Clean label is a simple enough term, but dig a little deeper and the clean label conundrum begins to unravel. With no legal or commonly-accepted definition within the food industry, clean label has become a catch-all for a panoply of food and beverage claims from “all natural” to “minimally processed,” from “sustainable” to “GM-free.”

It has become a mainstream consumer movement that has shifted from being a trend to something that is considered normal, expanding from the health food store to the supermarket. It is now a moving target for food reformulators, who are at the whim of the consumer’s changing wish list.

Underpinning the concept of clean label is simplicity: simplified food labels that consumers can understand and trust. In its wake, the movement leaves food businesses floundering to reformulate their products by eliminating or replacing additives that, at first glance, do not appear to have a role to play in the clean label landscape.

So while on one side of the table, a clean label presents an opportunity for consumer-driven reformulation, on the other it threatens the continued use of additives that have unique and beneficial performance attributes, but which might now be perceived as unacceptable and unwholesome.

Towards Clear Label

As a result of this growing dichotomy, the scales are rebalancing towards increased product and ingredient transparency, pushing “clean label” towards a “clear label” philosophy. This brings with it a new opportunity, and a chance for the food industry to address the long-standing perception that additives with E-numbers, especially artificial ones, are not safe. Although the E-number system is a catalog of food additives that have been extensively evaluated (and re-evaluated) for safe use in food products and which was intended to reassure consumers, consumer perception of E-numbers has been clouded by inaccurate and misleading information. This way, the E-number system, far from bringing clarity into additives in food, has hidden many simple molecules behind obfuscating E-numbers. Nitrogen, present in 80% of the air we breathe, is E941. Vitamin C, essential for health, is E300. There are many other examples.

The Formulation Challenge

The food industry is now facing the challenge to formulate new innovative products that meet consumer expectations for transparency, combined with safe and healthy ingredients. Therefore, consumer access to balanced (clear and understandable) information is paramount. This, perhaps, represents the biggest hurdle: with social media at our fingertips, a single consumer advocate or individual blogger can have a widespread influence on consumers who ultimately demand change – good or bad – with no sound scientific justification. Unjustified clickbait scare stories are all too common.

Without a shift from clean to clear, there is a risk that clean labeling will lose its balance and veer towards sensationalistic concerns and consumer confusion, and that would be detrimental for the food industry, food regulators and consumers alike.

Throughout this two-part article, cellulose derivatives are referenced as a case study. These additives, a family of hydrocolloids based on natural cellulose, have a long history of safe use and have approved health claims and benefits associated with their consumption. Yet consumer understanding and perceptions threaten to jeopardize their application in food products and their place in the clean label landscape.

What’s in a Name?

In general, the names of food ingredients, their standards of identity and their conditions of use are regulated by law. This is to protect the interests of the state, consumer welfare and ensure a level playing
field among competitors. In the clean label landscape, ingredient names, and especially consumer familiarity and acceptance of these names, play an even more central role. The issue for clean labeling is that additive names, sometimes chemical-sounding and difficult to pronounce, give rise to the impression of scary unfamiliarity, which in turn results in perceptions of higher risk (Song & Schwartz, 2009). Likewise, simple and clean-sounding names evoke images of health and well-being. For example, the replacement of nitrates with celery powder may make a product seem more favorable. Yet celery powder contains a significant amount of naturally-occurring nitrate which does not have to be disclosed on the product label. It could be argued that this is a use of “clean” labeling but not “clear” labeling.

Other manufacturers have tried to implement more consumer friendly names for chemically altered, synthetic, or otherwise controversial ingredients; but name changing efforts have not been game changers. For example, in 2012, a request to rename high-fructose corn syrup as “corn sugar” was rejected by the FDA on the grounds that it would only confuse consumers and could even pose a health risk to those suffering from fructose intolerance. While the rules and regulations on both sides of the Atlantic strive to eliminate misleading food labels, clear labeling should go a step further to provide simple, clear messaging on which consumers can make informed choices.

The Role of Social Change

The power and reach of global social media platforms have enabled a relatively small number of food activists to successfully force large food corporations and fast food chains to substitute ingredients based on perceived risk versus sound science. Some notable examples include Mac&Cheese, a product manufactured by Kraft that contained artificial colors. The petition to pressure Kraft for the removal of the artificial colors was initially filed by Van Hari (a.k.a. Food Babe) and Lisa Leake, and gathered 360,000 signatures. Another interesting example was the petition for the removal of cochineal extract (also known as carmine) from Starbucks Coffee which garnered 7,000 signatures in less than a month, and saw Starbucks ridiculed as “Starbucks” when the story first ran in the media.

Increasing consumer involvement and advocacy related to the composition of the foods they eat should be welcomed by food scientists because consumers are the major driving force for clean labeling. However, most petitions and press stories that are against additives represent, at best, a one-sided view of the ingredient. The use of carmine by Starbucks did not violate any food regulations and did not expose the consumer to an increased safety risk. Carmine carries a fairly solid safety profile, yet it is derived from cochineal beetles and this was the real issue. Ironically, although it cannot be used in vegetarian or Kosher products, it is natural.

While consumer involvement via social media can be beneficial, it can also lead to biased perception and to unnecessary reformulation. It can even lead to the introduction of ingredients that are no better, or are potentially worse, but which have a more positive perception profile. For this reason, consumers need access to information that allows them to balance the perceived risk with the science-based information on which regulatory agencies have made their assessments.

Negative Characteristics

The following characteristics of ingredients that may create a negative image from a consumer perception should be considered:

Is the ingredient also used in non-food, industrial applications?

Many food ingredients that attract public dislike are also found in non-food products. One of the foremost questions that product developers and ingredient manufacturers should therefore consider is whether the ingredient is also used in industrial applications. Cellulose derivatives are a good example of a category of food additives that are also found in a number of industrial applications, and are thus subject to guilt by association. Examples include the use of cellulose derivatives in tile adhesives, cement and gypsum

Alland & Robert Develops Instant Soluble Acacia Gum

In order to meet the needs of the beverage industry, acacia gum supplier Alland & Robert has set up its latest reference “Instant Soluble Acacia gum 500I,” dedicated to the stabilization of complex oil emulsions in aqueous solutions. It is particularly suitable for citrus fruits, paprika and beta carotene. These are ingredients frequently used in the production of fruit sodas, sports drinks and other beverages.

Alland & Robert works very closely with the biggest companies of the food & drinks industry, and the demand for a product like Instant Soluble Gum Acacia 500I was high, especially for the manufacturing of sodas in new and mature markets. Thorough market research, including sales analysis and customer consulting, ensure consistency between the market demand and this new product.

The scientific approach of the research and development activities Alland & Robert has lead allowed to identify and to confirm the key indicators measuring the emulsifying power of the acacia gum. The researchers found that the surface tension and the gum’s emulsifying capacity can, inter alia, depend on the originating acacia gum country and on the soil composition.

Violaine Fauvarque, Marketing Manager for Alland & Robert notes: “The lab has its own expert team working on new development projects. It took about one year for the Alland & Robert team to create Instant Soluble Gum Acacia 500I. In the laboratory, the team realized oil-in-water emulsions based on flavor recipes (for instance with orange essential oils) using a semi-industrial high pressure homogenizer to be as close as possible to customer’s conditions. The team ran tests to study long-term stability, and accelerated the ageing process of the emulsion. The study of the evolution of the size and the distribution of droplets by laser granulometry allows A&R to determine the performance of gum acacia and to select the best batches that will be dedicated to most demanding flavors and beverages industries.”

Alland & Robert Develops Instant Soluble Acacia Gum
products and paints and coatings. The use of cellulose derivatives in these applications raises consumer suspicions about the function of the additive in the foods they consume. In the eye of the consumer, the industrial and food grade products are interchangeable; purity profiles and good manufacturing processes are not factored into product risk perception.

For such dual-use additives, it would be beneficial to explain the reasons for their use in foods in more detail. This would enable consumers to make their own judgments and fact-based decisions according to their own preferences. Cellulose derivatives are an example of a family of highly functional additives that are used for their texture-enhancement properties (binding, heat setting, foaming and stabilizing) and health benefits and lifestyle enablers (egg, meat, gluten and fat replacement). They offer unique food solutions that help consumers live healthier, more convenient and enjoyable lives. Some are also widely used in the pharmaceutical industry as excipients in oral tablet and capsule formulations and this might be used to further ensure the consumer of their safety.

Increasing consumer involvement and advocacy related to the composition of the foods they eat should be welcomed by food scientists. However, most petitions and press stories that are against additives represent a one-sided view of the ingredient.

**Does it have any published adverse health-related issues?**

Food producers, consumers and regulators alike are all interested in the possible adverse health effects of specific food ingredients and additives. Safety concerns regarding carcinogenic compounds, effects on gut health, possible allergic reactions and other adverse side-effects will often have a negative impact, even if the source of the data isn’t scientifically credible. That said, the majority of global regulatory authorities with oversight over food additives publish the results of their scientific findings. This information, while publicly available, is unlikely to be completely understood - or even reviewed - by the average consumer who is not trained in food science or toxicology. Understanding the results of such safety reviews for hundreds, if not thousands of food ingredients, is a significant challenge, even for the most educated consumer. Thus, reverting to the “name sounds like a synthetic chemical” mentality is common.

**Is the ingredient a focus of consumer debate or concern?**

When it comes to choosing foods and beverages, the modern consumer relies heavily on information found on the internet to help them make decisions.

Often, however, the consumer finds contradictory information, or simply too much information, and can default to a risk-averse position. As a result, food and beverage manufacturers are continually on the defensive, as consumers change their preferences on the basis of a flood of (mis)information from social media about the ingredients they eat and their impact on health and wellness. Often, when the media chooses to ignore important facts, it drives controversy and widespread confusion rather than meaningful change.

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Additives have never been more important to food manufacturers, in light of the increasingly complex food supply and developments in food technology. However, the use of additives is an emotional topic that provokes a lot of consumer concern (EUFIC, 2006), simply because consumers do not understand the role these additives play in enabling healthier, more convenient and enjoyable lives. When this knowledge deficit is coupled with the vast amount of misinformation and conspiracy theorizing found on the internet, it is no surprise that consumers are suspicious about the reasons for additives being added to the foods they are eating. Consumer acceptance of food additives can only happen if food producers and retailers communicate a clear motivation for their use, including why they are used in food, in which products they are used, at what concentrations they are present, and why they do not present a risk to human health.

Cellulose derivatives are a good example of a family of additives on which little information has been shared with the general public, even though they are versatile additives with important functionalities. The family of hydrocolloids has the polymeric backbone of cellulose, a naturally occurring and renewable resource. They are defined as INS 460-469 by the Codex Alimentarius International Numbering System and have corresponding E-numbers in Europe. Examples include methylcellulose (E461), hydroxypropyl methylcellulose (HPMC, E464) and cellulose gum (E466).

These additives, also known as gums, are derived from cellulose, itself a natural and sustainably sourced renewable material, which is then modified to achieve functionalities not seen in natural cellulose. Like other hydrocolloids, they are used in food products to thicken, gel and/or stabilize, but they also help during manufacturing processes (improving textures and giving better product behavior during packing), increase shelf-life (thus reducing food waste) and preserve product properties during heating or microwaving. They also help to address demanding health and lifestyle requirements, by enabling the reduction and replacement of substances like gluten, egg, meat, oil and fat. For example, in recent years the lives of celiac patients (and others who believe they have a gluten intolerance) have been significantly improved by the development of a much wider range of gluten free foods than were available before. By helping consumers to understand that these additives enable the development of the products they need and like, consumer familiarity and acceptance may be increased.

Disclosure - Safety

Previous research suggests that consumers are worried about the widespread use of additives, and would like to be better informed about the potential health implications of their use and consumption (Tarnavölgyi, 2003; Eurobarometer, 2006, 2010). Yet food additives are rigorously assessed and must meet stringent regulatory standards, more so than some other food ingredients. The scientific risk assessment of food additives is highly complex and lay consumers lack the time or motivational capacity to process this kind of information (Hansen et al., 2003). It therefore falls to the food industry to disseminate the information in a way that takes into account both the conclusions of the risk assessments and the informational need of the consumer.

The safety of cellulose derivatives as food additives has been extensively evaluated by regulatory bodies, including the former EU Scientific Committee on Food, the WHO/FAO Joint Expert Committee on Food Additives (JECFA), the US Food and Drug Administration and the European Food Safety Authority (EFSA). These evaluations have led to all cel-
Stakeholder Perception

Another approach to improve consumer perceptions of food additives is to engage specific consumer groups that directly benefit from certain additives. By educating and engaging these groups in terms of how cellulose derivatives can benefit them directly, more information is tangibly transferred to consumers at large. This helps to familiarize consumers with these additives in a positive and non-defensive way. Some of the consumer groups that benefit from the use of cellulose derivatives are listed here:

Celiac Groups and Gluten Free Advocates: Many gluten free products in the market are made possible with the use of HPMC. HPMC can mimic the water-absorbing and structural capacity of gluten, allowing food manufacturers to create gluten free foods that satisfy the dietary needs of consumers without compromising on taste, look or feel.

Vegans and Vegetarians: Some cellulose derivatives can mimic the structural functionality of protein in meat and eggs and also allow for the replacement of animal-derived gelatin. In this way, these products directly benefit vegans, vegetarians and other consumers that have specific cultural and religious dietary requirements (kosher, halal etc.). Cellulose derivatives bring additional safety advantages in that they can also significantly reduce the potential for risks such as Salmonella contamination.

Diabetic Organizations and Support Groups: The health claims related to the use of cellulose derivatives and their effect on the reduction of post-prandial glycemic response are important benefits for this specific consumer group.

Heart Health Organizations and Support Groups: The health claims related to the use of cellulosic derivatives and their effects on the maintenance of normal blood cholesterol concentrations could benefit consumer groups with vascular difficulties in general and, specifically, patients with heart problems.

Why are they Relevant?

Additives perform a variety of useful functions in food that consumers often take for granted. While additives are listed on the ingredient declaration, there is typically no additional information as to their function. As a result, the consumer questions why they are there and to whom they bring benefit: the consumer or the manufacturer.

Clear labeling provides the food industry with an opportunity to proactively support the future of their products by educating the consumer. Indeed, some companies, such as Nestlé, already explain on certain labels the role of some controversial – and non-controversial – ingredients in a move to make them more acceptable to consumers. This move to share information with the consumer may enhance the reputation of the manufacturer and also limit the power of sources of misinformation. Just: Gluten Free Bakery, a company based in the UK, has taken this concept online with its Tricky Ingredient Guide for HPMC. HPMC is described as “sounds quite scary but it’s not,” along with a brief explanation about what it is, its safety and why they use it in their products i.e. to create “the texture of real bread and to help them freeze.”

Cellulose derivatives offer a range of additional solutions to help food companies meet consumer demands and these too should be explained to the consumer. For example, HPMC can reduce oil uptake.
in products due to its water absorbing and thermal gelation properties. As products are heated in oil, water will evaporate creating a void which tends to fill with oil during deep frying. With the addition of HPMC, water is retained and prevented from evaporating.

**Ingredient Clarity**

In the early days of the chemical age in the 1950s, consumers embraced science, but a societal erosion of faith in science, caused in part by food scandals, has created mistrust. Many additive names are difficult to pronounce and a chemical-sounding name can engender a perception of higher risk (Song and Schwartz, 2009). The name of the additive is often the first impression the consumer gets of the additive, and this influences the consumer’s further analysis of the risk/reward assessment of the ingredient. However, global naming criteria for additives follow the principle that a name should not be misleading, and should be scientifically accurate. It is for this reason that some additives have chemical names that, at first glance, may arouse suspicion.

Hydroxypropyl methylcellulose is a good example of a name that is unfamiliar, chemical-sounding, and not immediately appealing to the health-conscious consumer. While renaming it might provide a viable short-term strategy for the management of consumer perception, a more pragmatic and long-term approach would be to provide clarity via the process outlined in this article. Other informational sources such as infographics, and relationships with permitted health claims and other more familiar ingredients, should also help to increase consumer familiarity with and acceptance of certain food additives.

**Gaining Credibility**

Information from credible sources may help to build consumer trust and contribute to a more balanced perception of food additives. For cellulose derivatives, obtaining opinions from interested stakeholders (gluten free advocates, vegan groups, diabetic support groups and so on) should help to build a favorable case. In the same way, emphasizing EFSA and JECFA scientific opinions, including those on substantiated health claims relating to HPMC and novel food claims for methylcellulose, also should increase credibility and acceptability of cellulose derivatives in general.

**Ensuring Accuracy**

Clean label conveys notions of quality, trust, and transparency. However, in reality, this isn’t always the case. One good example is the move to replace sugar on the ingredient list with healthier, clean sounding alternatives, such as evaporated cane juice.

The consumer is purposely mislead into believing that the product is healthier and more natural than the original and yet evaporated cane juice is not cane “juice” at all – it is nothing more than sugar in disguise. The result is a wave of lawsuits over sugar content and misleading marketing claims.

With no standard definition of clean label in place, the move from clean to clear label is vital. It is a chance to engage with the consumer through a variety of channels and an opportunity for the industry to position themselves as sources of reliable, transparent and accurate information. Ultimately, honesty is the best policy.

**Moving Forward**

It is not uncommon for consumers to develop ingredient-based food fears, or for specific foods, additives or ingredients to fall out of favor with the public. While some concerns can be justified, others are unnecessary; they emerge as a result of the knowledge deficit between consumers and food developers, and consumers and policy makers.

The diminution of trust has been further accelerated by the availability of an overwhelming amount of information - and misinformation - available on the internet and through social media. Campaigns can be waged at low levels within groups of consumers, emerging into higher-level, acute actions if the more mainstream media runs a story. Unfortunately, the resulting consumer action or inaction will dictate the commercial future of any food ingredient (Seisun, 2010).

Until now, the typical policy of the food industry and of individual firms is to deal with each crisis as it arises. However, by embracing a clear label philosophy and sharing transparent and accurate information on the risks and benefits of foods and the ingredients they contain, the food industry and its policy makers have an opportunity to take ownership of the narrative. In this way, threats to products can be minimized and the consumer is able to make informed choices based on individual preferences.

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