil, bleached palm oil and pure groundnut oil).

Conclusion: Based on the analysis of chemical composition, colour and sensory evaluation of commercial serunding (shredded meat) marketed in Malaysia, the quality characteristics of serunding will be influenced by the raw material, formulation and method of preparation. High fat content of serunding (shredded meat) was associated with lighter colour characteristics and higher sensory acceptability (colour, odour, taste and overall acceptability). The results obtained in this study shows that manufacturers of meat floss in Malaysia do not produce meat floss to standard quality. Therefore, it is reasonable to provide general guidelines that will lead to the production of better quality shredded meat.

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