becomes one of making the necessary inspections, according to a pre-arranged plan, and reporting these to the proper authority in the plant for necessary action. It is usually the practice that quality control does not have the authority to make changes in the production procedure. This is left entirely to the management of the production department. Quality control should, of course, offer every assistance in attempting to resolve a difficulty without undue delays. For example, if the quality control finds something wrong along the production line, its first duty is to advise the production manager or supervisor without delay, so that corrective action can be taken without danger of lost production.

Conclusion

Quality control is frequently regarded as consisting of a laboratory in which a man with a white coat does "bug counts", and makes other mysterious tests. The quality control manager is frequently recorded as a thoroughly unsympathetic detective who is always looking for trouble, and frequently causing it. These concepts are totally wrong. Quality control is a method of operation, a method of management, a method of thinking, such that production errors and risks may be reduced to a minimum. A quality control department is simply a part of that system. The quality control manager is not an unsympathetic detective, but rather a helpful constable.

A real quality control system involves a great deal more than a laboratory, a man, and a microscope. It involves an understanding of how the system works, an active and sympathetic participation by the management of the company itself.

Quality control is a useful function that can pay dividends. It requires setting high standards on the product to be produced, and determination to produce it that way. A company deciding to make use of a quality control program should first consult with some one experienced in the matter. Obviously, each operation must be worked out separately, and each may require different specifications and procedures. It is important to select the right personnel, and to obtain the full support of management.

DISCUSSION

Industry Section

Discussion Leader: W. F. HAMPTON

Discussion Panel: MANUEL SANCHEZ, HARRY F. SAHLMAN, E. A. FIEGER, HARDEN TAYLOR

Q. Hampton: How many shrimp are left on deck after a drag in the West Coast Mexican fishery?

A. Pinson: Up to 2000 pounds, although the average drag (1½ to 2 hours) would yield 200 to 250 pounds.

Q. Hampton: What precautions are taken, if a large catch is made, to protect the shrimp while on the deck?

A. Pinson: Ice is shoveled over the shrimp and mixed thoroughly.

Q. Fieger: Do you place ice on bottom and top?

A. Pinson: Yes.

Q. Mingledorff: What is the longest time the shrimp are kept on ice aboard the boats?

A. Pinson: Ten to 12 days at sea, with two days spent in travel to and from the grounds. The oldest shrimp are ten days old on reaching the dock.

Q. Weil: What was bacterial count two to three days after capture?

A. Fieger: The bacterial count depends upon the position of the shrimp in the hold, with the top layers having less than 1,000,000 after 10 days and the lower layers about 100,000,000 per gram after ten days. After capture the bacterial count runs 500-40,000 per gram. After washing average count would be about 7000 per gram.

Q. O'Neill: Are there any future plans for freezing shrimp at sea on Mexican west coast?

A. Pinson: They have five freezer boats at present but their operation has not proven economically feasible so far.

Q. Levenson: What is a dangerously high bacterial count and what are the types of bacteria involved.

A. Fieger: 25,000,000 per gram and above is considered prohibitive. *E. coli* an indication of human contamination is considered dangerous.

Q. Levenson: Can these counts be kept down?

A. Fieger: Use of germicides would be all right if Food and Drug would accept them. One per cent sodium bisulphite in saline solution reduces bacterial count.

A. McPhillips: Our boats are cleaned carefully after each trip with live, wet steam for 15-20 minutes.

Strasburger: Chlorine is better than live steam if used after a thorough wash down of the hold.

Malton: One to 200 ppm chlorine is used in butter churns in dairy plants.

Pinson: Our holds are covered with galvanized iron; no wood is exposed to the shrimp.

Sahlman: Plastering of the hold is a good practice.

Pinson: I think not. Cracks may appear and bacteria may enter there.

Strasburger: A solution of 200 ppm of chlorine is sufficient. Metal lining is superior to either cement or wood, which are porous and harbor bacteria.

Q. Fieger: What size of shrimp are landed in the Mexican fishery?

A. Pinson: About 75 per cent of the catch is under 15 count. In the spring they may run 36-43 count.

Q. Wegmann: How long does heading process take and what protection is afforded from the sun?

A. Pinson: About one half hour. Canvas is used overhead as protection for the shrimp.

Q. Colter: How can the producer determine bacterial count of shrimp?

A. Fieger: There is no method at present that can be used on the dock. Spoilage is determined only by the appearance of the shrimp.

Q. Idyll: How do you think the tossing of heads overboard affects fishing?

A. Pinson: In a confined area the throwing of heads overboard can cause the shrimp to leave the grounds. Also, boats sometimes pick up large quantities of partly decomposed heads in the net.

Strasburger: Yet some people suggest chumming for shrimp with shrimp meal so that catches can be improved.

Ferreira: It is illegal to discard heads and other trash from shrimp boats but the law is not enforced at present. American biologists claim the dumping of heads on the grounds is not harmful. I personally believe that this practice can be harmful in certain cases.

Ellison: In Pamlico Sound the dumping of trash has not affected the catches of shrimp.

H. Taylor: I suggest experiments along this line. Feeding habits, observed in aquaria, would be helpful.

Duggan: Disposal of heads is always a problem to processors. I suggest the use of a grinder of the type used in kitchen disposal units.

Strasburger: In our plants in Cleveland and Dallas we grind the waste and flush it into city sewers.

Wegmann: The dumping of heads causes pollution. The solution is to dump the trash over a wider area.

Q. Strasburger: Are not metal baskets more sanitary for use on board the boats?

A. Pinson: Wooden baskets are cheaper but require replacement after several trips.

Q. Sahlman: Are any attempts made to ship in shrimp after several days to allow fresher shrimp to reach the dock?

A. Pinson: No, this has not been attempted in Mexico.

Sahlman: The American Campeche fishery does this. We find this technique improves the quality, with no shrimp more than six days old being landed on the Florida west coast.

Q. Ellison: What causes the so-called "stinker" shrimp?

A. Strasburger: No bacteriological work has been done on stinkers but they are found in conjunction with decomposition.

Q. H. Taylor: Are these stinkers related to the so-called "carbolic" shrimp?

A. Strasburger: No, the stinker is caused by decomposition and the carbolic shrimp is caused by iodoform. The latter are often associated with waters of high salinity.

Q. Sahlman: Are there any iodoform shrimp in the Campeche catches?

A. Strasburger: They are found in brown shrimp, *Penaeus aztecus*, of U.S. coast in June and July especially, and in white shrimp, *P. setiferus*, from Mississippi delta and west to Freeport, Texas. They are not as prevalent in Florida east coast catches.

Q. Sahlman: Has the iodoform other effects than smell?

A. Strasburger: Yes, it affects the taste.

Q. Ellison: Could you review the loss of weight problem during freezer storage?

A. Strasburger: There is least freezer loss with white shrimp and greatest with the pink shrimp, the brown being intermediate.

Q. Pinson: What are the possibilities of making a five pound package of shrimp without glaze.

A. Strasburger: Five pound packages, not glazed but overwrapped, produce a very good product.

Klein: A paper on this subject is being given on Friday.

Q. Duggan: If the shrimp are frozen in pans immersed in water what is the effect of pressure during freezing?

A. Strasburger: The metal pans are split by expansion.

Q. O'Neill: Flavor is a function of storage time. Is there a law specifying the maximum time in freezers?

A. Wegmann: There is a federal law which specifies that shrimp should be destroyed after one year in storage. This law is not enforced at present.

Malton: This storage time regulation was a wartime measure.

Q. Wegmann: What is the average weight loss in five pound pack in 12 months?

A. Strasburger: This loss depends on many factors, such as species, storage conditions (mostly temperature), packaging methods and the type of freezer. The loss also depends on individual plant conditions.

Hampton: Moisture loss is a direct function of storage. At lower temperature there is less moisture loss if the parkage is correctly wrapped.

Q. Ferreira: What does the Food and Drug Administration say concerning labeling of a five pound package? Can you say "five pounds when packed"?

A. Strasburger: The contents must weigh the amount stated when it is opened by the consumer.

Pinson: We add to five pound packages three ounces of raw and six ounces of peeled shrimp to compensate for losses.

Q. Fieger: What is the allowable amount of breading that can be added in breading shrimp?

A. Duggan: No standard has been established as yet but industry recommendations are for: "greater than 42 count—up to 50 per cent breading; less than 42 count—up to 42½ per cent breading." Army requirements call for 29 per cent batter.

Q. Sahlman: How much batter do you put on your shrimp?

A. Duggan: To 100 pounds non-peeled shrimp (which produce 85 pounds peeled) we add 30 pounds of batter, to make up 115 pounds of the breaded product.

Q. Sahlman: Would the addition of water to batter be of advantage in freezing and cooking?

A. Duggan: This was tried and did not work well since when cooked the water comes out in the grease.

Q. Fieger: What effect has salt and time of blanching on the yield?

A. Robinson: Blanching takes three to eight minutes at 33-40° salometer reading. Cooking losses can be high.

Q. Jackson: What is the storage life of canned shrimp?

A. Robinson: Thirty months, although we are still testing 15 year old packs. (These are not in top market condition!)

Q. Jackson: What preservatives do you add?

A. Robinson: None.

Q. Wegmann: Which do you find best, truck or boat deliveries of shrimp?

A. Robinson: From distant points like Apalachicola it is better to transport shrimp by truck. Catches taken directly from the boat are usually best, however.

Q. Wegmann: Can the consumer tell the age of a shrimp pack by looking on the can?

A. Robinson: No. However, since War II production has never caught up with demand and the consumer does not need to worry about buying old shrimp.

Q. H. Taylor: Has a satisfactory method been found to anticipate spoilage of seafood products?

A. Hampton: No method has been found as yet. Spoilage is a combination of rancidity and of decomposition of protein.