Raw materials (ingredients, processing aids, and packaging materials) are the foundation of finished food products. As such, they must meet regulatory requirements (safe and legal for your intended use) and your specifications (contribute to the functionality and quality of your process and product).

Historically, research and development worked alone when selecting a new raw material. But now a broad team of expertise is needed, due to increased access to unique and complex materials, global sourcing, handling methods, customer locations, and regulations. The team assesses if the material has limitations or may be too costly to handle, and determines if additional measures are necessary to prevent potential safety issues for the employees and product.

TRADITIONAL ROLES
A description of team responsibilities helps in the understanding of the diverse expertise needed to identify key raw material characteristics.

• Research and Development (R&D) – Invents the finished product to meet the customer’s expectations.
RAW MATERIAL SELECTION
R&D selects the appropriate raw materials based on functionality. Functionality can encompass multiple areas, such as providing identified characteristics of the finished product (binders, thickeners, type of resin for plastic packaging, etc.), organoleptic characteristics (flavor, color, aroma, texture), product safety characteristics (to lower the pH or water activity), and preservatives (extension of shelf life, color, or flavor retention, etc.).

CONSIDERATIONS IN SELECTION
Is there a raw material already in use that has the same or similar characteristics?

If so: Don’t add unnecessary complexity.

Resource: List of existing approved materials and their specifications.

Is this a raw agricultural item, commodity item, or one that has a standard of identity?

If so: Develop a general specification that can be used between multiple potential suppliers.

Resources: Supplier technical information, the standard of identity, food action defect level from regulations, comparison of different suppliers’ specifications from the Internet.

What are the limitations on the use of the raw material?
• No limits or qualifications, such as the Generally Recognized as Safe (GRAS) listing in the United States.
• Use has been limited to specific products.
• Limitations or ban on the use, such as genetically modified materials for organic products.

Resources: Supplier technical information, regulations for the country of sale, e.g., U.S. Code of Federal Regulations (CFR), Canadian Food Inspection Agency, European Commission, etc.

Are there legal, maximum levels for use, both in the country of manufacture and the country of sale/use?

Resources: Same as previous.

Does the raw material meet existing company or customer standards (e.g., kosher, halal, organic, gluten-free)?

PLANT DISCUSSIONS AND TRIALS
Trials require close collaboration between R&D and the manufacturing team. These examples of questions to be answered and the method for initiating discussions before, during, and after the trials will help facilitate the trial process.

OSHA Considerations
– Does the new material present a potential safety or handling concern to the employees or the facility (such as a flammable material or an irritating powder that needs venting)?
– Are there additional reporting requirements?

Food Defense Considerations
– Are there potential toxic levels of the raw material? If so, how is potential purposeful abuse handled?

POST-TRIAL DISCUSSIONS

Facility and Equipment Capabilities
– Can the plant appropriately handle the material (e.g., is sufficient storage capacity and special equipment or preparation available)?
– Is the existing equipment capable of handling the material (e.g., granularity is too large for the dispenser)?

Material and Production Costs
– Are there additional costs associated with the material, such as holding for COA review and/or in-house testing, additional labor, decreased line flexibility, increased time for changeovers, increased lead time prior to use (such as thawing, hydration and mixing, etc.)?
– Will additional rotation controls be necessary for short shelf-life materials and will there be additional costs affiliated with more frequent delivery?

Historically, research and development worked alone when selecting a new raw material, but now a broad team of expertise is needed.

Resources: Company standards, customer requirements, supplier technical information, supplier-provided certificates.
Flexibility in sourcing and cost

- Is the material a commodity-type item that can be purchased from multiple sources? If so, compare existing specifications from multiple suppliers; allow comparison bidding/purchasing.
- Can the tolerances for characteristics be expanded to be able to purchase from more than one source or a wider range of possible, existing materials (such as granulation size for materials that are going to be dissolved or melted)?
- Can purchasing find a similar functionality material that has costs less or has fewer concerns?

Size and type of packaging based on forecast use

Typically, the larger the container purchased, the cheaper the cost-per-pound. However, if the forecast is for use of 100 pounds in a year, what is the appropriate-sized container to purchase? It would not make sense to purchase in 50 pound bags (multiple unloadings of the package with resulting potential of damage or contamination) or in a Super-Sak (with destruction of, or potential use of, expired materials).

RAW MATERIAL SPECIFICATIONS

After the team has discussed and agreed upon the key characteristics for the raw material, the next step is to document these expectations. This can be as simple using as the dated Technical Data Sheet from the supplier. A purchase order should list the supplier’s specific name and item number for the material. A recommendation is to include the revision date of the Technical Data Sheet (with associated specifications).

As a company grows, or your requirements become more complex, the supplier’s information is expanded upon within your own specifications. At a minimum, the information should include technical and food safety information, including:

- The name of the product and the supplier’s item number.

PRODUCT NAME

General name

Material identification can be general for commodity-type products or those with a standard of identity, such as salt, granulated sugar, FD&C Yellow #5, and so forth. General names or descriptors ease use and sharing specifications, especially when soliciting and comparing prices between multiple suppliers.

Material-specific name

A product-specific name or number may be assigned by the supplier when the item is a unique or proprietary material (such as with most flavors).

Item number

This is the number you assign to the purchased item in order to track materials within your system.

COMPOSITION

The ingredient/material composition is listed in decreasing order of presence or as outlined in labeling regulations. For packaging materials, the specific composition of the packaging material would be specified, such as glass, polyethylene (PET), polypropylene (PPE), and so forth.

FOOD ALLERGENS

It is not unusual for a supplier’s Technical Data Sheet to state that the material does not contain an allergen; however, most U.S.-based suppliers are only considering U.S.-regulated allergens. If you are controlling more than these, ensure you receive written confirmation of the presence/absence of the allergens you are managing.

ORGANOLEPTIC INFORMATION

Organoleptic characteristics are tested with your senses, including visual appearance, aroma, and flavor. This brief description is typically used during the receipt or pre-use at the plant to confirm that basic expectations are met or identify issues that can be readily checked by appearance (puree rather than whole fruit), aroma (off odors such as musty or chemical), or flavor (caramelization with high fructose corn syrup or rancidity with oils).

ANALYTICAL INFORMATION

Analytical characteristics typically require testing with instruments rather than your senses. For example, an organoleptic description of a product could be “red liquid” and the analytical information would be the colorimeter reading.

Characteristics to be outlined include those affiliated with functionality, quality, and food safety. You do not necessarily need a Certificate of Analysis or in-house testing.
for all of the listed characteristics, rather, these characteristics are outlined as an agreement about what you are purchasing and as a basis for discussion if concerns are identified.

As described earlier, determining the key biological, chemical, and physical parameters requires R&D and plant management to review historic information about the material, regulatory requirements, and the supplier history, as well as how the material will be handled in-house.

Food safety parameters or tolerances could include biological, chemical, or physical characteristics:
- Biological – Microbiological limits for pathogens, such as Salmonella and Listeria monocytogenes.
- Chemical – Fortification levels, sulfite levels, heavy metal content, etc.
- Physical – Size and foreign material (rocks, glass, metal, bones, etc.)

Functionality or quality parameters would include characteristics that can impact the functionality of the material or adversely impact your product.
- Biological – Microbiological limits for spoilage organisms or indicators of poor sanitation, including total plate count, yeast, mold, and coliform.
- Chemical – Characteristics such as concentration levels or purity.
- Physical – Characteristics such as viscosity, color, granulation size, insect parts, crush strength, physical measurements, etc.

Outline the appropriate conditions for shipping and storing the material. Include any special storage or handling directions, such as “do not freeze” or “store in a flame-resistant cabinet.”

Following the supplier’s storage recommendations, describe the product’s shelf-life (the supplier’s safety and quality guarantee for the product).

Determine if there are special directions for handling the material, such as if employees need to wear a face mask or other personal protective equipment (PPE) or if the material needs to be shaken before use.

Additional information about a new or revised material may be vital to your company and customer. You may wish to stipulate these requirements in the raw material specification, such as:
- Packaging size and composition (such as a 25-pound, multi-layered paper bag; poly-lined corrugated box; Super Sak; bulk tanker).
- Religious dietary requirements such as halal or kosher as well as clarification if dairy or pareve.
- Where the material has been approved within regulations. This information can be found in the Code of Federal Regulations (CFR) for the U.S. This information can be received from the supplier or you can conduct a web search for “CFR + name of the raw material.”
- Colors – Is it a “certified color” (i.e., Yellow #5, Red #40) or “exempt from certification”?
- Flavors – Is the flavor artificial and/or natural?
- Organic – Does it meet the National...
A more in-depth knowledge of suppliers and materials is essential to meet FSMA requirements and purchaser expectations.

More and more raw materials are sourced from unfamiliar suppliers. In many cases, manufacturers never meet their suppliers, let alone inspect their facilities to ensure compliance with basic GMPs. However, there are new legal responsibilities for purchasers from the Food Safety Modernization Act, expanded industry expectations, and increasing recalls due to poor sourcing or mishandling of raw materials.

This seminar lays the foundation to more fully understand legal requirements for domestic and international suppliers and materials, as well as contracted services. Understanding the key components of a Supplier Approval Program and Raw Material Specifications Program will help manufacturers identify key players for supplier approval and communication, assess suppliers and the materials to ensure they meet expectations, and establish a line of communication with suppliers to improve the services provided.