

PRELIMINARY STUDIES ON THE COMPARATIVE CHEMICAL COMPOSITION OF THE DIFFERENT COMMERCIAL BRANDS OF "PATIS" IN THE PHILIPPINES¹

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ABSTRACT

Various commercial brands of patis (fermented fish sauce) were analyzed comparatively, for their moisture, total solids, total nitrogen and sodium chloride contents.

From the standpoint of nutrition, those with higher total nitrogen contents are considered the better grades. The total solids range from 28.56 per cent to 37.81 per cent and sodium chloride from 22.26 per cent to 26.44 per cent. Samples with high total solids have better keeping quality because of low moisture content.

Although almost all the brands fall within the range requirement of total nitrogen, sodium chloride and total solids set by the Philippine Standard Association, yet as revealed by the analysis, these standards and requirements are met without technological planning and no effort is being made by the manufacturers to produce uniform standard grades of patis.

INTRODUCTION

Patis or fish sauce, a popularly known condiment in the Philippines, is a well-aged, fermented salted fish product. It is a clear liquid sauce, straw yellow to amber in color, obtained from the slow digestion of salted fish or shrimps. It is extensively used in the Philippines for flavoring food in much the same way as soy sauce is used in Japan and China, nuocnam in Cambodia, and nampla in Thailand. The Philippines is claimed to be the first among the countries in the Far East to engage in the manufacture of patis. Fish used in the manufacture of patis are also in the manufacture of bagoong (fermented fish paste). Often, these two products are manufactured together.

No accurate standard has yet been promulgated for the composition of patis. A tentative definition as established by the United States Fish and Wildlife Service is "the finished

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products shall have total solids of not less than 35 per cent; shall contain not less than 10 per cent protein (16 grams/liter total nitrogen) and not less than 20 per cent or more than 25 per cent by weight of salt. It may contain added spices or other flavoring materials as well as approved coloring materials."

Small fish such as anchovies (*dilis*) and alipmouths (*sap-sap*) are commonly used in the manufacture of fish paste. These fish are of little commercial importance in retail trade so that they are usually bought from fishermen in large baskets and used to make bagoong. During the fermentation stage, the fish are usually disintegrated and the liquid produced in this process is filtered off as patis or fish sauce. The manufacture of patis passes through the bagoong stage. After the first extraction, saturated brine is added to the bagoong residue, letting it stand for a certain number of days to make ready for the second extraction. This procedure is continued until all the fish flavor has been extracted. This accounts for the various grades of patis presently sold in local markets.

The fresh fish are thoroughly washed with fresh tap water, and all dirt and other extraneous materials are removed. Salt is added and thoroughly mixed with the fish with the proportion of one to three or two to seven parts by weight. Wooden vats and shovels constitute the equipment needed for this process.

The mixture of salt and fish is usually placed in wooden vats or earthenware containers and allowed to undergo fermentation until the characteristic aroma and flavor brought about by the breakdown of fish proteins are produced.

Experiments conducted by the Philippine Fishery Program of the U. S. Fish and Wildlife Service (1950) show that the use of pure salt has advantages over the ordinary solar salt in the manufacture of bagoong and patis. The rate of fermentation during the early stages of digestion becomes twice faster in bagoong salted with pure salt than with impure solar salt. It was found out further that a storage temperature of 45°C for the first week and 37°C for the next 2 weeks gave the same degree of fermentation as what would normally result after a storage period of six months under ordinary temperatures.

High quality or better grades of patis are prepared from anchovies, goby fry, herring fry, and small shrimps. A cheaper grade of patis is prepared by mixing the residue from a series of extraction with saturated brine solution. Others sell the residue which is grounded and mixed saturated brine to get the proper consistency, after which a small proportion of good anchovy bagoong is added to simulate a genuine anchovy bagoong.

The grade and kinds of container determine the market price of the patis, but in most cases, experienced buyers judge the grade according to its color and flavor. The various grades are classified as *especial*, *extra*, and *primera*.

The aim of this investigation is to make a comparison of the chemical composition of the various commercial brands and grades of patis that are presently manufactured in the municipalities of Navotas and Malabon of Rizal Province and vicinities. The main bulk of the production of patis in the Philippines comes from these municipalities. The results of these analyses could serve as a guide to consumers from the standpoint of nutrition.

MATERIALS AND METHODS

Patis packed in bottles were purchased at random from the different markets of Manila and suburbs.

Twenty-two samples were analyzed in the Chemical Research Laboratory of the Philippine Fisheries Commission for moisture, total solids, total nitrogen and sodium chloride contents. The analytical methods used were those of the standard methods as prescribed in the official and tentative methods of analysis of the Association of Official Agricultural Chemists (AOAC).

RESULTS AND DISCUSSION

Table 1 shows the results of the analysis of the twenty-two samples. It can be noticed from the Table that there is a marked difference among the various grades of patis as regards their chemical composition.

For clarity and comprehension of the standards set by the Philippine Standards Association (PSA) in relation to the

local terminology of patis grades found in the local markets, the following guide is being adhered to in this study:

LOCAL TERM	PSA EQUIVALENT
<i>Especial</i> (First extract)	First class (A)
<i>Extra</i> (Second extract)	Second class (B)
<i>Primera</i> (Third & Fourth extract)	Popular (C)

TABLE 1.—Comparative chemical composition of various brands of patis.

Brand numbers	Class	Moisture (Per cent)	Total Solids	Total nitrogen GM liter	Sodium chloride (Per cent)
1. Brand No. 1	First class (A)	63.15	36.85	22.59	22.20
2. Brand No. 1	Popular class (C)	67.54	32.46	12.30	23.67
3. Brand No. 2	First class (A)	62.41	37.58	27.64	23.16
4. Brand No. 2	Popular class (C)	69.22	30.77	10.13	24.58
5. Brand No. 3	First class (A)	64.36	35.64	23.84	22.41
6. Brand No. 3	Popular class (C)	74.15	25.85	8.62	22.26
7. Brand No. 4	First class (A)	62.68	37.32	23.14	22.86
8. Brand No. 5	Second class (B)	68.81	31.19	6.89	25.51
9. Brand No. 5	Popular class (C)	71.54	28.56	5.42	23.81
10. Brand No. 6	Second class (B)	65.44	34.56	19.66	25.98
11. Brand No. 6	Popular class (C)	69.78	30.22	7.01	23.54
12. Brand No. 7	First class (A)	62.85	37.15	20.42	26.44
13. Brand No. 7	Popular class (C)	67.19	32.81	9.71	25.26
14. Brand No. 8	Popular class (C)	68.16	36.84	10.99	24.15
15. Brand No. 9	First class (A)	62.93	27.07	23.10	23.84
16. Brand No. 10	First class (A)	62.19	37.81	21.71	23.76
17. Brand No. 11	First class (A)	64.35	36.65	20.68	24.44
18. Brand No. 12	First class (A)	68.61	36.39	24.35	23.97
19. Brand No. 13	First class (A)	63.94	36.06	26.92	25.19
20. Brand No. 13	Second class (B)	68.44	31.56	14.58	25.97
21. Brand No. 13	Popular class (C)	70.52	29.48	9.78	25.51
22. Brand No. 14	First class (A)	64.66	35.34	2.57	23.67

Those with higher total nitrogen are considered the better grades. First class (A) is rated as the highest; second class (B) as next; and Popular class (C) the lowest. The sodium chloride content ranges from 22.26 per cent to 26.44 per cent and the total solids from 28.56 per cent to 37.81 per cent. It was also found that samples with high total solids have better storage and keeping quality because of the lower moisture content. Presence of moisture is responsible for the growth of molds.

At a public meeting of the Philippine Standards Association held on September 4, 1958, which was attended by local technologists representing government and private entities, producers and consumers, the following quality standards for bagoong and patis were adopted by the Association:

"Fish bagoong made of small fresh fish and common salt with not less than 85 per cent sodium chloride should contain in the whole substance, the following: total solids, not less than 40 per cent; protein (Nx6.25), not less than 12.5 per cent; total nitrogen, not less than 20 grams/liter; and sodium chloride, not less than 20 and not more than 25 per cent".

Shrimp bagoong, made of small shrimps and common salt with not less than 85 per cent sodium chloride, should contain in the whole substance the following: total solids, not less than 35 per cent; total nitrogen, not less than 16 grams/liter; and sodium chloride not less than 20 and not more than 25 per cent.

Bagoong must be packed, stored, exported, transported, offered for sale in receptacles made of glass, earthenware, porcelain, chinaware, or wooden barrels for export trade. The use of tin cans may also be permitted provided they are new and clean, and not made out of rusty or painted second hand material. These receptacles must be tightly covered, closed or sealed to avoid any leakage or foreign contamination by flies, spoilage agents or pathogenic organisms and poisonous substances. Receptacles for bagoong must serve not only as containers but also as index of quality and sanitation of the product.

Patis is obtained by decanting and/or pressing or centrifuging the bagoong after it has been thoroughly fermented or disintegrated with or without the addition of boiling brine and allowed to settle or concentrated by boiling.

Fish patis should have a specific gravity between 1.21 and 1.22 and the alkalinity of the water-soluble ash of one gram of the original sample should not be less than one cubic centimeter of the tenth normal acid, and total solids not less than 32 per cent.

In addition, various brands of patis should meet the following specifications: first class (A), total nitrogen, not less than 20 grams per liter; second class (B), total nitrogen, not less than 14.4 grams per liter; and popular (C), total nitrogen, not less than 9.6 grams per liter.

The specific gravity, alkalinity of water, soluble ash, and the percentage of total solids and protein of shrimp patis correspond to those in fish patis and its various brands.

Extract is the liquid termed as patis obtained from a ba-

Recommended receptacles for patis are glass containers of 35 to 750 ml. capacity. Glazed earthen jars or gallon jars are appropriate containers intended for export trade in bulk, for institutions, hospitals, restaurants and other food establishments.

CONCLUSION

Twenty patis samples were analyzed according to their moisture, total solids, protein and sodium chloride contents.

The percentage of protein of the especial grades of patis falls within the proposed standard set by the Philippine Standards Association, that of "having not less than 12 per cent protein for patis of the first class (A) or *especial grade*."

One brand, Brand No. 5—second class (B) having 6.89 grams per liter total nitrogen, does not even conform with the requirement for popular (C) which is not less than 9.6 grams per liter total nitrogen.

Six out of 20 samples do not conform with the total solids requirement of the PSA that of "having not less than 32 per cent." The percentage of total solids of all the samples analyzed is directly proportional to the percentage of protein.

Nineteen samples conform with the sodium chloride requirement of "not less than 20 and not more than 25 per cent." One patis sample, Brand No. 7, first class (A), having 26.44 per cent exceeds the sodium chloride requirement.

Different brands having the same grades cover a wide range of percentages of total solids protein and sodium chloride.

RECOMMENDATIONS

Results of analyses made on patis brands commonly found in the metropolitan markets of the country reveal that there is little effort made on the part of the manufacturers to produce consistently high quality products that would safeguard the needs of the consuming public. If ever there are brands that fall within the proposed standards set by the Philippine Standards Association, these standards are met only by chance, that is, without any technological planning and not based on known systematic methods of patis preparations.

The volume of patis for domestic and export trade is increasing yearly (Fisheries Statistics of the Philippines, 1948–51) and this clearly indicates that patis manufacturers are proportionally increasing, too. To offer a safeguard to the buying public, here and abroad, against misbranded and adulterated patis with resultant high quality products the following recommendations are presented:

1. Patis manufacturers must conform with the requirements set forth by the Philippine Standard Association as regards the preparation and standardization of packs;
2. Patis manufacturers must have an analysis laboratory to conduct routine samplings of all the products especially those for export trade; and
3. The government entity concerned should conduct periodic examination of the operation, packing and packaging of products of patis establishments to check misbranding and adulteration.

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