



DISCOLORATION IN PRECOOKED TUNA FOR CANNING

The development of off-colors in tuna meat during precooking is a tuna canner problem which is economically significant. Although these off-colors vary from green to shades of tan and brown, the popular term to describe this condition is "green tuna." Because it is difficult or impossible to predict which fish will develop off-colors, a considerable amount of money is invested in these fish before they are discarded. Studies have shown the nature of the pink pigment normal to canned tuna meat and have led to means for preventing discoloration.

In August 1955, the U. S. Fish and Wildlife Service initiated work on this problem. The approach was first to identify the chemical compounds that produce the desirable pink pigment that is characteristic of good-quality precooked tuna and then the off-color pigments of green tuna.

Results of experiments leading to the identification of the desirable pink pigment are presented in a paper entitled "Identification of Pink Pigment of Canned Tuna" by Brown and Tappel in the March-April 1957 issue of Food Research. This work was supported by funds made available through the Saltonstall-Kennedy Act of 1954 and was administered collaboratively by the Service's Seattle Fishery Technological Laboratory and the University of California.

Brown and Tappel's studies of the properties of the pigment causing the desirable pink color of precooked and canned tuna show that the pigment is hemochrome. Their studies also indicate that the hemochrome is derived from the reaction heme of myoglobin and residual hemoglobin with either denatured globin or nicotinamide, or with both. The pink pigment in canned tuna can be stabilized by the proper addition of hemochrome-forming compounds and reducing agents.

The second phase of the investigation into the cause of discoloration or "greening" of precooked tuna was to study the nature of the pigments causing this condition. The laboratory investigations of this phase of the problem have been completed. The results of this part of the investigation, including recommendations for preventing the development of off-colors in canned tuna, are being prepared for publication and will be released within a short time.



INSPECTION AID FOR VOLUNTARY U. S. STANDARDS FOR FROZEN FRIED FISH STICKS RELEASED

The Bureau of Commercial Fisheries on June 12, 1957, released an Inspection Aid for frozen fried fish sticks. This Aid is designed to familiarize any one interested with the use of the voluntary U. S. standards for grades of frozen fish sticks. It will enable the interested party to use the standards as a quality-control tool in the plant or to assess the quality of frozen fried fish sticks delivered as being in accordance with the requirements for a certain grade.

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

INSPECTION AID No. 27

FROZEN FRIED FISH STICKS - GUIDE FOR MAKING DEDUCTIONS

SUB-FACTOR		NO. OF POINTS TO BE DEDUCTED		
		APPEARANCE MAXIMUM 35	DEFECTS MAXIMUM 40	CHARACTER MAXIMUM 25
FROZEN STICKS	CONDITION OF PACKAGED STICKS	Little deterioration or disorder		0
		Slight deterioration or disorder		1
		Moderate deterioration or disorder		2
		Excessive deterioration or disorder		3
	STICKS SEPARATE	Easily		0
		With slight to moderate pressure and no damage to coating		1 - 2
		With slight damage to coating		3 - 4
		With pressure and moderate damage to coating		5 - 8
		With difficulty and serious damage to coating		9
	BROKEN STICKS	None		0
		10 percent		7
		More than 10 percent		14
	DAMAGED STICKS	None		0
		10 percent		1 - 3
		20 percent		4 - 6
		30 percent		7 - 13
		More than 30 percent		14
	UNIFORMITY OF SIZE AND SHAPE	No non-uniform sticks	0	
	10 percent	1 - 2		
	20 percent	2 - 4		
	30 percent	3 - 7		
	40 percent	5 - 11		
	50 percent	8 - 15		
	60 percent	11 - 15		
	70 percent	13 - 15		
	More than 70 percent	15		
CONTINUITY OF COATING	No sticks showing breaks in coating	0		
	10 percent	1 - 2		
	20 percent	2 - 4		
	30 percent	3 - 6		
	40 percent	4 - 8		
	50 percent	5 - 10		
	60 percent	7 - 10		
	70 percent	9 - 10		
	More than 70 percent	10		
HEATED STICKS	COLOR	No sticks deviating from uniform color	0	
		10 percent	0 - 1	
		20 percent	1 - 3	
		30 percent	2 - 5	
		40 percent	4 - 8	
		More than 40 percent	7 - 10	
	FREE OIL IN COOKING UTENSIL	None		0
		Slight amount of free oil		1 - 3
		Excessive free oil		5
	ADHERENCE OF COATING	No sticks showing swelling or ridging of coating		0
		10 percent		0 - 1
		20 percent		1 - 3
		30 percent		2 - 5
		40 percent		4 - 6
		50 percent		7 - 10
		60 percent		8 - 10
		70 percent		9 - 10
		More than 70 percent		10
DAMAGE BY HANDLING	None		0	
	Slight		1	
	Moderate		3	
	Excessive		5	
OILINESS OF BREADING	None		0	
	Slight		1	
	Moderate		2	
	Excessive		3	
TEXTURE OF COATING	Firm not tough, pasty or mushy		0	
	Slightly tough, pasty or mushy		1	
	Moderately tough, pasty or mushy		2	
	Highly tough, pasty or mushy		3	
TEXTURE OF FLESH	Firm but tender and moist		0	
	Slightly tough, dry and/or fibrous or mushy		1	
	Moderately tough, dry, and/or fibrous		3	
	Excessively tough, dry and/or fibrous		5	
BLEMISHES	Blood spots, bruises, curd spots, burned material	1 - 2		
	Carbon specks (small 1 point, large 2 points)	1 - 2		
SERIOUS BLEMISHES	None	0		
	10 percent	7		
	More than 10 percent	14		
BONES	None	0		
	Occurrence in 10 percent of sticks	5		
	20 percent	10		
	More than 20 percent	14		

See instructions for inspection, Tables 3, 4 and 5; and include distortion of heated sticks.

The basic policy of the Bureau of Commercial Fisheries in encouraging the development and promulgation of voluntary U. S. standards for grades of fishery products has been to make available a single official nationwide and uniform system of quality evaluation for each of the important fishery products. Such a system will do much to stabilize the market, and elevate the quality of the fishery product concerned.

The Aid lists the various factors which detract from the quality of the fish stick and the relative importance of each. The points deducted for increasingly severe defects are tabulated.

Frozen Fried Fish Sticks--Guide to Making Deductions, Inspection Aid No. 27 was prepared by the Department of Agriculture from data supplied by the Department of the Interior's Bureau of Commercial Fisheries. Together with the official voluntary U. S. standards for grades of frozen fried fish sticks, the Aid forms a complete system for evaluation of a product as to quality.



FROZEN FISH PACKAGING IMPROVEMENT PROPOSED

During a recent meeting of industry members and Service technologists, held at the Bureau of Commercial Fisheries Seattle Technological Laboratory, there was general agreement that much of the variable quality of frozen fish steaks, as sometimes found in the retail cabinets, is due to factors beyond the complete control of the original packer. It was felt that development of better packaging procedures promises to be the only effective means of increasing the processor's control of quality in his product throughout the distribution chain.

Improved techniques would be required to hold oxidation and dehydration of the product to an absolute minimum regardless of the undesirable temperatures and poor handling which the product might suffer during distribution and marketing. If

such a safety factor could be built into the product through use of "ideal" packaging materials and special application techniques, progress would be made in protecting the product from the unavoidable stresses encountered in the marketing chain.

Changes in basic packaging techniques are costly. The value of a given technique and its commercial practicability must be demonstrated before it can be adopted by the industry. For this reason, the problems involved in accomplishing the necessary investigations of the many packaging processes were discussed. The industry members recommended that the Service undertake cooperative studies with the industry in this vital field of research.



REVISED AND NEW FEDERAL SPECIFICATIONS PLANNED FOR FIVE FISHERY ITEMS

During a recent conference of members of Federal agencies and the Department of Defense, the various services established relative priorities for all previously requested and desired Federal product specification actions. Definite completion action was requested on five Federal specifications between now and the end of fiscal year 1959. These specifications are as follows: (1) Fish, Fresh (chilled) and Frozen, PP-F-381, revision; (2) Tuna Fish, Canned, PP-T-771, revision; (3) Clams, Canned, new specification; (4) Lobsters, Live; Chilled and Frozen Meat, new specification; and (5) Scallops, Chilled and frozen, revision and conversion of present applicable military specification to Federal specification.

The proposed final draft of the Federal specification for Shrimp, Frozen, Raw: Breaded (PP-S-315) has been prepared in accordance with comments from Federal agencies concerned and industry. Prior to formal promulgation of the specification, a first-hand in-plant evaluation of the requirements of the specification is being made in terms of commercial practicability with due consideration given to Federal procurement needs.



TECHNICAL NOTE NO. 40 - EXPERIMENTAL MOBILE DE-ICING, WASHING, AND WEIGHING UNIT FOR UNLOADING FISH FROM VESSELS

ABSTRACT

THE DESIGN OF AN EXPERIMENTAL MOBILE FISH DE-ICING, WASHING, AND WEIGHING UNIT FOR UNLOADING GROUND FISH FROM A FISHING VESSEL IN NEW ENGLAND IS DESCRIBED. THE EXPERIMENTAL UNIT CONSISTS OF A WOODEN UNLOADING PLATFORM, A RECEIVING HOPPER, A COMBINATION DE-ICER AND WASHER, A CONVEYOR, A WEIGHING HOPPER, AND A SCALE--ALL MOUNTED ON A STEEL FRAME SUPPORTED ON WHEELS.

BACKGROUND

The design and development of mechanical equipment that will promote efficient and sanitary handling of fishery products is one of the projects of the Bureau of Commercial Fisheries in East Boston, Mass. As a part of this project, a mobile fish de-icing, washing, and weighing unit for unloading New England groundfish (haddock, ocean perch, cod, etc.) from a fishing vessel has been designed. After the design has been criticized for possible improvement, the unit will be constructed.

DESCRIPTION OF EQUIPMENT

The mobile de-icing, washing, and weighing unit (fig. 1) consists of a steel frame mounted on eight rubber-tired swivel casters. Attached to this frame is a

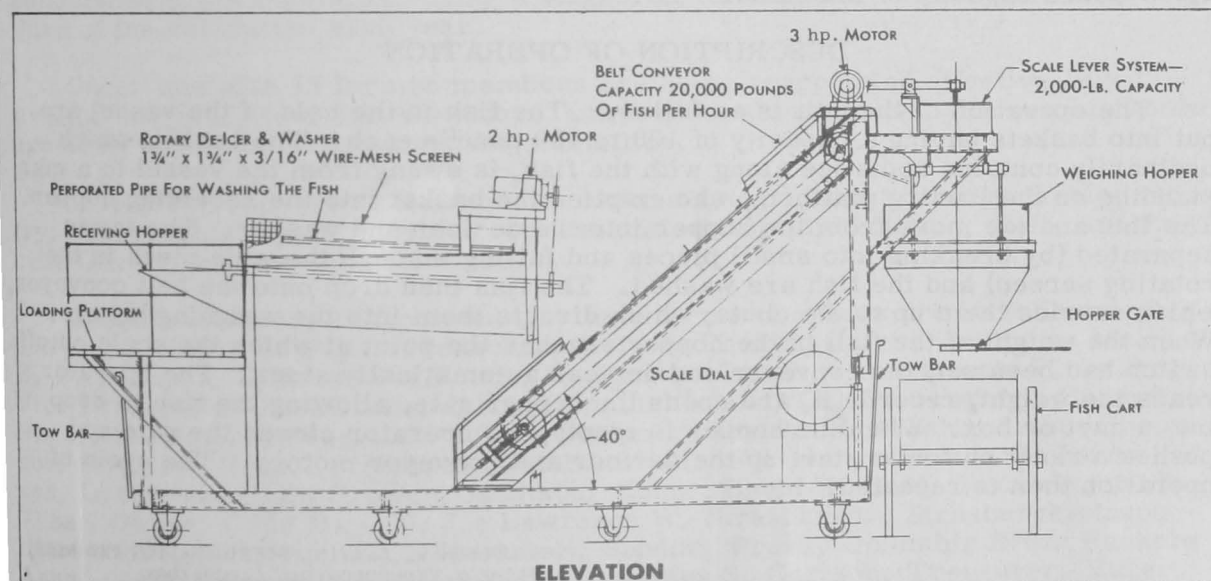


FIG. 1 - MOBILE FISH DE-ICING, WASHING, AND WEIGHING UNIT.

wooden loading platform, a receiving hopper, a rotating cylindrical screen-type de-icer and washer, a conveyor, and a weighing hopper connected to an automatic moistureproof scale.

DE-ICER AND WASHER: The combination de-icer and washer is somewhat similar to those used in the ocean perch fishery. It consists of a rotating screen 8 feet in length and 3 feet in diameter. The screen is made of $\frac{3}{16}$ -inch diameter wire mesh, suitably reinforced and having openings $1\frac{3}{4}$ inches square. Water, flowing through a $1\frac{1}{2}$ -inch diameter pipe perforated along the bottom and located within the upper half of the rotating cylindrical screen, provides for the washing of the fish. Power for the rotation of the screen is provided by a 2 hp. electric motor.

NOTE: PLANS FOR THIS UNIT MAY BE OBTAINED FROM THE FISHERY TECHNOLOGICAL LABORATORY, BUREAU OF COMMERCIAL FISHERIES, 61 SUMNER ST., EAST BOSTON, MASS. INTERESTED PERSONS ARE INVITED TO SEND THEIR COMMENTS DIRECTLY TO THE LABORATORY OR TO VISIT THE LABORATORY AND DISCUSS THE UNIT FIRST-HAND.

CONVEYOR: The conveyor is of a galvanized metal-belt type having a rated continuous capacity of 20,000 pounds of fish an hour. The belt is 3 feet wide, has galvanized angle-iron flights attached transversely at 2-foot intervals, and is designed to operate at a speed of 260 feet a minute. The conveyor is driven by a 3 hp. electric motor.

WEIGHING HOPPER: The weighing hopper has a calculated holding capacity 2,300 pounds of fish and is of galvanized metal suitably reinforced. The hopper is suspended from an enclosed lever system. A manually-operated gate in the bottom of the hopper enables the operator to dump the fish from the hopper into a cart or box.

SCALE: The scale consists of an enclosed lever system located over the weighing hopper and connected to a moistureproof direct-reading indicating dial. The housing for the dial contains an automatic cut-off switch and an electric heating element, which maintains the dial at the proper operating temperature in cold weather.

The cutoff switch is connected to the control switches for the conveyor motor and the de-icer motor in such a manner that when the desired weight is reached (weight at which cut-off switch is set), the operation of the conveyor and the de-icer is stopped. A manual reset button is provided to re-start the conveyor and de-icer motors after the fish in the hopper are dumped. The cutoff switch can be manually set to stop the conveyor and de-icer motors at any desired hopper weight within the 2,000-pound capacity of the scale.

DESCRIPTION OF OPERATION

The operation of the unit is as follows: The fish in the hold of the vessel are put into baskets having a capacity of 100 to 150 pounds each. The basket, which ordinarily contains some ice along with the fish, is swung from the vessel to a man standing on the loading platform, who empties the basket into the receiving hopper. The fish and ice move from the hopper into the de-icer and washer. The ice is separated (by breaking into small pieces and falling through the wide mesh in the rotating screen) and the fish are washed. The fish then drop onto the belt conveyor which carries them up to the chute, which directs them into the weighing hopper. When the weight of the fish in the hopper reaches the point at which the scale cutoff switch has been set, the conveyor and de-icer automatically stops. The operator reads the weight, records it, and opens the hopper gate, allowing the fish to drop into a cart or box. When the hopper is empty, the operator closes the gate and pushes a reset button to start up the de-icer and conveyor motors. The cycle of operation then is repeated.

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