

Global Lexicon Harmonization for Sensory Evaluation of Nutritional Beverages

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INTRODUCTION

For companies with global sensory programs, it is essential to standardize and align sensory methodologies across regions to ensure the reliability and comparability of results. This alignment requires consistent sensory language, including attribute definitions and references that sensory panels use to describe product characteristics. However, there are many challenges to doing this, including:

Category complexity

- A vast product range that includes sole source nutrition, functional nutrition and supplemental nutrition.
- A variety of protein sources including dairy and plantbased.
- A wide age range including baby, toddler, children, and adult
- Multiple flavor profiles (plain, chocolate, vanilla).
- Varity of processing techniques used across regions that impact organoleptic properties.

Panel-related

- Panelists were unfamiliar with certain regional reference materials, for example the Thai panelists were unfamiliar with goat milk, cheese, and alternative plant milks, making some product types more challenging to evaluate.
- Difficult to find universal sensory references as many attributes require alternative local references, e.g., bitterness, grain, animalic.

Geographic and logistical barriers

- Time zone differences restrict realtime collaboration.
- Language barriers require translator support.
- Shipping restrictions make crossborder transport of large quantity of dairy-based products difficult, leading to unpredictable timelines.
- Inconsistent product preparation instructions: for example, Asian formulas instruct boiling water and cooling to 40C while US formula instructions provide no water temperature instructions and roomtemperature is typically used.

KEY RESULTS 1

Global Lexicon Development

In the nutritional beverage category, dairy profile was deconstructed into 5 discriminating sensory attributes:

BUTTERY DAIRY

Measures the flavor associated with fatty, heavy, rich dairy flavor, lacking in sharp notes with a slight sweet cream flavor

FRESH MILKY Measures the flavor associated with generic cow milk dairy which can be green and grassy **SOUR DAIRY**

COOKED MILK

Measures the flavor associated with a cooked protein note of warmed dairy

CHEESY Measures the **sweaty**, slightly baby vomit flavor

note in some cheese

and slightly acidic dairy

METHODOLOGY

COLLATE INTERNAL LEXICON

What

- Defined the category of nutritional beverage drinks.
- Collated internal existing lexicons for nutritional beverages.

Who

MJN SCSF US, TH, MX teams, MMR Panel leader





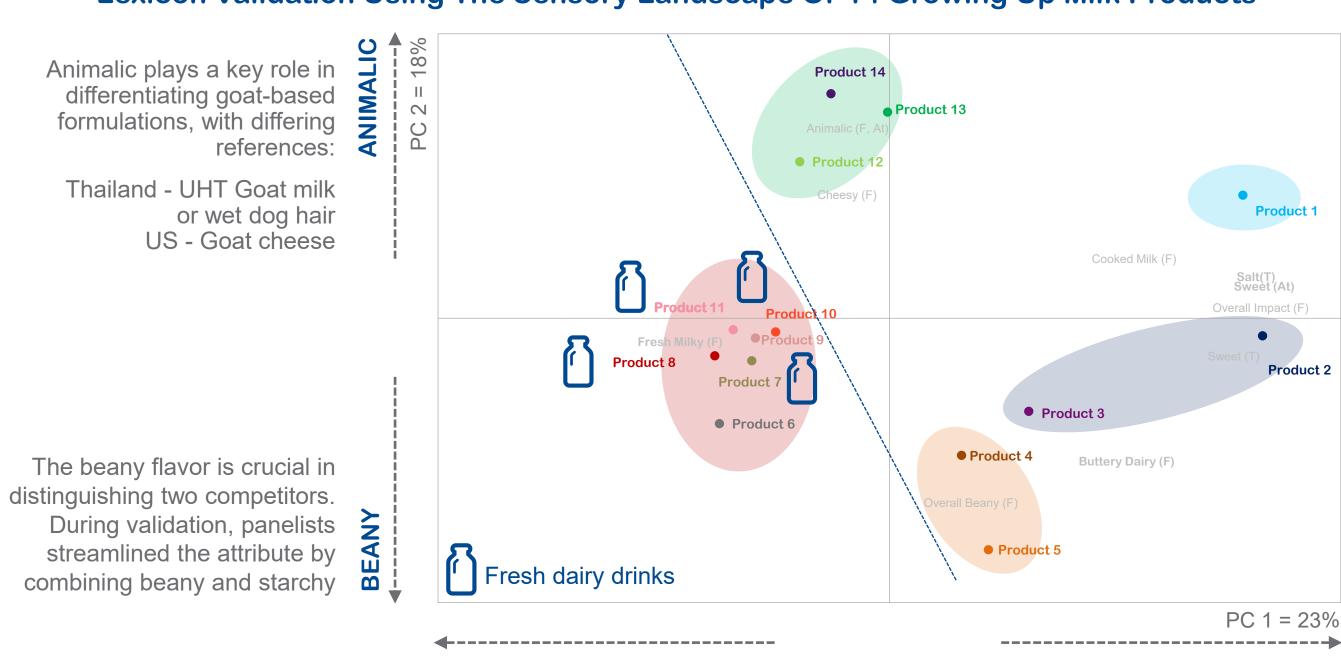
KEY RESULTS 2

Measures the flavor

associated with fermented

Lexicon Validation Using The Sensory Landscape Of 14 Growing Up Milk Products

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LOW IMPACT & SWEET/ **SALT FRESH MILK** Overall, **fresh dairy drinks** have mild and simple fresh milky profiles

HIGH IMPACT & SWEET/SALT COOKED MILK Majority of the reconstituted powders are more intense, sweeter and characterized by cooked milk notes

GLOBAL LEXICON DEVELOPMENT (US BASED REFERENCE)

What

- Scientific publications review to understand plain, vanilla and cocoa flavor attributes.
- Over 100 products in similar and adjacent categories were tasted to expand the flavor language beyond what's used in the current market to clarify and widen the flavor notes.
- Confounding attributes were streamlined.
- Team tasting with current commercial nutritional drinks, focusing on plain, vanilla, and cocoa flavors to ensure initial lexicon was as complete and efficient as possible.
- Joint review and protocol alignment with MJN SCSF global team.

Who MMR US team





THAI LEXICON HARMONIZATION What

- On-site collaboration with MJN PL to align lexicon incorporating universal and TH-specific references.
- Adjusted for cultural & local market differences.

Who

MMR Panel leader, MJN SCSF US Team Lead, MJN TH Panel Leader, MMR TH Team



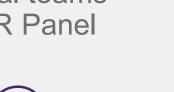


GLOBAL LEXICON & UNIFIED PROTOCOL What

- Trained MJN internal team on harmonized lexicon.
- Aligned evaluation protocol (serving size, foam/bubble assessment when mixing) and basic taste anchors.

Who

MJN SCSF global teams (US & MX), MMR Panel leader









US DEDICATED PANEL TRAINING & VALIDATION

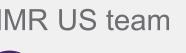
What

- Panel training on harmonized lexicon and calibrated basic taste scales.
- Validated lexicon using a sensory landscaping evaluation of 14 Toddler Growing up milk products.

Who

MMR US team







LEARNINGS

A collaborative and communicative approach, preferably through face-to-face engagement is essential to effectively driving global lexicon harmonization.

- In this collaborative approach, one sensory team member from MJN and MMR participated throughout all steps of the process to ensure cohesive communication and effective decision-making.
- Sharing products across regions and conducting cross-regional team tastings played a critical role in this collaborative approach, helping to understand the product context and to align on local lexicons.

Maximizing preparation before team interactions is critical, given the limited time zone overlap and constrained on-site time for face-to-face visits.

- The local team's support in procuring reference materials ahead of time greatly facilitated the smooth alignment of the Thai references.
- For items unavailable locally, US references were shipped to the MJN Thailand facility prior to the team's visit.

CONCLUSION

- Global lexicon harmonization is a crucial step to ensure reliable and comparable results across regions, which includes the following key steps:
 - Developing a broad lexicon representative of the defined category, as well as covering the need for future product innovation and renovation.
 - Streamlining confounding attributes provides the foundation for actionable & robust results. • Creating consistent universal references as much as possible, and aligning on any locally sourced
 - references across regions. Validating the panel using discriminating product set.
- As part of the ongoing effort to build global DA capabilities, MJN has successfully validated the U.S.
- panel using the harmonized lexicon through collaborating with MMR.
- The next step is to validate the MJN Mexico and Thai DA panels to ensure consistent application of the DA methodology across regions.