

SUCCESSFULLY DEVELOPING A CLEAN LABEL PRODUCT



TNO innovation for life

Over the last ten years consumers have become increasingly reluctant to purchase products with a list of chemical substances on the label. For that reason food manufacturers are taking up the challenge to deliver ‘clean label’ products. The key issue is how do you achieve ‘clean label’ and ‘natural’, and maintain the product’s original high quality, performance, and safety? TNO supports manufacturers in the development of tailor-made solutions, using clever combinations of ingredients and non-chemical processing treatments.

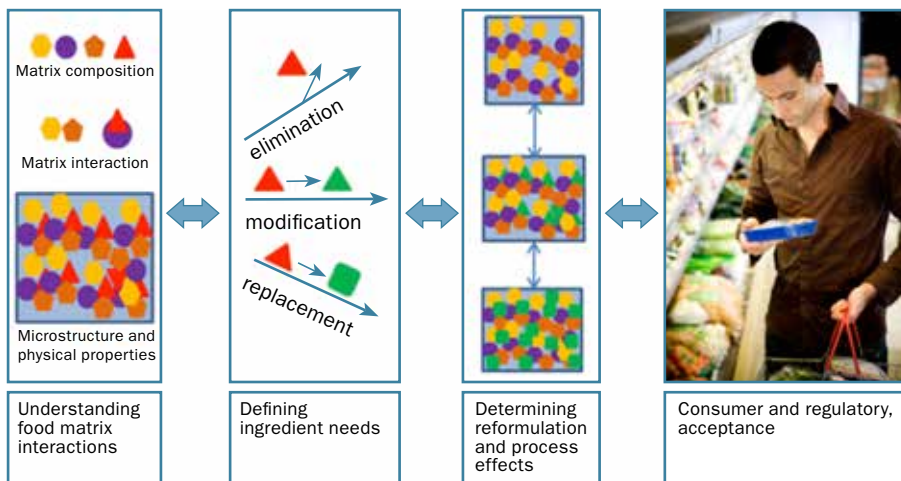
TECHNOLOGICAL CHALLENGES IN “CLEANING UP” LABELS

How to clean up labels while still maintaining product organoleptic properties? In addition, how to clean up labels and still maintain the required product safety

and stability during the lifecycle of the food product? Which ingredients need to be eliminated? What replacements are available or needed? TNO is able to answer these questions using a science-based approach.

Food category	Thickeners	Preservatives/ Anti-oxidants	Stabilizers/ Emulsifiers	Colorants
Bakery		High importance	High importance	
Soups/Sauces	High importance	High importance	High importance	
Beverages		High importance	High importance	High importance
Confectionary				High importance

Ingredient classes requiring technological intervention for clean labeling



Systematic science-based approach for addressing challenges in developing products with clean labels

CONSUMER PERCEPTION OF LABELS

Food ingredient labels have been the source of information for consumers to learn more about the foods they consume. By providing the list of ingredients used in a food product, consumers can make more informed decisions with their food choices. However, for the vast majority of consumers, reading food labels may lead to confusion instead of enlightenment. For the consumer point of view, clean label implies an understandable list of ingredients in the foods they consume. In most cases, consumer familiarity with most, if not all ingredients listed in the label, is an important factor to consider. This may include those ingredients that consumers would normally have in their kitchen. Furthermore, most consumers will consider food products that have no E-numbers in the ingredient list as a characteristic of a clean label product. In addition, consumers consider food products with chemical sounding ingredients as not clean label.

TNO STRATEGY FOR CLEAN LABELS

Our proven reformulation approach is the starting point towards the development of a clean label product. At TNO, this approach starts with translating the real product into a model food system. We have knowledge of the constituents of the product matrix, their interaction and influence on organoleptic properties and product process-ability. Our model food systems provide a defined matrix that forms an integral part in understanding the functionalities of specific food ingredient. After a model food system is setup, a strategy and or a technological intervention is then applied. This stage may either entail elimination (or replacement) of an ingredient or process

modification. Changes in the physical properties of the food systems will be measured. Benchmarking changes against the initial properties of the model food system provides information of the ingredient effects on matrix properties. This becomes the first cycle in the iterative process of reformulation. The cycle ends when the desired properties are obtained. The main advantage of working with our model food systems is the systematic definition of ingredient functionality within a given matrix. In reformulation, product understanding is a crucial asset. The approach using model food systems also provide information for the specific ingredient functionality requirements given a matrix against a desired sensory or physical property. This information crucial for the development of clean label ingredients. Furthermore, via our microbial genomic tools we are able to screen potential natural ingredients which can replace the unclean preservatives to tackle microbial spoilage during shelf life.

INGREDIENT MODIFICATION

Currently, the main strategy for developing ingredients that may be used for clean label products is the move away from chemical modification. For example, many product developers are replacing chemically modified starches with physically modified starches. TNO has various physical modification techniques available to control ingredient functionality. In addition, an important aspect of clean labeling is to identify sustainable ingredient alternatives with the same or enhanced functionalities compared with their synthetic counterparts. TNO has various high-throughput screening for various ingredient functionalities.

DEVELOPING A CLEAN LABEL: FROM MOLECULES TO FOOD PRODUCT

Product developers need practical, cost-effective solutions for developing clean label food products. At TNO, food product development is approached both from top-down and bottom-up. Understanding the interactions of the different ingredients at various length scales in specific food matrices systematically results in a robust and cost-effective method of reformulating.

TNO'S HOLISTIC CLEAN LABELING STRATEGY INCLUDES:

- › A working definition of the clean label framework from stakeholders
- › An understanding of labeling regulations and ingredient positioning
- › Access to ingredient screening, identification and modification strategies
- › Application of reformulation in model systems; and
- › Implementation of the results from model systems to existing commercial formulations.

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TNO HEALTHY LIVING

TNO initiates technological and societal innovation for healthy living and a dynamic society.

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