

## Comparing an Untrained Panel Cheese Flavor Lexicon to a Trained Panel Cheese Flavor Lexicon

Phillip Moore

### ABSTRACT

This research was comparing an untrained panel cheese flavor lexicon to a trained panel cheese flavor lexicon. The untrained panel lexicon was conducted at McPherson College, while the trained panel lexicon was conducted at the sensory analysis department at Kansas State University. There were a total of ten cheeses used for the project. These cheeses were Joan of Arc Goat Cheese – Traditional, Maytag Blue Cheese, Kraft Low-Moisture Part-Skim Mozzarella Cheese, Kraft Mild Cheddar, Emmi Emmantaler Swiss, Sartori Reserve Asiago, Reggiano Parmesan, Black Diamond Aged Cheddar, President Brie, and Rembrant Aged Gouda. The same ten cheeses were used for each panel. The untrained panel came up with a total of thirty attributes for the ten cheeses. The attributes were Sharp, Milky, Consistent, Cheddary, Strong, Dry, Pungent, Delayed, Aged, Sour, Creamy, Instant, Flavorful, Musky, Potent, Lingering, Overwhelming, Muggy, Rotten, Curdled, Bland, Smooth, Soft, Subtle, Dull, Plastic, Artificial, Raunchy, Unique and Minty. The trained panel came up with a total of thirty-seven attributes. The attributes were Blendedness, Fullness, Longevity, Cheese ID, Buttery, Cheddar, Diacetyl, Butyric, Dairy Overall, Cooked Milk, Dairy (Processed), Dairy Sweet, Dairy Sour, Dairy Fat, Aged, Animalic, Goaty, Oil, Sharp/Bite, Brown, Caramelized, Fruity, Floral, Pineapple, Grain, Green, Nutty, Musty, Fermented, Moldy, Pungent, Sweet, Salty, Sour, Bitter, Umami, and Astringent. Averages were calculated for each attribute for each cheese. Between the 67 total attributes that were created between the two panels, only five of them were present in both panels. These attributes were Sharp, Cheddary/Cheddar, Pungent, Aged and Sour. The average rating of each of these five attributes was found for all ten cheeses and compared.

Keywords: *Lexicon, Panel, cheese flavor*

### INTRODUCTION

No research was found comparing a trained panel lexicon to an untrained panel lexicon. A lexicon is the vocabulary of a particular language, field, social class, person, etc. In language for example, a dictionary is a representation of a lexicon, with each word in the dictionary is considered a lexeme. Flavor lexicons are used widely to describe and discriminate among products within a category. They are a very important tool that most food retail companies use throughout the development process. In the Sensory Analysis Department of Kansas State University they develop and utilize previously developed lexicons to accurately represent and rate things such as flavor, texture, appearance, and/or feel of foods, beverages, packaging materials, ingredients, pet foods, over-the-counter pharmaceuticals, textiles, and paint finishes. To develop and use existing lexicons properly, a highly trained panel is used. A panel is a group of people who are chosen to do something, for example to discuss something in public or to make a decision. The panel has the responsibility of discussing and coming up with attributes for the items that they are testing, then rating the attributes on a scale from 0-15 to the best of their ability. A good prospective flavor panelist should be able to describe sensations and should be able to discriminate between taste and aroma sensations. Panelists at the Kansas State Sensory Analysis department have different levels of

experience but each one had to complete a 120 hour training program to be a part of the testing that requires a trained panel. Comparing the trained and untrained panel lexicons could allow researchers to better understand what consumers actually taste rather than what they think they taste. Doing so will also demonstrate the difference between a highly trained panel and an average consumer in the matter of sensory analysis.

### MATERIALS AND METHODS

For the research a total of ten cheeses were used. They included Joan of Arc Goat Cheese – Traditional, Maytag Blue Cheese, Kraft Low-Moisture Part-Skim Mozzarella Cheese, Kraft Mild Cheddar, Emmi Emmantaler Swiss, Sartori Reserve Asiago, Reggiano Parmesan, Black Diamond Aged Cheddar, President Brie, and Rembrant Aged Gouda. All of these cheeses were purchased at the Hy-Vee grocery store in Manhattan, Kansas. The first thing that needed to be done was congregating the untrained panelists and having an orientation session to sample the ten cheeses so that the panelists could come up with the flavor attributes. There were two orientation sessions with six cheeses introduced in the first session and the remaining four cheeses introduced in the second session.

Prepping the cheeses for the orientation sessions included cubing the cheeses into one-half inch cubes using a cuber borrowed from the Sensory Analysis Department at Kansas State University, and a knife to cut each cheese. Also, random 3-digit sample codes were assigned to each cheese for orientation so the panelists would not know what kind of cheese they were testing. After all of the cheeses were cut into one-half inch cubes they were all stored in plastic bags and refrigerated. When it came time for the first orientation, the six cheeses selected for the first orientation session were taken out of the refrigerator and distributed into plastic sample cups approximately five to six cubes per cup. Each cup had the random 3-digit sample code assigned to each cheese in it, and then lids were placed on each cup. The same thing was done for the second orientation session except with the remaining four cheeses that had not been sampled. Once each cheese sample was in a plastic cup with its random 3-digit sample code the area where the session would be held had to be prepped.

Preparing an area for the orientation session consisted of several things. Each panelist was provided with three styrofoam cups, one for hot water, one for cold water, and one to use for a spit cup. Hot water was used because it rinses the mouth of the panelists better than cold water in between cheeses. The cold water was used if the panelists got thirsty and also helped with rinsing the panelists mouth in between cheeses. A pitcher of hot water and a pitcher of cold water were placed on the table for the panelists to fill up their cups before they began the session. The spit cup was used when the panelists had completely chewed the cheeses. They would then spit the cheese into the cup. This was done to prevent the panelists from eating too much cheese and becoming sick to their stomach and/or full. This would change their taste perspective on the flavor of the cheeses. The next things that were provided for each panelist were unsalted saltine crackers and sliced up cucumbers. These items were used for cleansing the taste of each cheese out of the panelist's mouth in between each cheese to prevent any carry over flavor from one cheese to another. The last thing that was provided for each panelist was a spoon. The spoon could be used for a couple of the cheeses that were softer and messier, such as the Maytag Blue Cheese and the Joan of Arc Goat Cheese - Traditional. Once all of these things were set up and ready to go it was time to bring in the panelists.

To begin orientation the panelists sat down at the table and were served the first sample of cheese. The panelists were responsible for discussing the flavors they tasted from the cheese and deciding on what words they were going to use to describe them. They did this with all ten cheeses, rinsing their mouths in between each cheese to prevent carry

over flavor. All of the attributes were recorded and that concluded the orientation sessions for the ten cheeses.

Now that all of the attributes had been established for the ten cheeses there had to be a ballot created. A digital ballot with blank areas for each attribute was sent from the Sensory Analysis Department at Kansas State University. Each attribute that the panelists had come up with was entered into each blank on the ballot. Because there was not enough room for all thirty attributes on one page of the ballot, each ballot consisted of two pages. For each testing session a total of thirty ballots were used. There were a total of six testing sessions so all together one-hundred and eighty ballots were printed out for testing.

Preparation for testing was a little different than preparing for the orientations sessions. The items that were different from the orientation sessions were a pencil, a ballot, and the codes on the sample cups for each cheese were different from the orientation session and also different each test session. Each panelist was given a random 2-digit code to put on their ballot instead of their name. On each ballot was a place for the panelists to write their 2-digit code, a place for the date, a place for the panelists to write down the cheese sample number, and the thirty attributes that the panelists came up with at the orientation sessions for all ten cheeses, with a number scale ranging from zero to fifteen beside each.

The testing sessions were also conducted differently than the orientation sessions in that they were individual rather than consensus. There was no discussion during testing and rating of each cheese. The panelists were provided with a sample of cheese one at a time and went through each attribute and rated the cheese on the scale from 0-15. Each cheese was tested a total of three times. At each testing session a total of five cheeses were tested so all together there was a total of six testing sessions. Once all six testing sessions were conducted the data from all of the ballots was put in an excel spread sheet.

## **RESULTS**

The untrained panel came up with a total of 30 attributes for the 10 cheeses that were used. These attributes were Sharp, Milky, Consistent, Cheddary, Strong, Dry, Pungent, Delayed, Aged, Sour, Creamy, Instant, Flavorful, Musky, Potent, Lingering, Overwhelming, Muggy, Rotten, Curdled, Bland, Smooth, Soft, Subtle, Dull, Plastic, Artificial, Raunchy, Unique and Minty. For Kraft Mild Cheddar the panelists decided on sharp, milky, consistent, and cheddary. For Emmi Emmantaler Swiss they decided on strong, dry, pungent, delayed, and aged. For Black Diamond Aged Cheddar they decided on sour,

strong, instant, flavorful, and musky. For Maytag Blue Cheese they decided on sour, potent, overwhelming, lingering, muggy, rotten, and curdled. For Kraft Low-Moisture Part-Skim Mozzarella Cheese decided on bland, smooth, soft, subtle, and dull. For Reggiano Parmesan they decided on dry, aged, **bitter**, mild, and consistent. For Rembrant Aged Gouda they decided on instant, creamy, consistent, and sour. For President Brie cheese they decided on minty, plastic, artificial, overwhelming, and bland. For Sartori Reserve Asiago the panelists decided on dry, delayed, creamy, and subtle. For Joan of Arc Goat Cheese – Traditional the panelist decided on sour, lingering, raunchy, and unique.

As for the trained panel, they came up with a total of 37 attributes for the same ten cheeses. These attributes were Blendedness, Fullness, Longevity, Cheese ID, Buttery, Cheddar, Diacetyl, Butyric, Dairy Overall, Cooked Milk, Dairy (Processed), Dairy Sweet, Dairy Sour, Dairy Fat, Aged, Animalic, Goaty, Oil, Sharp/Bite, Brown, Caramelized, Fruity, Floral, Pineapple, Grain, Green, Nutty, Musty, Fermented, Moldy, Pungent, Sweet, Salty, Sour, Bitter, Umami, and Astringent. Averages were calculated for each attribute for each cheese. The cheese with the highest average for each attribute was found for the trained and untrained panel as well and put into a spread sheet. Between the 67 total attributes that were created between the two panels, only five of them were present in both panels. These attributes were Sharp, Cheddar/Cheddar, Pungent, Aged and Sour. The average rating of each of these five attributes was found for all ten cheeses for the trained and untrained panel and compared side by side in a spread sheet.

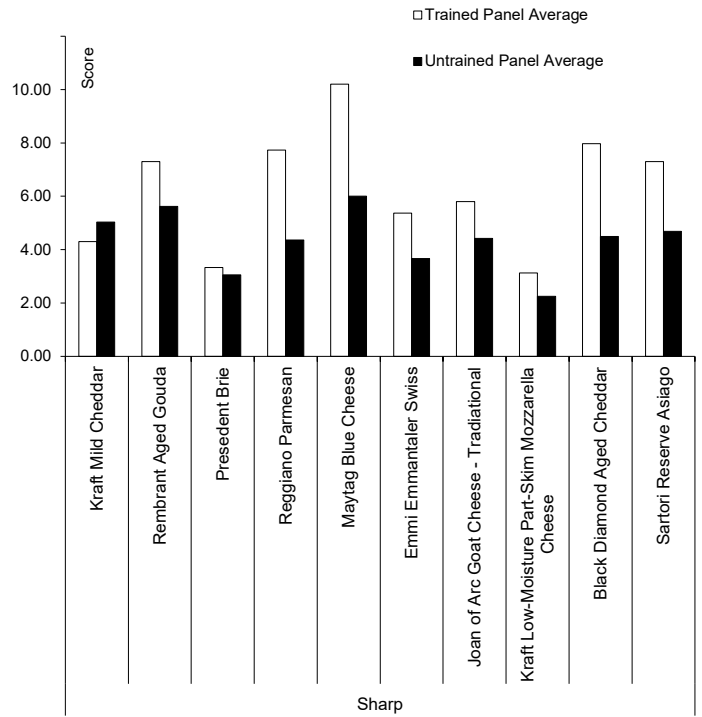


Figure 1. Comparing Trained Panel averages to Untrained Panel Averages for the attribute Sharp

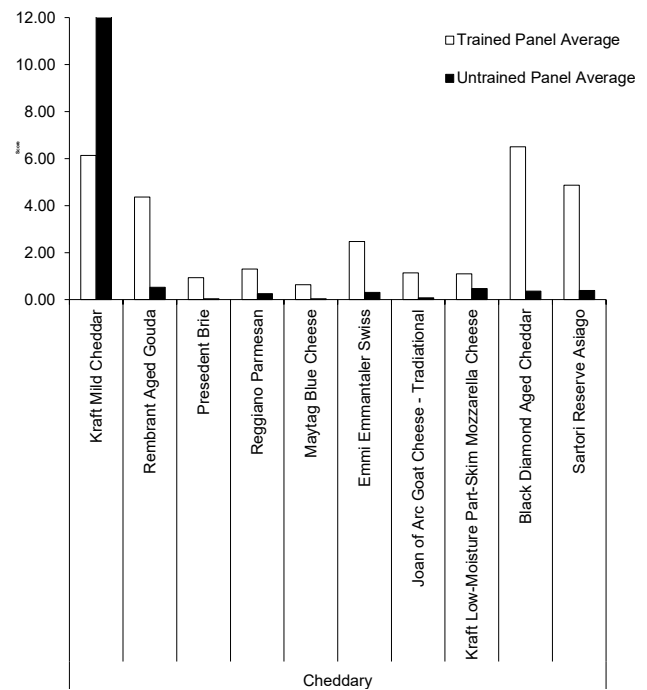
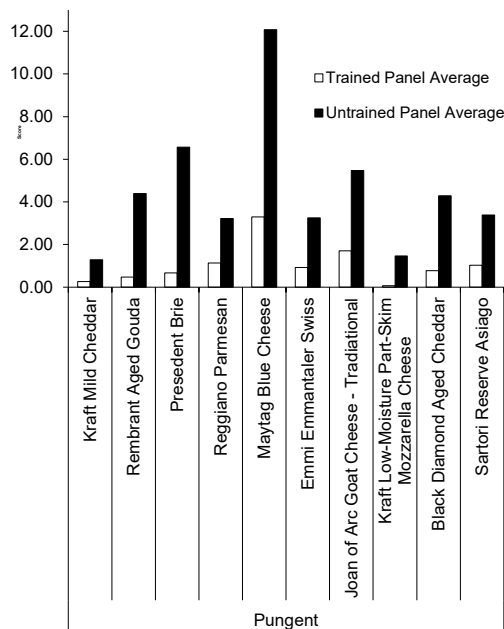
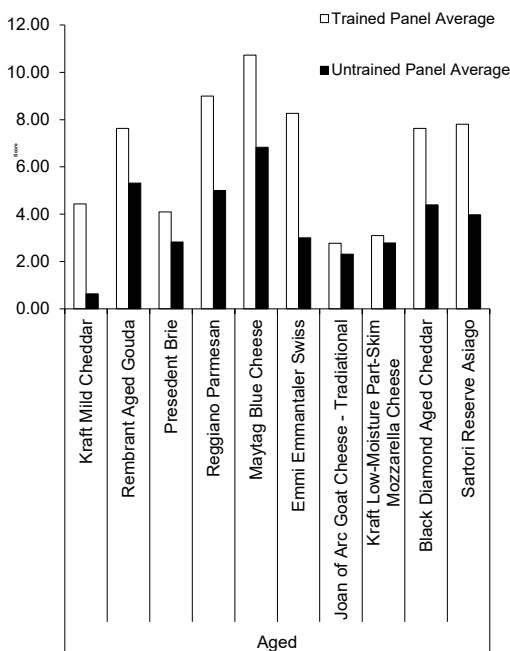


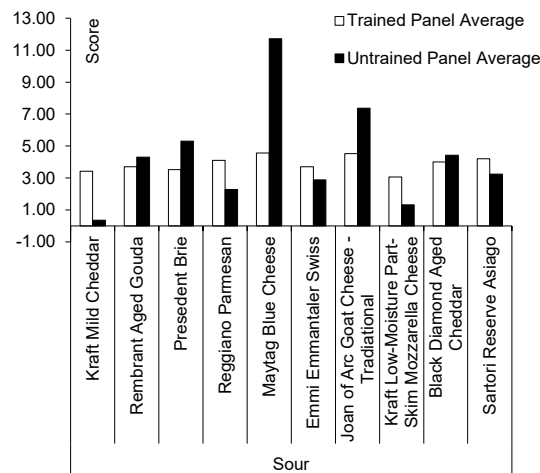
Figure 2. Comparing Trained Panel averages to Untrained Panel Averages for the attribute Cheddar



**Figure 3.** Comparing Trained Panel averages to Untrained Panel Averages for the attribute Pungent



**Figure 4.** Comparing Trained Panel averages to Untrained Panel Averages for the attribute Aged



**Figure 5.** Comparing Trained Panel averages to Untrained Panel Averages for the attribute Cheddary

**Discussion**

This research is comparing an untrained panel cheese flavor lexicon to a trained panel cheese flavor lexicon. For this research, I was responsible for conducting the untrained panel cheese flavor lexicon here at McPherson College, and the trained panel cheese flavor lexicon was conducted at Kansas State University by a graduate student in the Sensory Analysis Department. For the research there were a total of ten cheeses used.

For the untrained panel cheese flavor lexicon that was conducted at McPherson College there were a total of six panelists that were chosen. These panelists had no training in flavor analysis prior to the research and were considered consumers. The trained panel cheese flavor lexicon conducted at Kansas State University had a total of five panelists, each with different levels of experience. To be a part of a sensory panel in the Sensory Analysis Department at Kansas State University each panelist had to complete a 120 hour training program. During their training they learn about descriptive analysis - the 15 point scale, rating items related to references, and understanding definitions of different attributes. They have to have a level of sensory acuity that allows them to distinguish between several attributes within a sample, and training helps them hone this skill. The panelists have also conducted testing on a wide variety of products - mostly food. Beyond cheese they have seen other dairy products, beverages, snack products, and non-food items.

The trained panel came up with a total of 37 attributes for the ten cheeses while the untrained

panel came up with 30. Out of the 67 attributes between the trained and untrained panel, only five attributes were present in both. Those attributes were Cheddary/Cheddar, Pungent, Aged and Sour. The

averages were found for each attribute for each cheese for the trained and untrained panel and compared.

**Table 1.** Description of cheese flavor lexicon attributes as defined by the untrained panel

Attribute	Definition
Aged	A clear, distinct aromatic edge that is sometimes described as sour, astringent
Artificial	Made in imitation of a natural product, esp as a substitute; not genuine
Bland	Mild or insipid
Cheddary	Having a taste like that of cheddar cheese
Consistent	Unchanging in achievement or effect over a period of time
Creamy	Resembling cream in consistency or taste; soft and smooth
Curdled	*
Delayed	To postpone until a later time; defer. In reference to release of flavor
Dry	Marked by the absence of natural or normal moisture
Dull	Lacking in force, intensity, or sharpness
Flavorful	Full of flavor
Instant	Occurring at once; immediate. In reference to release of flavor
Lingering	Lasting for a long time or slow to end. In reference to flavor
Milky	Of or like milk in flavor
Minty	Having the flavor or aroma of mint
Muggy	Oppressively humid; damp and close
Musky	Resembling the smell of musk; having a heady or pungent sweet aroma
Overwhelming	Overpowering in effect or strength
Plastic	Marked by artificiality or superficiality; synthetic
Potent	Possessing great strength; powerful
Pungent	The sharp physical penetrating sensation in the nasal cavity
Raunchy	Dirty; Slovenly; Grubby
Rotten	Having a foul odor resulting from or suggestive of decay; putrid
Sharp	The total impression associated with the combination of aromatics that are sour, astringent and pungent
Smooth	Not harsh or astringent
Soft	Lacking strength of character; weak
Sour	Fundamental taste sensation of which lactic acid and citric acid are typical
Strong	Having an intense or offensive effect on the senses
Subtle	So slight as to be difficult to detect or describe
Unique	Being the only one of its kind

\* Not defined

**Table 2.** Description of cheese flavor lexicon attributes as defined by the trained panel

Attribute	Definition
Aged	A clear, distinct aromatic edge that is sometimes described as sour, astringent
Animalic	The combination of aromatics reminiscent of farm animals and barnyards
Astringent	The complex of drying, puckering, shrinking sensations in the oral cavity
Bitter	Fundamental taste sensation of which caffeine or quinine are typical
Blendedness	To create a harmonious effect or result
Brown	A sharp, caramel, almost burnt aromatic
Buttery	The aromatics commonly associated with natural, fresh, slightly salted butter
Butyric	An aromatic that is sour and cheesy, reminiscent of baby vomit
Caramelized	Aroma associated with chemical compounds
Cheddar	Having a taste like that of cheddar cheese
Cheese ID	*
Cooked Milk	The combination of sweet, brown flavor notes and aromatics associated with heated milk
Dairy (Processed)	Dairy that has been altered from its raw state by heating the dairy above a cow's body temperature
Dairy Fat	An oily aromatic reminiscent of milk and dairy fat
Dairy Sour	The sour aromatics associated with dairy soured products
Dairy Sweet	The sweet aromatics associated with fresh dairy products
Dairy, Overall	Of, for, or relating to milk or milk products
Diacetyl	Aromatic associated with diacetyl
Fermented	Combination of sour aromatics associated with somewhat fermented dairy/cheesy
Floral	A sweet aromatic associated with flowers
Fruity	An aromatic blend, which is sweet and reminiscent of a variety of different fruits
Fullness	Richness or intensity of flavor
Goaty	An aromatic that is pungent, pungent, musty and somewhat sour, reminiscent of wet animal hair
Grain	A general term used to describe the aromatics associated with "nutty" grains
Green	Sharp, slightly pungent aromatics associated with green plant/vegetable matter
Longevity	Long Life
Moldy	A damp, somewhat mildewy aromatic associated with a mold growth
Musty	Aromas associated with molds and/or freshly turned soil
Nutty	Non-specific, slightly sweet, brown character often found in nuts
Oil	*
Pineapple	The fruity aromatic associated with pineapple
Pungent	The sharp physical penetrating sensation in the nasal cavity
Salty	Fundamental taste sensation of which sodium chloride is typical
Sharp/Bite	The total impression associated with the combination of aromatics that are sour.
Sour	Fundamental taste sensation of which lactic acid and citric acid are typical
Sweet	Fundamental taste sensation of which sucrose is typical
Umami	Fundamental meaty taste elicited by monosodium glutamate (MSG)

\* Not defined

**ACKNOWLEDGEMENTS**

Katherine Gallo  
Dr. Delores Chambers  
Dr. Edgar Chambers IV  
Valerie Olson  
Dr. Allan Ayella  
Dr. Dustin Wilgers

**LITERATURE CITED**

- Food Science Institute – Facilities Sensory Analysis.  
Food Science Institute - FacilitiesSensory  
Analysis. Kansas State University, n.d. Web. 17  
Oct.2012.<<http://foodsci.kstate.edu/p.aspx?tabid=621>>.
- Re'tiveau, A, Chambers, H.D., Esteve, E (2005).  
Developing a Lexicon for the Flavor Description of  
French Cheeses. *Food Quality and Preference*,16  
(6), 517-527.
- Lee,J., Chambers, H.D. (2007) Lexicon for Flavor  
Descriptive Analysis of Green Tea. *Journal of  
Sensory Studies*, 22 (3), 256-272.
- Heisserer, H.D. Chambers, E. (1993). Determination  
of The Sensory Flavor Attributes of Aged Natural  
Cheeses. *Journal of Sensory Studies*, 8 (2), 121-  
132.
- Drake, M. A., G. V. Civille (2003). Flavor Lexicons.  
*Comprehensive Reviews in Food Science and  
Food Safety*, 2(1), 33-40.