SOME OBSERVATIONS ON THE PROTEIN QUALITY OF FISHMEAL PREPARED BY WET AND DRY REDUCTION METHODS

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INTRODUCTION

Fishmeals are generally produced by dry and wet reduction methods depending on the fat content of the fish. In the wet reduction process the oil forms a by-product and the economics of production are cheaper compared to the dry reduction process. During the glut season large quantities of the fish are dried in the sun and are converted into fishmeal. Due to the paucity of fishmeal driers in India large quantities of fish are dried in the sun and transported to Bombay for processing into fishmeal.

It is well know that whole meals are more nutritious because of the water soluble components are being retained by them. Rehian *et al.* (1942) observed that meal processed from dog fish by the wet reduction process was of higher nutritive value than the meal processed by dry reduction. Evans *et al.* (1944) observed that meals showed a low nutritive value when processed by dry reduction, while Record *et al* (1934) observer no significant difference in the protein value between dry and wet rendering process by chick feed trials. A study on the nitrogenous losses in the wet reduction process was reported by Kamasastri and Rao (1962). Negi and Kehar (1962) found that beach-dried meal was superior to the cooked and pressed meal (wet reduction) in overall nutritive value as evaluated on cattle. As large quantities of fishmeals are dried in the sun, a systematic study on some of the varieties of thin fishes such as ribbon fish etc was done and the results of these investigations on the protein of the meals are presented in this paper.

MATERIAL AND METHODS

The fish obtained from the trawler catches were taken for experimental purpose. For dry reduction experiments the chopped fish having the moisture content 72% to 80% were dried in the sun for 3 to 4 days so as to bring down the moisture content below 10%; and also in thermostatically controlled hot air drier at 105°C; while the meals for the wet reduction were prepared according to the procedure described by Kamasastri and Rao (*loc. cit*). The variation in temperature while drying in the sun was 33° to 38°C. The periods of drying for one kg of material, chopped fish and presscake were 5 to 6 hours and 3 to 4 hours respectively. The initial moisture content of the presscake varied from 53.5% to

58%. The material was turned over from time to time while drying and enough care was taken to avoid scorching. The fat content of the meals ranged from 2.13% to 9.33% (dry basis).

The pepsin digestibility and moisture were determined according to A O A C (1960). Total volatile nitrogen was determined by the method of Conway and Byrene (1933). Alpha amino nitrogen was determined by Pope and Stevens method (1939). Available lysine was determined by Carpenter's method (1960). Gross energy values were determined by the chromic acid oxidation method of O'shea and Maguire (1962). Gross protein value was determined using Anwar's formulae (1962).

Results and Discussion

It is seen from the table 1 that the total volatile nitrogen and alpha amino nitrogen are higher in the case of the meals prepared from whole fish dried in the sun as compared to the meals prepared by wet reduction process. The high total volatile nitrogen in the sun-dried whole meals are due to more interval of time taken for drying to a moisture level of 10%. It reflects on the protein degradation of the whole fish during sun drying which is not pronounced in the cooked fish. The total volatile nitrogen of the sun-dried meals processed by wet reduction are not so high as the dry reduction meals as a good amount of moisture is initially removed, much of the bacteria are killed and the enzymes are inactivated during the boiling process.

The meals prepared by wet reduction did not show any off odours. This is due to the larger part of the odoriferous compounds being leached out along with the stick water. Kamasastri and Rao (*loc. cit.*) observed that major part of TVN was lost in stick water. The significant observation in this investigation was that irrespective of the type of drying, meals produced by wet reduction process showed little difference in the alpha amino nitrogen and total volatile nitrogen values.

The pepsin digestibility in general is slightly more in the case meals dried in hot air drier. Olley and Watson (1961) showed that pepsin digestibility of more than 89% was associated with an available lysine content which varied from 5.73 to 7.5 g/16 g of nitrogen. In the present series of the experiments the available lysine values varied from 5.73 g to 16 g of nitrogen with a digestibility minimum of 89.33%. Similar high values were recorded by Carpenter (1960). The gross protein values ranges from 106.7 to 133.5. Potter *et.al.* (1962) determined the gross energy values of the herring meals to evaluate the metabolisable energy which is also being utilised for nutritional evaluation. The gross energy values for the different meals ranged between 3.29 to 4.45 Cal/gm. However, Potter *et al.* (1962) recorded a higher range of values between 4.74 and 5.15 Cal/gm.

From these observations it can be seen that wet reduction coupled with sun drying can produce an equally good meal as mechanically dried meals. This can be adopted in fishing villages, where driers cannot be installed.

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Summary

From the results of the investigation on the protein quality of the fishmeal prepared by wet and dry reduction processes it can be seen that the protein degradation in the cooked material is less compared to the uncooked material. Drying at 105°C did not alter the available lysine value significantly, if enough care was exercised to avoid scorching, in dry and wet reduction processes. Drying the presscake in the sun did not significantly change the available lysine value. Considering the slight variations in the available lysine value, pepsin digestibility and gross energy values the meals prepared by the wet reduction process coupled with sun drying can be adopted in fishing villages where the installation of the mechanical dryers is a problem.

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