Building Trust in Philippine Food Products

The Importance of TESTING AND CERTIFICATION

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Consumer Expectations

- Customers are increasingly careful and discriminating about the food they buy and consume for themselves and their families.

- Food items sold should not only be delicious and nutritious but also clean, sanitary, safe, and compliant with the highest standards of hygiene.

Consumer Expectations

- Food items sold should not only be delicious and nutritious but also clean, sanitary, safe, hazard free and compliant with the highest standards of hygiene.

Shared Responsibility

- Responsibility for clean, safe, hazard free food is shared by:
  - *food producers*
  - *processors*
  - *regulatory agencies*

Food Industry

- In the food industry, the importance of food sanitation and safety cannot be overemphasized. You owe it to your customers; you also owe it to yourselves if you want to stay in business in a sustained way.

Safety System Basics

- Only *safe* and *wholesome* foods may be marketed
- Regulatory decision-making is *science-based*
- Government has *enforcement* responsibility
- Manufacturers, distributors, importers, and other are expected to comply and face *liability for noncompliance*
- Regulatory process is *transparent* and accessible to the public

Key Requirements for Demonstrating Food Safety

- Food Safety Management Systems (*ISO 22000, HACCP, GAP)*
- Regular Surveillance mechanism
- Credible testing laboratories (ISO17025; ILAC-MRA)
- Food Certifications

WHY TEST?

Food testing and analysis play a crucial part in our everyday lives.

Food safety testing ensures that the food we eat is safe for consumption

Nutritional analysis provides details on the ingredients of food

Food chemistry testing provides the levels of additives and contaminants in food we would otherwise not know about.

WHY TEST?

- Meeting product specifications (inputs and finished product)
- Baseline development and identification of risk factors
- Process capability/validation
- Process verification
- Investigative testing and remedial activity verification
- Verifying that regulatory guidelines have been met.

Food Safety Management System

- Food safety is an integral part of the production of all foods and the shared responsibility of all segments of the supply chain.

- In recent times there has been increased awareness for the need to evaluate the food safety practices in the production of agricultural products.

Food Safety Management System

- Microbiological testing is not a guarantee of product safety. It is one component of an overall food safety system. Before microbiological testing is initiated, prerequisite programs must be in place.

- These programs should be appropriate to the specific operation

Food Safety Management System

- **The following Prerequisite Programs maybe adopted:**
  - Good Agricultural Practices (GAP)
  - Good Manufacturing Practices (GMP)
  - Sanitation Practices
  - Hazard Analysis Critical Control Point (HACCP)
  - Traceability and Recall Management

Good Agricultural Practices (GAP)

- Organic agriculture includes all agricultural systems that promote the ecologically sound, socially acceptable, economically viable and technically feasible production of food and fibers.
- Organic agricultural dramatically reduces external inputs by refraining from the use of chemical fertilizers, pesticides and pharmaceuticals.

Good Agricultural Practices (GAP)

- It also covers areas such as, but not limited to soil fertility management, varietal breeding and selection under chemical and pesticide-free conditions, the use of biotechnology and other cultural practices that are consistent with the principles and policies of this Act, and enhance productivity without destroying the soil and harming farmers, consumers and the environment

Good Manufacturing Practice (GMP)

❖Product specific GMPs

- thermally processed low-acid canned foods
- acidified foods
- bottled drinking water

Good Manufacturing Practice (GMP)

❖ **Production and Process Controls**

- end results emphasized
  - *ensuring that no adulterated food enters marketplace*
  - *terms used subject to variation in interpretation*
- raw materials and ingredients properly
  - *inspected, analyzed*
  - *segregated, stored*
  - *handled*

Hazard Analysis Critical Control Points (HACCP)

- the implementation of **Hazard Analysis and Critical Control Points (HACCP)** programs in several sectors of the food production industry gives consumers the trust that food supplied is safe
- HACCP programs require detailed and comprehensive identification of potential hazards that are “reasonably likely to occur.”

Hazard Analysis Critical Control Points (HACCP)

❖Hazard Analysis Critical Control Point

- To monitor and control production processes
- Identify food safety hazards and critical control points
    - Production, processing and marketing
    - Establish limits
    - Monitor
- Applied to meat, poultry, and eggs

Good Manufacturing Practice (GMP)

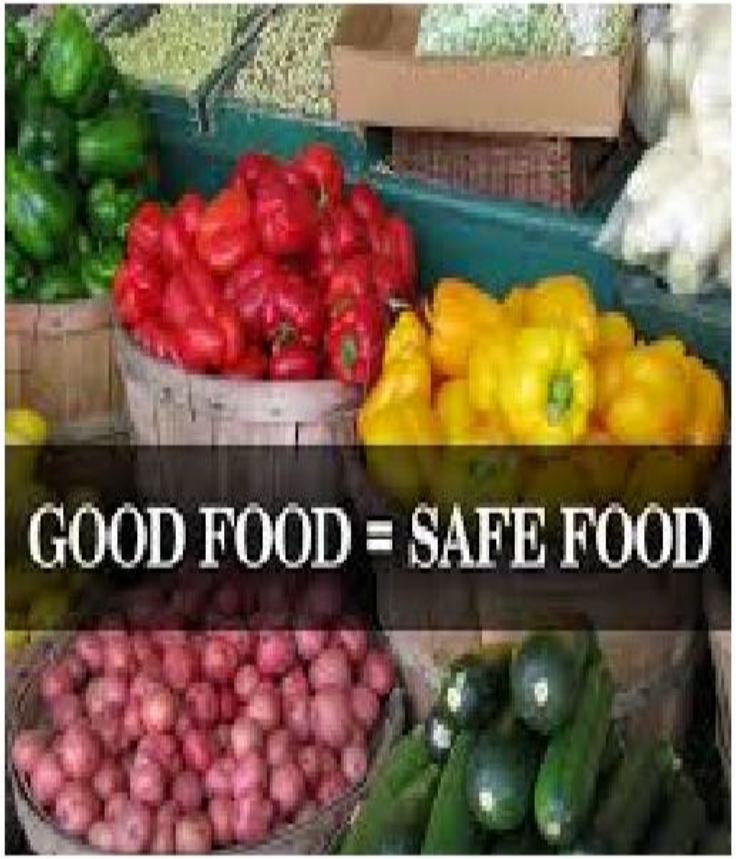
❖Production and Process Controls

- manufacturing operations must be monitored
  - *pH, water activity, temperatures*
  - *elimination of metal from product*
- personnel should be trained and aware of GMP requirements

Regulating the Quality and Safety of Foods

"THE FOOD YOU EAT
CAN BE EITHER
THE SAFEST
&
MOST POWERFUL
FORM OF MEDICINE
or
THE SLOWEST
FORM OF POISON."

Ann Wigmore



Regulating the Quality and Safety of Foods

❖**Regulatory Issues:**

- Food Additive Regulation
- Labeling
- Novel Food Processing
- Standardization
- Responsibility (liability)
- Food Irradiation
- Genetic Modifications
- Consumer protection

Testing and Methods of Analysis

- To ensure food safety and quality, food samples require certain tests and analyses.

Testing and Methods of Analysis

Types of Methods use for Testing

On-site – inside the manufacturers plant

Off- site – outside by an independent laboratory; provides a higher degree of precision with a more expanded list of parameters; requirement for regulatory purposes

Testing and Methods of Analysis

❖**Areas of Food Testing**

- Nutritional Labeling
- Certificate of Analysis
- Micronutrient Composition
- Macronutrient Composition
- Microbiological Analysis
- Specialty Quality Control
- Plant and Equipment Sanitation
- Water Activity Testing

Testing and Methods of Analysis

❖ **Areas of Food Testing**

- Food allergen testing
- Food chemical analysis
- Food contact tests
- Food contaminant testing
- Nutritional analysis and testing
- GMO testing

Testing and Methods of Analysis

❖ **Areas of Food Testing**

- Melamine contamination testing
- Microbiological tests
- Spiral plating for bacterial count
- Pesticide residue testing
- Veterinary drug residue testing
- PCR food testing

Testing and Methods of Analysis

❖Microbiological Testing

- Food microbiology is the study of microorganisms that play major roles in food processing and preservation, general food quality, and may even occur naturally within certain food types. It is important to understand these microorganisms and their relation to the food industry in terms of food spoilage, food-borne illness, or food-related intoxication.

Testing and Methods of Analysis

❖**Understanding food pathogens**

- Microorganisms (microbes) in the environment – some are harmless, some are beneficial, and others cause food spoilage and breakdown.

- A small number of microbes have the potential to cause food poisoning and known as "**human pathogens**".

Testing and Methods of Analysis

❖PATHOGEN TESTING

- A pathogen is any agent (bacteria, virus, etc.) that may cause human or animal illness or disease.

Testing and Methods of Analysis

❖**Sources of human pathogens**

- From planting through to transport to customers, there are many opportunities for human pathogens to contaminate fresh produce.
- Preventing human pathogens from contaminating fresh produce during growing, harvesting, packing, storing and transport to customers is the best way minimize the risk to consumer health.

Testing and Methods of Analysis

- **Controlling Pathogens: Pathogen Testing**

➢ Bacteria

- Salmonella
- E.coliO157:H7
- Listeriamonocytogenes
- Campylobacterjejuni

➢ Viruses

- Norovirus
- HepatitisA

Testing and Methods of Analysi

- **Controlling Pathogens**:
  - Environmental Testing

- Environmental monitoring programs are a commonly used tool to assess microbial contamination and to track sanitation effectiveness in a processing facility.

Testing and Methods of Analysis

- Types of Test Methods

- Cultural Methods
- Immunoassay
- PCR (Polymerase Chain Reaction) Methods

Testing and Methods of Analysis

❖ Validated Methods

- Important points to consider in the selection of a method:

  It has been validated for the material of interest.

  It has been validated against an internationally recognized official method such as

- AOAC International or Bacteriological Analytical Method (BAM).
- It has been validated through an independent validation study (internal or third party)

Common Microbiological Testing

Micro Testing and Analyses applicable to every major food product category:

Aerobic plate count (to indicate product quality)
Campylobacter (poultry products)
Clostridium botulinum species (canned vegetables)

- Coliform / *E. coli* (indicates food product quality and safety)
- *E. coli* O157:H7 (ground beef and unpasteurized juice products)
- *Lactobacillus* (salad dressings and vacuum-packaged products)
- *Listeria* (meat, vegetables, deli salads, RTEs, and dairy)

- *Pseudomonas* (fresh meat, poultry, and fish)
- *Salmonella* (meat, poultry, vegetables, and dairy products)
- *Staphylococcus aureus* (deli salads, processed meat, and poultry)
- *Vibrio* (fish and seafood)
- Yeast and mold (sauces, dressings, beverages, and dairy products)

N utritional Labeling

4-methylimidazole (MeI) analysis
Carbendazim analysis
Trans-fat Analysis
Sugar profile analysis
Vitamins and minerals analysis
Omega-3 fatty acids
Food allergen detection
Aflatoxins
Acrylamide
Trace metals and organics

Specific Food Contact Analyses

21 CFR 172.878 (1) Readily Carbonizable Substance
21 CFR 172.878 (2) Lim. Sulfur Containing Compound
21 CFR 172.878 (3) UV Absorbance Limit
21 CFR 175.300 Nonvolatile 8% Alcohol Extractives
21 CFR 175.300 Nonvolatile DI Water Extractives
21 CFR 175.300 Nonvolatile Heptane Extractives
21 CFR 177.1520 Extractable Fraction in 2 solvents
21 CFR 177.1550 Fluoride Extractives (8% Alcohol)

Specific Food Contact Analyses

21 CFR 177.1550 Fluoride Extractives (DI Water)
21 CFR 177.1550 Fluoride Extractives (Heptane)
21 CFR 177.1550 Nonvolatile 8% Alcohol Extractives
21 CFR 177.1550 Nonvolatile DI Water Extractives
21 CFR 177.1550 Nonvolatile Heptane Extractives

Specific Food Contact Analyses

21 CFR 177.1630 DI Water Extractives
21 CFR 177.1630 Ethyl Alcohol Extractives
21 CFR 177.1630 Heptane Extractives
21 CFR 177.1810 Styrene Block Polymer Extracts
21 CFR 178.3620 (b) (i) Saybolt Color
21 CFR 178.3620 (b) (ii) UV Absorbance Limit

Specific Food Contact Analyses

21 CFR 178.3620 (c) (1) (i) Initial Boiling Point
21 CFR 178.3620 (c) (1) (ii) Color
21 CFR 178.3620 (c) (1) (iii) UV Absorbance Limit
21 CFR 178.3910 Nonvolatile 8% Alcohol Extractives

Specific Food Contact Analyses

21 CFR 178.3910 Nonvolatile DI Water Extractives
21 CFR 178.3910 Nonvolatile Heptane Extractives
21 CFR 178.3910 Nonvolatile Toluene Extractives

Food Pesticides Residue Analysis

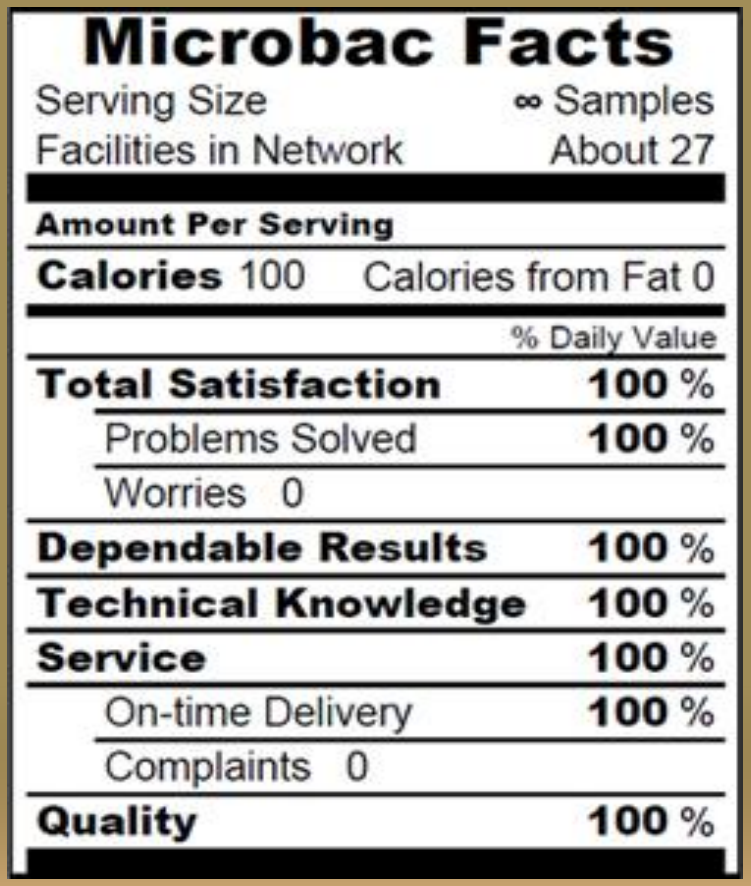
Pesticide residue analysis such as organochlorine pesticides is performed using instrumentation, including GC/MS/MS or LC/MS/MS

GMO Analysis

GMOs are organisms, usually plants, that have had a portion of their genome modified and are created when foreign genetic material (DNA) is introduced into the host's DNA. GMOs are typically some type of commercial crop such as tomatoes, soybeans or corn.

- PCR-based analysis of the DNA from these crops is conducted to determine whether sample contains any GMO material.

Nutritional Analysis



Microbac Facts

Serving Size	∞ Samples
Facilities in Network	About 27
Amount Per Serving	
Calories 100	Calories from Fat 0
	% Daily Value
Total Satisfaction	**100 %**
Problems Solved	**100 %**
Worries 0	
Dependable Results	**100 %**
Technical Knowledge	**100 %**
Service	**100 %**
On-time Delivery	**100 %**
Complaints 0	
Quality	**100 %**

Nutritional Labeling

Proper nutritional labeling to any food product in compliance to FDA regulatory requirements

Drug Residues in Imported Seafood

One of the major food safety concerns of the FDA is the presence of unapproved antibiotics and antifungal chemicals in imported seafood.

- **Chemical Analysis of Aquaculture Drug Residues**
- Several methods have been developed recently for aquaculture drug residues. The best and most sensitive use a high-performance liquid chromatograph interfaced to tandem mass spectrometers, (LC-mass-spec-mass-spec or LC/MS/MS). This instrument significantly reduces the background signal and, therefore, allows the measurement of organic compounds at very low levels, in the parts-per- trillion range, for many compounds.

Chemical substances play an important role in food production and distribution.

Many chemicals are intentionally included in our daily diet, for instance; food additives, colors and flavorings. Moreover, a number of chemical substances are present in the environment as pollutants. These contaminants are unintentionally present in raw materials used in food production and distribution and can often not be avoided.

- The right balance between risks and benefits of substances that are used intentionally and the reduction of contaminants in the human food chain is an important food safety goal toward consumer protection in every country in our globe.

Water Quality and Safety

- Be aware of potential sources of pathogens from your water sources
- Maintain wells in good condition
- Be aware of current & historical use of land
- Consider practices to protect water quality
- Consider irrigation water quality & use
- Microbial testing of water

Testing Frequency

Flowing Water (rivers, streams)

4 times per year

Impounded Water (ponds, lakes)

3 times per year before season begins

Processing Water

- Practices that ensure & maintain quality
  - -sampling & micro. Testing
  - -develop SOP's for all processes using water
  - -clean/sanitize water contact surfaces
  - -install backflow devices & legal air gaps
  - -routinely inspect equipment used to maintain quality

- Consider the water temperature for certain produce
- Maintain efficacy of antimicrobials
- Use appropriate wash methods

Monitoring Water Quality

- One of the most important factors growers need to consider is the safety of water that comes into contact with the harvestable portion of the crop, including water used for irrigation, frost protection, and post-harvest cooling and washing. When present, pathogenic microorganisms in water pose a significant risk to the safety of fresh produce it comes into contact with.

Possible Contaminants

Water treatment chemicals

disinfection by products (DBP) and fluoride

Fertilizer pollution

(NO_3 and NH_3)

Drugs

Acetaminophen, caffeine, 1,7- dimethylxanthine

Synthetic chemicals

used in chemical industry and in plastic production - acetaldehyde, isobutane, nonanoic acid, toluene

Bacterial contamination

Arsenic, Lead, Cadmium, Mercury. Chromium

Pesticides

Radioactive pollutants

Nutritional Fact (in label)

Type of Water	Parameters
Distilled Drinking Water *(Absolute, Wilkins)*	Calories, Total Fat, Total CHO, Na, Protein (all reported as zero)
Mineral Water *(Hidden Spring, Hidden Valley, VIVA)*	pH, TDS, Ca, Mg, Na, K, bicarbonates, sulfates, chlorides
Purified Drinking Water *(Crystal Clear, Nature's Spring, Pure Water, Aqua Life)*	Calories, Total Fat, Total CHO, Na, Protein (all reported as zero)

Basic on-site QC monitoring parameters

- pH
- Temperature
- Conductivity
- TDS
- Resistivity *(0.05 – 2 M ohms/cm)*
- ORP
- Ozone residual *(0.1 – 0.4 ppm)*
- Chlorine
- Other specific ions
- Microbiological *(coliform and HPC)*
- Turbidity

Water Quality's Impact on Produce

In recent years, there have been numerous recalls and illness outbreaks involving E. coli 0157:H7 or Salmonella traced back to lettuce or spinach greens. There have been a number of other incidents involving previously-unseen occurrences of Salmonella in tomatoes, peppers and most recently in papayas. It is believde that E. coli 0157:H7 is associated with beef, and that Salmonella is associated with poultry products. So how, then, can these organisms occur in vegetable and fruit products?

Water Quality's Impact on Produce

The other potential sources of contamination at the farm that can and must be controlled - namely, runoff water from property adjacent to the farm; irrigation and processing water quality, and the quality of products such as fertilizers or compost that are used to grow crops to maturity.

Water Quality's Impact on Produce

Microbiologically, these may include coliform bacteria, Shigella, enteric viruses such as Norovirus and Norwalk, and parasites such as *Cryptosporidium* and *Giardia*. Chemically, the potential contaminants can include heavy metals, pesticides, herbicides, and a host of other organic chemicals. Public potable water producers are required by law to address many of these potential contaminants in their testing plans on some predetermined schedule.

Water Quality's Impact on Produce

There is no safe substitute for a well-designed testing plan to ensure that water of appropriate quality is used to irrigate farmlands. The testing of irrigation water on processing company-owned farms should be an integral part of the quality management plan for the processor; farms not owned by the processor should be contractually obligated to regularly provide certificates of analysis for their irrigation water attesting to the quality of the water.

Water Quality's Impact on Produce

- The most basic analyses for water quality (total coliforms, salmonella, nitrates, etc.) should be monitored on a regular basis, while other testing may be done on a less frequent basis unless initial results indicate problems requiring corrective action (Cryptosporidium, Giardia, Shigella, Enteric Viruses, and pesticide residues, to name a few).

Water Quality's Impact on Produce

- Regular water testing can give you useful knowledge about the safety of water and how it might vary during the season or from year to year. Water testing labs test for *E. coli* instead of *Salmonella* spp., *Listeria monocytogenes*, hepatitis A virus, parasites, and other sources of human illness because it can be a useful indicator of these and other pathogens.

Food Product Certification

- One of the ways customers assure themselves of the safety and purity of their food purchases is by looking at the FDA (Food and Drug Administration) certification in product labeling/packaging.
- The FDA or the Food and Drugs Administration is the government agency tasked to ensure that food — as well as medicines and drugs – sold in the local market are safe for consumption.

Food Product Certification

- Department of Agriculture
- **ORGANIC PRODUCTS**
- Good Agricultural Practices (GAP) Certification Program
- Good Animal Husbandry Practices (GAHP) Certification Program

Department of Agriculture

- PLANTS AND BY PRODUCTS

- Seed Certification
- Phytosanitary Certificate

Department of Agriculture

- FISH AND BY PRODUCTS

- Clearance to Import Live Fresh/Aquatic Animals

Department of Agriculture

- MEAT AND BY PRODUCTS

- Inspection of Imported Meat and Meat Products
- Meat Inspection Certificate

Department of Agriculture

- **SUGAR**

- Sugar Export Clearance
- Molasses/Muscavado Clearances for Export
- Clearance for Release of Imported Sugar
- Certificate of Sugar Requirement of Processors of Sugar-based Products

Department of Agriculture

- SUGAR
- Clearances for Withdrawal/Inloading/Outloading for Export Sugar Shipment
- Certificate of Exchange Authority (CEA) on Swapping of Classes of Sugar
- Certificate of Verified "A" Export Sugar
- Certificate for Quota Eligibility (CQE)

Why is Accreditation critical to Food Manufacturers/suppliers?

- Minimizing Risk of producing Faulty Food Products entering the market
- Avoid Expensive Retesting
- Ease Export & import issues regarding Food safety

How can we define Accreditation?

- Procedure by which an Authoritative Body (PAB) gives formal recognition that a Body (laboratory) is competent to carry out a specific task (testing/calibration)

Mutual Recognition Arrangement (MRA)

- test data to be accepted between MRA member-countries
- reduces cost /reduces retesting of products
- mutual confidence among signatories scope of recognition
- mutual confidence in the technical competence of signatories and their accredited laboratories

THANK YOU

ASTS

ASTS Analytical Solutions and Technical Services, Iloilo Inc.
Jalandoni Estate Lapuz Iloilo City

we deliver TRUST that you can count on

DOH Accredited Laboratory for Drinking Water Analysis
Accreditation Number:
06 - 051 -14 -LW - 2

OUR MISSION:

To establish a world class testing center with state of the art facilities that meet international standards and ensures protection of human, health, safety and environment.

To be a leader in developing training programs relevant to the operations of the government and the industry.

To be a global service provider in testing, training and consultancy in support of the national quality infrastructure of the Philippines.