

FUNDAMENTAL STEPS IN PROJECT DEVELOPMENT AT FDC

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Regardless of the food or beverage product, agricultural or feed ingredient, nutraceutical or functional food, extracted component or process optimization project being performed at FDC, the procedure involves some essential steps.

For example, regardless of the specific service being performed, researching the prior information is a step that always occurs early to ensure that the consultant and the client have information about regulatory and technical considerations that is accurate, current and complete.

Project Example: New Product Development

Using the development of a new processed food product as an example, following is an outline for the procedure followed by FDC consultants.

1. Researching the Prior Information

The first step in developing a food product is researching any prior information about the product, the technology that will be used, the required raw materials, the food chemistry of and interactions between the proposed ingredients, and shelf life studies of the ingredients and the finished product. Also of interest is information about similar products, consumer preference studies and any additives that will be used.

The FDC Library is the best food science and technology information resource in Manitoba. The Library is a critical resource for obtaining information quickly that is accurate, current, relevant, complete and unbiased. FDC consultants use the Library for conducting literature searches to find information on processes, patents and product formulations. The FDC Library has access to specialized information for food science and technology and has publications about virtually any area and commodity in food science and technology.

FDC consultants obtain information on any regulations that must be complied with in developing the food product. Legislation that clients must adhere to includes product labelling, nutritional labelling, allowable additives, health claims, nutrient content claims, standards and food safety practices such as HACCP (hazard analysis critical control points).

2. Standardization of Ingredients

Product development work in the laboratory is next. If the client already has a formulation to base the product development work on, the consultant performs a standardization of volume amounts indicated in the recipe to weight measurements for commercial quantities. Weight measurements are more accurate than volume measurements for large laboratory and pilot plant quantities, and thus are more reliably reproduced in successive product development trials and production lots.

The consultant also observes and thoroughly documents the client preparation method and recipe for accurate recording and thus reliable and consistent reproduction.

If the client has a product idea that is theoretically new, the consultant discusses the product qualities and ingredients the client desires and product formulation will begin directly.

3. Prototype Development

Once a formulation has been developed, a prototype of the product is made, which the consultant evaluates for potentially problematic considerations. Difficulties may arise from the ingredients or the preparation method once the process is reproduced in the laboratory and the ingredients have been standardized to weight measurements.

The consultant and the client troubleshoot the process and alter the ingredient type, quality, quantity or the preparation method in order to correct any problems.

4. Commercial Ingredients

When developing a food product for commercial distribution, the processor uses commercial ingredients that are available at volume discounts for large quantities, which is more economical than retail purchase of ingredients in large volumes. Commercial ingredients are also more consistent in quality.

The consultant helps the client to determine the need for preservatives, stabilizers and other additives in the product and will identify the most cost-efficient sources of commercial ingredients for the client.

Using commercial ingredients, the client recipe is reformulated and is altered as required to achieve the intended quality or to improve it. Ingredient quantities and preparation method are approximated repeatedly in order to achieve a prototype that is satisfactory to the client. Ingredient interaction effects are monitored throughout and internal sensory evaluation tests are conducted.

The product continues to be reformulated as required and client approval of the final laboratory prototype is essential. The consultant confirms with the Canadian Food Inspection Agency (CFIA) that regulations have been complied with concerning nutrient content claims, health claims, product label and ingredient requirements.

5. Volume Scale-Up

Determining the readiness of the product for scale-up to pilot production of high volumes is next. The goal is to duplicate the taste, colour, texture, appearance and other physical and sensory properties of the product on a large scale, while maintaining economic viability of manufacturing the product.

6. Packaging Considerations

Packaging materials for the end product are chosen in consultation with the client. The client is responsible for cost and aesthetic considerations, including marketability and image of the packaged product. The FDC consultant is responsible for evaluating practical parameters, such as safety, functionality, interaction between food and packaging material and stability of the packaged product.

In choosing appropriate and desirable packaging, decisions must be made about the following options:

- Glass or plastic jars or bottles
- Metal or plastic lids
- Pressure- or heat-sensitive seals in lids
- Tamper-proof strips over or around lids
- Light and moisture barriers
- Cellophane, foil or paper packaging
- Consumer convenience

7. Pilot Plant Trials

Once a prototype has been prepared, pilot scale trials are conducted for test marketing. Client access to the technology in the FDC pilot plant is a great advantage. Purchasing equipment and building a facility is not an immediate expense for clients with limited resources. Use of the FDC pilot plant allows clients to focus on optimizing a processing method without worrying about the financial risk of making technology purchase decisions that are subject to change.

Equipment selection occurs and processing parameters are established. Decisions are made about whether a product will be processed by chilling, freezing,

dehydration, canning, aseptic conditions, modified atmospheric conditions, pasteurizing or irradiation.

Processing effects are determined and calibrated for in maintaining quality control of the product and process development. Effects on the raw materials of the processing time, temperature, agitation, pumping and other treatments are considered in ensuring process reproducibility and maintaining the product quality in scaling up to commercial quantities. Troubleshooting occurs, including adjustment of the product formula, processing conditions or equipment used as required.

Client approval of the pilot-scale prototype is required before further work continues.

8. Shelf Life Testing

Shelf life testing is conducted to determine the length of time that a food product will maintain its safety and quality. Shelf life varies according to packaging type, materials and method, as well as storage conditions. Temperature, humidity and exposure to light must be controlled.

The components of shelf life testing include assessing the physical, chemical, microbiological and sensory attributes of the product.

9. Product Label

Labelling requirements must be considered in creating a product for commercial distribution. Requirements vary between countries. Basic label requirements in Canada include:

- Common name of the product (for example “peanut butter” or “strawberry jam”)
- Net quantity
- Name and address of the producer
- List of ingredients
- Durable life date
- Indication whether previously frozen
- Bilingual requirements
- Nutrition facts table

Labelling of nutritional content is mandatory in Canada with some exceptions. Nutritional content labelling is mandatory in the U.S. Nutritional labelling can be conducted by chemical methods or by use of a database of known nutritional values.

FDC performs nutritional labelling services using an electronic program. In Canada, the final label must be approved by the CFIA.

10. Final Project Report

When the work has been completed according to the agreed-upon contract, a final project report is created. The written report includes a detailed description of the research and development conducted. The product formulation is documented as well as the processing conditions. Ingredient suppliers are noted and equipment recommendations are made. The results of the shelf life studies are included.

Clients have the option to rent the FDC facility and equipment for further processing. After a period of production in the FDC pilot plant and developing a sound market for the product, clients are better able to decide on business considerations such as whether to construct their own facility or to co-operate with a processor to make the product for them.

For more information about FDC services, contact the Centre or visit the website.



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