THE COMPOSITION OF SHRIMP MEAL MADE FROM FRESH AND SPOILED SHRIMP HEADS[1/]

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ABSTRACT

To determine whether fresh as well as spoiled shrimp heads could be processed by a simple method to make meal was the purpose of this study. The differences in the chemical composition of several types of shrimp meals were observed. The protein content of shrimp meal is low compared to that of menhaden and other commercial fish meals. But even with a protein content of only 40 percent, shrimp meal may be of some commercial value as animal feed and its production might be profitable considering the low cost of processing.

INTRODUCTION

Shrimp heads are usually discarded at sea or in the freezing and canning plants in the process of deheading. In the plant the waste material creates a disposal problem. The head contains much of the viscera and offers a good prospect of turning it into meal for animal feed. At present some heads from canning plants are reduced to meal.

Shrimp heads are not always available in fresh condition, especially when the deheading is done on board the vessel. The effect of spoilage of the raw material on the chemical composition of the final product is not fully known, although it is a general belief that spoilage deteriorates the quality. Lassen et al. (1944) stated that the degree of freshness of the raw material is of primary importance in determining the quality of fish meal. On the contrary, Grau and Williams (1955) observed that growth of chickens was almost the same when they were fed with fish meals made from fresh as from spoiled mackerel.

The chemical composition of shrimp meal has been reported by several workers. The analysis by Daniel and McCollum (1931) showed 47.44 percent protein, whereas later analysis by Manning (1934) showed the much higher value of 54.51 percent. In the process of deheading by hand, the efficiency of the worker determines how much meat clings to the head. This difference may contribute considerably to the observed difference in protein content between shrimp meals.

The present work was done to determine whether fresh as well as spoiled shrimp heads could be processed by a simple method to make meal, and to observe the differences in the chemical composition of several types of shrimp meals in regard to protein, ether extracted fat, moisture, and ash.

MATERIALS AND METHODS

Two lots of shrimp heads were collected from a packing plant at Key West, Fla. The first lot was brought to the laboratory preserved in isopropyl alcohol. No preservative was used on the second lot, but it was kept in the shade at an air temperature of 75° to 80° F. A portion of the heads were taken for processing at 24, 48, and 72 hours from the time when the shrimp were taken out of the ice and deheaded at the packing plant.

To make meal from the shrimp heads, the heads were first dried in the sun. It usually took 24 hours of sunlight. The dried heads were then ground in a Waring blendor.

It is believed that shrimp meal could be made on a commercial scale in an almost similar method as that used in the laboratory, thus minimizing the cost of production. The only

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machinery required would be a simple grinder. If enough sunlight is not available, a simple hot-air drier could be used to dry the heads. Vincent (1950) calculated that with a simple type of drier and grinder, the total cost for producing one ton of shrimp meal would be $17.60. This cost includes fuel, labor, electricity, bagging, and also incidental expenses. However, at present the cost of production would be higher than that quoted by Vincent.

Fig. 1 - Deheading of shrimp in a Key West shrimp packing plant.

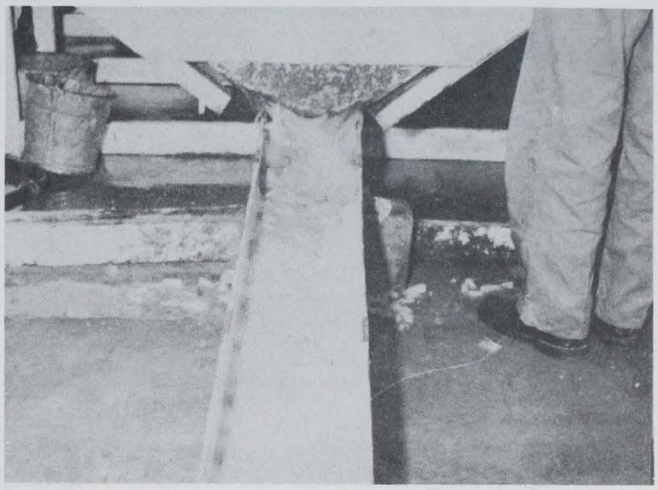

Fig. 2 - Shrimp heads moving through a chute at a South Atlantic shrimp packing plant.

The four samples of meals thus prepared were analyzed for crude protein, fat, moisture, and ash. Nitrogen was determined by Kjeldahl's method. Total quantity of protein (N x 6.25) was calculated from this. In shrimp meal a part of the total nitrogen is contributed by chitin, a N-acetylated glucosamine polysaccaharide. Since the proteinaceous fraction of nitrogen apart from that contributed by chitin is the standard for evaluating the meal, the crude protein was estimated by deducting the value of protein contributed by chitin from the total protein content. The determination of protein from chitin was made according to the method devised by Brown (1959) using the factor 6.25.

RESULTS

Table 1 shows the analysis of the different samples of shrimp meals. The percentage of protein was lowered by about 10 percent during the first 24 hours of spoilage. During spoilage enzymatic and bacterial actions break down protein to amino acids and subsequently to ammonia and other volatile substances which are lost.

Table 1 - Analysis of Shrimp Meal Made from Fresh and Spoiled Heads

Samples of Meal from	Total Protein	Protein from Chitin	Crude Protein	Ether Extract	Moisture	Ash
Fresh heads	47.95	3.60	44.35	4.28	4.75	20.90
Spoiled heads:						
24 hours1/	42.68	3.45	39.23	3.39	7.75	20.61
48 hours1/	42.51	3.00	39.51	3.43	6.75	21.72
72 hours1/	41.49	3.30	38.19	4.25	7.04	23.10

1/ Indicates the lapse of time between when the shrimp were taken from the ice and deheaded at the packing plant.
Note: The difference between total composition shown and 100 percent is undetermined.

The meals made from spoiled shrimp heads showed relatively lower protein content than that of the meal made from fresh heads. So, in terms of quantity of protein, the quality was deteriorated. Meals made from spoiled heads had some offensive odor, and that increased with the increase in days of spoilage.

CONCLUSION

The protein content of shrimp meal is low compared to that of menhaden and other commercial fish meals, which is generally 55 to 65 percent. However, with an average protein content of even 40 percent, meal made from fresh as well as spoiled shrimp heads may be of some commercial value as animal feed, and its production might be profitable considering the low cost of processing.

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DEVELOPMENT OF HERRING CURING

The preparation of brine-cured herring has been an important industry since the early Middle Ages. The first authentic writings dealing with the curing of herring date from the Twelfth Century. Cured herring was one of the principal articles traded on the continent of Europe by England. The herring fisheries were the cause of several wars in the Baltic between some of the Hanseatic cities and various Baltic states claiming grounds fished by the Hanseatic towns. The wars between England and Holland are held to have been caused in general by their rivalry in trade and in the acquisition of colonial possessions, but the immediate cause was a struggle for control of the herring fishery on the East Anglian coast.

The method of herring curing is considered to have been crude until the time of William Beuckels, a fish merchant of Biervliet, in Flanders, who during the Fourteenth Century, greatly improved the methods in use. This new development laid the foundation for the great wealth acquired later by the Netherlands from the fish-curing business. Beuckels died in 1397, and his work was later considered to be so valuable that a monument to his memory was erected in his native village by Charles V.

The first mention we have of pickled herring in America is by Josselyn, in the Seventeenth Century, who in his Chronological Observations of America states: "We used to qualify a pickled herring by boiling of him in milk." It is believed, however, that the pickling of herring was carried on by the earliest settlers of America and possibly by the fishermen who came to these shores from Europe even before the first settlements were made, since herring were readily caught in shore waters and since herring curing was even then the most important fishery industry in Europe.

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