

PHYSICAL AND CHEMICAL PROPERTIES OF FILLETING WASTE FROM GROUPER AND GOAT FISH

K.P. Nithin*, A. Manjunatha Reddy, N.S. Sudhakara and R.M. Prabhu

*Department of Dairy Economics and Business Management,
Dairy Science College, Bangalore

Department of Fish Processing Technology, College of Fisheries, Mangalore

Email: nithu521@gmail.com (*Corresponding Author)

Abstract: The filleting waste of grouper (*Epinephelus areolatus*) and goat fish (*Parupeneus indicus*) were collected from fish freezing industry. Physical characteristics, Weight composition, proximate composition and quality characteristics were studied. Head waste from grouper and goat fish were quantified and found to be 28.2% and 30% respectively whereas viscera waste were 18 % and 16.7% respectively. Proximate analysis of the waste from both the species indicated the presence of reasonable quantity of proteins ranges from 15.20 % to 20.70 %. Total lipids in the waste varied from 3.0% to 2.10%. Filleting waste were subjected to meat separation by two methods viz, steaming and hand picking of flesh from bones and head regions and by using deboning machine, Yield of meat by mechanical separation and steaming ranges between 36.0 and 44.6 for grouper and 40-60% for goat fish.

Key words: Filleting waste, Weight composition, *Epinephelus areolatus*, *Parupeneus indicus*

Introduction

In India, some species like grouper, goat fish, bull's eye, and red snapper are being processed by fish freezing industries for the manufacture of frozen fillets. Almost all species of fish, nearly 40-50% is thrown away as waste. This waste is highly perishable because of its high moisture and protein content and becomes ideal medium for growth of microorganisms. If this waste is left unattended, it produces off odour and cause pollution problems. Though filleting wastes contains considerable quantity of meat, it varies with respect to size and techniques involved in preparation. Generally, wastes from large sized fishes are not accepted in fishmeal industry. At present this waste is being dumped on the beaches and reduced to manure. This method of disposal is not only a loss to the fisheries sector but also causes pollution. The present method of disposal of waste is not efficient and hence there is a need to develop suitable method for recovering the meat present in the filleting waste. At present, methods such as hand picking, separating the neat using meat bone separator, use of enzymes

and boiling the waste and separating the meat are available to recover the meat from the filleting waste (Reddy, 2007). In the present investigation an attempt was made to recover the meat from filleting waste of grouper and goat fish and its Physical characteristics, Weight composition, proximate composition and quality characteristics were studied.

MATERIAL AND METHODS

The filleted wastes of grouper (*Epinephelus areolatus*) and goat fish (*Parupeneus indicus*) were obtained from a commercial fish processing plant. Each fish frame consisted of head, fins, and viscera with gills and vertebral column with adhering meat obtained during filleting of fish. Filleting waste was brought in iced condition and it was preserved using crushed ice in the laboratory and kept in chilled condition till it was used.

Physical characteristics

The fish frames obtained as waste during filleting differed in length and weight depending on the size of whole fish. The average sizes of frames were measured by selecting 10 frames randomly and their length and weight were determined individually.

Proximate and chemical analysis

Proximate composition includes moisture, protein, fat and ash were analysed according to the method recommended by (AOAC, 2000). Tri-methylamine nitrogen (TMA-N) and total volatile base nitrogen (TVB-N) were estimated according to the method described by (Betty and Gibbons, 1937). Alpha amino nitrogen (AAN) was estimated by the method of (Pope and Stevens, 1959).

Sensory evaluation

The freshness was noted by examining the colour, odour and general appearance of the skin, eyes, gills and flesh of frames on a ten point scale by trained persons.

Separation of meat from fish frames

The frames obtained as waste from fish processing plant were subjected to meat separation by two methods viz., steaming and hand picking of flesh from bones and head regions and by using deboning machine, in which the frames after de heading and eviscerated were pressed mechanically to recover flesh from bones.

Results and Discussion

In the present study the physical, chemical characteristics of filleting waste of grouper (*Epinephelus areolatus*) and goat fish (*Parupeneus indicus*) were analysed. Studies were conducted on weight composition and meat separated manually and mechanical separation.

The value of fish frames is due to the large amount of flesh it carries, even after removing the fillets. The flesh content in frames can be as high as 60% of the frame weight (Ravi chander and Keay, 1976). The recovery of the flesh from skeleton is critical and decides profitable utilisation. Different methods have been used for separation of flesh and are classified into mechanical and non-mechanical techniques (Grantham, 1981).

Weight composition

The average total length of grouper frame is 34.1 cm. The average weight 299.0g. The average total length of goat fish frame is 29 cm and the average weight is 168.0g. The data are given in Table: 1 the fish frames of the two species consisted of all the parts of fish except the skin and the filleted flesh. The part wise composition of fish frames with average length and weight are given in Table: 1. the flesh contributes 43-47% of the weight of frames, the head 28-30%, and viscera 16-18% and fins 7-8%. The average size of fish frames ranged between 29 and 30cm, mean weight between 168 and 299 g. The size and species have profound influence on the weight composition of fish and meat yield (FAO, 1989).

Quality and freshness

The initial quality of fish frames of the two species viz, goat fish and grouper as evaluated by sensory method, which indicated that the raw material are fresh and acceptable for further processing, correlating with the biochemical indices like TVB.N, TMA.N and α -amino nitrogen. Connell (1975) has stated that for good or passable quality 10-15 mg TMA.N/100gm or 35-40 mg of TVB.N/100gm can be regarded as the limits beyond which, the fish can be considered spoiled. The same values are applicable for fish frames, the values are well within the acceptable limits, 7.50mg% to 8mg% of TMA.N and 19 mg% to 20.5% of TVB.N for both species indicating the fish frames are well handled, chilled and stored appropriately until further processing.

Proximate composition

The parts such as head, flesh and viscera separated from fish frames shows variation in proximate composition (Table: 2) the same species fish show variation from organ to organ. The flesh separated from frames is compositionally same as any food fish with protein content ranging between 15-18%. The head contained considerable amount of flesh with protein content of 15-17% but showed higher fat and lower moisture content. The high protein content in viscera 19-20% may be attributed to high enzyme activity. The information on proximate composition of parts of fish is scanty, but information on chemical composition of whole fish and edible parts has been studied (Keshava and Sen, 1983).

Yield of flesh from fish frame

The weight composition of fish frames indicate that the filleting operation leaves behind large quantities of flesh attached to the skeleton and in the head region. To find a suitable method to separate the flesh from backbone and head the frames were subjected to meat separation by two methods mechanical and manual. In mechanical separation, using a de-boner the yield is 36% flesh against actual yield of 48% with the backbone where as the yield from goat fish is 40%. Thus by mechanical separation 75% of meat in grouper and 90% in goat fish can be recovered. The separation of flesh from frames and head by steaming and hand picking gave a better flesh recovery, 45% in grouper and 60% in goat fish. The steaming and hand picking is labour intensive and result in loss of water soluble nutrients, where as mechanical separation can handle large quantities of frames. The advantage of mechanical separation of flesh is well documented (Regenstein, 2004).

Table: 1 Physical characteristics and Weight composition of fish frames grouper (*Epinephelus areolatus*) and goat fish (*Parupeneus indicus*)

Name of the parts	Grouper (<i>Epinephelus areolatus</i>)	Goat fish (<i>Parupeneus indicus</i>)
Head (%)	28.2	30.0
Bone with adhering flesh (%)	47.8	43.4
Viscera (%)	18	16.7
Fins (%)	7.5	10.0
Mean weight	299.0gms	168.0 gms
Mean length	34.1 cm	29.0 cm

Table: 2 Proximate composition of filleting waste from grouper and goat fish

Proximate Composition	Grouper			Goat fish		
	Head	Flesh	Viscera	Head	Flesh	viscera
Moisture (%)	65.10	72.80	68.40	67.20	70.10	69.60
Crude Protein (%)	15.20	18.10	20.70	17.80	19.40	19.10
Crude Fat (%)	3.00	3.90	4.60	2.10	2.60	3.90
Ash (%)	12.40	3.30	3.10	11.50	3.00	3.50

References

- [1] AOAC, Official methods of analysis, 12th Edn. Association of official analytical chemists, (2000) Washington DC.
- [2] Beatty, S. A. and Gibbons, N. E J. Biol. Can. 1937, 3, 77-91.
- [3] Connell, J.J. Control of Fish Quality. Fishery News Book Ltd, Farnham Surrey. (1975), England.
- [4] FAO. Yield and nutritional value of commercially more important fish species FAO Fisheries report no (1989), 309:25-56.
- [5] Grantham, G. J. Minced fish technology a review, FAO Fisheries Technical paper no. 216. (1981)FAO, ROME.
- [6] Manjunatha Reddy, A. Utilization of filleting waste of fish freezing industry for the preparation of value added products. M.F. Sc., Thesis, KVAFSU, Bidar. (2007).
- [7] Pope, C.G and Steven, M.F. The Determination of amino nitrogen using a copper method. Bio chem. J, (1939), 333:1000 -1077.
- [8] Ravichander, N and Keay, J.N. The production and properties of minced fish from several commercially important species in keay.j.n. proceedings of the conference on the production and utilisation of mechanically recovered fish flesh (minced fish), Aberdeen, U.K, torry research station: (1976),18-24.
- [9] Keshava. N and D.P Sen. Proximate composition of five species of flat fishes. Fishery technol (1983), 20:24.
- [10] Regenstein, J. M. Total utilization of fish. Food Technol. (2004), 58:28-30.