East, Central and Southern African
Health Community

MANUAL FOR EXTERNAL MONITORING OF FORTIFIED MAIZE FLOUR IN SMALL SCALE OPERATIONS

(Technical Auditing and Inspection, combined with Quality Control)

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EAST, CENTRAL AND SOUTHERN HEALTH COMMUNITY (ECSA-HC)

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Foreword

Over the last five years, the East, Central and Southern African Health Community (ECSA-HC) has continued to undertake advocacy and technical assistance to assist member countries to embrace and scale up Food Fortificationinitiatives as a key strategy to reduce micronutrient malnutrition in the region.

ECSA has been working with partners in direct response to resolutions of the Conference of Health Ministers to scale up Food Fortification initiatives as a critical plank in fighting the devastating effects of micronutrient malnutrition among populations of member states. ECSA partners in the Regional Food Fortification Initiative include the A2Z Project, USAID, UNICEF, Micronutrient Initiative (MI), and ICCIDD, among others.

Part of the outcome of the intensified collaborative initiative, is a series of fortification guidelines developed to guide the Industry during the fortification process of staple foods and provide government food inspectors a reference point in enforcing the standards.

Similarly, food control manuals have been developed for the Industry and the Government to provide technical reference resources that cover the entire fortification process to ensure that the fortified foods are safe and adequately fortified with the required fortificants.

This manual is part of a series of manuals on food fortification and is meant to directly contribute to the overall effort to strengthen food fortification in the region.

It is our hope that the use of this manual will help strengthen food control activities in our countries in order to deliver safe and quality fortified foods to the ECSA population.

Steven Shongwe
Executive Secretary
ECSA Health Community

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The manual is as a result of joint work by distinguished food fortification experts in developing countries. During the drafting of this manual, consultations with senior officers from food control departments of the ECSA member states were made and input incorporated.

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ECSA is deeply thankful to the above authors for preparing this manual.

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MANUAL FOR EXTERNAL MONITORING OF FORTIFIED MAIZE FLOUR IN SMALL SCALE OPERATIONS (Technical Auditing and Inspection combined with Quality Control)

Technical auditing and inspection activities are carried out at small scale maize mills as part of the enforcement activities performed by the government, as a way to ensure that fortified maize flour meets the nutrient quality and safety specifications established in regulations. During the technical audits, the performance of quality assurance activities done by the producer is examined. Then, the conformity of the fortified food with technical specifications is confirmed through sampling and chemical analysis of the flour samples taken at the plant. Samples of the premix (and/or preblend) are also taken to verify the micronutrient composition.

This manual presents the steps for carrying out the technical auditing and inspection combined with quality control.

Quality control is normally the responsibility of the maize millers in large scale flour mills. However due to the lack of capacity for quality control at small mills, the inspection is combined with sample collection for testing (quality control) as a service to the small scale mills. The manual also describes the spot test method for iron (NaFeEDTA) in flour.

Technical audits are mainly based on reviewing the producer's records and so the listed objectives, measured by indicators and criteria of success, are based on the ones used for the QA system used in small scale mills. As any enforcement procedure carried out by a government body, the warnings and legal actions that should be taken when noncompliances are noted are to be defined and applied when necessary.

Results of auditing and inspection activities should be consolidated twice a year in order to determine the degree of success in fulfilling the fortification goals, identify obstacles to overcome and propose actions to be taken. It is recommended that an annual report be prepared and published where data is presented graphically to portray the situation of the maize flour fortification program in the country, along with information from other food control or surveillance activities.

The sections included in this manual are:

- Planning inspection visits
- Conducting technical auditing, inspection and quality control visits
- Performing spot test for determining added iron (NaFeEDTA) in fortified maize flour

A. PLANNING INSPECTION VISITS

I. Objectives and Accountability

The purpose of planning inspection visits is to ensure that:

- Resources are allocated to visit the maize flour fortification centers as frequently as possible.
- Inspectors receive appropriate training on the process of maize flour fortification and sampling procedures when performing auditing and inspection activities. Training for carrying in situ the spot tests for iron is also included.

The *Supervisor of Food Control Inspectors* is responsible for achieving the objectives and informing the *head of the Food Control Authority of the plan*.

II. Procedure

The Supervisor of inspectors should perform the following duties

a. Plan, budget and schedule

1. Based on the total number of maize flour fortification centers that should be visited and based on experiences from previous year, plan the required number of visits per year.
2. Estimate the financial resources that will be needed considering:

- Personnel
- Transportation and fuel
- Approximate number of samples to be analyzed and cost
- Other issues such as approximate number of extra-visits

3. Plan a training workshop every 6 months for the food control inspectors about their supervising activities when they visit the small scale maize fortification centers.
4. Provide a report to the Head of Food Control Authority about the plan, the schedule and estimated budget to carry out the plan.

B. CONDUCTING TECHNICAL AUDITING/INSPECTION AND QUALITY CONTROL VISITS

I. Objectives and Accountability

The purpose of the technical auditing and inspections visits is to verify that the small scale maize millers are carrying out the fortification process as regulated, and records of use of premix and amount of fortified flour produced are kept up to date. The Inspector should plan to spend one to two hours to make detailed examination of processes, including qualitative determination of the content of iron in the flour during the visit. The visit should be made with the view to assist the maize millers to maintain the quality of the fortification process. The visits may be scaled down or scaled up depending on the performance of the mill, but it is recommended to start with a visit every month.

Food Control Inspectors are directly responsible for achieving these objectives and they should report the findings from the visits to their *Supervisor.* The *Supervisor* is responsible for preparing frequent reports to the *Head of the Food Control Authority* and any other governmental body involved in the enforcement of fortified foods.

II. **Procedure** (Food Inspectors)

a. Technical Audit

1. Begin the technical audit with the aid of the checklist presented in **Table B-1**. As the audit takes place, record any non-compliance found in the same table under the column of “Suggestions for Improvement and Deadlines”.

b. Inspection/Quality Control

2. During the visit, the inspector shall take randomly 5 packaged flour samples (~500 g), and test each one of them for their iron content using the spot test methods provided in **Section C**.

3. **All** samples should indicate the presence of added iron EDTA using the spot test.

4. If criterion is not met, take another 5 samples. If absence of fortification is confirmed in more samples. Request the unpacking of the lot, and supervise the addition of more preblend as required to adjust the concentration.

5. At the end of the visit, take two 500-g flour samples for quantitative testing at a laboratory.

6. Take a 100-g sample of the **preblend** and 50-g of the **undiluted premix**, if the latter is available. Write down the type of iron used in the premix as well as information of other nutrients as labeled on the box or the Fact Sheet.

   Write the information in Section 4.2 of **Table B-1.**

7. Pack the samples in dark air tight containers and close them tightly.

8. Label each sample with the following information:
   - Name of the factory
   - Product brand
   - Date of inspection
   - Lot number
   - Sample ID or number

9. On return to the office, the inspector should hand in the auditing/inspection forms and the samples to the Supervisor.

III. Records and reporting (Supervisor of Food Inspectors)

1. The Supervisor shall receive the samples and the reports from the auditing/inspection visits. The preblend and premix shall be sent to the National Food Control Laboratory, or to a reliable laboratory to determine the type and amount of iron that was used. Likewise, the samples of fortified maize flour shall be sent along to determine the content of iron and vitamin A using quantitative methods.

2. When results from the National Food Control Laboratory are received, the supervisor shall analyze them and prepare a report. A letter of recommendations shall be sent to the mill if it is necessary.

3. The supervisor shall prepare a consolidated report every 6 months and submit it to the Head of the Food Control Authority.

   These reports shall also be forwarded to the National Coordinating Committee of the Fortification Programs.

C. SPOT TEST FOR DETERMINING ADDED IRON (NaFeEDTA) IN FORTIFIED MAIZE FLOUR

I. References

AOAC Methods. 12 ed. Ferrous salts. Official Final Action (7.74).
AACC Method 40-40. Iron –Qualitative Method. First approval 5-5-60; reviewed 10-27-82.

II. Principle

Ferric iron, in an acidic medium, reacts with a solution of potassium thiocyanate (KSCN) to form an insoluble red pigment. Other types of iron, such as ferrous iron and elemental iron can also produce this reaction, once they are oxidized to the ferric form using hydrogen peroxide.

III. Materials

A. Filter paper Whatman # 1
B. Manual sieve.
C. Watch glass.

IV. Reagents

A. HCl–2 N. To a 500 ml beaker, add 100 ml distilled water. Then pour slowly 17 ml of concentrated HCl, and finally 83 mL more of water.
B. Potassium Thiocyanate-10%. Dissolve 10 g of KSCN in 100 ml water. Previous to use, mix 10 mL of this solution with 10 mL of HCl-2 N.

V. Procedure

1. Place the filter paper over the watch glass.
2. Wet the surface of the filter paper with the solution of potassium thiocyanate. Let the liquid penetrate the paper fibers.
3. Using a hand sieve, sift portion of the flour sample in order to load a think layer over the entire wet area. Take out any excess.
4. Add a little more of the acidic solution of potassium thiocyanate over the flour. Let it stand for a few minutes for the reaction to occur.
5. Red color spots indicate the presence of a ferric salt, such as NaFeEDTA.

VI. Interpretation

6. Number and distribution of spots are indicative of the homogeneity and iron level of the sample. Use samples with known amounts of the same type of iron that is expected to make a comparative assessment.

FORTIFIED MAIZE FLOUR- AUDITS AND INSPECTION-TABLE B-1

CHECKLIST OF TECHNICAL AUDIT AND INSPECTION/VISIT TO SMALL SCALE MAIZE MILLERS

Inspection registry:	Date:	Inspector Name:
Maize Mill Name:		
Address:		
Telephone:	Fax:	e-mail:

ASPECTS	YES	NO	N/A	ASPECTS	YES	NO	N/A
1. Premix and preblend:				3. Fortification Process			
1.1 Mill Inventory log (TABLE A-1 & A-2) is up to date				3.1 Records of fortified flour produced is updated			
1.2 Sufficient premix for 2 months or				3.2 Fortified Flour /Premix proportion is as expected			
Preblend for 2 months is available				4. Packaging and labeling			
1.3 Storage is adequate				4.1 Flour packaged in appropriately labeled bags			
2. Premix production:				4.2 Type of iron and other nutrients labeled appropriately			
2.1 Iron & Vitamin A amount is indicated							
2.2 Records of preblend preparation (A-2)							
2.5 "First-in, first-out" system is used							

Spot tests conducted during inspection			Results of the Iron tests for samples sent to the laboratory		
Sample #	Sample ID	Result of Spot Tests in Mill	Sample #	Flour Sample ID	Iron Content (mg/kg) (Laboratory Results)
1			1		
2			2		
3			Samples #	Premix/Preblend Sample ID	
4			1		
5			2		

NEW RECOMMENDATIONS		
Non-compliances	Suggestions for Improvement & Deadline	
Inspector Name:	**Signature:**	Date
Factory Representative: **Receiving Report**	**Signature:**	Date
Supervisor (Name)	Signature	Date

East, Central and Southern African

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