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Processing Channel Catfish

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Several steps must be completed in processing channel catfish into a salable product: receiving and weighing the live fish at the processing plant; holding them alive until needed; then stunning, deheading, eviscerating, skinning, chilling, size grading, freezing or ice packing, packaging, warehousing, icing, and shipping the finished product.

Receiving

Before being purchased for processing, fish are evaluated for quality by experienced tasters. Sample fish are taken from the pond at least three times: normally 2 weeks before harvest, the day before harvest, and the day of harvest. At the pond fish are loaded into aerated water tanks and transported to the processing facility. The fish are unloaded from the truck into baskets for weighing and then put into an aerated holding vat or directly into the plant. In most cases, fish enter the processing line directly from the trucks and are only held in tanks to keep the plant in operation when fish delivery is delayed (Figure l).

Deheading

The fish are removed from holding tanks and stunned with electrical current, which makes them easier and safer to handle by workers. The fish are moved into the processing plant on a distribution conveyor belt (Figure 2). From the distribution conveyor, the stunned catfish drop into a holding bin for each processing line. The first line operator is the lay-up person. This operator positions each catfish in the proper orientation for the band saw operator to remove the head quickly and efficiently. The head is pushed into a chute that routes it to a waste disposal conveyor belt below the band saw, and the carcass proceeds to the evisceration operation. A good band saw operator can process from 40 to 50 fish per minute (Figure 3).

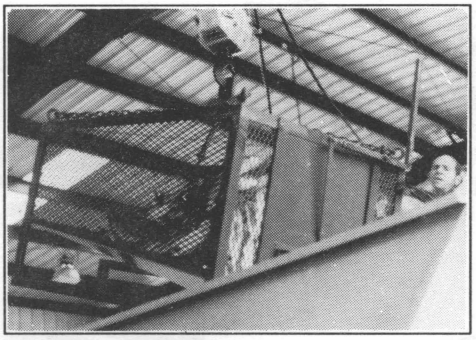

Figure 1. Fish are loaded into a tank directly from the truck.

Figure 2. Fish travel from holding tanks to be stunned with elecrical current.

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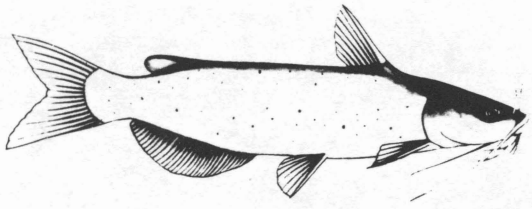
Figure 3. Deheading channel catfish with a band saw.

Figure 4. Removing viscera from the body cavity of the fish with a vacuum eviscerator.



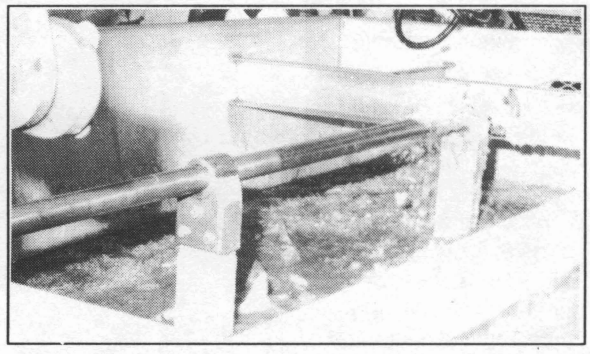


Figure 5. Channel catfish in the chill-tank in a mixture of water and ice.

Figure 6. Larger fish are filleted at filleting tables by hand or by automatic filleting machines.

Automatic deheading and eviscerating machines are also being used by most processing plants. Automation does require some size grading of fish for efficient use.

Evisceration

The body cavity is opened by hand with a knife, and viscera are withdrawn by use of a vacuum eviscerator (Figure 4). Viscera are conveyed to the offal collector, and the viscerated carcass proceeds to the skinning operation.

Skinning

The membrane skinner has been the standard industry machine for skinning channel catfish since its introduction. This machine has a rotating roller with sharp "teeth" that present the fish to a sharp blade held in place by spring pressure. Very close tolerances between the blade and roller teeth make it possible to remove only the skin as the fish is passed over the roller. Capacity is abut 12 to 14 fish per minute per operator. Most processors use two operators per machine, so the machine capacity is 24 fish per minute.

Chilling

After deheading, eviscerating and skinning, the whole dressed fish is lightly spray washed and conveyed into the chill tank where it is immersed in a mixture of ice and water. Fish are held in the chill tank from 10 to 30 minutes at a temperature of 38° or less (Figure 5). Fish must be cooled rapidly and held below 40° F to attain low microorganism numbers, good flavor and maximum shelf-life, and to ensure overall quality. It is extremely important to control the microorganism buildup (which is directly related to the shelf-life of the fish). Some processors add up to 20 parts per million of chlorine to the chill-tank water or rinse water. Water and ice are added periodically to maintain the proper water level and temperature.

Size grading

When fish exit the chill tank, they are conveyed to a sizing station where they are sorted by weight. Small and some medium sized fish are usually processed as whole fish, whereas medium to large fish are typically processed as fillets or steaks. In smaller plants, grading is a hand operation; however, in larger plants some mechanical or electronic sizing systems are used.

Product form

Catfish of the proper size are sold iced, frozen or pre-breaded in the following forms: whole fish, fillets, steaks, strips and nuggets. Size control of fillets to within 1- to 2-ounce weight increments is essential for marketing of the filleted product. Fish of the appropriate size that will yield the needed fillets are filleted by hand at filleting tables (Figure 6) or by automatic filleting machines. The fillets are trimmed to produce the nugget, then sized and either frozen or packed in ice for shipment.

Channel catfish "steaks" are prepared by cutting size-graded fish into cross-section pieces. The steaks are then individually quick frozen or packed in ice and sold in 15-pound boxes.

Freezing

Before freezing, channel catfish products are injected with or tumbled in a polyphosphate solution which acts as an antioxidant and prevents excessive water loss during freezing.

The most important consideration in maintaining excellent quality fish in the frozen state is to insure that they are processed, frozen rapidly, and held at 1 to 10° F or below until used. The temperature of the fish must be reduced from 32° F to 15° F in 30 minutes or less to be considered quick-frozen and to retain the original quality. The channel catfish are individually quick-frozen (1° F) in a tunnel or spiral freezer (Figure 7). Carbon dioxide, liquid nitrogen, or conventional mechanical freezing systems are being used in various plants to freeze channel catfish. The choice of freezing media and machinery is mainly a question of economics. The fish or fish pieces are placed on the in-feed belt to the freezer so they are not touching. The variable speed belt is regulated so that the fish remain in the freeze chamber the required time and are frozen when they exit the tunnel.

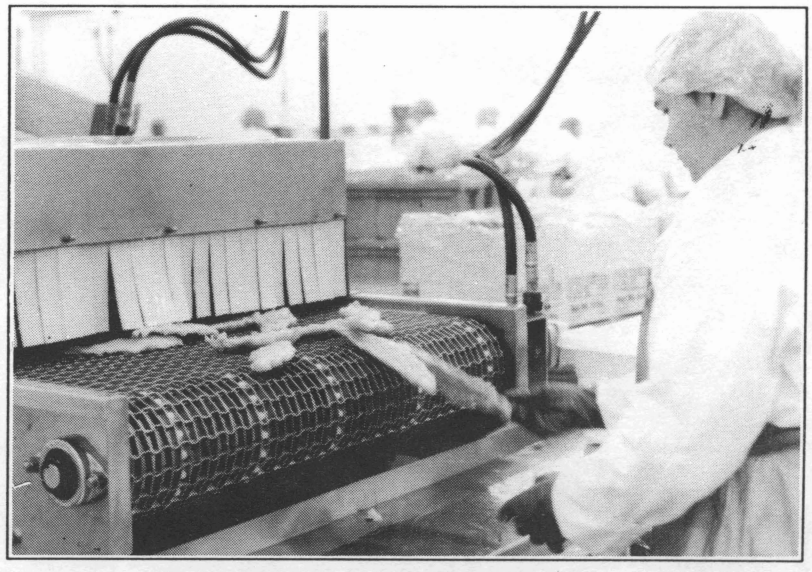


Figure 7. Fillets are quick-frozen on a spiral freezer or a tunnel type freezer.

Packaging

Frozen. When whole frozen fish exit the freezer, they are conveyed through a water bath or sprayer. A coating of ice (glaze) is formed over the fish, which is the first step in packaging. The individual quick- frozen glazed whole fish or fillets are sized and packed in cardboard shipping cases that are lined with polyethylene bags. The whole frozen fish are divided into increments of 2 ounces each and packed into 15-pound boxes. Frozen fillets are packed in 15-pound boxes with fillets divided into lots with a 1- to 2-ounce range.

Ice-Packed. Whole iced fish are divided into the same size categories as frozen whole fish and packed in ice in 50-pound shipping boxes that contain 30 pounds of fish and 20 pounds of ice. Steaks are packed in 15-pound shipping cartons.

Warehousing

Frozen channel catfish are held at 0° F or below if required by state law in a frozen storage warehouse until shipped. The iced product is usually packed and shipped within 48 hours in refrigerated trucks. It is held at the processing plant in refrigerated storage at 30° F to 38° F until shipped.

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