Apple colour, size, taste, texture and price

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Everybody lives in their own flavour-world

- Genetics of flavour perception
- Peak of multiple significant associations around 29Mb on chromosome 6
- Genetic associations found for 2-heptanone, isobutyraldehyde, b-damascenone and b-ionone.
- Use human genome databases to global variability in consumer sensitivity

MacRae et al. (2013)
Focusing on ‘**Uniqueness**’: ‘the characteristics or key elements which differentiate it from other products of its category and, therefore, constitute its exclusiveness.’

- Familiarity / Novelty
- Situational appropriateness
- Attitudinal and emotional product associations
- Eating occasions

Jaeger et al (2011)
Definitions: Taste & Flavour

**Eating Quality:** all those characteristics of a food that lead a consumer to be satisfied with the eating experience:

- **Texture:** The sensory manifestation of the structure of the food:
  - Mechanical properties (e.g. hardness)
  - Mouthfeel / geometric properties (e.g. smooth, gritty)
  - Juiciness

- **Flavour:** The impressions perceived via the chemical senses from a product in the mouth:
  - Tastes – perceptions caused by soluble substances in the mouth (salty, sweet, sour, bitter, umami).
  - Aromatics – olfactory perceptions caused by volatile substances released from the product in the mouth via the nasal passage.
  - The chemical feeling factors – that stimulate nerve ends in the mouth and nasal cavities (spice heat, cooling).
Every apple we grow should be one we can sell

» Eating quality
  » Texture
  » Flavour
    » Taste (sweetness, acidity, bitterness)
    » Aromatics
» Appearance
  » Cosmetic
  » Food safety
» Size
  » Convenience
  » Value

» Liking
» Willingness to buy
» Repurchase
» Price
Eating Quality: Firmness and Crispness

Predicting consumer liking for apples

Harker et al (2008)

\[ \hat{p} = \frac{1}{1 + \exp(\text{constant} \cdot \ln(Lbf\text{firmness}))} \]

\( \text{SE} = \text{value1 and value2} \)

A. Red Delicious
B. Gala November
C. Gala April
D. Golden Delicious
E. Fuji
F. Braeburn
Implications: New cultivars

Cultivar 1  Cultivar 2

Number of apples

Firmness
Implications: New cultivars

- Genetics (Cultivars)
- Environment (Region & Site)
- Orchard Management
- Harvest & Storage
Resource partitioning as indices of quality

» It is better to ensure that every fruit you grow can be marketed
» Growing for quality is preferable to sorting for quality
» Resource partitioning is important
» Dry matter content may allow prediction of quality at harvest and potentially earlier in fruit development
Consumer responses to DM categories: ‘Royal Gala’

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Difference of 1.5 units → 85% of consumers will choose High over Low DM apples

92% of consumers find apple acceptable

‘Probably will buy’

‘Possibly will not buy’

Experimental auctions:
Apples that look good but taste bad

“Even though I thought that the old apples were nicer in the tasting trial, I still suspect that the new ones would be better overall”

Monetary value of kiwifruit eating quality

Jaeger et al (2011)
Practical Industry Experience

» Kiwifruit
» Tomatoes
» Apples
Flavour: sweet, sour and aromatic apples

» Apple preference maps suggest a hierarchy that is:
  » Texture (preferences for firm and juicy apples)
  » Taste (preferences for sweet high acid and sweet low acid apples)
  » Aromatics

» For some cultivars ‘consumer acceptability’ of firm apples is further enhanced if they are also higher in sugars (SSC), but these relationships are cultivar specific

» It is difficult to quantify the role of the aromatic component of apple flavour?
  » Aromatics are confounded with other aspects of fruit biology
  » Poor basic understanding of what triggers consumers’ sense that something is different/wrong

Appearance and size

- Vison is a predominate human sense (sets expectations)
- There are clear ‘rules’ about preferred colours, shapes, symmetry
- Consumers buy with their eyes
- Consumers become attuned to appearance of produce that they regularly see when shopping
- They discard the unusual
- They can detect blemishes quickly
- Poor appearance is often associated with poor food safety

- Texture and flavour are dominant once fruit has been tasted (in experiments)
- Stated preferences are often weakly held (in experiments)
Pears: shape, colour and russet

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Beta value of attribute (where a large positive or negative value indicates greater importance than small values)

- Oblong: -1.05*
- Pyriform: -1.04*
- Round: -0.75*
- Green: -0.59*
- Yellow: 0.82*
- Red: 0.85*
- None: -0.31*
- Some: 0.44*
- Lots: 0.07

Pear factor (Australia only)

least preferred
most preferred

The New Zealand Institute for Plant & Food Research Limited
Opportunity for new segments associated with fruit which invoke no expectation

» Expectations of round and red pears were unformed, and thus these pears were less likely to be chosen as either most preferred or least preferred.

» But consumers were willing to identify the most liked red-skinned pear, and

» Consumers placed bids to purchase red-skinned pears to take home with them.
Disorders: eyetracking and consumer rejection

\[ y = 0.9382x + 4.3335 \]

\[ R^2 = 0.9649 \]

Percentage of consumers rejecting to purchase apples at the same supermarket again (%)

Percentage of consumers who fixated their gaze on the disorder (%)

Size

» Perceptions of value
» Convenience and waste
» For children and for adults
Size

» Innovation: breaking all the rules
» Rockit™ apples
» Role of packaging
Summary

» Eating quality (texture, flavour, taste)
» Appearance
» Size
» Price

Eating quality is of primary importance. Orchardists have control over eating quality through selection of cultivars, management of orchards and fruit maturity at harvest. The value of apples to consumers is defined by the interplay between eating quality and price.
References


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