

Atelier de Formation des Formateurs en Enrichissement de la Farine

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Flour Fortification Initiative

A Public-Private-Civic Investment in Each Nation



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INTERNATIONAL

NATIONAL REGULATORY MONITORING SYSTEM

Sampling Plans and Implementation

Specific Plans

- Additives
- Contaminants
- MRL's
- Mycotoxins
- Nutrition

- Specific commodity i.e. Fruits, grains etc
- Specific point in food chain i.e. Farm, market, retailer

- RSA has \approx 2,500 inspectors dealing with “environmental health” which includes food control (also deal with pollution etc)
- Approximately 2,000 on the road and rest are “administration”
- All of the above underwent a 3 day training course in food fortification covering WHY (nutritional need), HOW (adding at the mill) and the Regulation requirements

- RSA system plans for two (2) National sample runs per annum each generating \approx 1,000 to 1,200 samples per run
- Each sample checked at laboratory for Vitamin A and either Riboflavin or Niacin
- Iron spot test is used for screening purposes
- With 52 Municipal and/or District level Food Control this is only 20 samples per level

- RSA has 5 major milling groups and a total of 15-25 mills producing 95% of the wheat flour and 75% of the maize meal commercially available – typically operating at a claimed 70% rated capacity
- All of the mills sell nationwide
- Also need to cover imports from neighbouring Lesotho and Swaziland

- RSA also has in excess of 500 “small” mills (about <5MT per hour) that distribute more Provincially than Nationally and an unknown number of hammer mills (dubious if they fall under the regulations so are ignored at this point in time).
- RSA mills \approx 2.5 million MT wheat and \approx 5 million MT maize (believed to be dropping)

- Food Control, therefore, need to ensure major mills are not “over monitored” due to ease of access
- Question of “risk analysis” – not only to the public from non-compliance but to the fortification programme *per se* because larger millers perceive smaller millers are non-compliant and threaten to pull out in protest

- Requirement recognised that Food Control must specify, within tight limits, what samples should be taken and where.
- RSA regulations only permit prosecution based on samples taken at mill level but it is recognised that sampling must be carried out at retail level to ascertain delivery performance of the fortification programme

Theoretical Plan

- 52 Metropolitan Districts \pm 20 samples (= a single sealed package) each
- Minimum 10 from millers in area with maximum 2 from “big 5 group” – to be taken at mill level
- 10 from retail outlets with majority taken from major supermarkets or wholesalers (theory is price is lower therefore market penetration deeper)
- No more than 2 samples from any miller – no more than 25 samples in total

Targeted Plan – Compliance

- Again Metropolitan based.
- 20-25 fortified samples but only at mill level with none taken from “big 5”
- Take note of pre-mix used and identify this on the submission report
- Non fortifying millers to be noted but not sampled from (Food Control will advise specific action)

Targeted Plan - Delivery

- Again Metropolitan based.
- 20-25 fortified samples but only at retail level with no more than 1 sample per brand name.
- Additional instruction may be given – no more than 2 samples from any one milling company

Instructions

- Sample consists of “any sealed package”.
- Sample to be dated and placed in sealed black plastic bag, kept out of direct sunlight and placed in refrigerator as soon as possible.
- Samples to be sent or delivered to laboratory once collection completed

Sampling for Compliance - LEGAL

- Codex CAC GL 50 recommends that the inspector samples from the square root of the number of packages i.e. If a warehouse has 60,000 bags then the inspector needs to take samples from 245 bags, combine them, mix thoroughly and sub-sample

- Taking a package from the packing line is not sampling
- Mill will have kept a small sample from each hours production and combined them – inspector has the mandate to take a sample from there

$$\text{Total Error} = \sqrt{\text{Sampling Error}^2 + \text{Analytical Error}^2}$$

Sampling Error

- Do something once error is 100%
- Repeat the above 4 times and halve the error
- Repeat the above 9 times and halve it again

Analytical Error

- Laboratories will thoroughly mix the sample received from the inspector
- Laboratory will then analyse the sample – possibly in duplicate and, more than likely, twice on the same extract rather than twice from the same sample

Total Error

- Laboratory error can be high - @ 95% confidence level for vitamin analysis in fortified product the result is $\pm 15-20\%$
- Distributing 200g of pre-mix in 1000Kg of flour is not easy even with a very good mixer so we could have a variation $>30\%$

A Simple Example

- Consignment of Grain arrives at Mill.
- Mill want to test for Protein
- Variation within the truck (sampling error) is $\pm 0.4 \%$
- Analytical error on protein analysis is $\pm 0.2 \%$

Total Error

$$= \sqrt{\text{Sampling Error}^2 + \text{Analytical Error}^2}$$

$$\text{Total Error} = \sqrt{(0.4)^2 + (0.2)^2} = 0.45 \%$$

$$\mathbf{\textit{Total Error}} = \sqrt{(\mathbf{0.4})^2 + (\mathbf{0.1})^2} = \mathbf{0.41\%}$$

$$\mathbf{\textit{Total Error}} = \sqrt{(\mathbf{0.2})^2 + (\mathbf{0.2})^2} = \mathbf{0.28\%}$$

$$\mathbf{\textit{Total Error}} = \sqrt{(\mathbf{0.2})^2 + (\mathbf{0.1})^2} = \mathbf{0.22\%}$$