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Added Soy Proteins in Processed Meats in Malaysia

A.S. BABJI, ADNAN, A. and AMINAH, A.
Department of Food Science and Nutrition,
Faculty of Life Sciences,
Universiti Kebangsaan Malaysia
Bangi, Selangor, Malaysia.

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RINGKASAN

Dua kaedah digunakan untuk menentukan jumlah protein soya yang terkandung dalam beberapa hasil daging proses. Penggunaan protein soya makin meningkat kerana harga daging yang mahal. Oleh sebab tidak ada kawalan yang rapi, penggunaan bahan tambah seperti protein soya digunakan dengan tidak terhad sebagai pengganti kepada daging. Hasil kajian ini menunjukkan hasil-hasil daging seperti burger dan frankfurter mengandungi di antara 5 – 25% protein soya. Apabila kedua-dua kaedah dibandingkan, didapati kaedah enzimatik adalah lebih sensitif daripada kaedah pengemparan. Bagaimanapun, didapati kaedah pengemparan adalah lebih sesuai untuk digunakan dalam kawalan mutu, ia lebih murah dan praktikal.

SUMMARY

Two methods were used to determine the amount of soya protein added in some local processed meat products. The use of soya protein in processed meat formulation is increasing because of the high cost of meat. At present there are no strict measures to ensure the proper use of food extenders in meat and other products. Results from this study indicate that most meat products such as burgers and frankfurters produced locally contain between 5 – 25% added soya protein. The enzymatic method of determining soya protein was found to be more sensitive than the centrifugation method. However, for routine quality control work, the AOAC (1980) centrifugation method would be more practical and economical.

INTRODUCTION

Non-meat ingredients are commonly added to meat products for many reasons, some of which include curing, seasoning, binding, preservation and bulking associated with the final properties of the meat products.

In Malaysia, soya-protein is becoming important as food binders, fillers and for bulking pupposes. This is especially true for the processed meat industry where meat substitutes are added to replace meat in order to reduce the cost of production.

Soya protein is one of the easily available protein sources and increasing quantities are being used as human foods (Seal, 1980). Although the use of soya protein in meat and meat products is strictly regulated overseas, in Malaysia, there is currently no specific regulation concerning its use in local meat products.

Secondly, preparation of samples for analysis is cumbersome and tedious because other non-meat materials are added besides soya protein. A method using enzyme galactose dehydrogenase was used by Morrissey *et al.* (1982). This procedure involves acid hydrolysis of soya meat blends and determining the free galactose plus arabinose values, which are found to be linearly dependent on the amount of soya added. The AOAC (1978) developed a rather quick centrifugation method for the determination of soya protein in meat products. This method utilises the fact that dilute acid will dissolve the hemicelluloses of soya protein, but not the cereal flour starch. The hemicelluloses are then precipitated with 95% ethanol which is then quantitated following a carefully controlled contrifugation.

This study is aimed at investigating the use of soya protein in local processing of meats and also at comparing the two methods recently used in countries overseas for monitoring the use of soya protein in meat products. It is hoped that with the preliminary data provided from this study the governing authority would take a serious step to strictly regulate the proper use of soya protein and other bulking agents in the food industry.

MATERIALS AND METHODS

Samples of meat products from local meat manufacturers were purchased randomly at various retail outlets in the city. Since burger is currently a popular fast food, this type of product was chosen along with some sausages for this study. The samples were kept frozen at -20°C until ready for analysis.

The two methods used for the determination of soya protein, were the enzymatic method by Morrissey *et al.* (1982) and the centrifugation method AOAC (1980). In the enzymatic method, acid hydrolysis of the suspected soya meat products was performed, followed by determination of free galactose plus arabinose using β galactose dehydrogenase which is specific for D-galactose and L-arabinose. This method is based on the fact that the galactose plus arabinose values for soya meat blends are linearly dependent on the amount of soya added. In the centrifugation method, the dilute acid used dissolves the hemicelluloses of soya protein and soybean flour but will not affect the cereal flour starch. This enables the determination of soybean flour or soya protein concentration in the presence of cereal flour. The dissolved hemicelluloses are subsequently reprecipitated with 95% ethanol and quantitated following a carefully controlled centriguation. For reference purposes, soya protein concentrate (Centex, Central Soya) soya protein isolate (Supro 620) and chicken meat were used to determine the galactose plus arabinose contents.

RESULTS AND DISCUSSION

To ensure the reliability of the results obtained from this experiment, the levels of galactose plus arabinose of known substrates were tested. From Table 1, it is observed that the levels of galactose plus arabinose for chicken meat, soya protein concentrate and soya protein isolate are similar to data reported earlier by Morrissey *et al.* (1982). The levels of galactose plus arabinose in chicken meat is very low (as expected) while those for soya isolate are high and soya concentrate, the highest.

TABLE 1
Galactose plus arabinose contents in chicken meat, soya protein concentrate and isolate.

Material	uM galactose plus arabinose/gm sample*
Chicken meat	1.2
Soya protein Concentrate	580.0
Soya protein Isolate	52.0

*Wet weight basis

Various combinations of soya protein concentrate and chicken meat were prepared to observe the relationship between galactose plus arabinose values with an increase of added soya. Table 2 and Figure I show the linear relationship, upon which the enxymatic method was based. Morrissey *et al.* (1982) reported this method to be sensitive and capable of detecting less than 0.2% soya flour or concentrates and less than 2% soya isolates in meat products.

TABLE 2
Galactose plus arabinose contents in mixtures of soya protein concentrate - chicken meat

% Soya Protein Concentrate Added	μM galactose plus arabinose/gm sample*
2	20
4	26
6	40
8	45
10	72
20	100
30	165
40	264
50	300
60	317

*Wet weight basis

The amount of soya protein (determined by the enzymatic method) in various processed meat products are shown in Table III. Results indicated that varying amounts of soya protein were used in the formulation of meat products. A maximum level of 25% added soya protein was observed

in a beef burger sample with about 4.0% being the minimum. It is interesting to note that samples of processed meats obtained from well established large manufacturers contained more textured soya protein than the small scale manufacturers. This is not surprising as knowledge of high technology does lead to maximum efficient use of added soya protein. Large factories may have received the advice of foreign experts who market a wide range of textured soya proteins.

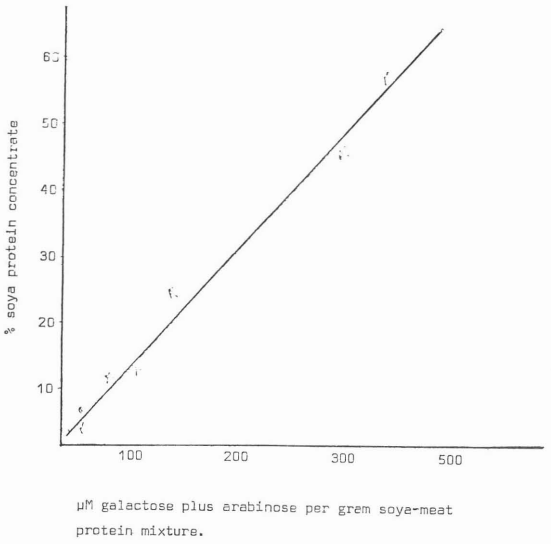

Fig 1. Linear relationship between added soya protein and galactose plus arabinose in soya-meat mixtures.

Table 4 shows the amount of added soya protein in various processed meats using the centrifugation method (AOAC, 1980). The recovery of soya protein by this method was generally lower than the enzymatic method. When the two methods were compared recovery from the enzymatic procedure was much higher, thus confirming the sensitivity of the method.

However, for routine quality control measures, the centrifugation method was found to be more suitable. It is rapid, convenient and economical compared to the tedious preparation and high cost of enzymes. Secondly the enzymatic procedure also requires careful handling by the worker to ensure the activity of the enzyme, β — galactose dehydrogenase, that is utilized in the test.

TABLE 3
Soya protein contents of various meat products as determined by the enzymatic method

	Meat Products*	% Soya Protein Concentrate
A_1	Chicken Burger (flavoured)	16.7
A_2	Beef Burger	25.0
B_1	Beef Burger	5.5
B_2	Chicken Burger	4.0
C_1	Beef Burger (flavoured)	8.0
C_2	Beef Burger	15.0
D_1	Chicken Burger	7.7
D_2	Beef Burger	7.2
E_1	Beef Frankfurter	11.7
E_2	Chicken Frankfurter	16.0
F	Continental Beef	7.0

*Products were obtained from established meat manufacturers as well as small producers.

TABLE 4
Soya protein contents of various meat products as determined by the centrifugation method

	Meat Products*	% Soya Protein Concentrate
A_1	Chicken Burger (flavored)	10.00 ± 0.39
A_2	Beef Burger	18.75 ± 0.17
B_1	Beef Burger	5.00 ± 0.17
B_2	Chicken Burger	5.19 ± 0.21
C_1	Beef Burger (flavored)	6.31 ± 0.32
C_2	Beef Burger	10.00 ± 0.35
D_1	Chicken Burger	5.08 ± 0.11
D_2	Beef Burger	5.00 ± 0.31
E_1	Beef Frankfurter	7.56 ± 0.27
E_2	Chicken Frankfurter	11.87 ± 0.45
F	Continental Beef	5.43 ± 0.20

*Products were obtained from well-known meat manufacturers as well as local small producers

CONCLUSION

Results, using both methods indicate that soya protein is commonly being added to the processed meat products in Malaysia. The amount of soya protein added varies, depending on the technology and know-how of the manufacturers. It was observed that larger meat manufacturers added more soya protein, while the smaller backyard producers used less soya protein.

To date there are no specifications and regulations by the governing authority on the use of binders, fillers or bulking agents in processed meat and meat products. It is hoped that more positive steps will be undertaken by the governing bodies to regulate and ensure the proper use of food additives.

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