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FACT SHEET

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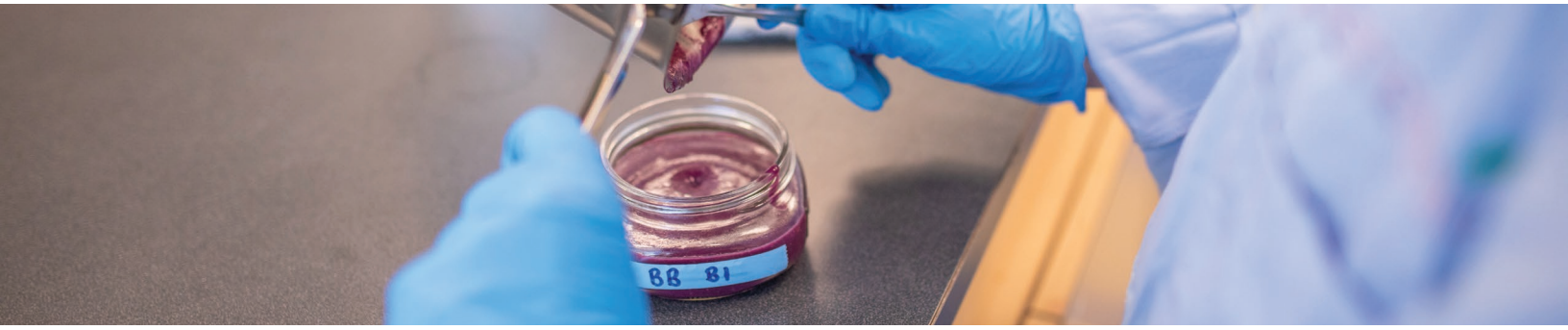

PRODUCT DEVELOPMENT 101

Food scientists at Perennia work with clients to turn their concept into a successful end product. We want your idea to be translated into optimized prototypes that best meet your expectations and prepare you for commercialization. Below is a general outline of the steps our food scientists work through when developing a product. Please note these steps are sequential; however, it is not uncommon for these steps to overlap or be repeated. For example, sometimes, when we reach step two, benchtop formulation, we learn that some parameters in step one are unachievable and need to be modified. We work with you to achieve as many desired parameters as possible while delivering a safe and appetizing product.

Perennia Product Development Steps:

1. Outline ideal product parameters

- What does the final product look like on the shelf? (i.e. liquid, dried, etc.)
- What kind of storage will the product require? Shelf-stable, refrigeration or freezing?
- Are there claims that align with business and marketing targets? (i.e. all-natural, plant-based, no added sugars, non-GMO, etc.)
- Are there any nutritional targets? (i.e. source of fibre, target grams of protein per serving, caloric content maximum, etc.)
- Are there any key ingredients to include?
- Will there be any allergens, or does it need to be allergen-free?
- Where will this product be sold (at the farmers' market, retail, or online) and how does this affect the product formulation?
- Does your company have the capacity to make this product, or will a suitable co-packer need to be identified?

2. Benchtop formulations created

- Food scientists will create initial formulas based on your requirements. Each ingredient's levels will be modified until your targets from step one are met, keeping desirable taste as a priority.
- Ingredients will be sourced from commercial suppliers and must comply with Canadian food regulations. We will also start organizing the costing of ingredients and COA's/specification sheets for each ingredient.
- During benchtop formulation, processing parameters will be outlined (what temperatures are required for how long, how long of a mixing time is required, what order the ingredients be added in, etc.).
- We will also start investigating packaging options that will work for the final product format (is the product sensitive to light, oxygen, moisture, etc.)
- We can also investigate co-packing options and/or what equipment will be required to process in-house.
- Initial shelf life evaluations on benchtop prototypes can occur to ensure the formulation is stable at this stage.

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3. Optimized prototypes are chosen

- A few prototypes will be presented to the client. Differences in the product could be a slight modification of one or more ingredients that impact flavour, cost or nutrition.
- At this time, clients may choose one final prototype to move to the next step immediately or can complete market research on a few prototypes. This could be as simple as receiving feedback on a few selected prototypes from a larger team at your company or some of your current or potential customers to help decide on a final prototype.

4. Final prototype selection and development of product specifications

- Once a final prototype is chosen, Perennia's food scientists will outline product specifications to move towards scale-up at your facility or at your co-packer. Product specifications will include ingredient listing and quantities, outlined target food safety and quality parameters and processing instructions.
- The product's final costing can be determined with suppliers, and ingredients will be ordered for production.
- Labelling information such as ingredient declaration, allergen listings and nutrition facts tables can be completed by Perennia to comply with CFIA regulations. This information will then be submitted to your packaging designer and/or supplier.
- Confirmation of regulatory and food safety requirements for this type of product and process will occur. Perennia has food safety and regulatory specialists available for assistance.
- Final packaging should be determined and ordered at this point.

5. Scale-up

- The final prototype formula will be pilot-tested at your or your co-packer's facility. Most of the time, scale-up presents some unexpected challenges. Your ingredients may not behave the same way on a large scale, or proportions may need to be adjusted. So it is very important to include this step to determine if adjustments are needed.
- Final packaging should be used in your pilot production to ensure it works for the product and the process.
- Product specifications may require modification once moving to a larger production process. Food safety indicators will still need to be met. However, other modifications can be made if necessary to ensure expectations such as texture, flavour and stability can be achieved.
- Once the pilot is successful, you can finalize ingredient quantities. At this point, samples will represent your final product, and you are ready to confirm your product's stability.

6. Shelf-Life Determination

- Samples should now be submitted for shelf life testing. Depending on product type, an accelerated study may be available; however, real-time shelf life testing should always occur.
- Perennia food scientists will request a certain amount of samples from you based on your product and study. Our team will test your product for your desired shelf life with sensory, analytical and microbial testing to determine your product's shelf life.

For more information and to inquire about product development services, please get in touch with our innovation team at **innovation@perennia.ca**