

Consumer preference in commercial UK filter coffee blends

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Coffee is consumed widely in Europe, with national and regional preferences in character, manufacturing and brewing practice. The last decade has seen an exponential increase in popularity of coffee within the UK market for fresh bean coffee served out of home with a market value in excess of £268 million per year (Allgera 2001). Yet relatively little is understood about how consumers differentiate between products and what influences their decisions. Consumers drink filter coffees in different presentations, normally with the addition of whiteners and sweeteners. These additions change consumer perceptions of sensory character.

However, it is not always possible for the assessors to taste all the samples within a single session, when the number of products is greater than about 7, and it may not be possible to hold multiple sessions. To overcome this the use of mutually orthogonal latin squares has been suggested to design a balanced incomplete block experiment, which allows the assessors to sample a sub-set of the total number of products present. The advantages of this design have been discussed many times in the past (**Wakeling and MacFie**). **Wakeling and Buck** recently looked at this again, with a view to how experiments can be designed, using the programme Design Express.

This approach is satisfactory when the data are analysed by traditional methods, but preference mapping requires that all assessors provide scores for all the samples. Two solutions for this problem have been proposed. **Callier and Schlich** suggested that the incomplete data sets (from each assessor) could be made complete by calculating homogeneous clusters of consumers, in a procedure they called CLIP. The cluster could then be summarised by its vector of product mean scores. The value of the technique was tested on a complete data set. As the main issue with preference work is the number of samples being presented, the data set was altered to make it incomplete. Products were carefully removed to ensure that the data sets were still balanced. Three data sets with different percentages of data removed were compared with the complete data set by Monte-Carlo simulation, to test whether the depleted data sets could replicate accurately the results obtained from the original set. Their results indicated that the greater the percentage of data missing the less accurate the results; they suggested that in low noise data approximately half the samples should be tasted by each assessor, but in noisy data about two-thirds of the samples were required.

Ben Slama, Heyd, Danzart and Ducauze investigated another approach, by reducing the number of products that were presented, using the D-optimal design. This was divided into several stages. Firstly, the full range of products (N) are expertly assessed in a QDA manner, the results of which are subjected to Principal Components Analysis (PCA) to provide a two-dimensional sensory product space. On the assumption that the data are to be analysed by external preference mapping, the scores obtained from the PCA are used to produce the 6 parameters required for a full quadratic regression (the matrix X). The second stage is to

reduce the number of products, using the D-optimal criterion. The effect is to minimise the variance of the coefficients of the regression:

$$\text{Var}(\beta_c) = s_c^2 (X'X)^{-1}$$

This provides the optimal subset of products. The technique was tested with a complete data set of 24 products, and hedonic data from 639 consumers was collected. The preference map that was produced from the D-optimal subset of 12 products showed good agreement with that produced with the full set of products.

The aim of this study was to investigate preference of different segments within the coffee consuming population, and to see how presentation affects overall preference.

Eighteen products, medium to dark roast and including wholly Arabica and Arabica/Robusta blends, were selected from a product space of >40 retailed filter coffees purchased from local supermarkets. Two data sets were collected. A balanced incomplete block design was used to collect data from consumers in different regions. This was compared with data gathered using 100 consumers sampling all 18 coffees over 3 sessions in their normal presentation (with/without milk and/or sugar) or consumption habits. It was concluded that segmentation of consumers and relating such hedonic ratings, as has been reported for speciality coffees (**Cristovam *et al*, 2000**), would facilitate new product development by coffee blenders. There is a real need to be able to target products to specific segments of the U.K. coffee market.

References:

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