Development of Canned Fish Curry

P. K. VIJAYAN and K. K. BALACHANDRAN
Central Institute of Fisheries Technology, Cochin - 682 029

A process for canning sardine in two different curry media is presented. One curry medium yields a product with medium pungency while the second one has a low pungency. Sardine canned in curry medium having medium pungency developed signs of internal corrosion as well as slight bitter taste at the end of 15 months storage at ambient temperature. Similar phenomenon took place in the other product only at the end of 18 months storage. Being a ready to serve product it needs no further preparation for the table.

Fish canning in India is an export oriented industry, the principal commodity of export being canned prawns and to a limited extent other items like crab, fish etc. The major internal market for canned fish is the defence establishment and the north-east region besides a small off-take from the metropolitan cities. Other sections of the population do not generally relish canned fish either due to economical consideration or the fish in oil or brine has again to be prepared to suit their taste. The industrialisation and consequent urbanisation of the country is generating demands for convenience foods which can be consumed without further preparation. However the culinary habits even with regard to fish preparation vary from region to region. Fish canned with onion and peas is popular in overseas markets, however even such products require further preparation for the table. Any attempt in the technological development of a process for fish curry should take into consideration the taste preferences of the sections of population for whom it is intended. Realising the potential for such a product Indian Standards Institution has issued the standard specifications for mackerel canned in curry (IS:9312, 1979). Though extensive research has been carried out in the country on development of processes for canning a variety of fish and shell fish nothing much has been carried out on processing a ready to serve canned fish except the attempts to formulate a curry as a medium for canning fish by Rai, Saralaya & Parashuram (1971). This paper gives an account of the development of sardine canned in curry yielding two different tastes, one medium pungent and the other less so.

Materials and Methods

Fresh sardine (*Sardinella longiceps)* landed by the country craft and in rigor when received in the laboratory was used for the study. After a number of trials two recipe were finalised for the preparation of the curry medium as given in Table 1. Chopped onion was fried in oil until brown in colour and set apart. A fine paste was made of coriander, chilli, turmeric, ginger, garlic and green chilli using minimum quantity of water. This paste was mixed with the remaining water and heated to boiling after adding green peas. Boiling was continued until the gravy acquired a thick consistency. At this stage fried onion, sliced tomato and salt were added and mixed well. Tartaric acid was added and the mixture allowed to cool.

Dressed and cleaned fish was cut to two third the size of the can and was blanched in sodium chloride solution (15%) for 15 min at room temperature. The blanched fish was packed in S.R. lacquered cans and cooked for 30 min in steam at 0.35 kg per cm^2 pressure. After draining the drip the curry medium was added to the can maintaining the proportion of fish to curry of 60:40 (IS:9312, 1979). An 8 oz fish can of size 301 × 203 or 307 × 119 requires 120 g of cooked fish and 80 g of curry medium for a net weight of 200 g of canned fish in curry

Table 1. *Recipe for the curry medium*

	I	II
Chilli powder	10 g	30 g
Coriander powder	25 "	20 "
Turmeric powder	4 "	4 "
Pepper	4 "	4 "
Green chill	10 "	10 "
Ginger	10 "	20 "
Garlic	30 "	20 "
Green peas	300 "	300 "
Onion	250 "	250 "
Table salt	25 "	25 "
Tomato	250 "	250 "
Refined groundnut oil	100 "	100 "
Tartaric acid	2 "	2 "
Water	1000 ml	2000 ml
Dressed fish	2.5 kg	2.5 kg

medium. (The above recipe is sufficient for 15 cans of size 301 × 203). The cans were exhausted in steam for 10 min, seamed and heat processed in steam at 1.05 kg per cm^2 pressure for 60 min and cooled.

Alternatively the blanched fish was added to the curry medium and boiled well till a proper consistency was attained, and then packed in cans and processed further.

pH of the contents was measured on a homogenate of the can contents using an Elico L1–120 model pH meter. Organoleptic assessment was made by a trained taste panel consisting 12 members and the overall acceptability was rated on a hedonic scale ranging from 9 to 1, 9 for extremely like, 4 for acceptability limit, 1 for extreme dislike and the scores were analysed statistically. Visual rating was given to the internal can corrosion.

Results and Discussion

Several recipe with different ingredients in different proportions were tried to get a satisfactory curry medium. Many of them yielding acceptable taste suffered alteration in taste and consistency during heat processing, often resulting in an unacceptable product. The pungent taste of chilli is preferred by some whereas mild pungency is favoured by other. Therefore the two acceptable recipe outlined in Table 1 were arrived at after several trials and observations with regard to the retention of consistency, taste and flavour of the curry medium after heat processing as also satisfying the taste of different consumers.

For maintenance of the correct proportion of fish to curry in the pack the first method, namely, adding measured quantity of curry to fish in can was found more convenient. However, the penetration of spicy flavour into fish flesh took time. In the second method, where fish was boiled in the curry and packed in cans, the maintenance of proportion of fish to curry in the pack posed some problem, though the curry was ready for consumption immediately after processing. Therefore in the subsequent trials the former method was followed.

Table 2. *Organoleptic characteristics of fish curry before and after canning*

	Before canning	After canning
Curry medium I		
Appearance	Pale yellow colour	Pale yellow colour
Flavour	Spicy and juicy fish curry flavour	Spicy and juicy but slight change in flavour, still very good
Pungency	Slightly pungent	Slightly pungent
Texture	Soft and firm	Soft and firm, not pasty
Overall score	8.20 ± 0.54	7.8 ± 0.86
Curry medium II		
Appearance	Red colour	Pale and colour
Flavour	Spicy fish curry flavour	Slight change in flavour, still very good
Pungency	Medium pungent	Medium pungent
Texture	Soft and firm	Soft and firm, not pasty
Overall score	8.00 ± 0.45	7.4 ± 0.96

The time of heat processing was so selected that the bones became soft and yielding while maintaining a firm and soft texture of the meat. In order to render the bones soft and yielding the cans had to be heat processed for a period of 60 min in steam at a pressure of 1.05 kg per cm^2. At shorter periods of processing though sterility could be attained bones were not rendered sufficiently soft.

In order to observe the taste and flavour alterations due to heat processing organoleptic evaluation of fish curry before and after canning was carried out (Table 2).

The canned sardine curry samples were stored at room temperature (29 ± 2°C) and periodically examined. The observations are summarised in Table 3.

During storage one of the significant observations was the appearance of the internal corrosion of the can noticed in the sample having medium pungency. At the end of 15 month's storage there appeared some corrosion, particularly at can ends and near side seam joints. The intensity of corrosion increased and was clearly apparent at the end of 18 month's storage. The curry medium also acquired the taste of lacquer and became very significant by 18 month's storage.

In the other set of curry too, of which the principal difference was in the low content of red chilly, green chilly and ginger, internal corrosion of the can became slightly apparent at the end of 18 month's storage. However the taste and flavour remained without considerable change upto this period.

Table 3. *Storage characteristics of sardine canned in curry*

	Curry medium *I*						Curry medium *II*					
Period of storage in months	3	6	9	12	15	18	3	6	9	12	15	18
Internal corrosion of can	Nil	Nil	Nil	Nil	Nil	+	Nil	Nil	Nil	Nil	+	++
Adhesion of meat to the can	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Lacquer discolouration	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
pH	5.55	5.55	5.50	5.50	5.45	5.40	5.55	5.50	5.50	5.45	5.40	5.30
Flavour	Very good	Very good	Good	Good	Good	Fair to good	Very good	Very good	Good	Good	Good	Fair
Taste	Very good	Very good	Good	Good	Good	Fair to good	Very good	Very good	Good	Good	Fair	Slightly bitter
Texture	Firm & soft	Firm & soft	Firm & soft	Firm & soft	Firm & soft	Firm	Firm & soft	Firm & soft	Firm & soft	Firm & soft	Firm	Firm

+ = slight corrosion; ++ = moderate corrosion

Rai *et al.* (1970) had used tamarind as an ingredient in the curry recipe to impart the required sour taste to the curry. In the present study instead of tamarind, tartaric acid, the natural acid present in Malabar tamarind were used. The pH of the medium which was 5.55 initially in both types remained more or less steady throughout the storage. The texture of the fish meat in curry changed from firm and soft to firm in both curry medium during storage. The overall score for the two preparations is presented in Fig. 1. Depending upon the overall characteristics of the curry sample during storage, it can be assumed that the curry sample containing more chilli can be safely stored for 15 months and the other for 18 months at room temperature.

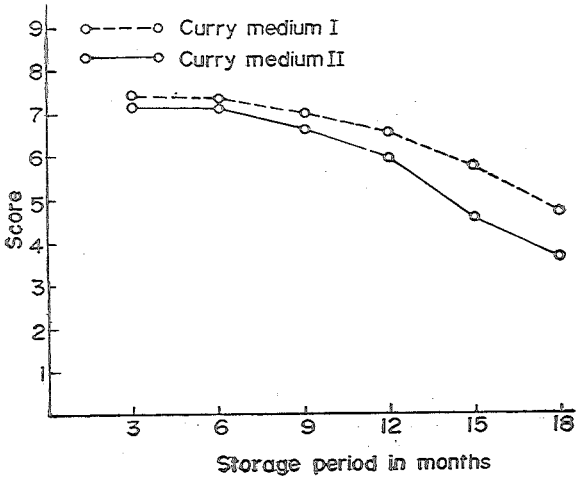

Fig 1. Overall score for canned sardine in curry medium

References

IS:9312 (1979) *Specifications for Mackerel Canned in Curry.* Indian Standards Institution, New Delhi.

Rai, B.S., Saralaya, K.V. & Parashuram, P. (1971) *Indian Packer,* **25,** 19