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A Simple Method to Determine Consumer Preference

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A Simple Method to Determine Consumer Preference

Abstract

Statistically significant consumer preference determinations are possible by Extension personnel in the field using available clientele and without complicated statistical analysis. Clientele such as shoppers at farmers' markets can provide ratings for sensory attributes such as look, feel, taste, or smell of a particular treatment. The statistical analysis used involves comparing the rank means of the raw rating data. This procedure factors out consumer variation. The example given uses SAS to complete the analysis.

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Introduction

Extension field trials often involve consumer preference. This may be the look of a turf grass; the feel of a textile; the taste of a cooked, raw, or processed food product; or the smell of a product.

Statistical analysis of consumer preference often requires a trained consumer panel to show significant results. Even then, simple statistical procedures, such as analysis of variance, can be inappropriate for this type of data due to panelist variation: e.g., sensory preferences, personality differences, and variation in the use of the rating scale. Use of a 1 to 10 preference scale often varies, even among trained panelists. Some panelists use the lower range, some the higher, and some rate all choices somewhere around the middle of the scale.

Thus, analysis of preference data often is complex, using techniques such as multiplicative mixed models (Smith, 2003) or principle components analysis (M. McDaniel, personal communication, August 27, 2003). These advanced statistical methods make analysis more precise by factoring out much of the panelist variation interfering with analysis of the data using a simple analysis of variance (M. McDaniel, personal communication, August 27, 2003).

In Extension field trials, trained test panels are not available. Advanced statistical methods require help from statisticians, often located some distance from the field site. A simple, practical consumer preference technique is needed to evaluate field data.

Consumers at field tours, local Master Gardeners, farmers' market shoppers, 4-H members, parents and leaders, and commodity producers are available to extension personnel, and willingly volunteer their services to rate products. Using these consumers, statistically valid tests for preferences can be conducted using the method described here.

Collection of Data

Prepare and present samples to be evaluated in an identical manner. Provide evaluation forms and pencils for the consumers to record their preferences. Tables and chairs arranged around the central distribution area can make the evaluation process comfortable for the consumers.

Collection Example

An example uses specialty potato cultivars sliced and boiled in an identical manner. Cultivars were identified by number and placed on paper plates for sampling by consumers (shoppers at a local

farmers' market). Evaluation form instructions read, "On a scale from 1 to 10 (10 being the best, 1 being the worst), rate the following potato cultivars. Please take a sip of water between samples." Paper cups and cold water were provided.

Analysis of Data

This procedure uses the SAS 1999 statistical software for analysis. This is easily installed on an Extension office computer.

Enter raw rating data into a spreadsheet such as Excel. Number each consumer (replication), and record the rating for each product attribute (texture, flavor, and appearance in the potato example) for each treatment (each cultivar in the potato example). This data must be saved as a text file to be read by the SAS program.

Use a nonparametric statistical technique to analyze the mean ratings for each treatment. The rank of each rating is computed. By ranking the 1 to 10 ratings of the evaluators, the variation due to differences in use of the rating scale is minimized.

Next, employ a signed rank test to assess statistical differences between treatments. A chi-square test will indicate the level of significance of the data. This will tell you if the mean ranks for each attribute of the treatments are significantly different.

To perform mean comparisons on significantly different attributes, use the standard error of the mean ranks for each attribute. The mean rank, plus or minus two standard errors, approximates a 95% confidence interval. Therefore, any two means differing by more than two standard errors are implied to be significantly different. You can then state which treatments are statistically significantly different. In the potato example, after data analysis, such statements as the following can be made:

- "At the Twin Falls (Idaho) Farmers' Market, consumers preferred the texture of 'Caribe' and 'Huckleberry' potatoes over all other cultivars tested."
- "Taste test results indicate that 'Caribe,' 'German Butterball,' 'Yukon Gold,' 'Viking Red,' and 'NorDonna' rank high"(Olsen, 2003).

Analysis Example

Using SAS, the following nonparametric procedure was applied to the specialty potato data. Where:

- Location is either 1 or 2 since the test was performed at two separate farmers' markets.
- Cultivar is the specialty potato type (these are the treatments)
- Texture is the mouth feel of the boiled sample
- Flavor is how the boiled sample tasted
- Appearance is how the boiled sample looked
- Rep is each individual consumer completing the entire evaluation
- A:\Potatotaste00.txt is the location and the name of the text data file
- The procedure NPAR1WAY calculates the mean ranks

The SAS program is as follows.

```

Data Pottaste2;
Infile'A:\Potatotaste00.txt' delimiter='09'x;
Input location rep cultivar texture flavor appearance;
Proc sort;
    by location cultivar texture flavor appearance rep

Proc MEANS;
    by location cultivar;

Proc NPAR1WAY WILCOXON;
    by location;
    Class cultivar;
    OUTPUT OUT=DataT Wilcoxon;
    VAR texture flavor appearance;

Proc rank out=rankdata data=pottaste2;
var texture flavor appearance;
rankst f a;
by location;

Proc sort data=rankdata;
by location cultivar;

Proc means mean stderr;
var t f a;
by location cultivar;

run;
```

The results of this SAS program provide, for each attribute at each location for each treatment:

1. The rating mean--the raw score averaged for each attribute
2. The rank mean--the rank scores averaged for each attribute

Also provided are:

1. The chi-square for the ranked means. This will tell you if there are significant differences between the rank means.
2. The standard error for the rank means. If the chi-square shows significance, the standard error will tell you which rank means are different from each other.

This consumer preference technique and statistical method allows Extension professionals in remote field situations to measure sensory attributes of products using available consumer clientele and statistical analysis possible on an office computer.

Acknowledgement

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References

Olsen, N., Robbins, J., Brandt, T., Lanting, R., Parr, J., Jayo, C., & Falen, C. (2003). *Specialty potato production and marketing in southern Idaho*. University of Idaho College of Agricultural and Life Sciences CIS 1110.

SAS Institute Inc., 1999. SAS OnlineDoc®, Version 8, Cary, NC.

Smith, A., Cullis, B., Brockhoff, P., & Thompson, R. (2003). Multiplicative mixed models for the analysis of sensory evaluation data. *Food Quality and Preference*. Vol. 14 (5/6), 387-395.

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