Bulletin of Animal Science, Special Edition, 1995

ISSN 01260 - 4400

Physical and Organoleptic Quality of Meat-Ball Beff Filled by Five Kinds of Filler

S. Triatmojo, A. Pertiwiningrum and Y. Indaryani

Faculty of Animal Husbandry, Gadjah Mada University, Yogyakarta

ABSTRACT: The objectives of this research were to compare the physical and organoleptic quality of meat-ball beef filled by tapioca, sago, *garut*, maizena, and *ganyong* meal and to evaluate scientifically that tapioca meal could be subtituted by the sago, maizena, *garut* and *ganyong*. The materials were 7.50 kg of second grade beef, 5 kg filler (tapioca, sago, maizena, *garut*, *ganyong*), eggs, salt, onion , pepper, sodium bicarbonat. Each 500 doughs (80% of beef, 20% of filler) was added by 10 g salt, 5 g pepper, 15 g onion and 25 ppm sodium bicarbonat. The factors were the kinds of filler, i.e. PO (tapioca), P1 (sago), P2 (*garut*), P3 (maizena) and P4 (*ganyong*). The physical qualities were tested on pH, cooking loss, water-holding capacity and tenderness, and the organoleptic quallity were strangetenth, texture, taste, and colour (flavor). The organoleptic quality were tested by using scoring methods of 7 panels. The data were analyzed by using an analysis of variance of one-way classification. For differences between the mean treatments were tested by Duncan's New Multiple Range Test (Astuti, 1980). The results indicated that physical and organoleptic quality of the meat-ball beef filled by tapioca, sago, maizena, *garut* and *ganyong* were not significantly different. The conclusions were that tapioca meal could be subtituted by the sago, maizena, *garut* and *ganyong*. There were shown that the yields had similar qualities.

Key Words : Meat-Ball, Physical and Organoleptic Quality, Kinds of Filler.

Introduction

Meat ball is one of meat processing products which is very favourable to people. However, we found it with various quality, because it had no define formulation standard of producing best quality finely about meat or filler materials used in the processing.

The utilization of filler in meat-ball industry was very essential, because besides it improved the texture, it also decreased the processing cost. In the deversification of food processing program, it needed observating or studying filler material used in the meat processing, namely sagu meal, maizena, *garut* starch and *ganyong* starch as an alternative of tapioca starch substitution in meat ball processing.

According to the similar physical and chemical pro- perties of the forth of filler materials as the substitution of tapioca meal, they were expected to produce the similar quality of meat-ball with the meat-ball filled by tapioca.

The chemical composition of tapioca starch, sagu, maizena, *garut* and *ganyong* flour were : 12 - 17% water content, 80-87% carbohydrate, 0.1-1.0% protein, 0.06- 0.40% fat, 0.1-0.5% crude fibre, and 0.1-1.4% ash (mine- ral) content (Radley, 1954; Anonymous, 1972; Kay, 1973).

The study was designed to investigate the effect of tapioca starch substituted by sagu, maizena, *garut* and *ganyong* starch as filler materials on physical composition and meat-ball of beef organoleptic.

Material and Methods

Beef cattle meat of second grade amounting of 7.5 kg, and 5 kg filler material (1 kg tapioca starch, 1 kg sagu starch, 1 kg maizena flour, 1 kg *garut* starch and 1 kg *ganyong* starch), 1 kg egg, onion, pepper, salt, and caustic soda (bicarbonate) were used in this study.

The connective tissue were removed from the beef cattle meat, and the meat was cut into small pieces, followed by grinding and mixing with the ground spices. The meat was made into dough by adding filler materials with the ratio of 80 : 20 (for all material starch were made similarly). Each 500 g batter was supplemented by 1 egg, 10 g salt, 5 g pepper, 15 g onion and 25 ppm caustic soda (bicarbonate). The homogen dough was formed into meat-balls and boiled in hot water of 100oC up to the meat-balls floated on the water surface.

The samples were tested on tenderness, cooking loss, water-holding capacity, pH; and the organoleptic tests involving of starngetenth, texture, taste, flavor of meat ball were tested by using a seven phanels.

The collected data were analyzed by a variance analysis of one-way classification. The differences of means were tested by Duncan's New Multiple Range Test (Astuti, 1980).

Results and Discussion

The physical properties of meat ball were cooking loss, water-holding capacity, tenderness and pH. The results indicated that the tapioca starch substituted by sagu starch, maizena flour, *garut* and *ganyong* starch did not result significant differences on the physical properties (Table 1).

The filler tapioca replacement did not differ significantly on the pH of meat-ball. The high acidity was due to the meat used in processing had high water-holding capacity, because it involved in meat chopping. The high pH usually has a high water-holding capacity. Forrest et al. (1975) showed that the fresh cattle meat (before undergone rigormortis phase) had high pH relatively. The meat used in meat-ball processing should be still in pre-rigor and or post-rigor phases, by reason that meat still has a good water-holding capacity, which affected the tenderness.

The utilization of filler material did not result significant difference on the water holding capacity. It was due to the pH conditions among the filler materials were not significantly different, and the protein content of meat and filler maerials were similar.

The cooking loss of all treatments were small. These meaned the nutrition contents lost were also small, because the weight lost in the processing was followed by lossing for the part of juiciless and nutrition content (Romans and Ziegler, 1974).

The filler addition in meal-ball processing improved the water-holding capacity because of choping processing. The meat protein content, filler and supplemented materials were expected to improve the water-holding capacity and to reduce the cooking loss. The small cooking loss was due to the high water-holding capacity of meat protein, because the filler proportions added were small and had low protein content.

The tenderness of processed meat was affected by water content, protein and fat content (Kramlich, 1971). By the similar ratio between the meat and filler material, it was estimated that water and fat content were similar, so there was no great affect on the tenderness.

The higher filler proportion of cooked meat-ball decreased the tenderness, because filler had a small ability to performe fat emulsion; while the blinder, besides, it had a water holding capacity, it also had ability to perform fat emulsion (Price and Schweigert, 1970; Triatmojo, 1992). The high meat ball tenderness was due to greater meat proportion.

The meal-ball organoleptic quality were tenderness, flavor, taste, textur. The results indicated that there were significant differences between the filler substitution on the meat-ball organoleptic quality. The average of organoleptic quality, namely tenderness, taste, flavor and texture represented in Table 2.

Table 1. The average of physical properties of meatball, namely pH, cooking loss, water-holding capacity and tenderness

Parameters	Treatment				
	PO	P1	P2	P3	P4
pH	6.96	6.99	6.97	6.94	6.94
Water-holding capacity (WHC)	46.51	46.99	45.57	46.19	47.32
Cooking loss	13.51	14.33	13.36	14.26	13.32
Strangetenth	0.55	0.53	0.54	0.48	0.48

Table 2. The average of meal-ball organoleptic quality namely tenderness, taste, flavor and texture

Parameters	Treatment				
	P0	P1	P2	P3	P4
Strangetenth	3.53	3.05	3.43	3.30	3.51
Texture	4.35	4.52	4.44	4.57	4.45
Colour	3.73	3.82	3.73	3.56	3.70
Taste	5.17	5.65	5.15	5.41	5.34

Based on the statistical analysis showed that there were no significant differences on the organ oleptic test. The tenderness ranged from 3 to 4 scores, indicated that meat-ball was few elastic to tender. It was due to the low filler proportion resulted low gel formation which affected the meat ball elastisity, with score small elastic. The low filler made small fat emulsion, while the binder besides, it had water holding capacity , it also had ability to perform the fat emulsion (Price and Schweigert, 1970; Triatmojo, 1992).

The meal-ball texture ranged from 4 to 5, it meaned that the meat-ball was little roughness to smooth. The fat content, emulsion stability and binder content affected the meat-ball texture (Forrest et al., 1975). It was estimated that the dough emulsion was not unstable, so that the meat-ball was porous and fat or gelatine were snared into the meat-ball.

The meat-ball colour ranged from 3 to 4. It meaned that the meat-ball was light-grey to pink. The meat-ball colour was affected by meat myoglobine and either ingredient addition (Forrest et al., 1975). The meat ball colour correlated with the filler granula size. The more smaller gelatinization temperature, resulted little denatured pig- ment, and oxidation of protein and filler composition. The low filler proportion, the small starch size and low gelatinization temperature resulted a sweet flavor (pink).

The high taste ranged from 5.6 to 6.0, the meat-ball filled by sagu starch resulted the taste with saltless to deliqious. If the dough was homogenized incompletely, resulted adomination taste of the spices ingredient, namely salt taste, starch taste, and pepper taste. By utilizing the fixed spices it would reduce the anacceptable dominant taste.

Conclusions

The study was concluded that the tapioca substitution with sagu, maizena, *garut* and *ganyong* starch had no different physical and organoleptic quality. Therefore, all filler materials could substitute tapioca starch in meat ball processing.

The physical and organoleptic quality between the filler substitutions and the tapioca filler did not differ. Event, according to the consumer acceptability, the meat-ball filled by the sagu, maizena and *ganyong* were more acceptable than meat-ball filled by the *garut* starch.

Literature Cited

Astuti, M., 1980. Metode Statistik. Jurusan Pemuliaan Ternak, Fakultas Peternakan UGM, Yogyakarta.

Direktorat Gizi Departemen Kesehatan RI., 1972. Daftar Komposisi Bahan Makanan. Edisi kedua, Bharata Karya Aksara, Jakarta.

Forrest, J.C., E.D. Aberle, H.B. Hedrick, M.D. Judge, R.A. Merkel, 19775. Principle of Meat Science. W.H. Freeman and Co., San Fransisco.

Kay, D.E., 1973. Root Crops. The Tropical Products Institute, London.

Kramlich, W.E., 1971. Sausage Products, In: The Science of Meat and Meat Products. J.F. Price and S.S. Schweigert eds. W.H. Freeman and Co, San Fransisco.

Romans, J.F. and P.T. Ziegler, 1974. The Meat We Eat. 10th ed. The Interstate Printers and Publ., Inc., Danville, Illinois.

Trialmojo, S., 1992. Pengaruh Penggantian Daging Sapi dengan Daging Kerbau, Ayam dan Kelinci pada Komposisi dan Kualitas Fisik Baso. Laporan Penelitian Fakultas Peternakan UGM, Yogyakarta.