

THE TRIGGER FISH INDUSTRY

AT ELMINA

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SUMMARY

1. An exploratory study has been conducted to obtain an insight into the industry developing around the trigger fish - *Balites Spp.* at Elmina.
2. The trigger fish season has a longer duration than the herring season and provides employment and incomes for a large section of the community after the herring season. Like the herring industry, there is marked division of labour in the trigger fish industry.
3. However, whereas herring is largely processed by smoking, trigger fish is salted.
4. An average of 24 basinfuls of fresh trigger fish was handled per woman per week but the size of business among the women varied from 8 to 50 basinfuls per week.
5. One major constraint faced by the salters was availability of barrels.
6. The cost of salting 24 basinfuls of fresh trigger fish was estimated to be about £92.00. Of this the cost of the fresh fish comprised 66 percent. Salt accounted for 15 percent while labour cost made up 16.4 percent of the total salting cost.
7. Gross margins derived from salting and sales of 24 basinfuls of fresh fish was estimated to be £30.00 which represents the weekly returns made by the average salter.
8. Most of the salted product from Elmina was sold on the Mankesim market where consignments from Elmina competed with those from Manford and Apam. Other places of sales included Kumasi, Tarkwa, Sekondi-Takoradi and Obuasi.

A. INTRODUCTION

Objective and Method of Study

1. This report gives a general analysis of the industry which is rapidly developing at Elmina around trigger fish - *Balistes* spp. It discusses the economic importance of the fish and outlines the costs involved in the salting processes and the gross margins derived by the salters. There is also a brief discussion about the future prospects of the industry.

The report is based on analysis of answers given by 57 salters of trigger fish randomly selected for study, and on actual observation of all the activities involved in trigger fish salting. Surveys were also conducted at the Mankesim and Beposo markets to study the marketing of the salted product.

History of the Industry at Elmina

2. As a source of human food and personal incomes for fishermen and processors at Elmina and probably other parts of Ghana, the trigger fish has a very recent history. Records from the Fisheries Division of the Ministry of Agriculture indicate that fishermen started landing appreciable quantities of the fish only as recently as 1971. Prior to the 1971 season, no use was made of this specie of fish at Elmina. Those inadvertently caught were thrown back to the sea. This still continues at Tema. That trigger fish has a very recent history is borne out by the fact that none of the 57 salters randomly interviewed had been in the trade for three years. In fact only 3 of them took to trigger fish salting in the 1971/72 season and these claimed to be the pioneers of the business. All the rest took to trigger fish smoking only in the 1972/73 season.

3. The industry was started by few women who accepted the inadvertant catches of trigger fish for household consumption after salting. The use of the fish spread into many households and surplus over household requirement were bartered out for other food stuffs mainly cassava, plantain and vegetables. From the barter stage the salted fish appeared on the open market and slowly gained consumer acceptance. Today the fish has "arrived" among the other species as a fish with great economic importance and potential.

The Economic Importance of Trigger Fish

4. A fairly large number of people at Elmina derive some revenue from the trigger fish industry. These include fishermen, salters and people hired by them. Census of the people engaged in the various activities within the industry was taken for three separate periods during the survey to ascertain the number of people employed by the industry. Counts were taken simultaneously at the landing and salting sites every day between 8.00 a.m. and 9.00 a.m. This was the time of the day when salting activities were at their peak. Table I presents the dates of the census and the results obtained. It was estimated that the industry employed about 1022 people. These comprised 540 fishermen and 482 women and small boys. The 540 fishermen represent 47.1 percent of the male population of 1146 which according to the 1970 population census were engaged in agriculture, fishing and mining (1). Table I gives a breakdown of the number of people engaged in the salting activities. There were about 127 gutters who were mostly boys aged between 10 and 15 years. These boys were estimated to gut between 10 and 18 basinfuls of fresh fish per day at the rate of 20 pesewas per basinful thus making between $\text{¢}2.00$ and $\text{¢}3.60$ each on a normal fishing day. Carriers of fresh trigger fish from landing site to the three salting grounds numbered about 111 (Table I). They were found to carry from 10 to 20 basinfuls per person per day at 20, 10, 20 pesewas per basinful to Akyinmu, Ayisa and Bantana respectively. The salters in the trade including the owner salters, hired salters and driers total about 244 (see Table I).

Table I
Population of People Engaged in the Trigger
Fish Business

Date	Salters	Porters	Gutters	Total
18/4/73	284	165	192	647
19/4/73	412	205	268	856
23/4/73	310	118	138	566
25/4/73	252	118	101	471
26/4/73	257	122	143	522
27/4/73	215	83	97	395
2/5/73	225	84	99	408
3/5/73	273	100	117	490
4/5/73	189	74	86	349
21/5/73	224	96	102	422
23/5/73	195	85	112	392
24/5/73	178	88	121	387
25/5/73	154	106	103	363
Σ	3168	1444	1650	6262
<i>Σ</i>	243.7	111.1	126.9	481.7/per day

5. With regard to the incomes derived by fishermen from trigger fish industry and the volume of landings, it has been estimated by the Fisheries Department, Elmina, that a total of 682.7 long tons of trigger fish valued £98,150.09 was caught at Elmina in the 1971/72 season (2). The same source estimated total landings per normal day of 4.3 long tons per normal day valued at £3,305.09 in the 1972-73 season. (2) This works out to be 6.4 pesewas per pound weight of fresh trigger fish. Assuming 540 fishermen in the trade it is estimated that a fisherman made a gross returns¹ of £6.49 per day from trigger fish. Others who derive revenue from the industry include those who market in the salted product.

6. The trigger fish industry gives a longer term of employment during the year than the herring industry. This is because the trigger fish season lasts longer. Whereas the herring season normally lasts three months the the season for trigger fish could last seven months. For example the 1972/73 trigger fish season commenced in October 1972 (immediately after the herring season) and by April 1973 the season had not ended.²

7. The use of trigger fish for food was becoming increasingly popular at the time of the survey. Evidence of this could be found from the increasing interest of the salters to augment their operations and from the appearance of the salted product in increasing volumes even on as distant and less traditional markets as Accra and Agona Junction. Salted trigger fish is usually used in the preparation of stews and soup after removal of the tough skin. It is highly scented and said to impart nice flavour to the stews and soup. The fish is largely eaten in its salted form but it may also be fried like other fish species after removal of the skin. Some women were seen smoking the fresh trigger fish - though only the kitchen scale. None of the women encountered had attempted large scale or commercial smoking of the fish. Use is usually found for the tough leathery coat of the salted product in the cleaning of cooking utensils - aluminium pans, buckets, etc.

1 The cost of the boat, net, fuel etc. not deducted.

2 The season ended in Mid-June (1973).

No use was however made of the gut removed from the fish prior to salting. It is estimated that about half a ton of this stuff was removed and thrown into the sea every week at Elmina. This could be used to compound animal feed or as manure for crop production.

B. COST AND RETURNS TO TRIGGER FISH SALTING

The Salting Processes

8. Fresh trigger fish is sold to sellers in basinfuls - basinful being the unit of measure in the trade. Counts made from 20 basins indicated that a standard basin could take an average of 316 single trigger fish or between 250 and 375 depending upon the sizes of the fish and size of landing during the day. For example, basins are more loaded than normal when the landings are heavy. Fish bought from the fishermen or their agents is first contracted out for gutting (removal of viscera). Gutting which is an extremely skilled operation is normally performed by young boys for a normal fee of 20 pesewas per basinful or 25 pesewas when landings are abnormally heavy. After gutting the fish is cleaned and headloaded in basins to the salting grounds.

9. There are three main salting grounds at Elmina. The central and the largest one is located at Ayisa¹ - opposite the docking or fish landing site, while the two others are at Akyinmu, near the Elmina Government Clinic and at Bantama near the beach. At the salting grounds the fish is divided into small volumes and salt added to each lot in basins. They are then shaken several times to allow the fish to mix thoroughly with the salt. When this is well done the fish is poured into wooden pig-feet barrels with the addition of a layer of more salt and then covered with polythene sheets, sacks or straw and left to stand overnight. On the next day the fish is removed and arranged on straws, polythene sheets and/or old fishing net in the sun to dry. While the fish is in the barrel it absorbs some of the salt and losses its excess water. The resultant salt solution is therefore not immediately discarded but may be used to salt two or three subsequent batches of fish with the addition of marginal quantities of salt.

village

1 Ayisa has now been cleared for the construction of a cold storage facilities for fish.

The solution is discarded only when its scent becomes intolerable. Drying may take 3 to 5 days depending upon weather conditions.

Scale of Operation

10. Each of the 57 salters studied handled from 8 to 50 basinfuls of fresh trigger fish per week. The average number of basinfuls handled was 24 with the standard deviation and coefficient of variation being 10 basinfuls and 37 percent respectively. This means that the variation between the salters in terms of the size of business was quite considerable. The scale of operation by a seller was found to be limited among other things by the number of barrels available. The 57 salters had from 1 to 6 barrels or an average of 3 barrels each. The barrels were of uniform size and could take an average of four basinfuls of the fresh fish at a time.

Salting Cost

11. The materials and equipment used in trigger fish salting comprised the following: the barrels or salting containers; the fish itself; basins and grass straw; polythene and old fishing nets for drying the salted fish. Baskets were the most common containers for packaging the products although empty jute sacks were sometimes used.

12. Prices quoted by the 57 women interviewed indicated that a barrel cost an average of $\text{₡}3.70$. The range was $\text{₡}2.50$ to $\text{₡}5.20$. However, the season of the survey was the maiden one for most of the women encountered besides, it (the season) had not ended at the time of the survey. It was therefore not possible to estimate the average useful life of the barrels to obtain a basis for depreciating them. The basins used for trigger fish operations were also used for domestic purposes and herring operations during the herring season. It was therefore difficult to find what proportion of the cost of the basins to charge against trigger fish operations - the price of an average size basin was $\text{₡}3.00$ (3 p.2). Due to the above difficulties, only the variable cost of salting a unit volume of trigger fish is calculated. In this report, a unit volume of trigger fish is taken as 24 basinfuls of the fresh fish. Basinfuls are the units in which the fresh fish is sold by the fishermen to the salters. The 24 basinfuls represent the average size of operation per week per salter in the sample. The breakdown of the total variable costs involved is presented in Table 2.

Table 2 Cost & Returns to Trigger Fish Salting

<u>A. Variable cost of salting 24 basinfuls of the fresh fish</u>			
(a)	Non-labour Items	£	% of total cost
	i) Cost of Fresh Fish 24 basinfuls @ £2.50/basinful	60.00	66.0
	ii) Salt 18.6lb/basinful @ 3p/lb 1½ bags @ £9.00/bag	13.70	15.0
	iii) Straw (grass) for drying (6 bundles/week) at 40p per bundle	2.40	2.6
(b)	Labour		
	iv) Gutting @ 20p/basinful	4.80	
	v) Cleaning & portorage @ 20p/basinful	4.80	
	vi) Salting @ 30p/barrel of 4 basinfuls	1.80	
	vii) Drying @ 60p/barrel of 4 basinfuls	3.60	
		91.10	100%
 <u>B. Marketing Costs (Variable)</u>			
	i) Transport cost to Mankesin @ 1.20p/basketful	3.60	
	ii) Cost of loading at Elmina @ 70p/basketful	2.10	
	iii) Cost of unloading @ 20p/basketful	0.60	
	Total Marketing Cost	6.30	
	Total Variable cost of processing & Marketing	97.40	
 <u>C. Returns</u>			
	Gross Returns 6347 @ £2.00/100	126.94	
	Total Gross Margin £126.94 - £97.40	29.54	

13. Table 2 shows that the highest cost item in trigger fish salting was the fresh fish itself. Fresh fish was also the item which had the least stable price during the season. At the beginning of the season - October to December 1972, fresh trigger fish could be obtained for 60 pesewas per basinful. By the time of the survey the price had risen by nearly 213 percent to $\text{P}2.50$ whereas handling charges; portorage, gutting and other charges had remained relatively unchanged. The costing given in Table 2 is based upon the prevailing prices during the survey period of February - April. The cost of fresh fish constituted 66.0 percent of the total cost of processing (Table 2).

14. Labour was the second highest cost item after fresh fish. Accounting for 16.4 percent of the total variable cost of salting, labour costs comprised the cost of gutting, cleaning and portorage. It also included the cost of salt application and drying of the salted product. Cleaning and portorage together cost 30 pesewas per basinful if the fish were carried to Bantana or to Akyinmu, and 20 pesewas if it were sent to the central salting grounds at Ayisa.

15. It was estimated that an average of $\text{P}13.70$ worth or 448.8lbs. of salt was used per 24 basinfuls of the fresh fish. The quantity of salt used however varied quite substantially among the salters. Weights taken from 26 of the 57 salters interviewed ranged from 8.3lbs to 38.2lbs per basinful of fresh fish.¹ The mean was 18.6lbs per basinful while the standard deviation and coefficient of variation were 8lbs and 43 percent respectively. The 468.8lbs of salt per 24 basinfuls of fresh fish takes into account the fact that the resultant salt solution from the first batch of fish is used for sometime with the addition of only marginal and diminishing quantities of salt. Salt cost 3 pesewas per lb with a bag of about 295lbs costing $\text{P}9.00$. Women who bought the salt on credit however, had to pay higher prices usually depending upon the length of the credit period. The cost of salt used accounted for 15.0 percent of the total variable cost of salting as shown in the Table.

¹ See Appendix Table I

16. The final stage of the salting process is the drying of the product. Drying evaporates excess moisture leaving behind the salt in the fish. Here the fish is spread singly and in lines on layers of grass straw. In some cases the straw may be covered with an old fishing net or a polythene sheet. The fishing net and polythene sheet facilitate collection of the fish when dried. The four corners can be folded together quickly with the fish collecting at the centre. The use of polythene sheet and old fishing net usually minimized the quantity of grass straw needed. The straw was sold in bundles at 40 pesewas per bundle and it was estimated that it required 6 bundles to dry 24 basinfuls assuming no polythene nor net were used. Total variable cost of processing (salting) 24 basinfuls of fresh trigger fish was therefore calculated to be $\text{G}91.10$.

C. MARKETING & MARKETING COST OF TRIGGER FISH

Places of sales

17. Salted trigger fish from Elmina is supplied to many urban markets in Ghana including Kumasi, Tarkwa, Prestea, Sekondi-Takoradi, Obuasi and Winneba. The bulk of the product is however fed to the Mankesim market on Wednesdays and Saturdays from where redistribution takes place. Many of the salters - 18 out of the 57 interviewed indicated that they sold their fish only at Elmina to itinerant dealers who travelled to and from up country. Twenty-seven of them however sold at the Mankesim market. Among these were 12 women who also sold the fish on some of the urban markets mentioned above. Other places of sale mentioned were Asin Foso, Fanti Nyankomasi, Bepong and Dunkwa-On-Offin. On four successive visits made to the Mankesim market during the survey, an average of 147 basketfuls of trigger fish were encountered per market day. These comprised an average of 60 basketfuls each from Elmina and Munford; 16 from Apam and the rest from Anomabu, Moree, Biriwa and Kromantse. This indicates that the bulk of trigger fish supplied to the Mankesim market came from Elmina and Munford.

Packaging

18. Assuming an average of 316 pieces of fresh fish per basinful, a unit of 24 basinfuls would give 7584 pieces of the salted product. Some ten loaded baskets of salted trigger fish bound for the Mankesim market were investigated and found to contain an average of 3175 pieces. The range was 2520 to 4500, depending upon the size of fish, size of basket and the dexterity of the women in packing the fish into the baskets. Thus ~~that~~ 7584 pieces of fish would require 2.4 or 3 baskets for packaging. This contrasts with the manner of packing smoked herring into baskets. It should be noted that the same baskets are used for packaging both the salted trigger fish and smoked herring. However it has been estimated that an average size basket used in the fish trade can take about 1500 single smoked herring (3 p.9). Thus more trigger fish is usually packed into one basket than the smoked herring. This is probably because salting makes the fish more flexible while the tough almost leathery coat of the fish makes it extremely resistant to pressure. The women are therefore able to press the fish downwards during the packaging to allow more space in the basket. During packaging the women may sort the fish into two or sometimes three grades according to their sizes and this is usually done during packaging. In many cases however, all the fish is dumped and sold together with only the very large ones - usually about 4 inches and above in length being separated. Further sorting is done by retailers.

Marketing Costs

19. Table 2 also gives the cost of marketing the trigger fish at the Mankesim market. It has been assumed in the calculation that all the fish was sold on the Mankesim market and in the lot of 100 single pieces as happens at the wholesale section of the market. The most competitive fish to the trigger fish at this section was 'Kocbi'.

20. Transport charges from Elmina to Mankesim varied from 80 pesewas to $\text{¢}1.50$ per basketful of the salted fish depending upon the size of the basket and the mood of the driver. The average charge per basket was estimated at $\text{¢}1.20$. It cost an average of 70 pesewas per basketful to load the fish into the lorries at Elmina and 20 pesewas to unload them at the Mankesim market. Sellers also paid a market toll of 20 pesewas per basketful (Table 2). Total variable cost of marketing for the 7584 pieces was estimated to be $\text{¢}6.30$. In arriving at this, it was assumed that charges on the third basket would be half the others since it would be less than half-full.

Returns

21. The wholesale price during the four successive visits averaged $\text{¢}2.00$ per 100 single pieces but buyers were usually presented with handfuls of about 5 to 10 additional pieces of the fish as a dash. Assuming that a total of about 15¹ percent of the 7584 pieces went to waste during processing/handling and into dash, the remaining 6347 pieces would give a gross returns of about $\text{¢}126.80$. Subtraction of total variable cost of $\text{¢}97.40$ for processing and marketing would leave a gross margin of about $\text{¢}29.40$ on 24 basinfuls of trigger fish. This represents net returns made by the salters per week, less the cost of barrels, basins and baskets.

¹ This may be a rather generous estimate.

D. CONCLUSIONS

1. The future of the trigger fish industry would depend to a very large extent upon the following factors:
 - i) The general level of fish supply in the country especially during the trigger fish season;
 - ii) The duration of each trigger fish season; and
 - iii) Total landings of trigger fish made during each season.

These factors would undoubtedly influence the popularity of the fish.

2. Meanwhile it appears from the level of employment generated by the industry that any fishery scheme or project designed for Elmina need necessarily take cognisance of the trigger fish.
3. Efforts should also be made to obtain a use for the large quantities of viscera which is thrown away during the season.
4. It appears the emergence of this industry has given great impetus to the local salt industry which had been declining. Further work on the trigger fish should endeavour to establish the relationship between the two industries.
5. There seemed to be a dearth of 'pig-feet' barrels at the time of the survey. As the industry expands the situation will become more grim. Local carpenters should therefore consider improvising a substitute.
6. To encourage greater use of the fish, efforts should be made by appropriate bodies as well as the mummies themselves to evolve other methods of processing for the fish.

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