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Deboned meat from fish frames, mixed with ground choice beef and flavoring, makes...

Beefish Patties

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ABSTRACT

At present, ground meat can be obtained from fish frames or headed, gutted fish but it is underutilized in existing seafood products. Trying a different approach, we mixed it with ground beef and seasoning, in varying proportions, to make beefish patties.

Sensory evaluations indicated that beefish patties are just as acceptable as all-beef patties in appearance, odor, flavor and texture. Economic and nutritional considerations were not part of these evaluations but these factors would influence final consumer acceptance. The potential value of this new product suggests the desirability of expanding further development work.

INTRODUCTION

Ground beef (hamburger) patties have become a popular item in the American diet. Hamburgers are well known in institutional or commercial mass feeding situations and in domestic homes. Most consumers also recognize that ground beef represents a higher degree of utilization of a beef carcass than would be possible if only beef steaks and roasts were utilized.

Fish fillets have also become established in the American diet. Fillet sections are called steaks, but their appearance, flavor, and texture are obviously different from beefsteaks. Another difference between beef and fish is that the leftover parts of a fish carcass, after fillets have been removed, are underutilized as a source of ground or minced flesh.

In recent years, several groups have become interested in using meat-bone separators to obtain edible flesh from various underutilized sources. For example, machine-separated flesh can be obtained from "V-cuts" (a mixture of fillet meat and small "pin" bones obtained by trimming fillets to remove these bones). Although this minced fillet meat is made into an inexpensive type of fish stick, it represents an increase of only 2 percent or so in meat recovery from a fish carcass. Much higher increases of meat recovery, in the order of 20 percent, can be obtained from fish frames (carcass minus head, viscera, and fillets). Despite a potential tenfold increase in meat recovery, deboned meat from fish backbones is not generally used for making fish sticks.

The principal drawback to the present use of deboned meat from fish frames for making fish sticks is that fish sticks are generally recognized as a white-meat product. Fish frames contain blood-rich tissues under the spinal column even in species such as cod, haddock, and pollock which have practically no visible blood pigmentation in their fillet meat. This pigmentation will colorize machine-separated meat in proportion to the amounts of blood-rich tissues and unpigmented tissues in the material being fed to a meat-bone separator. Special decolorization treatments are being researched, but these treatments would increase production costs or reduce yield of the ground fish flesh.

A second problem in utilizing fish frames for manufacture of fish sticks is that the frames contain pieces of skin and membranes. These pieces can be removed by a deboning machine which has a fine-mesh screen, but the texture of the recovered flesh is much less fibrous than the flesh obtained from V-cuts. Consequently, fish sticks made from this source have a less desirable texture than fish sticks made from minced fillet meat (V-cuts).

Similar problems are encountered when using headed and gutted fish to recover edible flesh with meat-bone separators. This source of material also contains blood pigments as well as skin and membranes. The color problem in minced flesh obtained from headed and gutted fish is often not as severe as in minced flesh from frames. If the skeletal muscle ("fillets") of a headed and gutted fish is reasonably devoid of visible pigmentation, this flesh can "dilute" the coloration from the spinal blood-rich tissues in the machine-separated flesh. The other problem, pieces of skin and membrane, can be overcome using a strainer type of separator, but again the texture of the recovered flesh is

much less fibrous than the flesh obtained from V-cuts.

Instead of trying to alter the characteristics of ground meat from fish frames or headed and gutted fish to suit fish stick requirements, we took this meat "as is" and sought suitable product applications. Its sensory qualities, its nutritional and economic values, suggested product combinations with pigmented mammalian meats would be worth developing.

Beef was selected from the mammalian meats for this product development work. Several combinations such as frankfurters, sausages, and recipes using hamburger have been suggested (King and Carver, 1970; King et al., 1971; D. Miyauchi, M.A. Steinberg, and F. Teeny, NMFS Pacific Fishery Products Technology Center, Seattle, WA 98102, pers. comm.). This report describes a simple combination which we have called a "beefish" patty.

MATERIALS AND METHODS

Fish materials were obtained from local processors. Cod, haddock, pollock, or cusk filleting lines provided a source of fish frames. Since these fish had been eviscerated at sea, only the head was removed from these frames. For flounder and ocean perch frames, we had to remove both heads and viscera. Headed and gutted species were whiting, ocean perch, and carp. All fish materials were washed before deboning.

A Bibun meat-bone separator was used with or without the strainer as previously described (King and Carver, 1970; King et al., 1971)[1]. The unwashed minced fish flesh was frozen in waxboard fish block cartons using a plate freezer and stored at 0°F until used. Neither glazes nor additives were used to preserve these blocks.

The ground beef (hamburger) was bought locally. It contained 26-28 percent fat. It was not frozen and was mixed with the fish within 24 hours.

[1] The use of trade names is merely to facilitate descriptions; no endorsement is implied.

The beef and fish were mixed in a Hobart Meat Mixer. When seasoning was used, it was added just before the mixing. This seasoning is a hydrolyzed, plant-protein blend developed by the Nestlé Corporation, Food Ingredients Division, for us; it bore their number NM139-88.

Sensory evaluations were made using standard procedures (Amerine et al., 1965). The initial evaluations were done by a small group of employees of the NMFS Center in Gloucester. Informal evaluations were also made by several participants during two meetings of seafood technologists in New Bern, N.C., and Hamption, Va.

Subsequently, a much larger group of college students evaluated beefish patties in the student union of Virginia Polytechnic Institute and State University (VPI). Each participant was given one of three samples on a hamburger bun: all beef; 71 percent beef, 25 percent fish, 4 percent NM139-88 seasoning; or 61 percent beef, 35 percent fish, and 4 percent seasoning. The students were told that the union was planning to switch meat suppliers and wanted to see which one manufactured the best patty. They were asked to rate appearance, odor, flavor, and texture on a 9-point hedonic scale.

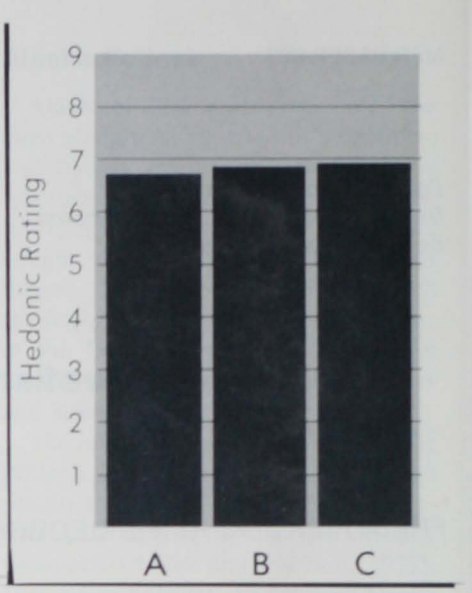

Figure 1.— On a scale of 1 to 9, patties made of (A) all beef; (B) 71 percent beef, 25 percent fish, and 4 percent flavor; and (C) 61 percent beef, 35 percent fish, and 4 percent flavor, all rated almost equally high on appearance, odor, flavor, and texture (see Table 1)

RESULTS AND DISCUSSION

Hedonic results from the large-scale VPI feeding test indicate that beefish patties can be just as acceptable as all-beef patties (Table 1 and Figure 1). The large number of respondents in this test and the fact that the minced whiting had been stored for a year before the test are especially noteworthy. Similar hedonic

Table 1.—Results from Virginia Polytechnic Institute and State University feeding test.[1]

Samples	*Appearance*	*Odor*	*Flavor*	*Texture*
Sample A (all beef)				
Number	30	29	29	30
Mean	6.87	6.55	6.83	6.57
(variance)	1.58	1.00	1.25	2.85
(standard deviation)	1.26	1.00	1.12	1.69
Sample B (71% beef, 25% whiting, 4% plant protein flavor)				
Number	56	56	56	56
Mean	6.96	6.77	6.61	7.09
(variance)	2.14	2.53	4.56	1.69
(standard deviation)	1.46	1.59	2.14	1.30
Sample C (61% beef, 35% whiting, 4% plant protein flavor)				
Number	56	56	56	56
Mean	6.80	7.00	6.89	7.00
(variance)	1.87	1.36	2.49	2.39
(standard deviation)	1.37	1.16	1.58	1.55

Overall Means $\frac{\Sigma(A+O+F+T)}{4}$

Sample A = 6.71
Sample B = 6.86
Sample C = 6.92

[1] Based on a 9-point hedonic scale as described by Amerine et al., (1965).

results were obtained by the Gloucester group under different testing conditions and using other kinds of fish in the patties.

The Gloucester group of evaluators also participated in a series of triangle tests to determine suitable proportions between the ingredients of beefish patties. On the basis of their results (Table 2), it appears that the proportion of fish flesh can vary from about 25 percent to about 50 percent without changing the overall acceptability of a beefish patty. These results and other (unpublished) hedonic results indicate a preference for including the hydrolyzed plant protein seasoning, NM139-88, compared with no seasoning at all. Our experience also indicates that the optimum use level of this seasoning may vary between 1 and 4 percent depending on the fish material used and the people doing the evaluation.

Although the beefish patty has an acceptability equal to an all-beef patty, it is a separate product. Taste panelists have had little or no difficulty distinguishing between the two products when served both at the same time. However, these taste panelists found that one can be used in place of the other with no loss in acceptability. Although some of these evaluations were based on frozen-stored fish ingredient, none were based on frozen-stored patties. These evaluations did not include economic or nutritional considerations. Final consumer acceptability of a beefish patty would be influenced by these considerations as well as its sensory quality.

Table 2.—Results of triangle test comparisons of beefish patties containing various amounts of machine-separated flesh obtained from haddock frames and ground beef with or without hydrolyzed plant protein seasoning, NM139-88.

Samples Compared (Beef and Fish ratios based on weights of each when mixed. Seasoning amounts expressed as percentage in the final mixture of beef, fish, and seasoning.)	Significant Majority of Evaluators Made Correct Choice (p=.01 or less)	Preference of Majority Who Made Correct Choice
All beef vs. Beef/Fish: 75/25	Yes	All beef
Beef/Fish 75/25 vs. 50/50	No	—
Beef/Fish 50/50 vs. 25/75	Yes	Beef/Fish 50/50
Beef/Fish 50/50 without Seasoning vs. Beef/Fish 50/50 with 2% Seasoning	Yes	Beef/Fish with 2% seasoning
Beef/Fish 50/50 with 1% Seasoning vs. Beef/Fish 50/50 with 2% Seasoning	No	—
Beef/Fish 50/50 with 2% Seasoning vs. Beef/Fish 50/50 with 4% Seasoning	No	—

CONCLUSIONS

Mixtures of ground beef and fish (beefish) have enjoyed good acceptability when tried as patties. (The ground fish component was obtained from sources presently underutilized for food.) These results, together with economic and nutritional considerations, lead us to suggest the value of continuing development work on this product. Both technological and marketing research are needed to properly assess its potential.

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