

Development of a Process for Canning Fresh Water Fish Rohu (*Labeo rohita*)

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

Results of experiments conducted to work out a process for canning fresh water fish rohu (*Labeo rohita*) from culture sources are presented. In order to impart a proper firm texture to the meat cold blanching the skinless boneless meat in 15% brine containing 0.25% calcium chloride was found necessary. Increasing the concentration of calcium chloride beyond 0.25% resulted in impairing the quality of meat, the texture becoming more fibrous and the flavour being adversely effected. Other firming agents tried did not yield any beneficial effect. The meat so blanching yielded a good product when canned in 'natural style.'

Fresh water fish constitute a major portion of the Indian fish landings. Of the 2.86 million tonnes of fish landed in 1984, 1.08 million tonnes were contributed by the inland resources (FAO, 1984). With ready markets available most of the fresh water fish is marketed fresh with very little left for processing and preservation. Therefore research work reported from India in the field of processing fresh water fish is very scarce.

There is an increased thrust given in culture of fresh water fish and this together with capture fishery is bound to increase their production substantially. This will call for development of effective processing methods for their utilization without waste. Canning offers a method of processing into a very stable product and in this field no work seems to have been reported apart from a study on canning tilapia (Anon, 1968). An attempt was made to study the canning characteristics of an important species of freshwater fish rohu (*Labeo rohita*) and the results are presented.

Materials and Methods

Fresh rohu (*Labeo rohita*) was collected from a fresh water fish farm and brought to laboratory in ice. Average weight and length of the fish were taken and then filleted and skinned manually. The fillets were analysed for moisture, fat, total nitrogen, non-protein nitrogen and ash by the AOAC (1984) methods.

Fillets were canned in 'natural style' after sprinkling salt over them or after cold blanching in brine in the following ways.

i) Cleaned fillets cut to size were packed in quarter dingly cans, sprinkled salt over it at 3% level and processed as natural pack.

ii) Cold blanching the fillets in 15% brine for 10 min and then processed as natural pack.

iii) Cold blanching the fillets in 15% brine containing 1% each of alum and citric acid for 10 min and processed as natural pack.

iv) Cold blanching the fillets in 15% brine for 10 min, cooked in steam at 0.35 kg/cm² pressure for 30 min and canned in oil.

v) As above using tomato sauce.

The cans were heat processed in steam for 25 min at 121°C. Cans were subsequently opened and tested. Samples were also canned in the conventional style after cold blanching in brine followed by pre-cooking in steam and canning using brine, oil or tomato sauce (market sample diluted with water in 1:1 ratio) as medium. Wherever necessary firming agents were added to brine to improve the texture of the meat. Round open top sanitary (OTS) cans (77 mm × 55 mm) with SR lacquer coating and plain quarter dingly cans were used as containers.

Results and Discussion

Fish used for canning were 36 to 43 cm in length and weighed 525 to 925 g. The average yield of skinless boneless fillets after trimming off the loose side was 31.7%. The proximate composition of meat is given in Table 1.

Table 1. Proximate composition of rohu fillets

Moisture %	76.45
Protein %	20.95
Fat %	0.62
Ash %	0.95

Rohu has relatively thick skin and large scales. If canned skin-on, the product displays an unappealing appearance due to the

hydrolysis of skin. Hence it was felt desirable to skin the fillets before canning.

Table 2 gives the results of examination of rohu canned in different styles. But for the natural flavour of fish, the sample canned in 'natural style' without prior blanching was rated inferior to others. Fish in tomato sauce became very fibrous and that in oil had a bleached colour. Fish treated with alum and citric acid had precipitated protein on the surface and the brine was milky white. Except for slight cloudiness of the brine and slightly soft texture of the meat, fish canned in natural style after cold blanching had desirable organoleptic qualities. Therefore it was felt that by improving the texture of the meat and the appearance of the self brine good quality canned product can be prepared by modifying this technique.

Table 2. Results of examination of rohu canned in different styles in quarter dingely cans

Sample No.	Can interior	Appearance of fish	Flavour	Texture	Nature of fill
i	Detinning	Light pink	Very good, natural	Soft	Cloudy brine
ii	„	Light pink	Good	Slightly soft	Slightly cloudy brine
iii	„	White precipitate of protein on surface	Fair	Soft and firm	Milky white brine
iv	„	Bleached colour	Good	Soft	Clear oil, no water
v	Heavy detinning	Good	Fair	Firm and fibrous	Good

Table 3. Observations on fillets cold blanched in different solutions

No.	Blanching medium meat	Colour and appearance	pH of brine	Remarks
i	15% brine	Pink, slimy	6	—
ii	15% brine + 0.5% citric acid	Slightly white, stiff and fibrous	2	Precipitated protein adhering to surface gives white colour
iii	15% brine + 0.5% CaCl ₂	Pink, slimy	7	—
iv	15% brine + 0.5% citric acid + 0.5% CaCl ₂	Slightly white, stiff and fibrous	—	Precipitated protein adhering to surface gives white colour

Table 4. *Effect of cold blanching in different media on the quality of the canned product*

No.	Blanching medium	Appearance of meat	Texture	Taste	Nature of media
i	15% brine	Good	Soft, juicy	Good	Light pink
ii	15% brine+0.5% citric acid	White precipitate of protein over surface	Slight fibrous	Fair	Colloidal
iii	15% brine+0.5% CaCl ₂	Good	Firm	Fair	Slightly coloured
iv	15% brine+0.5% citric acid+0.5% CaCl ₂	White precipitate of protein over surface	Slight fibrous	Fair	Colloidal, milky

Table 5. *Effect of varying concentration of CaCl₂ in blanching brine on quality of canned product*

No.	Blanching medium	Colour	Texture	Flavour	Nature of fill
i	15% brine	Good	Soft	Good	Slight coloured, clear
ii	15% brine+0.25% CaCl ₂	„	Soft and firm	Good	Clear
iii	15% brine+0.5% CaCl ₂	„	Firm	Fair	„
iv	15% brine+0.75 CaCl ₂	„	Fibrous	Poor	„
v	15% brine+1% CaCl ₂	„	„	„	„

Irrespective of the type of the pack it was generally observed that in quarter dingly cans detinning occurs in every case, it being more severe when tomato sauce was used as the medium. In subsequent studies only lacquered round OTS cans were used.

To improve the texture fillets were canned in natural style after cold blanching in (i) 15% brine, or 15% brine containing (ii) 0.5% citric acid (iii) 0.5% calcium chloride and (iv) 0.5% each of citric acid and calcium chloride. The fillets after cold blanching had the characteristics given in Table 3.

Cans after processing were later examined for the quality of contents. Results are given in Table 4.

Treatment with citric acid, alone or in combination with calcium chloride in brine affected the texture adversely besides the brine became colloidal and coloured. Treatment with calcium chloride along with brine yielded a satisfactory product.

Effect of varying concentration of calcium chloride on the quality of the product was further studied. Fillets were canned after cold blanching in 15% brine containing 0.25, 0.5, 0.75 and 1% calcium chloride. Results are summarised in Table 5.

General characteristics could be improved by cold blanching the fillets in 15% brine containing 0.25% CaCl₂. Increasing concentration of CaCl₂ resulted in the texture becoming more firm, but the flavour was adversely affected. Therefore it was

concluded that for processing a natural style canned product the fillets of rohu may be cold blanched in 15% brine containing 0.25% CaCl_2 .

Heat processing conditions were worked out taking into consideration the wholesomeness of the product vis-a-vis its bacterial qualities. It was observed that heat processing for 25 min at 121°C yielded a product of desirable characteristics in OTS cans of 77 x 55 mm size.

References

- Anon (1968) *Fish. Tech. Newsletter* 8, (4), 3
- AOAC (1984) *Official Methods of Analysis* (Horwitz, W., Ed) 12th Edn. Association of Official Analytical Chemists, Washington
- FAO (1984 Year Book of Fishery Statistics, FAO (Rome)