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Cost-in-Use: How Flavor Concentrates Lower Cost in Formulated Foods

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Abstract:

Formulated foods need flavor concentrates to optimize cost versus performance. Selecting a flavor concentrate is based on many factors such as flavor intensity, profile, and fortification. Cost of the flavor is also an important factor; however, the flavor intensity per unit of use will contribute to the highest optimization of a flavor. The food industry uses the term “Cost-in-Use” to describe the overall method of flavor impact cost per unit of use.

Introduction:

Formulated foods have an advantage in the marketplace; however, many factors have to be controlled. The marketing function of manufacturers will envision the degree of flavor, texture, performance, ingredient declaration, price point, and shelf life of the product. The product design function of manufacturers will then deliver on the marketing concept. The actual product will then reflect the assembly methods and ingredients used. By using a highly concentrated flavor, non-flavored alternative ingredients can be used for the lowest overall cost. Specifying a flavoring solely based on its cost per pound, without consideration for flavor strength, will lead to a more costly final product. Instead, flavor intensity per unit of use will be optimal. This concept is commonly termed “Cost-in-Use” by the industry.

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Cost-in-Use:

Flavors are generated from substrate through extraction, culturing, enzymology, and reactions (like heat). Compounding is when flavors are blended from multiple sources. The cost of the flavoring is then reflective of the processing and raw materials. Specifically, dairy ingredients such as cheese, milk, butter, and cream can be either directly converted into an end user flavor or further concentrated before final use. The flavor concentrate cost per pound will be higher than the traditional ingredient replaced; however, the use rate will be much less. The net result will be that the final product is lower in cost.

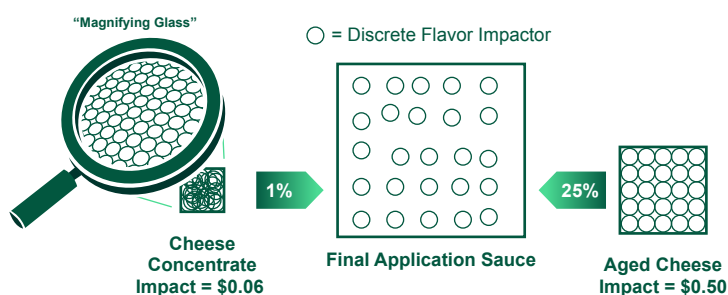


Fig. 1: The concept of how cost savings can be realized when a flavor concentrate at a lower use rate can deliver same amount of flavor, compared to traditional flavor source at a higher use rate.

Dairy ingredients, compared to vegetable-based ingredient counterparts, are more expensive. Replacement vegetable-based ingredients, such as fat, starch, and water, are blander and will need flavor if the product needs to achieve flavor parity. Therefore, the role of dairy flavor concentrates becomes important in formulated dairy foods as they reduce or eliminate dairy based ingredients.

Typical flavor concentrates available are Enzyme Modified Cheese (EMC) and Enzyme Modified Dairy (EMD) such as Lipolyzed Milkfat, Lipolyzed Cream, and compounded Dairy Flavor.

Another aspect of a flavor concentrate is that the label ingredient declarations can be simple, such as Natural Flavor, or contain ingredients that are beneficial for marketing to consumers, such as the dairy ingredient replaced. There are also options for clean label flavor concentrates.

Ingredient Information		Cost Reduced Product		Original Product	
Ingredient	Ing. Cost	Percent	Cost Impact	Percent	Cost Impact
Aged Cheese	\$2.00	--	--	25	\$0.50
Flavor Conc. EMC	\$6.00	1	\$0.06	--	--
Water	\$0.00	71	\$0.00	63	\$0.00
Oil, Fat	\$0.60	17	\$0.10	5	\$0.03
Starch	\$0.80	9	\$0.07	5	\$0.04
Salt, Other	\$0.50	2	\$0.01	2	\$0.01
TOTAL:		100	\$0.24	100	\$0.58

Fig. 2: Example: Cheese sauce formula and cost impact illustrating a cost savings when replacing aged cheese with a dairy flavor concentrate; in this case, an enzyme modified cheese (EMC).

Additional Benefits of Flavor Concentrates

Rebalancing:

There are additional advantages to using flavor concentrate that deliver cost savings. Processing will disturb the original orientation of flavor in traditionally used ingredients. Rebalancing, also known as flavor fortifying, is done to adjust the flavor of the product to an expected target flavor performance. The traditionally used ingredient — for example, cheese, butter, or cream — will be deficient in flavor without a large addition to the final product, which would add cost.

Flavor concentrates (EMC, EMD, etc.) are best at adding and rebalancing flavors. This also explains why there are so many dairy-based flavor concentrate products, each with different flavor profiles, which are needed to accommodate different product applications and flavor expectations.

Controlling Cheese Market Price Risk:

Cheese flavor concentrates typically range from 25 to 50 times more flavor per pound than the aged counterpart. Since use rates of concentrates are much lower than the traditionally used cheese, and securing supplies for the concentrate feedstock has a relatively low market risk, concentrate suppliers can offer flat market pricing. This allows final product purchasing managers to stabilize input dairy ingredient costs when faced with changing market prices.

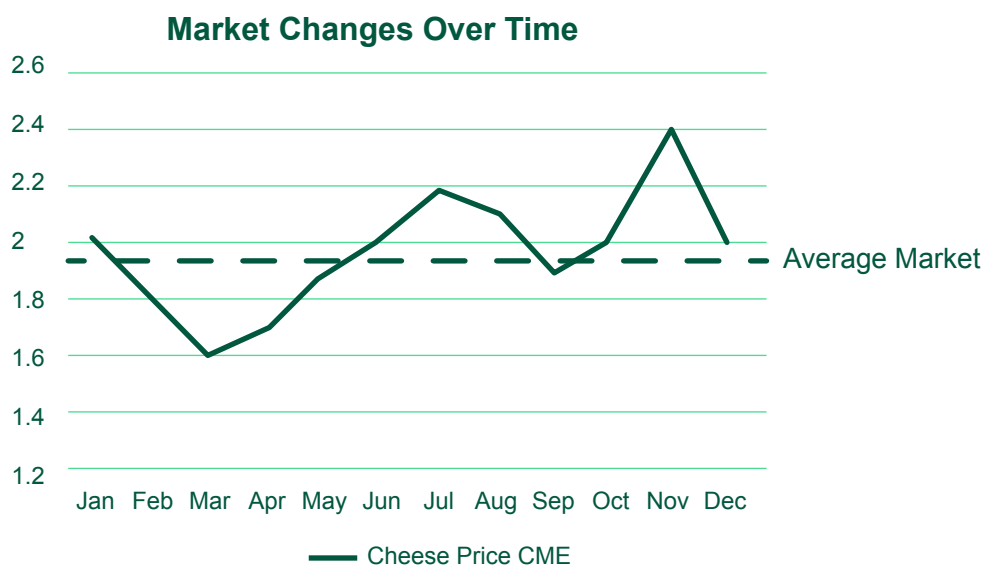


Fig. 3: Diagram of an idealized cheese market price changes over a year. While the average market, shown as the dashed line, may indicate price stability, it could be unacceptable to a manufacturer to pay the cheese price at the peak times of the year.

Cost of Cheese Aging:

Aged cheese profiles — for example, cheddar or parmesan — will need to be stored for a specific amount of time to acquire the desired flavor profile. This cost of aging is very significant. For example, storage cost would be about 1.5¢ and interest is about 0.5¢ per pound, per month. Flavor concentrates can reduce, and many times eliminate, cheese aging costs by removing the need to age cheese.

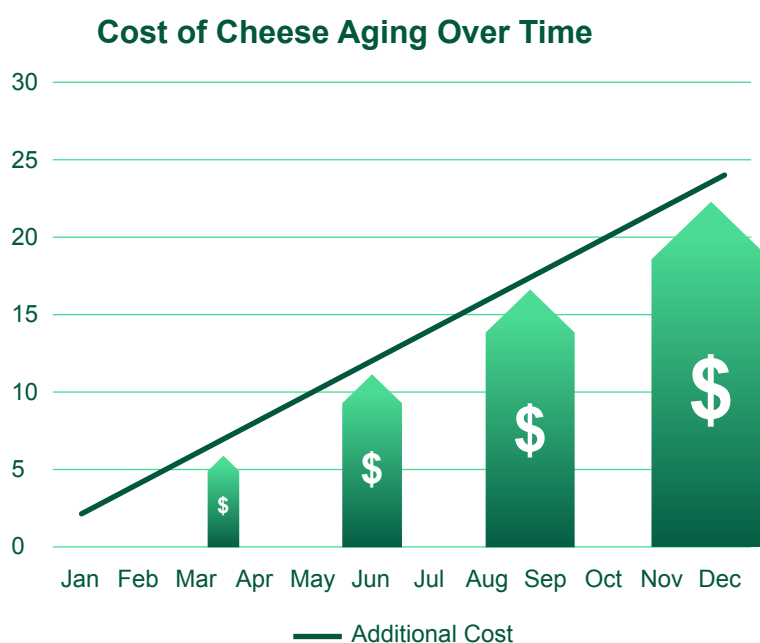


Fig. 4: Aging of cheese will incur added expenses at about 2 cents per month, per pound in storage and interest cost. Cheese aged for one year could incur about 24 cents in additional cost.

Variability in Cheese Aging:

As cheese ages, various factors will influence the flavor profile and level of flavor intensity. Typically, if the flavor is low at the maturation date, then more time can be added until the flavor meets its target. Adding more aging time will increase cost.

Additionally, if the flavor profile is divergent from the desired target, the cheese may never meet the flavor goal. Flavor concentrates have a very short maturation time and are vastly more consistent in flavor profile and intensity. This results in a controlled finished product flavor without the risk of drawn out and variable aging programs.

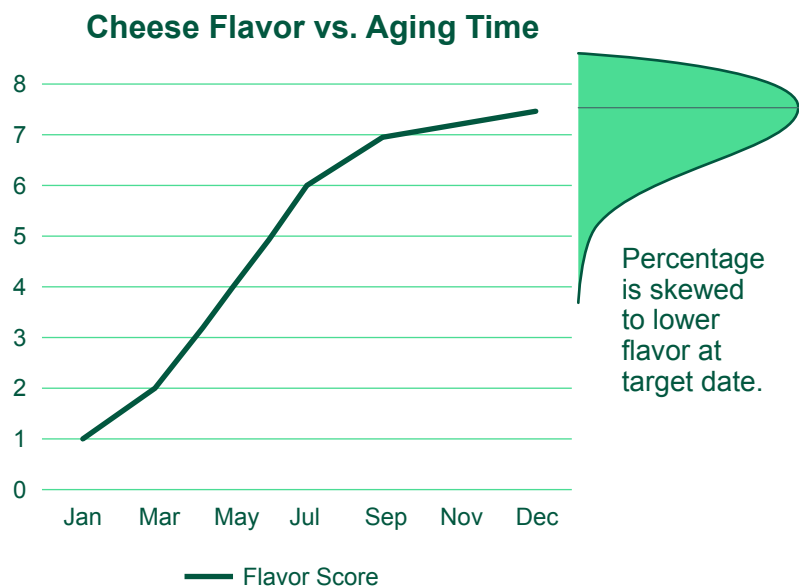


Fig. 5: Cheese flavor will increase with age; however, as time progresses, the intensity and profile of the flavor will vary more as a function of total time. This will add cost due to the increased time needed to gain the flavor level required or perhaps disqualify the cheese entirely.

Summary:

The advantages of flavor concentrates make good financial and technical sense. This is based on consistency, total net cost, and risk avoidance. The lesson of Cost-in-Use, simple in its approach, will enable purchasing and product managers to make better decisions. Flavor concentrates also have innovative ingredient declarations, which can help greatly in gaining cost reductions for legacy products.

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Glossary (list by order of appearance):

Concentrate, Flavor: Relative to the discussion of Cost in Use of this monograph, an example is a cheese concentrate that is defined as a cheese (or dairy-based ingredient such as milk, cream, butter, etc.) which has been subjected to intense processing such that the result is a generation of flavor well beyond the general practice of Standard of Identity natural cheese manufacture and culture directed aging. Standard of Identity natural cheeses, both defined by U.S. FDA and Internationally by the Food CODEX regulation, have been defined to be cheese products which may only use allowed ingredients and are manufactured by a generally defined set of protocols.

Intensity, Flavor: For a finished food application, this is the organoleptic description of the flavor as a broad and nondescript impact of the flavor overall. An example is a finished food being described as having low, medium, or high flavor.

Profile, Flavor: For a finished food application, this is the detailed description of the flavor by a trained panelist using individual flavor naming and the timing of flavor occurrence throughout consumption.

Fortification, Flavor: Flavor concentrates may have flavor profiles, that when compared to the flavor of an original ingredient being partially or fully replaced, have different ratios of the flavor operators and are not a function of simple concentration. Fortification then allows for the replacement of flavor compounds that are destroyed or partitioned when the food application is processed. Fortification can also accentuate the flavor of the food application to a level that unachievable through extensive use of the original flavored ingredient being replaced.

Ingredient Declaration: The U.S. FDA requires that formulated foods list, in descending order, the ingredients used. There are established common names for nearly all ingredients currently permitted in food.

Price Point: The reality of products having a price, with some allowance for range, as defined by the customary retail or industrial practices of the market. The Cost in Use practice would also respond to Price Point in its comparison to any reasonable functioning traditional or alternative ingredient.

Extraction: Flavor concentration by subjecting a substrate to a separation process to secure a flavor essence in greater concentration than what was found originally in the substrate. An example of an extraction process is the production of lemon extract using ethanol. The result is lemon essence without the bulk of the fruit.

Culturing: Flavor generation by subjecting a substrate to fermentation by food grade bacteria or yeast, such that the resultant product has vastly different flavor. Cultured products can be consumed directly — like yogurt — or concentrated — like cheese.

Enzymology: Flavor generation by subjecting a substrate to enzymes, which are proteinaceous catalysts, with a mode of specific chemical action. An example is lipase enzymes, which produce a lipolyzed cream when added to cream.

Reaction Flavors: Flavor generation by subjecting a substrate to a physical process, as in most cases heating, to produce new flavor compounds from chemical reactions. An example is caramel sauce produced from heating milk and sugar.

Market Pricing: In the USA, many manufacturers use the Chicago Mercantile Exchange (CME) to settle a fair pricing guideline for many commodity foods. Specifically, the CME has a market for cheese and butter.