WHEAT FLOUR FORTIFIED TO WHO CONSENSUS LEVELS

Philip Randall

pcubed@mweb.co.za

Tanzania

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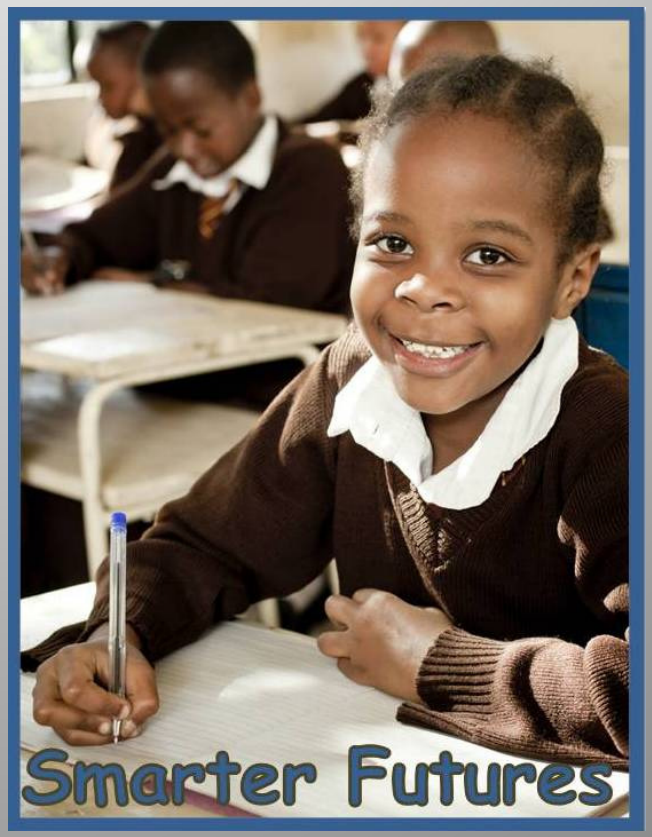

Methodology 1

- Three Countries – Kenya, South Africa, Tanzania
- Three iron sources for wheat flour – EDTA, Fumerate, Sulphate @ WHO Guideline level for consumption 75 – 149 g/person/day
- Two iron sources for maize meal – EDTA and Fumerate @ WHO Guideline level for consumption > 300 /person/day

Methodology 2

- Wheat flour and Maize meal sourced in country – all vehicles could be considered “medium to high” extraction
- Finished product prepared and evaluated under “local rules”
- Retention samples kept in each country for re-evaluation under local millers instructions i.e. “cool and dry” conditions – after 3 or 6 months (to be decided).

Methodology 3

- Pan Bread – open top
- Chapatti
- Porridge
- Stiff “porridge” – Ugali/Posho

Round 1

South Africa

- No significant differences
- All pass industry method
- “Slight spotting” on EDTA ???

Tanzania - Buguruni

- All samples pass industry accepted method
- Slight spotting noted in dough of EDTA bread sample
- EDTA and Sulphate – some slight quality differences – in chapattis
- In Uji – EDTA and Fumerate – slight colour issue

Tanzania - TFNC

- No problems reported in all sample sets

Kenya - UNGA

- All samples pass industry standard test for bread
- No problems in chapattis
- Slight colour issue with Ugali – EDTA
- No problems with Uji

KENYA – KU

- No problems with any products

Harmonisation Workshop

- > 50 delegates failed to identify any specific problem which could be related to any specific iron source. Two adverse comments related to either of the two control samples and one to EDTA. Two positive comments related to EDTA

Round 2

2nd Phase

- Repeat tests of flour stored at premises of collaborators
- Introduce samples using NaFeEDTA at 20 ppm in all wheat and maize products (previously 40 ppm and 15 ppm)
- Collaborators asked simply “is the product acceptable within your control criteria?”

Tanzania - Buguruni

- Sample comments similar to previous testing.
- Spotting again noted in bread but this time in different iron source
- Again different iron sources identified as having slight quality differences in chapattis

- Different iron sources identified as having slight colour issues in Uji

20ppm NaFeEDTA levels

- No problems reported in all four products tested.
- This would be the same result in Tanzania, Kenya and South Africa

Tanzania - TFNC

- Sample unusable due to infestation of samples by Tribolium (Rust red and Confused flour beetles).
- If maize meal or wheat flour does not last 6 months should we be performing organoleptic testing over that period?

Kenya - UNGA

- Sample unusable possible due to infestation of samples by Indian Flour Moth
- Again should we be testing over 6 months?

Kenya - KU

- Samples slightly infested with Indian Flour Moth – the infestation level appeared low but may have influenced the results. Infestation more apparent in wheat flour.

- Samples again had a high level of acceptability with no significant differences noted between samples – but did overall acceptability slightly decrease; is age a more contributory factor?

20ppm NaFeEDTA

- No problems reported.

South Africa

- No significant differences
- All pass industry method
- “Slight spotting” – in this case both were unfortified Controls.

Why Concentrate on Acceptability?

- Acceptability is “real” life
- All industry samples EASILY passed in-house acceptability scores (scoring high 90’s rather than min 75).
- Are we making too much of the “remarks” column – we did imply differences?

Is “spotting” real or a pigment of our imagination?

- Spotting has been seen on a few occasions:

SAGL – original flour - EDTA (by consultant) on bread crust

SAGL – old flour – both controls (by consultant) on bread crust

Buguruni – original flour - EDTA in bread dough

Buguruni – old flour – Sulphate in bread dough and on bread crust

- Cost is always an issue – but are we putting cost in context – compare cost of fortification to cost of bakery additives (millers add these voluntarily) and, the BIGGEST component, the cost of grain

- We are looking for excuses not actions – how else can we explain our inactivity; iron reactivity with the wheat flour and maize meal is not one we have proven

Jaco Minnar
of Timmerman Analytical

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www.chemometrics.co.za

info@chemometrics.co.za

PCA Score plots for bread.

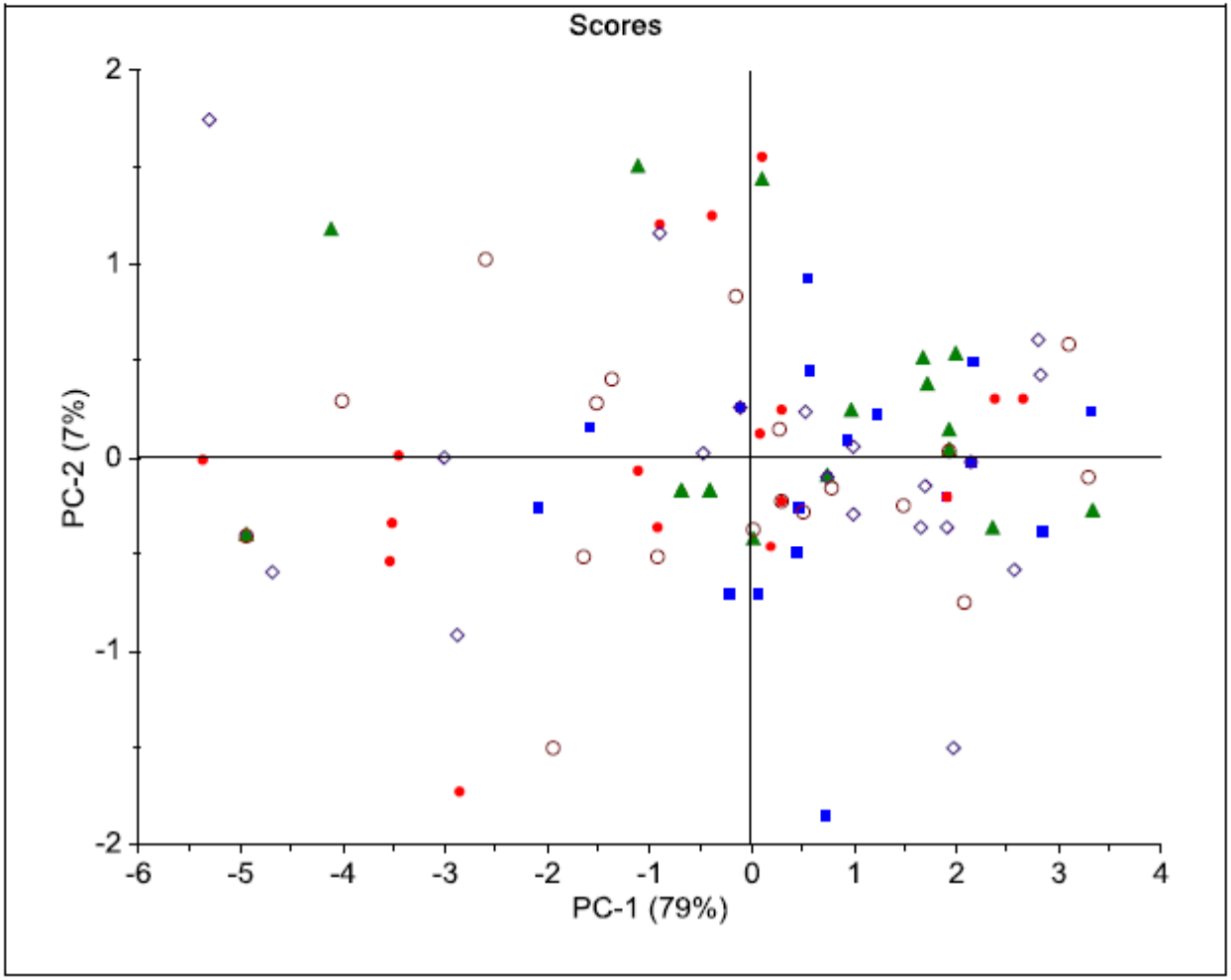
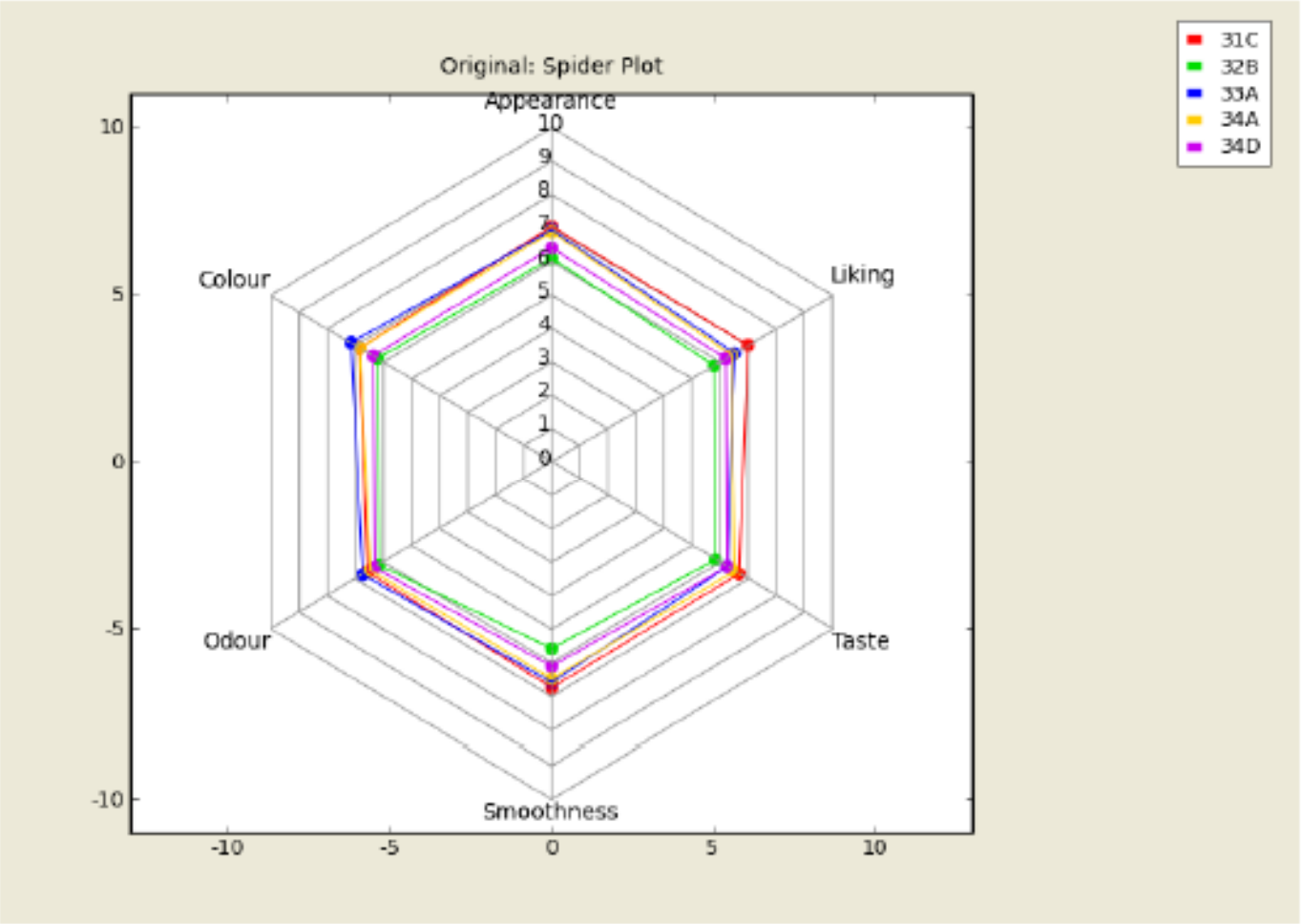


Figure 1.

PCA score plot for bread samples. Sample grouping: ■ 31C, ● 32B, ▲ 33A, ◊ 34A and ○ 34D. It is clear that all samples are equally spread across both the PC1 and PC2 axis and that there are no grouping or clustering of samples in one location.



Spider plot 1. Overall ranking

I conclude that:

- The level of sensory variance between different samples was too small to discriminate between treatments.

- Panellists were not trained well enough to understand the scale or distinguish small differences of sensory attributes, or the additives were well below the sensory threshold.

- There simply wasn’t any sensory differences between the samples.