Preservatives (Antimicrobials, Antioxidants and Mold Inhibitors)

Antimicrobials function in a food product just as the name implies. They prevent (anti) microbial growth throughout the life of the product. For clean-labeled products, alternative ingredients that can provide microbial protection include organic acids and plant-derived compounds. These alternative ingredients tend to function in one of two ways: 1) by lowering the pH or acidity of the product to make the food a less favorable environment for microbial growth or 2) altering the cell membranes of the microbes to prevent growth and proliferation in the food product.

In addition, the hurdle concept implemented for food safety reasons within processing facilities works with these functional ingredients. Hurdle technology combines preservation techniques to establish a series of preservative factors (hurdles) that the microorganisms in question are unable to overcome (jump over). These hurdles may be temperature, water activity, acidity, preservatives and others. Similarly, when developing clean label products, the more that alternative ingredients are combined, each with their own specific function or multiple functions, the greater the chance of producing a very safe, high quality, and marketable product.

Alternative antimicrobials include:
- Organic acids (acetic and citric)
  - Vinegar
  - Lemon powder
  - Lemon juice solids
- Plant-derived compounds
  - Essential oils of cinnamon and sage
  - Malic acid derived from dried plums
  - Celery extract

Antioxidants serve as preservatives in food products by preventing lipid or fat oxidation. Antioxidants work by scavenging free radicals that react with fat. Traditionally, butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) control the oxidation of animal fats. Therefore, meat products often include these ingredients as antioxidants.

Alternative antioxidant ingredient options include:
- Green tea extract
- Vitamin E
- Tocopherol
- Celery extract
- Cultured sugar
- Rosemary extract with vinegar

In bakery products, one of the main factors in extending product shelf life is controlling spoilage. The commonly used mold inhibitors in bakery products include propionates (calcium or sodium) and sorbates (sorbic acid or potassium sorbate).

Alternative mold inhibitors are:
- Vinegar
- Prune-juice concentrate
- Raisin juice concentrate
- Paste and cultured whey
- Plum juice concentrate for moisture retention in processed meat
- Natural gums (fruit pectin, guar gum or locust bean gum) for stabilizing or thickening
- Fermented skim milk, buttermilk and acid whey to reduce staling in bread
- Whey protein hydrolysate to delay hardening in protein fortified bar type products
- Other proteins such as pea protein for thickening

Learn More
This overview report is a complimentary offering of the Agricultural Utilization Research Institute (AURI). To learn more about this subject, or how AURI can help you develop a clean label food product, visit auri.org, or call (507) 537-7440.
Today’s Consumer: A Changing Frontier

Today’s average consumer is more health-conscious than ever and desires an increasing amount of information around their food purchases. More than ever before, they scrutinize nutritional labels on foods to avoid artificial ingredients and foods containing ingredients with long, chemical sounding names.

Consumers increasingly seek functional foods that provide sustenance and safety, as well as perceived health benefits associated with ingredients such as antioxidants. Consumers view these functional foods as either containing components that have beneficial physiological effects or lacking components that could negatively impact their health. These are only a few of the reasons why cleaner labeled foods are oftentimes perceived as safer, higher quality and even healthier.

However, is there a universal definition of a “clean label”? Clean-labeled foods have been associated with a plethora of food categories or phrases including “natural,” “organic,” or “minimally processed.” Today, there is no industry-wide definition of the term or regulation of its use.

Industry Challenge

The food industry has a challenge ahead—providing cleaner labeled, highly demanded foods that perform the same as their existing counterparts in terms of taste, quality and price. To meet this changing demand, food processors are increasingly becoming more transparent with the ingredients and processes they use. Additionally, food processors must find clean label alternatives for these negatively perceived ingredients.

So, where do you start and what are your options? The food processors will number one goal should always be to create a safe product for human consumption. It is important to remember that taste trumps all in terms of food products, especially as the main factor affecting repeat purchases. Therefore, it is very important to keep in mind the affect alternative ingredients have on both the safety and taste of the product.

Targeted Ingredients

In the clean-label ingredient marketplace, many alternative options exist for processors. The alternatives listed in this report do not comprise an all-inclusive list and it is not AURI’s intent to promote one ingredient over another, but simply to give an overview of available substitutes.

The clean label trend started back in the 1990s with trans fatty acids (TFAs). Food producers traditionally used TFAs to replace the negatively perceived saturated fatty acids (SFA) in foods. However, studies have shown that TFAs are more detrimental to heart health than natural SFAs. It was likely that at this point consumers became more conscious of highly processed foods that perform the same on either the retail shelf or the functional purposes. In replacing them, one cannot expect food processors use these ingredients for very specific, functional purposes. In replacing them, one cannot expect food processors to perform the same on either the retail shelf or the consumer’s palate. Substitute ingredients may also increase cost, so one must consider the impact on the bottom line.

Percentage of Consumers Putting a High Priority on Avoiding Ingredients

<table>
<thead>
<tr>
<th>High Fructose Corn Syrup</th>
<th>Artificial Colors</th>
<th>Trans Fat</th>
<th>Sodium Lactate</th>
<th>Trickle</th>
<th>Caramel Coloring</th>
</tr>
</thead>
<tbody>
<tr>
<td>80%</td>
<td>80%</td>
<td>75%</td>
<td>75%</td>
<td>85%</td>
<td>80%</td>
</tr>
</tbody>
</table>

2 out of 3 indicate “no artificial ingredients” claim is important or very important.

75% usually or always read package claims and ingredient listings.

According to an online survey of US and UK customers conducted by Rabens (http://rabens.com/news/label-she-trends-13) (2013), 68% of all food product launches in the U.S. in 2013 were Clean Label.

Artificial Colors

Artificial food dyes, otherwise known as colored foods (such as FD & C Food 40), have traditionally been used as they are an economical choice to produce intense colors within the products. In addition, certified colors are more able to withstand abuse from heat, light, pH and other factors during processing and storage. The ease of use, being either water-soluble or oil dispersible makes them a convenient choice for multiple food systems.

Examples of natural color additives:

- Annatto extract
- Caramel
- Grape seed extract
- Fruit juice
- Vegetable juice
- Turmeric
- Paprika
- Beta carotene (non-synthetic version)

One of the biggest challenges of natural colorants is their instability. Most are highly susceptible to oxidation. Heat and light exposure can also degrade color over time and shifts in the pH of the product can cause hue changes. Additionally, consideration of solubility is necessary, as some natural pigments are not water-soluble. Finally, the cost of some natural colorants is higher than their synthetic or artificial counterpart. This is most likely because the availability of natural colorants is limited and the process to grow and harvest the needed plant source is time consuming.

Sugars/Artificial Sweeteners

The food industry uses sweetening ingredients in food products of all types, including those with a sweet or savory profile. Foods include sweeteners for the obvious reason, to add sweetness, but can also add to the product stability, mouthfeel and color (for example, more browning in a baked food and cooked meat products). As noted in the previous section, consumers have even developed a negative perception of commonly sweetened ingredients such as high fructose corn syrup (HFCS). Additionally, the food industry commonly uses artificial sweeteners. These include synthetic substitutes, such as aspartame or saccharin, which give the product added sweetness, without the calories. Most notable for giving diet soft drinks their sweetness, artificial sweeteners, along with HFCS, have come under attack in recent years. The use of these sweeteners has seen a decline as consumers want cleaner labeled products, leading the industry to find alternative sweeteners to meet consumer demand.

Alternative sweeteners:

- Honey
- Maple Syrup
- Tapioca Syrup
- Sweet Potato Juice
- Pear Juice Concentrate

High Intensity Sweeteners:

- Stevia Leaf Extract
- Monk Fruit Extract

Keep in mind that these alternative sweeteners may contribute some flavor, may be more or less sweet than sugar and will vary in the amount of solids or moisture they contribute to the end product. From a nutritional standpoin, these alternates will still count toward the overall sugar content of the product. The cost may also be an important consideration as some of these alternative ingredients could be considerably more expensive.

HIGH IMPACT SOLUTIONS FOR PROCESSORS


Meatingplace 7.


2. Meatingplace Conference Summary, August 2015.

1. “Clean Label” 2013-2014

80% indicate that a short and simple ingredient listing is important or very important.

2 out of 3 indicate “no artificial ingredients” claim is important or very important.

75% usually or always read package claims and ingredient listings.