Fortifying African Products – 2nd interim report

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Flour Fortification Initiative
A Public-Private-Civic Investment in Each Nation

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

Wheat Flour Pre-Mixes donated by DSM South Africa

The Story So Far

South Africa

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

Tanzania - Buguruni

- All samples pass industry accepted method but some 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 – discussed in more detail later as level of sensory analysis was the most comprehensive

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

Current Thought Patterns April 2010

- This initial set of trials are inconclusive in that they have focussed on differences within a closed sample set and panels advised there are differences i.e. direct comparisons are possible – but where not asked about overall acceptability
- In Asia and Africa some within set differences have been noted

Current Thought Patterns April 2010

- Overall opinion is nothing objectionable or significant except .....
- … 2 respondents (“NO” – “NO” – “YUCK”) comments to Control 2 – EDTA – Control
- … 2 respondents clearly preferred EDTA
- More work needed especially in area of lower and higher levels (with normal mill variability)
- Wider evaluation by respondents without direct comparison

2nd Phase

Conducted July 2010 (Buguruni) and October 2010 (other parties)

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?” (discussed later)

Tanzania - Buguruni

- A fortunate misunderstanding led to testing the storage samples earlier than anticipated (consultants fault).
- 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

- This apparent conflict raises some methodology and technical issues which will be discussed later.

20ppm NaFeEDTA levels

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

- This, recurring situation, will be discussed later

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.

- The issue of “new EDTA”, “old EDTA” and “altered EDTA” and colour, as assessed by trained and unskilled panellists, will be discussed later.

South Africa

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

Current Thinking

- Problem is one of perception not reality?
- NaFeEDTA at 40ppm and 20ppm no problems noted
- No problems either with Ferrous sulphate or fumerate.

Conclusions

- Industry and panel results are not identifying any problems that can be demonstrated to be due to any of the iron sources in that all agree samples meet level of acceptability and scoring (trained panels) does not significantly differ.

- 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

PART 2 – More details and discussion

Methodology and Technical Issues

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

- This begs the questions:

“Are we looking for problems?”

“Would anyone but us actually notice?”

See the following photographs and then make up your mind:


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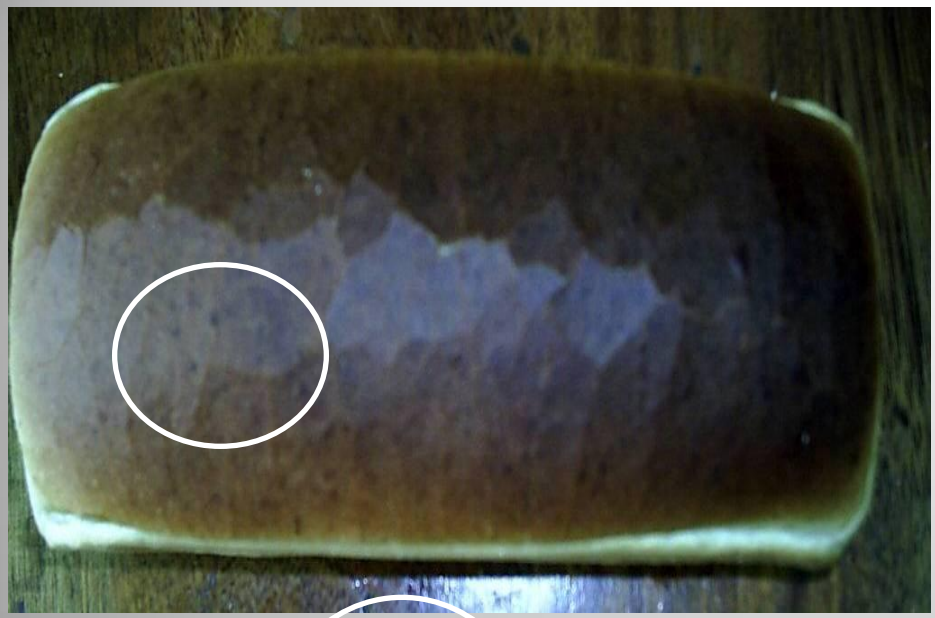

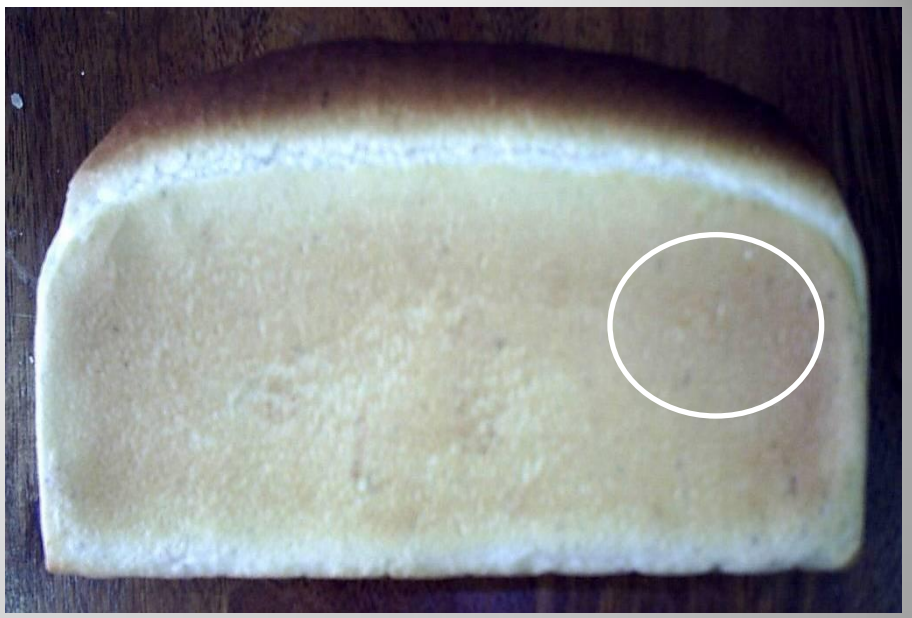


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Kenyatta University – Some Observations

Scoring System

- 5 = Neither like nor dislike
- 6 = Like slightly
- 7 = Like Moderately

- Getting “perfect scores” from a mixed panel is unlikely – this is why millers cultivate “brand loyalty”

The Panel

- Approximately 50% trained panellists
- Approximately 50% “walk ins” – Food Science students with some exposure to taste panels

- Approximately 60% of those who participated in trial 1 participated in trial 2

Colour

Bread

	Control	EDTA	Sulphate	Fumerate
April 2010	6.9	7.1	7.2	7.3
Oct 2010	6.8	6.2	6.4	6.8
20ppm		7.2		

Chapatti

	Control	EDTA	Sulphate	Fumerate
April 2010	6.9	6.8	7.2	7.7
Oct 2010	6.5	6.9	5.9	6.7
20ppm		6.9		

		Ugali	
	Control	EDTA	Fumerate
April 2010	7.7	7.6	7.2
Oct 2010	7.2	6.6	6.8
20ppm		6.7	

		Uji	
	Control	EDTA	Fumerate
April 2010	7.3	6.9	7.0
Oct 2010	5.9	6.0	6.3
20ppm		6.6	

Overall Liking

Same Scoring System

Bread

	Control	NaFeEDTA	Sulphate	Fumerate
April 2010	7.0	6.9	6.8	7.1
Oct 2010	7.0	5.8	6.2	6.4
20ppm		6.5		

Chapatti

	Control	NaFeEDTA	Sulphate	Fumerate
April 2010	6.6	6.5	7.5	6.3
Oct 2010	6.2	6.3	4.9	6.0
20ppm		6.6		

	Ugali		
	Control	NaFeEDTA	Fumerate
April 2010	7.5	7.2	6.7
Oct 2010	6.4	6.5	5.6
20ppm		6.5	

	Uji		
	Control	NaFeEDTA	Fumerate
April 2010	6.9	6.8	6.5
Oct 2010	5.8	5.9	6.5
20ppm		6.2	

- Standard Deviation within sub-sets increased slightly from trial 1 to trial 2 – diversification of opinion; what panellists were used to??
- Age more an issue than iron source?
- All samples had reduced colour score.
- Scores remain acceptable

Conclusions

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Return to Meeting Presentations