"Eat Safe, Live Safe"

SIGNIFICANCE OF FERMENTED FISH

- *Fermented fish are rich source of essential fatty acids, amino acids and micronutrients.*
- *Fermented fish are potential diet for improving nutritional security.*

WAYS TO IMPROVE QUALITY & SAFETY

- *Use high grade raw materials.*
- *Hygienic handling of the raw materials and finished products.*
- *Use of suitable and effective packaging system.*
- *Prevention of cross contamination*
- *Use good storage facilities.*

OTHER SUGGESTIONS

- *Wash product thoroughly before use.*
- *Do not consume uncooked (if not intended for raw consumption).*
- *Store fermented fishery products in glass container or food grade plastic container once it is opened.*
- *Avoid purchase of fermented fish during rainy days.*

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QUALITY ISSUES IN FERMENTED FISHERY PRODUCTS

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Fermented fishery products (FFP)

Fermented fishery products are any fish product which has undergone degradative changes through enzymatic or microbial action either in presence or absence of salt. Non-traditional products manufactured by accelerated fermentation, acid ensilage and chemical hydrolysis also belong to this category (FSSR, 2011).

Fermented fish types

- Sauce
- Paste
- Whole/ Sliced

Fermented fish products in India

- **Meghalaya** – *Tungtap*
- **Manipur** – *Hentak Ngari*
- **Tripura** – *Puthi shidal*, *Phasa shidal*, *Lona ilish*
- **Mizoram** – *Nghaum*, *Nghathu*, *Dan pui thu*, *Ai-um*
- **Arunachal Pradesh** – *Ngyii papi*
- **Kerala** – *Columbo mackerel*
- **Nagaland** – *Japangang nagtsu*
- **Assam** – *Hidal*

n = Number of units comprising a sample.
c = Maximum allowable number of units having microbiological counts above m.
m = Microbiological limit that may be exceeded number of units c.
M = Microbiological limit that no sample unit may exceed.

Regulatory guidelines for fermented fishery products (FSSR, 2011)

PARTICULARS	ORGANISM & TEST METHOD	SAMPLING n	SAMPLING c	LIMITS (cfu/g) m	LIMITS (cfu/g) M	STAGE WHERE CRITERION APPLIES
Hygiene Indicators	*Coagulase positive Staphylococci* **Testing:** ISO 6888-1 or ISO 6888-2	5	1	1×10^2	1×10^3	End of Manufacturing process
	Yeast &mold count **Testing:** IS 5403/ISO: 21527	5	0	100		End of Manufacturing process
Safety Indicators	*Escherichia coli* **Testing:** IS 5887 Part 1 or ISO 16649-2	5	2	4	40	-
	Salmonella **Testing:** IS 5887 Part 3/ ISO 6579	10	0	Absent/25g		-
	Clostridium botulinum **Testing:** IS 5887, Part 4 or ISO 17919	Absence of viable spores or vegetative cells of *Clostridium botulinum* and absence of botulinum toxin.				-
	HAZARD & TEST METHOD	**SAMPLING n**	**SAMPLING c**	**LIMITS (mg/kg) m**	**LIMITS (mg/kg) M**	**STAGE WHERE CRITERION APPLIES**
Biogenic amine	*Histamine* ***Testing:*** *ISO 19343: 2017*	9	2	200	400	-

Quality issues in fermented fish

- *Histamine formation in favourable environment*
- *Mycotoxin formation in poorly stored products*
- *Botulinum toxin production in favourable condition*
- *Contamination with foodborne pathogens when handled unhygienically*
- *Growth of parasites in favourable environment.*
- *Strong odour and flavour*
- *High content of volatile nitrogen compounds*
- *Rancidity*
- *Dehydration and dryness*
- *Occurrence of sand particles*
- *Discolouration*

Potential hazards in fermented fish

- *Histamine (poisoning)*
- *Pathogenic Escherichia coli*
- *Coagulase positive Staphylococci and enterotoxin.*
- *Salmonella*
- *Botulinum toxin*
- *Parasites in low salted product (if consumed uncooked)*
- *Chemical residues and contaminants*
- *Biotoxins (if marine reef fish is used for fermentation)*

Quality parameters of fermented fish (Fish sauce)

PARAMETERS	FSSR LIMIT
pH	*5.0 – 6.5 (Traditional Product)* *> 4.5 (If ingredients used to assist fermentation)*
Total Nitrogen Content	*>10g/Kg or L*
Amino Acid Nitrogen Content	*> 40% of total nitrogen content*
NaCl	*> 200g/Kg or L (if salted)*
HEAVY METALS:	
Arsenic (As)	*76 mg/Kg*
Cadmium (Cd)	*0.3 mg/Kg*
Mercury (Hg)	*0.5 mg/Kg*
Lead (Pb)	*0.3 mg/Kg*
Chromium (Cr)	*12 mg/Kg*