Drivers of Liking of a Selection of Rye Bread Products in Estonian and USA Markets

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INTRODUCTION

- Bread is an irreplaceable part of the diet in both Estonia and the USA. However, the components of bread vary significantly in these two countries. Estonian bread products typically contain rye flour, while products in USA are normally wheat-based.
- Rye bread is made with various proportions of flour from rye grain. The color varies from light to dark depending on the type of flour used and the addition of coloring agents. It contains more fiber and has stronger flavor than wheat bread.
- These differences create effects on the products sensory, functionality and health-related properties. Understanding the perception of rye bread by consumers would help to develop products for potential markets.

OBJECTIVES

- Determine the drivers of liking for a selection of rye bread products in markets of USA and Estonia.

MATERIALS AND METHODS

Samples

- Total of eight samples were tested, two from USA and six from Estonia.
- All breads were sliced which helped the serving of equal size and weight to all the participants.
- The studies in USA and Estonia were completed within the same week and used samples from same batches.

USA Bread



Estonian Bread

USA Bread



Estonian Bread





Sample Code

868: Rukkipala
450: Ruks hele seemneleib
564: Isa peenleib
606: Triinu rukkileib
610: Eesti rukkileib Klassikaline rukkileib
479: Ruks palaleib
310: Pepperidge Farm Rye Seedless
583: Pepperidge Farm Rye Seeded

Descriptive Sensory Analysis

- Seven highly trained panelists from the Center for Sensory Analysis and Consumer Behavior at Kansas State University developed the descriptive terms, definitions and references.
- Samples were served with a 3-digit blinding code.
- Panelists evaluated samples with crust for aroma, flavor, and texture characteristics.

Consumer study

- Both Estonian and USA consumer studies were Central Location Tests consisting with 101 rye bread users in both locations.
- Participants were asked to indicate their overall liking on a 9-point hedonic scale (1=extremely dislike; 5=Neither like/dislike; 9=extremely like).
- Additionally, participants were asked check all that apply, purchase intent, and some demographic questions (Gender, Age, etc.).

RESULTS

USA study results

Overall liking results:

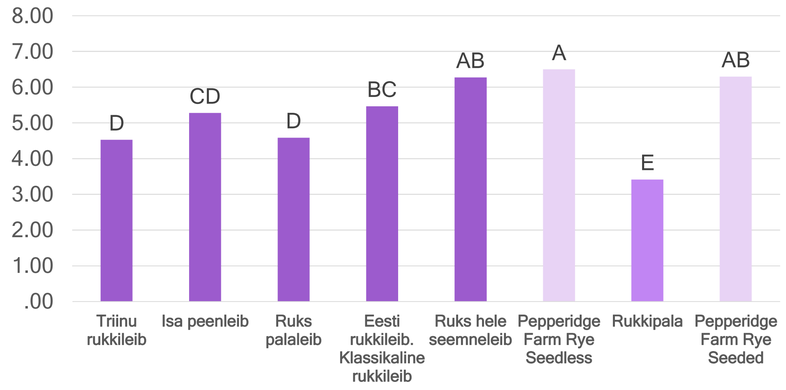

Figure 1. Mean scores of Overall liking for 101 USA participants for all 8 samples

- The letter represents significantly different groups (α= 0.05)

***Check-all-that-apply results*:**

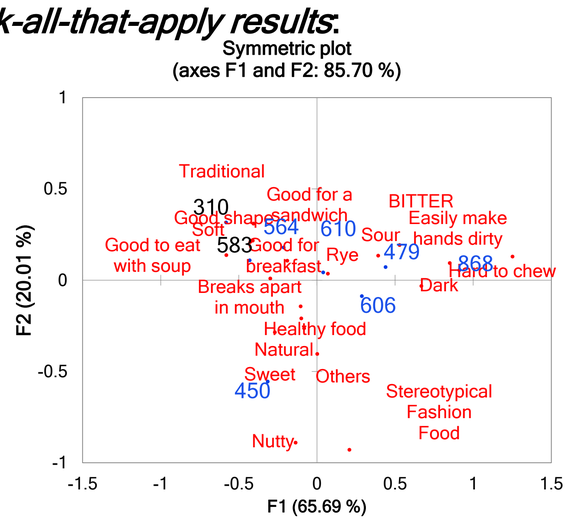

Figure 2. Relationship between CATA items and all samples for 101 USA participants

- Black colored samples are from USA and blue ones are from Estonia.
- US samples were described as Traditional, Good for a sandwich, Good shape, Soft, Good to eat with Soup. The other items as below:
  - Good for breakfast, Rye, Sour, Bitter, Easily make hand dirty, Hard to chew, Dark, Breaks apart in mouth, Healthy food, Natural, Sweet, Nutty, Stereotypical fashion food.

Partial Least Squared Regression results for USA Study

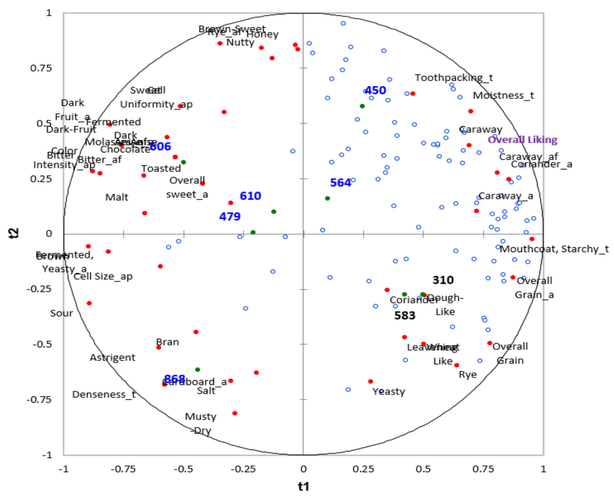

Figure 3. PLS-R for all attributes and all samples in USA study

- The black numbers are USA samples, the blue numbers are Estonian samples, the blue blank dots are consumer's likings, the red dots are attribute items and green dots are sample items.
- The US samples are located together and separated from Estonian samples. US samples are identified more with consumers liking than Estonian samples

Estonian study results

Overall liking results:

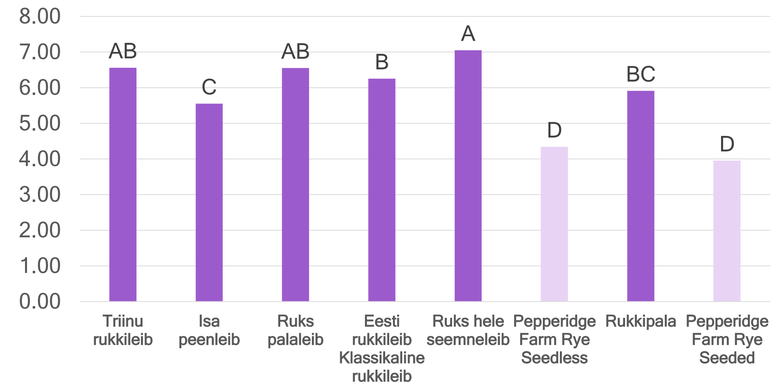

Figure 4. Mean scores of Overall liking for 101 Estonian participants for all 8 samples

- The letter represents significantly different groups (α= 0.05)

***Check-all-that-apply results*:**

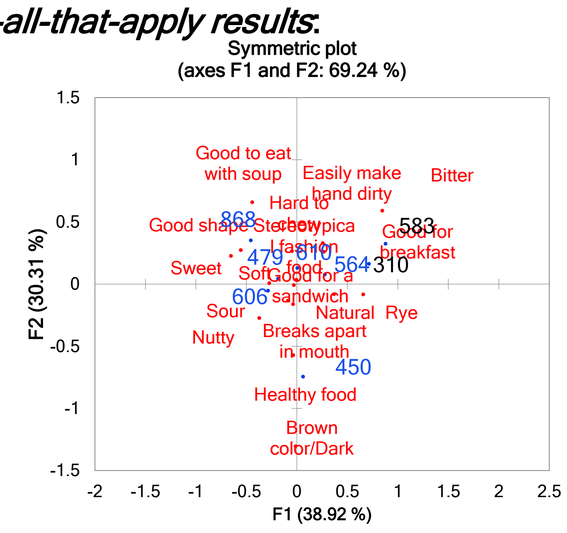

Figure 5. Relationship between CATA items and all samples for 101 Estonian participants

- Black colored samples are from USA and blue ones are from Estonia.
- Estonians described US samples as Bitter, Good for breakfast, and Easily make hand dirty. The other items as below:
  - Good shape, Good to eat with soup, Hard to chew, Stereotypical fashion food, Soft, Sweet, Sour, Nutty, Healthy food, Brown color/Dark, Natural, Rye, Others.

Partial Least Squared Regression results for Estonian Studv

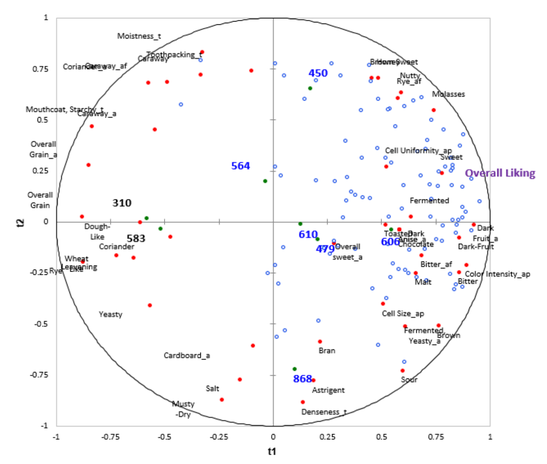

Figure 6. PLS-R for all attributes and all Estonian study

- The black number are USA samples, the blue number are Estonian samples, the blue blank dots are consumer's likings, the red dots are attribute items, and green dots were sample items.
- The US samples are located together and separated from Estonian samples. Estonian samples are identified more with consumers liking than US samples.

CONCLUSIONS

- The drivers of liking for American consumers are moistness and toothpacking for texture, caraway and coriander for aroma. For Estonian consumers the drivers are sweet, fermented, molasses, nutty, rye aftertaste, and cell-uniformity.
- The overall liking for 8 samples varied significantly between US consumers and Estonian consumers. In some cases both US and Estonian consumers gave one sample from Estonia same high overall liking scores - Ruks hele seemneleib. It suggested that this may have some potential on the USA market, although the CATA results show that they might have different reasons.
- The overall grain, wheat-like, dough-like, rye, coriander are American sample main flavor characteristics. Overall sweet, bran, dark fruit flavor, toothpacking, astringent, and bitter are the main flavor characteristics for Estonian samples. American consumers gave significantly higher overall liking scores to American samples than Estonian samples. Estonian consumers gave American samples lower overall liking scores when compared with Estonian samples