

# Quality Control

## A Model Program for the Food Industry

The dictionary defines *quality* as an important character, a degree of excellence or a necessary attribute. A group of activities designed to assure a standard of excellence is called **Quality Control**.

Food is basic for life. Quality or excellence in our food supply should be an important concern to all food processors. Safety and wholesomeness are the most important attributes of food quality. The lack of quality as it relates to safety and wholesomeness can result in personal injury, sickness or death. Food-borne illness is an example of sickness or even death when unsafe foods are produced and eaten.

Certain foods or food products are defined by regulations or policies called standards of identity. These standards of identity are definitions for a specific food product to avoid confusion or mislabeling of similar processed foods. Milk is a good example. The standard for skim milk is less than 1/2 percent fat, while the standard for whole milk is at least 3-1/4 percent fat. Quality defined by regulations, policies or standards is controlled by federal and state agencies. Failure to meet the degree of excellence defined by the regulations, policies or standards of identity is illegal.

The government-controlled attributes of food are another important measure of food quality. Therefore, the first category of food quality is **critical attributes** and includes factors that affect safety, wholesomeness or legality.

<b>Commitment + Awareness + Teamwork + Communication + Quality Control</b> <b>= Safe, Wholesome and Consistent Food Products</b>
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**Figure 1.** Quality is everyone's business. The organizational structure, a reporting system and open communication are necessary for success.

Besides the critical attribute of safety, other properties of the food product should be used to define overall quality. These other attributes are defined by industry, the processor or consumer demand. An example of this is the particle size of flour, the shape of a frankfurter or sausage or the color and flavor of salad dressing.

Two other categories that classify or describe additional quality characteristics of food products are called **major and minor attributes**. A major attribute is determined to be necessary for the food but not essential from a safety and legal standpoint. A major attribute could be fat content of hamburger meat or the portion weight of green peas in a frozen prepared dinner. A minor attribute is wanted but not absolutely essential to the product or not easily determined. For instance, the desirable flavor properties

of foods are highly subjective (dependent upon people), not easily measured and should be a minor attribute. However, flavor defects that can reduce sales should be classified in the major category.

The critical, major and minor attributes usually describe the key chemical, physical, and microbiological properties of a food. The manufacturing process and many known or unknown factors will affect the finished product. Therefore, a control program is the tool for the food processor to use to assure that quality targets are met.

Finally, to develop a quality control program, you must define expected food quality to provide a system of quality measurement, allow a means for action not reaction, help to minimize costly errors, and reduce the risk of food safety and wholesomeness defects. What is needed for a quality control program? The first step is a strong commitment from management. Quality control must have the same priority as the profit and loss statement for the business.

**Quality doesn't cost, it pays.** Beyond commitment, management must instill quality aware-ness throughout the organizational structure. A successful quality program needs people. It is important that the food operation personnel function as a team and openly communicate to identify problems, issues or opportunities. Once key elements of a quality control program are in place (management commitment, quality awareness, a team effort and open communication), develop and use additional tools.

The basic tools of quality control are:

- ❑ Ingredient Specifications
- ❑ Approved Supplier List
- ❑ Product Formulas
- ❑ Product Standards (Specifications)
- ❑ Manufacturing Procedures
- ❑ Critical Control Point Identification/Sampling Program
- ❑ In-Process Analysis, Records and Reporting Packaging Specifications
- ❑ Label Specifications
- ❑ Cleaning and Sanitizing Program
- ❑ Good Manufacturing Practices (GMP) Requirements
- ❑ Recall Program
- ❑ Warehousing, Shipping and Receiving Program
- ❑ Laboratory Analysis



**Figure 2.** Dry Ingredient Storage Area. Keep materials, ingredients and supplies off the floor and in closed containers. Repair torn bags.

## Ingredient Specifications

The quality of the finished food product after manufacture depends on the quality of the raw materials and ingredients. The best starting point for developing ingredient specifications is the supplier. Ask for a copy of the supplier's ingredient specifications. Review the information and modify the specifications to your needs. Discuss and settle specifications with the supplier. At times, specifications need to be negotiated with suppliers. Custom specifications from suppliers are possible. The ingredient specifications should be documented in a form consistent with the processor's needs. Ingredient specifications document should include:

- ☐ Name of Ingredient
- ☐ Internal Code Number
- ☐ Effective Date
- ☐ Basic Description of Ingredient Specifications categorized as:
  - ☐ Critical
  - ☐ Major
  - ☐ Minor
- ☐ Action and Reject Levels
- ☐ Ingredient Statement

The prepared ingredient specifications become a tool for control. The information under each heading should be simple but informative. Figure 3 is an example of an ingredient specification. It is simple and informative. The basic description is short and to the point. Critical specifications include two items associated with public safety. Critical specifications can also include factors influencing wholesomeness or legality. Action levels are used as a reference point to identify a potential problem. If the ingredient consistently reaches action levels, notify your supplier. The reject level is the point of refusing delivery of the ingredient. The ingredient statement for the raw material is a reference point to assure that the supplier has not changed the material. The final key point for ingredient specifications is for the supplier to know and agree to the content of the document.

**Figure 3.** An Ingredient Specification Document

Ground Black Pepper		
<b>Code Number:</b> A-001		
<b>Product Description:</b> Ground black pepper shall be prepared from the dried, immature berries of <i>Piper nigrum</i> . The color can vary from light-gray to a speckled black-gray.		
<b>Effective Date:</b> Today's date		
<b>Critical Specifications:</b>	<b>Action Level</b>	<b>Reject Level</b>
Salmonella	None	Positive in 100
<i>E. Coli</i>	None	Positive
<b>Major Specifications:</b>	<b>Action Level</b>	<b>Reject Level</b>
Granulation	4.5% (retained on a U.S. #35 sieve)	>5%
Volatile Oil	2.5%	<2%
Moisture	11.5%	>12%
Color	light-gray to black-gray	off-white to light gray
Yeast/Mold	<100 per gram	>100 per gram
<b>Minor Specifications:</b> None		
<b>Ingredient Statement:</b> Ground Black Pepper		

## Approved Supplier List

For each ingredient, an approved supplier list should exist and be available to individuals responsible for purchasing and quality control. In theory, more than one supplier per ingredient is desirable. A good target is three suppliers per ingredient. A supplier is an ingredient manufacturer, a broker or a distributor. When necessary, identify both the manufacturer and distributor on the approved supplier list.

Approve all sources of supply only after careful evaluation and review of their performance in the product. For approving alternate ingredient sources two key questions are:

- ☞ Does the ingredient meet the existing or needed specifications?
- ☞ Does the new ingredient provide the same or desired finished product?

At times, only one acceptable supply source may be available because of special requirements. In this case, alternate sources should be listed for emergency purposes. The emergency source of the ingredient should be one that has been tested and best approaches all specifications.

The approved supplier list should contain the following information:

- ☐ Ingredient Name and Internal Code.
- ☐ Supplier Name, Address, Key Contact and Phone Number.
- ☐ Trade Name of Ingredient.
- ☐ Supplier Code Number.

## Product Formulation/Recipe

Proprietary formulas are important. For each food product, written documentation of the formula or recipe should exist and be available for use by selected individuals. The formulas should be used daily as a means to assure consistency between batches, lots and even days of production. Manufacturing personnel need to know the recipe to assure that the product is formulated correctly. For highly confidential formulas, the production worker does not need all the details. A simplified recipe can be provided to assure that the secret stays a secret.

The individual formula sheets can have a variety of formats. Key aspects of any formula document are:

- ☐ Name of the product.
- ☐ Internal code number.
- ☐ Effective date.
- ☐ Listing of the ingredients.
- ☐ Listing of the ingredient code.
- ☐ Percentage formula.
- ☐ Batch formula.
- ☐ Batch yield.
- ☐ Ingredient statement.

Additional information that can be part of a formula document are packaging, lot size, regulatory constraints, net weight, package count per batch, etc. Be flexible with the format since the formula may purposefully be modified and the kind of information needed may change. If nothing else, the batch size may change due to business growth or decline.

Figure 4 is an example of a formula sheet.

**Figure 4.** A Food Product Formula Document.

<b>Chili Without Beans</b>			
<b>Code Number:</b> B-001			
<b>Effective Date:</b> Today's date			
<b>Ingredients</b>	<b>Code</b>	<b>% Formula</b>	<b>Batch Formula (lbs.)</b>
Beef, 75% lean	A-002	40.00	240.0
Tomato Paste, 32% T. S.	A-003	11.74	70.4
Water	A-004	40.00	240.0
Spice Premix	C-001	3.93	23.6
Corn Starch	A-005	4.33	26.0
		<b>100.00</b>	<b>600.0</b>
<b>Spice Premix</b>	C-100		
Chili Powder	A-006	31.75	7 lb. 8 oz.
Salt	A-007	21.17	5 lb.
HVP	A-008	19.05	4 lb. 8 oz.
Sugar	A-009	12.70	3 lb.
Cumin, grd	A-010	6.35	1 lb. 8 oz.
Onion powder	A-011	5.85	1 lb. 6 oz.
Oregano, grd	A-012	2.37	9 oz.
Garlic Powder	A-013	0.76	3 oz.
		100.00	23 lbs. 10 oz.
<b>Batch Yield:</b> 600 lbs.			
<b>Finished Product Yield:</b> 595 lbs.			
<b>Ingredient Statement:</b> Beef, Water, Tomato Paste, Corn Starch, Chili Powder, Salt, Hydrolyzed Vegetable Protein, Sugar, Spice, Onion Powder, Garlic Powder.			

## Product Standards

A key tool to assure quality in a finished processed food is the product standard document. Product standards define the food by physical, chemical and microbiological characteristics. Appearance, aroma, flavor and texture can and should also be considered for product standards.

Physical characteristics include size, shape, dimensions, weight, volume, count per package or container, presence of fines, or any other special features which define the particular food. Moisture, fat, protein, ash, fiber and carbohydrates are the basic chemical characteristics. Additional chemical criterion such as salt, sodium, cholesterol, etc., are used to chemically define food products. Chemical standards are necessary when using nutritional labeling or making label claims for low sodium, higher fiber or other nutritional facts.

Microbiological standards will be dependent upon the specific food item. First consider food poisoning organisms when developing product standards for a quality control program. Food safety is the responsibility of the processor. If the food product will support the growth of a potential food poisoning organism, identify the particular organism in the critical standards category as opposed to a major or minor standard.

Some typical food poisoning organisms are *Salmonella*, *Clostridium botulinum*, *Staphylococcus aureus* and *Clostridium perfringens*. Other microbiological standards such as a standard plate count (SPC), yeast or mold may be appropriate for classification as major or minor standards. For many products, especially those subjected to cooking or other thermal processes, use *Coliforms* and *E. coli* analyses to show and control post process contamination of cooked foods. Consider microorganisms that can cause food spoilage in a particular food product when establishing product standards. Yeast and mold counts are essential to control programs involving food

items with low or restricted moisture levels like flour or cereals. A simple standard plate count is always a good general indicator for tracking bacterial quality and should be considered at least a minor criterion.

The sensory properties of a food product are keys to the consumer acceptance. Flavor, texture, aroma and appearance are criterion that should be defined to assure that the product meets design expectations. Qualitative measures of sensory properties can be costly due to requirements for sophisticated equipment. Qualitative testing using taste panels, is an alternative to quantitative measurements. Make a sensory evaluation for flavor, odor and texture a part of a quality control program.

Establish a reject level for each product standard along with acceptable methodology. Base minimum reject levels upon regulatory requirements and practical production experience. If a method of measurement is nonexistent, then the standard is nonexistent.

The last element to product standards is a simple statement of ingredients as it will appear on the label. Figure 5 shows a format for product standards.

**Figure 5.** Food Product Standards Format

<b>Gravy and Beef Tips</b>		
<b>Code Number:</b> B-002		
<b>Product Code:</b> 1743		
<b>Effective Date:</b> Today's Date		
<b>Critical Standards</b>	<b>Standard</b>	<b>Method</b>
Meat Content	minimum of 35% meat (fresh basis)	Process Date
<i>Salmonella</i>	negative in 100g	#100
<i>C. perfringens</i>	<10/g	#101
<i>Staphylococcus</i> (coagulase positive)	<10/g	#102
<b>Major Standards</b>		
Meat chunks size	3/8" to 5/8" chunks	#200
Gravy color	(#3, 4 or 5)	Color Chart
Coliforms	<10/g	#103
<i>E. coli</i>	<10/g	#104
<b>Minor Standards</b>		
Gravy Texture	a smooth consistency & free of lumps	#300
Product Flavor	a mild meaty flavor & aroma	#301
Standard Plate Count	<25,000/g	#105
<b>Ingredient Statement:</b> Water, beef, flour, tomato paste, corn starch, salt, HVP, spices, sugar.		

## Manufacturing Procedures

For each product, document the method of fabrication or processing procedures to ease duplication from lot to lot, shift to shift and day to day. A simple way to approach this is a clear and concise "cookbook" approach. Key steps in the process which can impact upon yield, quality or production efficiency should be highlighted. Examples of key process steps might be "mix for 3 minutes before adding spices" or "cook to a minimum internal temperature of 145 degrees F." Several key points to consider when identifying important processing operations are time, temperature, equipment required, order of addition for ingredients and weight.

Manufacturing procedures also should include special instructions to the line worker or quality control personnel. An example instruction could be, "cross check" the net weight of five packages every hour. Figure 6 shows a simple manufacturing procedure to be used by production and quality control personnel.



Once prepared, make manufacturing procedures or portions of the procedures available to production employees. Use the document as an employee training tool.

Even with the best procedures, employees will find a “better” way to manufacture the product. Be open minded. If the new way is better, use it; if not, explain why. The key is for the employee to follow instructions.

**Figure 6.** Manufacturing procedures for use by production and QC personnel

Breaded Squash	
<b>Description:</b> Manufacturing Procedure	
<b>Date of Issue:</b> Today's Date	
<b>Authorized Products:</b> Code #1234	
Critical process control points are in <i>italics</i> .	
<ol style="list-style-type: none"><li>1. Remove stems and trim back blossom ends about ½". (#1) Operator shall trim away all damage caused by rot, insects, or mechanical abuse; QC shall monitor.</li><li>2. Wash the squash, rinse and sanitize with water containing 125 parts per million (ppm) chlorine for five (5) minutes. (#2) Operator shall adjust chlorine level; QC shall monitor.</li><li>3. Cross-cut squash into 3/16" thick slices.</li><li>4. Prepare batter according to Formula B-101. Load breading (Code 123) into breading machine.</li><li>5. Pass slices through the first batter/ breading operation. (#3) Batter viscosity shall be 80 ± 20 centipoise at 50°F. (Spindle #5, speed 50 on Brookfield Viscometer, Model RV) Operator shall adjust as required; QC shall monitor.</li><li>6. Pass battered/breaded slices through second batter/breading operation. (#4) Batter viscosity shall be 80 ± 20 centipoise at 50°F. (Spindle #5, speed 50 on Brookfield Viscometer, Model RV) Operator shall adjust as required; QC shall monitor. Every four hours, discard batter in second batter reservoir.</li><li>7. Freeze breaded pieces using spiral freezer. (#5) Packout group leader shall insure all product is solidly frozen before placing in boxes. QC shall monitor.</li><li>8. Prior to packing each lot, adjust tare on scale as determined by the average weight of 10 containers on this day. (#6) QC shall record the average container weight of 10 containers every day. Pack frozen squash into four-pound boxes. (#7) QC shall check five boxes per day for net weight (4 lb.) And one box per day for piece count. (#8) Group leader shall record all in-process data (chlorine level, batter viscosity, net weights) in process log.</li><li>9. Pack six boxes per shipping crate. Store in holding freezer at 0°F.</li></ol>	

## In-Process Records

It is important to know what is happening with the product and process during manufacturing. **In-process record keeping** is a way of obtaining the information. Both quality control and production personnel should participate in maintaining a daily manufacturing log. The specific product weight, temperature, size and shape, ingredient usage, product yield, scrap or waste, material balance and rework are examples of measurements made during the manufacturing process. Base the kinds of in-process measurements used in each operation upon what is called Critical Control Points.

A **critical control point** is a step in the process or in product formulation where small differences, changes or mistakes can cause the finished product to be a health hazard, illegal or costly to the business. Critical control points are identifiable (Figure 6). Some critical control points are defined by regulation when public health or product identity are of concern. Cooking temperatures, pasteurization time and temperature or allowable levels of ingredients are processing variables oftentimes defined by regulation.

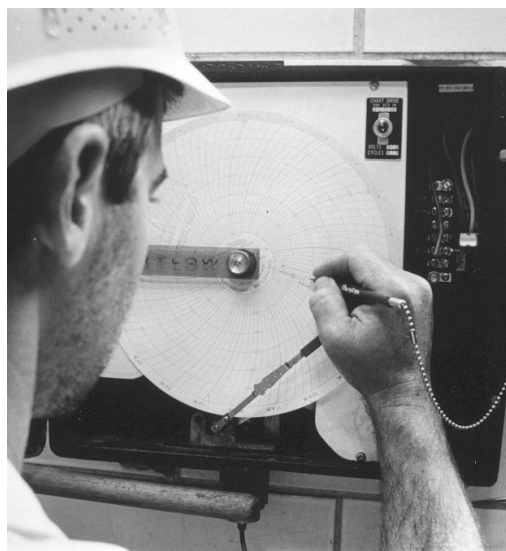
Critical control points may be self-imposed because of desired label statements on the part of the processor. Net weight is one example while nutritional labeling is another. The cost of a product can be increased by simple employee mistakes. In this case, critical control points in processing simply relate to those processing steps that influence yield or inferior product.

In-process record keeping can be a manual or automatic operation and in some cases both. Employee participation in record keeping provides an opportunity for pride in workmanship. In-process records also are a means of making adjustments to the product or process and preventing substandard product.

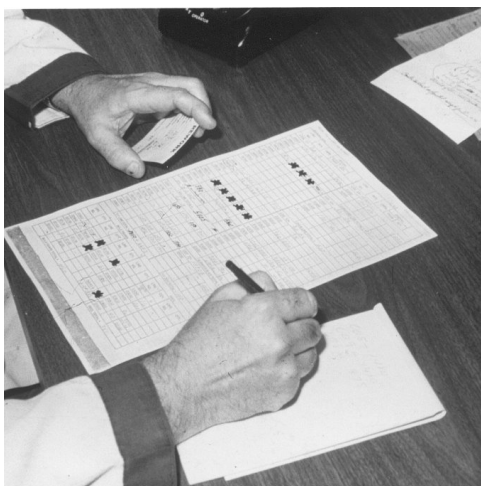
Turn in all in-process records to supervisory management for review at the end of a shift or working day. The supervisory review allows an opportunity to identify problem areas and to make changes to prevent reoccurrence. In some food processing operations, like a poultry or red meat facility, these records are available to the on-site USDA inspector.



**Figure 7.** In-line check weight of packaged product.



**Figure 8.** Employee records product change-over on in-process recording chart. Record processing data during operation, not at the end of the day.



**Figure 9.** Review and summarization of in-process data is necessary to minimize the change of a problem reoccurring.

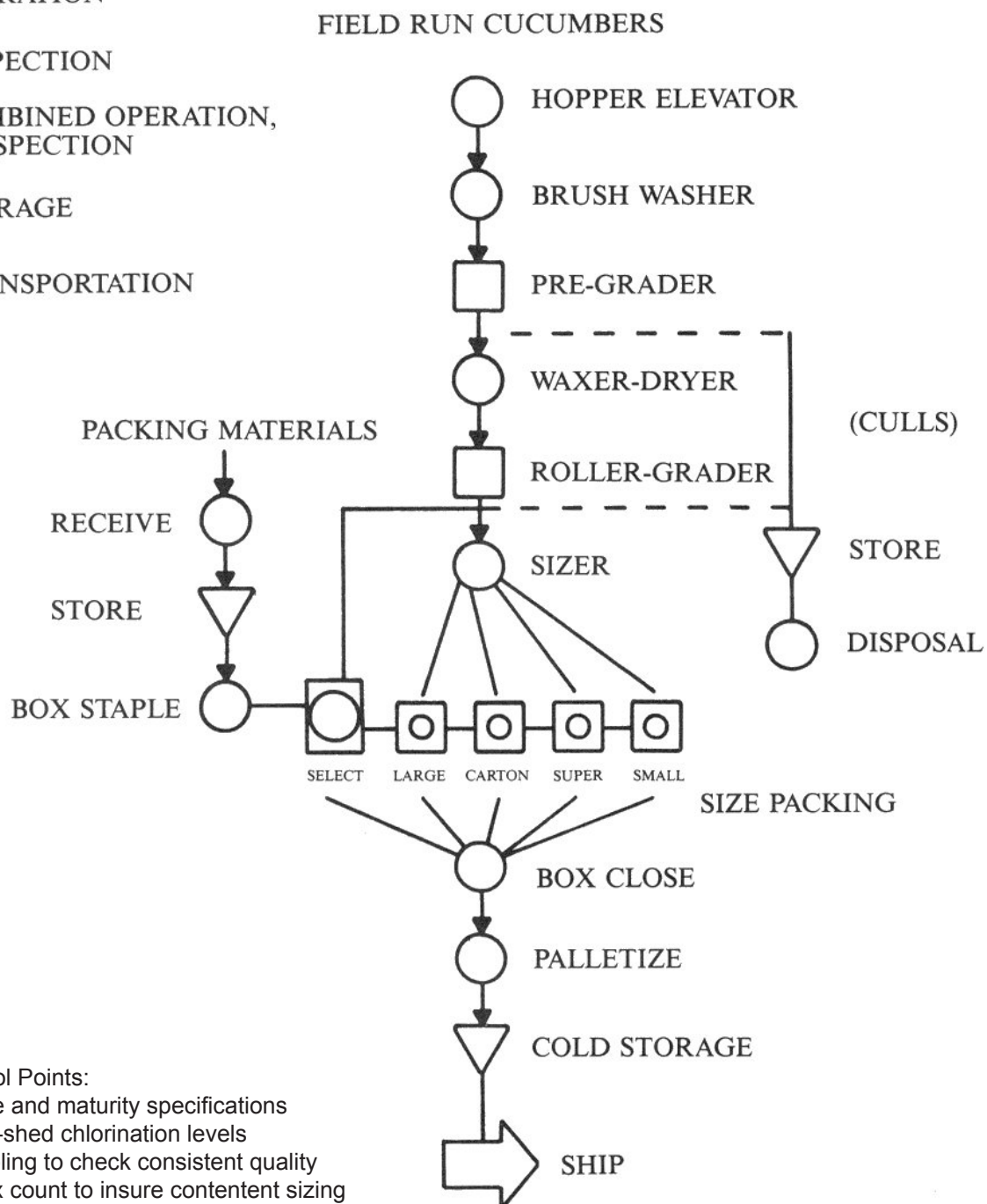
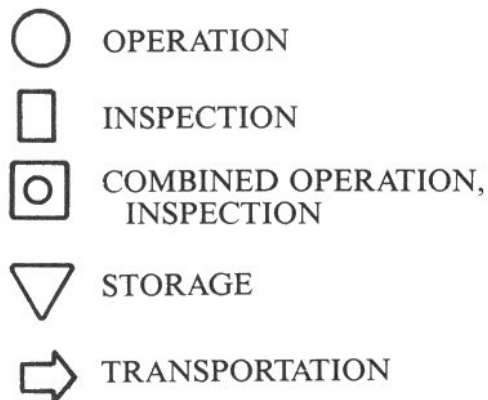


**Figure 10.** Attractive food packaging protects contents and helps assure customer satisfaction.



**Figure 11.** Critical Control Points from a Fresh Cucumber Process.

**LEGEND**



**Critical Control Points:**

- (1) Meets size and maturity specifications
- (2) Monitor in-shed chlorination levels
- (3) Line sampling to check consistent quality
- (4) Check box count to insure contentent sizing
- (5) Check product temperature to determine cooling needs

## Packaging and Labeling

A quality control program should include packaging and labeling. One of the first items that influence the consumer is the appearance of the package and the label.

Two basic packages are typically necessary for food products. The primary package encloses the food and has direct contact with the product. A film, jar, bottle, carton or box are some of the common primary packages. The secondary package is used to assemble multiple packaged food items for shipment. The shipper or secondary package provides protection, reduces handling of each individual bottle or carton and is necessary for efficient movement of goods to the consumer. Some packaged foods, particularly microwaveable products, have three package components: the pouch, the carton and the shipping case.

Poor packaging or labeling can create negative impressions relative to product quality. This is true for both simple and complex packages or labels. Packaging serves to protect the food product and allows shipment of multiple units. Items for packaging consideration are:

1. A statement from the supplier that the packaging is made of FDA and/or USDA approved materials. The package composition should be listed on the statement.
2. Dimensions of carton, jar, bottle or box.
3. Strength of the container and suitability for stacking, freezing or microwaving.
4. Strength of seals or fit of the lid. For heat sealed packages, the temperature requirements for sealing are critical.
5. Ability to restrict or allow air flow, moisture or light. Permeability, thickness, flexibility and temperature resistance are specific criteria in this category.
6. Graphics (illustration, picture or visual designs).
7. Label format and legal requirements.

Packaging must be selected or designed based upon the particular food item. Fresh fruits and vegetables require packaging that provides protection while allowing air flow for proper cooling and respiration. Dairy products require packaging to inhibit light penetration and excessive oxygen because of the potential for flavor defects due to oxidation, rancidity or the absorption of foreign flavor. A final example, the tea bag must provide permeability to moisture.

Package graphics, by words or pictures, define the contents and serve as point of purchase information. The law requires product name, ingredient statement and manufacturing or distribution location to be on the package. Government regulations list many requirements for packaging and even extend to specifying the size or type or printing. Pictures or other graphics are optional and serve to inform the consumer. Overall graphics must represent the contents of the container so mislabeling or misbranding does not occur. Some typical package and label defects are smears, scuffs, color variations, broken seals leaks, short fill and product infestation or spoil age. The defects can be found in both single unit packs and multi-packs (shippers).

It is to a food processor's advantage to develop packaging and label specifications along the same format as ingredient specifications.

Materials of construction are particularly important where direct contact with the food is involved. Certain chemicals or foreign materials from packaging materials can contaminate the food product. The packaging material must meet FDA and/or USDA requirements. Use a reputable packaging supplier. The manufacturer of the package is the main source for package specifications. Local distributors can obtain the needed information from the manufacturer.

Dimensions of the package, both inner and outer, are defined to prevent problems such as under or over-fill, shifting within the package, spillage or breakage of the container. Lack of control can be costly for product loss, giveaway or lost sales.

The strength of the container and the seals or the fit of the lid are important considerations. Failure with regard to these items can result in crushing, breakage or spillage. Most important is the potential for physical or microbiological contamination when a poor seal of improperly fitting cap is a package defect.

## Good Manufacturing Practices and Sanitation

Federal regulations define specific procedures to minimize the contamination of food products by people in manufacturing, processing packaging and warehousing facilities. The regulations are called Good Manufacturing Procedures (GMPs). GMPs are an integral part of quality control. It is the responsibility of food business management and ownership to know, practice, communicate and ensure that GMPs are carried out by employees. An overview of GMPs is as follows:

1. Individuals with communicable diseases cannot work in areas where food contamination is possible. This includes individuals with boils, sores or infected wounds.
2. Food handlers must follow good personal hygiene practices.
  - a. Wear protective clothing.
  - b. Clean and sanitize hands and gloves.
  - c. No jewelry.
  - d. Use gloves (non-absorbent) when the job requires hand covering.
  - e. Use effective hair restraints and covering.
  - f. Eat, drink or smoke only in designated areas.
3. Train employees effectively in hygiene, sanitation and pest control.

Along with GMPs, a cleaning and sanitizing program is essential. Cleaning and sanitizing should address three basic areas:

1. Exterior facility and grounds.
2. Internal facility including floors, walls, ceilings and ventilation system.
3. Equipment and all food contact areas.

A cleaning and sanitizing program prevents the build up of dirt and debris, maintains equipment in good repair, prevents growth and contamination from microorganisms and prevents the entry and harboring of insects and other pests. The quality program should: outline specific activities to be performed, any corrective measures, schedules for cleaning and sanitizing, identify approved cleaning compounds, sanitizers and baits and define a standard. Keep and maintain proper records.



**Figure 12.** Employees wear gloves, hair covering and protective clothing to assure food safety.

## Warehousing

Warehousing involves three activities (receiving, storage and shipping) that are included in a quality control program. The receiving operation is the foundation for processing finished food products of a designated quality. Guidelines for incoming shipments are:

1. Be sure the storage space is clean and consistent with the first-in-first-out rotation principle. FIFO or first-in-first-out rotation is the removal of inventory from storage in a systematic way where earlier stock items are used first. This can be accomplished by date coding the inventory according to the date of receipt.
2. Before unloading, inspect the condition of the carrier. Measure temperature, observe and note foul odors, spills, and insects. For refrigerated and frozen products, temperature is critical.
3. Observe the condition of the containers for damage which could be a source of contamination.
4. Collect random samples from the shipment and analyze or evaluate the samples in relation to specifications.
5. After unloading, inspect the condition of the carriers and notice the condition of the floors and walls. Take note of any dirt, filth or residues and evidence of previous spills.
6. Do not accept food, ingredient or packaging shipments combined with chemicals or poisonous substances.
7. If the shipment does not meet specifications, be prepared to reject all or part of the load.
8. Minimize dock time. Move refrigerated or frozen items directly into storage.
9. Date code all incoming shipments directly on the container or pallet load for stock rotation.

Improper storage can adversely impact upon the quality of materials, ingredients and finished product. Storage in an orderly manner under proper conditions of temperature and humidity is essential to quality. Certain supplies or ingredients may require segregation.

Rotate the inventory. If not properly managed items may ruin in storage areas.

Shipping is the final step in which a food business can have direct control on product quality. Ship items on a first-in-first-out basis and use the same guide-lines in shipping that you followed in receiving.

## Laboratory Analysis

The establishment of specifications and standards is meaningless without laboratory analysis or an evaluation program. Laboratory analysis is the phase in which a quality control program is implemented after product is produced. A sampling plan, along with an analysis frequency (time schedule defining how often analyses are made), is absolutely necessary.

Compile the methods of analysis used in the laboratory in a special working notebook. Micro-biological, chemical and physical analyses of food are available in the book, *Official Methods of Analysis*, published by the Association of Official Analytical Chemists. For some analyses, very simple methods are used in the laboratory. By example, for fruits or vegetables, color measurements and physical defects are sometimes determined by comparing the product to a chart. Other methods like a protein or fat analysis are more complicated and require specialized equipment.

Microbiological methods performed on product whether it is poultry, red meat, dairy, vegetable or seafood also requires special instruments and equipment. Incubators and an autoclave are necessary in microbiological analyses. An incubator is used to control temperature conditions and allow bacteria to grow so groups of bacteria (colonies) can be counted. An autoclave is like a steam cooker. This piece of equipment is used to sterilize laboratory glassware and destroy bacteria, yeast or mold after an analysis. Destruction of the microorganisms is important so safe disposal is possible.

Perform all laboratory analyses in a room away from the processing area. At times, a small food plant may not have a separate area. Therefore, there are three ways to obtain laboratory analysis results:

1. In-house lab.
2. Outside independent lab.
3. Combination of in-house and independent lab.

Appoint a qualified individual to conduct analyses, report the results and manage the job of quality control. Have laboratory tests results recorded and compared to the specifications or standards. Deviations from standards should be communicated so that additional action can be taken if necessary.

Many methods exist for the laboratory analysis of food. Examples of some methods are:

- ☐ Standard plate count, a microbiological method used to count the numbers of bacteria contained in a product.
- ☐ Yeast and mold count, a microbiological method used to count the number of yeast and mold in food.
- ☐ A chemical method (pH) which determines if a food is acidic, neutral or basic.
- ☐ Moisture, a chemical method to determine total water.
- ☐ Protein, a chemical method to determine the protein.
- ☐ Fat, a chemical method to determine total fat.

## Recall Plan

Product recall is having to bring back product from the distribution system. Every food business is susceptible to potential product recall. The public image of businesses can be destroyed during a recall if a well-organized plan is not implemented.

Why would a product be recalled? Products are recovered from distribution as a result of voluntary action by a business firm or involuntary action due to Food and Drug Administrative (FDA) action. The basic reasons for recall are best described by the FDA recall classifications:

<b>CLASS I</b>	As a result of a situation where there is reasonable probability that the use or exposure to a defective product will cause a serious public health hazard including death.
<b>CLASS II</b>	As a result of a situation where the use of or exposure to a defective product may cause a temporary adverse health hazard or where serious adverse public health hazard (death) is remote.
<b>CLASS III</b>	As a result of a situation where use of or exposure to a defective product will not cause a public health hazard

An example of Class I product recall would be contamination with a toxic substance (chemical or microbiological). A Class II product recall is where product is contaminated with food infection microorganisms, while a Class III example is where product does not meet a standard of identity.

Because of recall potential, a food business firm must be prepared for the worst situation. A recall plan should be developed and communicated to appropriate individuals within the firm before an emergency arises. The plan should include:

- ☐ An effective product coding system. Coding should be simple, yet broad enough to minimize financial loss. Date of manufacture, date code plus shift code, lot code or various combinations are possible.
- ☐ A record keeping system to identify and associate specific product, product code, carrier and destination.
- ☐ A list of key personnel and their assigned responsibilities for a recall. Select key personnel from each of the following areas: production, quality control, marketing, shipping/receiving and legal counsel.



- ☐ A communication system within the firm and a system into the distribution marketing shipping/ receiving channels and legal counsel. A communication system is critical to minimize rumor and the exaggeration or misstatement of the facts in and out of the business.
- ☐ Established procedures for evaluating and correcting situations.

A good recall program is like an insurance policy. The program will not prevent an adverse situation from occurring. It will, however, help the business and personnel prepare for a possible recall.

Food quality is an expectation of consumers. To meet this consumer need, every food business should develop and use an effective quality control program. Failure to meet consumer demand can cause a decline in product sales and profitability. A major product failure can totally destroy a business. Start or update quality control practices now, and continue to build the program for the future. In case there is doubt, ask two questions:

- ☞ Are we doing things right?
- ☞ Are we doing the right things?

## References

*How to Prepare A Quality Assurance Plan, Food Warehousing.* Department of Health and Human Services, Public Health Service, U.S. Food and Drug Administration.

Gravani, Robert B. *Food Science Facts for the Sanitarian, Dairy and Food Sanitation.* April 1986.

Rust and Olson. *Coping With Recalls, Meat and Poultry* Vol. 33, No. 3, March 1987.

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# Learning *for* Life

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