

Partial Drying and Smoking to Improve the Quality of Canned *Catla catla*

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A method for canning smoked *Catla catla* to yield an organoleptically acceptable product is described. Fillets of catla blanched in 10% brine for 30 min were made into fingers, partially dried in sun for 2 h and smoked for 3 h at $45\pm 2^{\circ}\text{C}$. The smoked fingers were cooked in flowing steam for 30 min and canned in refined groundnut oil. Control samples were processed excluding smoking in one case and both smoking and drying in the other. Smoked and canned product was rated organoleptically superior. Texture improved significantly in this sample during storage.

Key words: *Catla catla*, partial drying, smoking, quality

Catla catla is an important freshwater fish farmed in India, the average production during the last six years being 2,80,718 t (Anon, 1996). Freshwater fish, in general, is not considered suitable for canning because of their soft texture. Balachandran and Vijayan (1988) reported excessive precipitation of protein and adhesion of meat to the container making the product unattractive. They also observed that texture of canned freshwater fish rohu (*Labeo rohita*) could be improved by blanching in brine containing calcium chloride. This paper reports the improvement in flavour and texture of canned freshwater fish catla (*Catla catla*) by partial drying and smoking prior to canning.

Materials and Methods

Fresh catla (average weight 4.5 kg; av. length 63 cm) was collected from a fish farm and iced immediately after capture. The fish was filleted, skinned, washed thoroughly and cold blanched in 10% brine for 30 min. The blanched fillets were drained for 5 min and cut into fingers 5 x 2 x 1.5 cm. 180 g finger packed in 301 x 203 SR lacquered tinsplate can was cooked in flowing steam for 30 min, drained for 5 min, added hot refined groundnut oil, exhausted in steam, seamed and heat processed for 45 min at 121°C (sample A) (Madhavan *et. al.*, 1970). In another set, the blanched fingers were partially dried in sun for 2 h, and 170 g each packed in cans and processed as detailed above (sample B). In the third set, the partially dried fish fingers were smoked for 3 h at $45\pm 2^{\circ}\text{C}$, 170 g packed in each can and processed (sample C). The products were stored at ambient temperature ($25\text{-}30^{\circ}\text{C}$).

Sensory characteristics of the canned samples during storage were assessed by a trained panel of 7 members using the descriptive method of Amerine *et. al.*, (1965). The overall grade of the product was evaluated on a palatability rating scale according

to Peryam and Shapiro (1955). Piercing, puncturing and biting properties were measured using a Rheometer. Fish meat was analysed for proximate composition by AOAC (1984) methods. pH was measured on a homogenate of 25 g fish meat and 25 ml distilled water using a digital pH meter.

Results and Discussion

Proximate composition of the fish used in the study was moisture 76.36%, protein 19.45%, fat 3.23% and ash 0.96%. Catla is a medium fat fish. Sensory characteristics of the canned samples A, B and C are presented in Table 1. Texture of the meat

Table 1. Sensory characteristics of canned catla

Storage, months	Sensory characteristics	Sample A	Sample B	Sample C
3	Meat texture	Very soft	Firm and soft	Firm
	Curd, Adhesion	Present, heavy	Absent	Absent
	Colour of meat	Pinkish white	Pinkish white	Golden brown
	Can interior	Stained	No stain	No stain
	Flavour	Sweet	Sweet	Sweet, smoky
	Odour	Slightly muddy	Slightly muddy	Not muddy
	Taste	Good	Good	Very good
	Nature of oil Grade	Cloudy, turbid 6	Pale yellow, clear 7.5	Golden yellow, clear 8
6	Meat texture	Very soft	Firm and soft	Firm
	Curd, adhesion	Present, heavy	Absent	Absent
	Colour of meat	Pinkish white	Pinkish white	Golden brown
	Can interior	Stained	No stain	No stain
	Flavour	Sweet	Sweet	Sweet, smoky
	Odour	Slightly muddy	Slightly muddy	Not muddy
	Taste	Good	Good	Very good
	Nature of oil Grade	Cloudy, turbid 6	Pale yellow, clear 7	Golden yellow, clear 8
9	Meat texture	Very soft	Firm and soft	Firm
	Curd, adhesion	Present, heavy	Absent	Absent
	Colour of meat	Pinkish white	Pinkish white	Golden brown
	Can interior	Stained	No stain	No stain
	Flavour	Sweet	Sweet, less juicy	Sweet, smoky
	Odour	Slightly muddy	Metallic	Not muddy/metallic
	Taste	Good	Good	Good
	Nature of oil Grade	Cloudy, turbid 5.5	Pale yellow, clear 6	Golden yellow, clear 7.5
12	Meat texture	Soft, pasty	Firm and soft	Firm
	Curd, adhesion	Present, heavy	Absent	Absent
	Colour of meat	Pinkish white	Pale pinkish white	Golden brown
	Can interior	Stained	No stain	No stain
	Flavour	Muddy	Slight muddy	Sweet, smoky
	Odour	Metallic	Metallic	Not muddy/metallic
	Taste	Fair - good	Good	Good
	Nature of oil Grade	Cloudy, turbid 5	Pale yellow, clear 5.5	Golden yellow, clear 7.5

in A was very soft. Curd formation, meat adhesion and can interior staining were observed during storage. The meat had a muddy odour, which persisted throughout storage. After six months the control samples developed slight metallic flavour. However, it remained acceptable during the storage period of 12 months.

Even though there was much improvement in the sensory characteristics in sample B it still had the muddy odour and later developed a metallic flavour. However, adhesion and curd formation were not observed. There was no muddy or metallic flavour in sample C as smoking masked both. Smoked and canned catla had an attractive golden colour. The oil was transparent and golden yellow in colour.

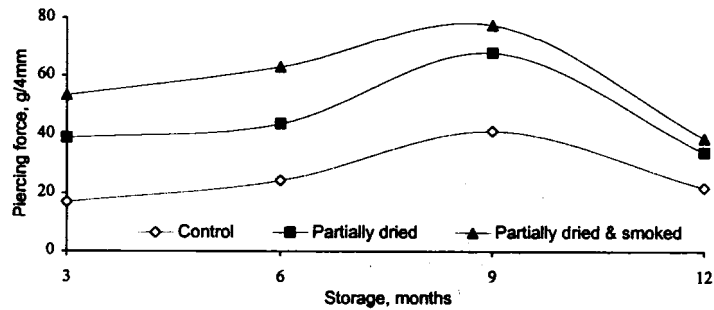


Fig. 1

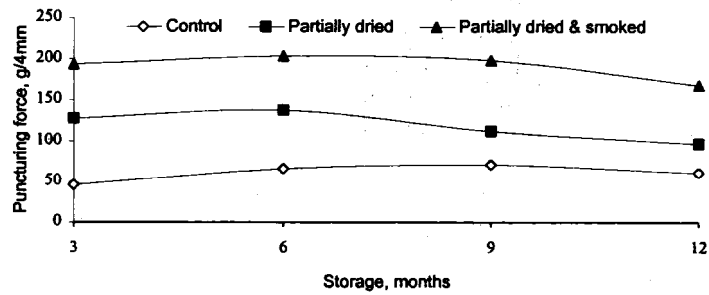


Fig. 2

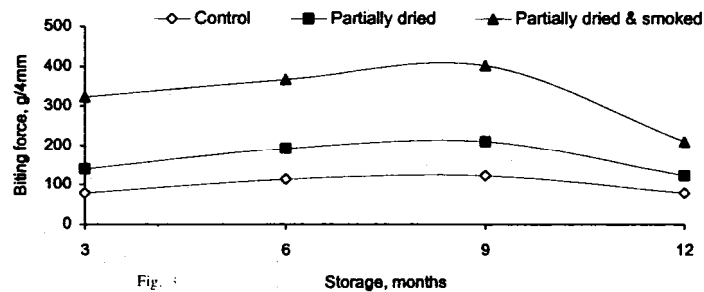


Fig. 3

Changes in piercing force (Fig. 1), puncturing force (Fig. 2) and biting force (Fig. 3) of canned catla during storage

There was much improvement in the texture of meat in samples B and C compared with that in sample A as revealed by rheological measurements of piercing, puncturing and biting forces (Figs. 1, 2 and 3). All samples showed a similar trend of piercing force, increasing upto the 9th month and decreasing thereafter. The piercing force for smoked and canned samples was highest followed by partially dried and canned catla and, the least in the untreated sample. Puncturing force showed increasing values as in the case of piercing, but a distinct peak was absent. Both B and C had higher initial values, which increased slowly for 6 months and decreased gradually. In the case of biting force too, samples B and C behaved similarly, increasing gradually for 9 months and decreasing thereafter. The peak biting force in smoked and canned catla was 402 g/4 mm while it was 210 g/4 mm for partially dried and canned catla. The increasing values of rheological parameters for treated fish samples show that changes leading to toughening the muscle fibre take place during storage. It has been pointed out that drying denatures fish muscle proteins and decreases protein solubility (Raghunath *et. al.*, 1995). This accounts for the disappearance of curd formation and meat adhesion in canned catla meat prepared from partially dried, as well as partially dried and smoked meat.

pH of the treated samples were lower than that of the control; lowest in the case of smoked samples(C). Carbonyl compounds of the smoke and the breakdown constituents of the lipid may be responsible for lowering the pH in smoke treated samples. The lower pH and low moisture may be contributing to the toughening of fish muscle proteins in the samples B and C.

Partial dehydration and smoking of catla meat was found to enhance the sensory characteristics of canned fish. Storage study for 12 months showed that the canned fish made from partially dried and smoked catla meat remained in good condition with good flavour, taste and odour.

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