



Evaluating the Sensory Characteristics of Organic Grassfed Milk

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In the food and beverage industry, marketing and sales can get you first time buyers. However, product sensory quality — specifically aroma and flavor — are what drives repeat purchases and creates sustained market share.

Simply put, food and beverage products that best meet consumer expectations for smell and taste sell better.

Despite the rapid expansion of the grassfed milk industry in the last few years, little is known of the sensory characteristics and consumer preferences for grassfed milk.

To address this, researchers from the University of Vermont, University of New Hampshire, and the USDA Agricultural Research Service (ARS) were awarded a USDA Organic Research and Extension Initiative grant to explore many aspects of grassfed dairy production in the U.S. One of the goals of the research is to gain a better understanding of the sensory quality of grassfed milk, and which factors at the farm level influence the presence and intensity of milk aroma and flavor characteristics preferred by consumers.

And while we are still analyzing the results, at least one general finding stands out so far: There is a lot of variability in the aroma and flavor of grassfed milk products.

The research team is using a three-phase approach, each working at a different level within the grassfed milk value chain, to address these objectives:

1. Evaluate, characterize, and document the variability of grassfed milk aroma and flavor available to consumers in the U.S. market.
2. Evaluate and document the sensory characteristics of grassfed milk collected on-farm.
3. Define and quantify consumer overall liking for the aroma and flavor of grassfed milk samples representing a range of aroma and flavor quality.

What are sensory characteristics?

Sensory characteristics are grouped into aroma and flavor. Aroma is what you smell when you sniff with your nose. Flavor includes everything you perceive when you put a product in your mouth, such as what you taste on your tongue, what you smell in your nose, and how it makes your mouth feel.

Your tongue detects five basic tastes using its taste buds: sweet, sour, salty, bitter and savory (umami). Everything else that you think you taste in your mouth is actually flavor compounds that travel from your mouth to your nose through the back nasal passage.

You can try this at home by simply holding your nose while you taste a food product. While holding your nose, you will be able to taste any of the five basic tastes present, but nothing else. When you let your nose go, you will taste (actually smell) the rest of the flavor.

Mouthfeels are exactly what the term implies, which is how your mouth feels during and after consuming a product. For example, your mouth might feel dry when eating bread, or you may pucker when you drink a sour lemonade. In the case of milk, you will often experience a fatty or creamy coating inside your mouth.

Objective evaluation

Although laboratory analyses may be able to measure something like the pH or salinity of a sample, they cannot accurately measure the wide range of aroma and flavor a human can perceive. Therefore, the type of sensory evaluation in this project requires using humans as an objective analytical instrument.

To evaluate samples objectively, tasters are trained using known reference standards to identify aromas and flavors on a standard, seven-point intensity scale:

1	2	3	4	5	6	7
No smell or taste	Very slight smell or taste	Slight smell or taste	Slight-to-moderate smell or taste	Moderate smell or taste	Moderate-to-strong smell or taste	Strong smell or taste

Trained tasters evaluate samples using the intensity scale to measure the following aroma and flavor attributes:

Total intensity of aroma: The overall intensity of smell (aroma) of the sample.

Balance: The harmony of the flavor. If individual flavors stick out and are easy to detect, the flavor is not balanced.

Fullness: Fullness is a measure of the complexity of flavor. If the product tastes simple and thin, it is not very full.

Total intensity of flavor: The overall intensity of taste of the sample.

Five basic tastes: The intensity of sweet, salty, sour, bitter and savory taste on the tongue.

Mouthfeel: The overall intensity of mouthfeel regardless of the type. This may be a mouth coating, dryness, salivation, etc.

Others: The overall intensity of other notes detected that do not belong in one of the previous categories.

Aftertaste at one and three minutes: The overall intensity of taste, regardless of what it is, left in your mouth at one and three minutes after your last sip.

Others at one and three minutes: The intensity of other tastes in the sample at one and three minutes after the last sip.

Mouthfeel at one and three minutes: The overall intensity of mouthfeel at one and three minutes after your last sip.

A panel of trained tasters used this approach to evaluate organic grassfed milk products purchased at supermarkets and grocery stores. In total, the trained tasters evaluated 35 milk samples representing the spring and fall seasons, three major milk companies, and three regions of the U.S.

Although we are still analyzing results, so far we have learned:

- Grassfed milk aroma and flavor vary between regions.
- Grassfed milk aroma and flavor vary between seasons.
- There is variability in grassfed milk aroma and flavor between milk companies.
- There is variability in grassfed milk aroma and flavor within each milk company.

Again, these aroma and flavor differences were found in retail milk that had been both pasteurized and homogenized. This indicates there might well be major differences found in the bulk tanks of different farms.

Recently, our project team began evaluating the aroma and flavor of grassfed milk samples collected directly from farms. So far, sensory analysis has been conducted on 31 milk samples from 29 farms in Vermont and New York. A second round of milk samples will be collected in the winter of 2021 to assess seasonal differences in milk aroma and flavor.

Although the study is yet to be completed, thus far we've seen that the range of sensory qualities collected on grassfed farms is similar to the supermarket samples. These findings are encouraging, as they indicate a possible opportunity for improvement by linking on-farm factors to grassfed milk sensory quality.

For instance, it is very possible that specific grassfed feeding strategies can be developed with the idea of improving and maintaining the reliability of aroma and flavor qualities.

We hope to initiate the consumer testing aspect of the project in late 2021. This testing will establish a specific sensory quality index that we can assign to all on-farm milk samples. We will then be able to correlate these against the farm factor data we are collecting to determine which factors and practices aid milk sensory quality.

We will continue to share results as they become available. Please feel free to reach out if you have any questions or feedback: contact Heather Darby at heather.darby@uvm.edu or 802-524-6501. This work is supported by OREI Project no. 2018-02802 from the USDA National Institute of Food and Agriculture.

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