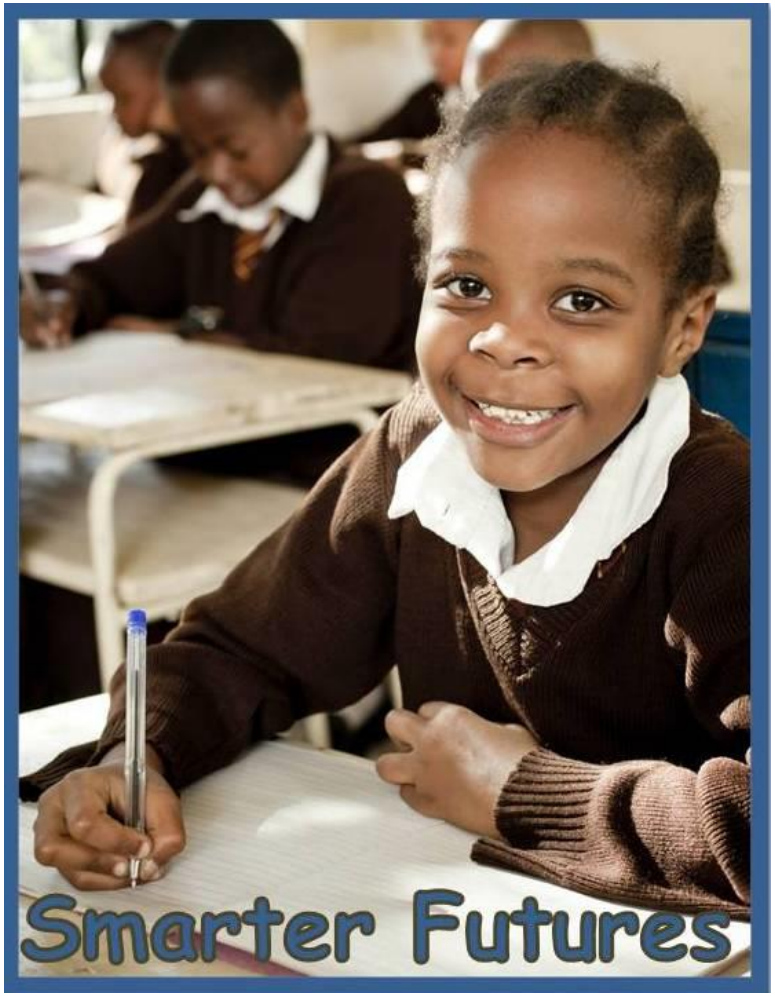
Fortification at the Mill

Quality Assurance & Process Control at the Mill

Quentin Johnson

(with contributions from Philip Randall)



Food Fortification Initiative
Enhancing Grains for Healthier Lives

AkzoNobel

Helen Keller
INTERNATIONAL

IFSBH

Ministerie van Buitenlandse Zaken

Quality Assurance Definition

A system to control all parts of the milling process to ensure the consistent production of flour that meets both regulatory and commercial requirements.

Process control of Fortification at the mill is a key component of the Quality Assurance system

Process Control in Flour Fortification

- Flour fortification needs process controls to ensure consistent quality and safety of the output: flour adequately fortified with essential minerals and vitamins.
- Effective process control systems use mechanisms to monitor activities and take timely corrective action.
- Well implemented process control gives an early warning of problems which in turn helps to avoid wastage, reworking of product, customer complaints, food recalls and liability issues etc

Quality Assurance Fortification
Mill Requirements and Responsibilities

- Premix procurement and storage
- Feeder/Dosifier Installation
- Feeder Calibration
- Feed Rate Calculations
- Process controls
  - Check Weighing, standards and sampling schedule
  - Iron Spot Test
- Record Keeping
- Laboratory Analysis
  - Quantitative test for Iron and Vitamins

Ultimate Process Control of Flour Fortification

- Modern mills with computer control systems
- Automatic feeder –flour scale feedback systems controlling the process
- Premix release system
- Stock Reconciliation method on weekly or monthly basis
- Iron spot test used as mill QC tool
- Good access to qualified laboratories for quantitative analysis for monitoring

Acceptable Process Control of Flour Fortification

- Manual feeder operations – volumetric type feeders
- Interlocked with either 1st Break sifter or flour collection conveyor motor
- Feeder Calibration
- Check weighing 2 – 4 times per shift
- Iron Spot Test
- Premix release system
- Stock Reconciliation method on weekly or monthly basis
- Access to outside testing laboratory

Premix Procurement and Storage

- Premix specifications or standards
- Approved supplier list at least 2 suppliers
- Purchase and storage records
- Cool dry storage room or area (A/C possible)
- Stock rotation First In First Out system
- Usage records including premix lot numbers

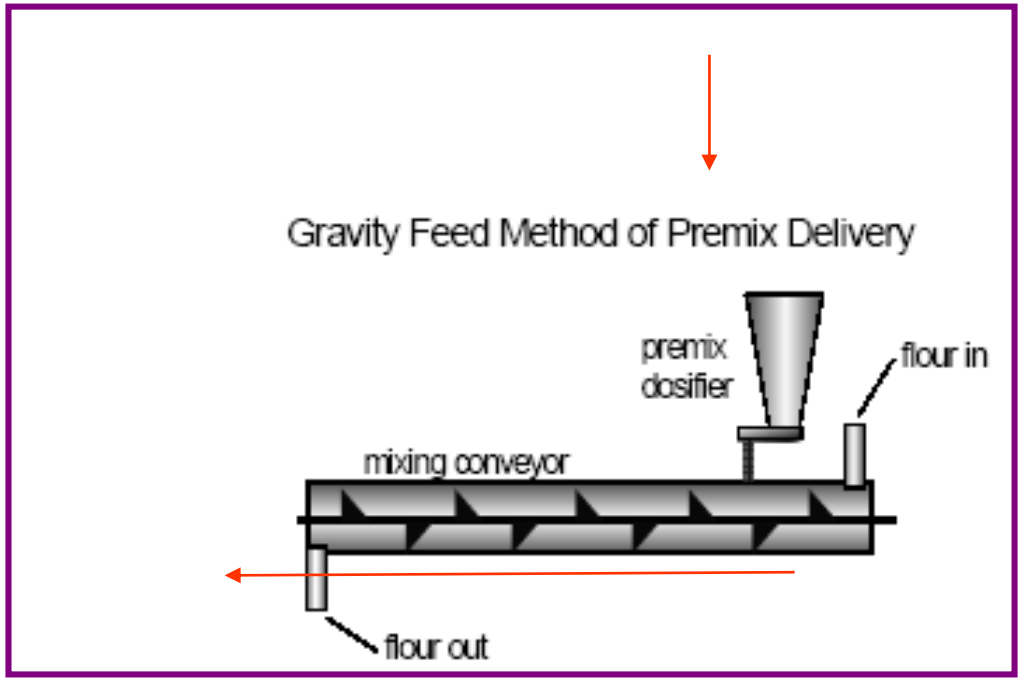
Feeder Placement - Gravity Feed System

Feeder is placed above flour collection conveyor.

MUST BE 3 METERS FROM DISCHARGE END OF CONVEYOR

Premix falls directly into the flour as it flows through the conveyor.

Feeder is usually placed above or near the flour collection conveyor that blends the various flour streams.

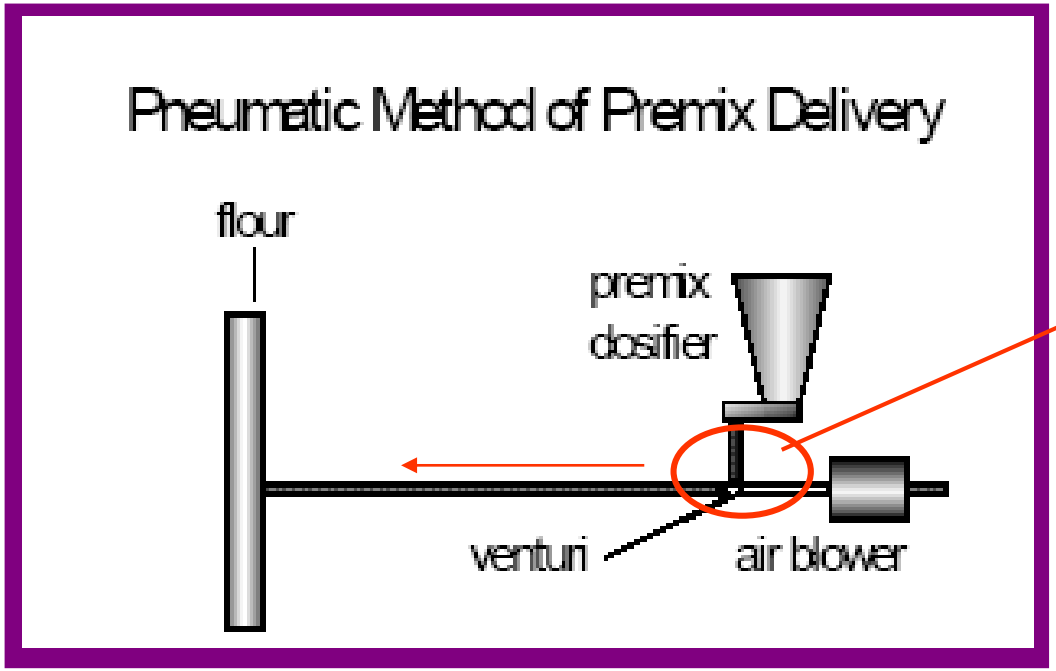


Feeder Placement Pneumatic System

Premix drops into a venturi tube, that injects the premix into an air stream.

Premix is blown by positive pressure or sucked by a vacuum through a pipe into the flour collection conveyor.

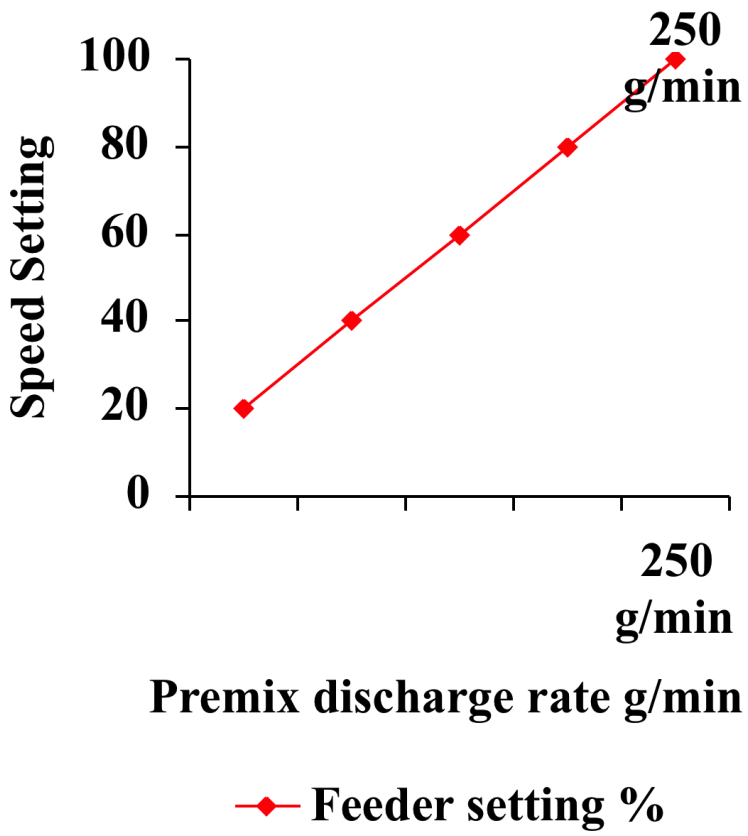
Occasionally downstream location in the flour flow can be used to add premix provided it will be well mixed with the flour.



FEEDER SIZING AND FEED RATE CALCULATIONS

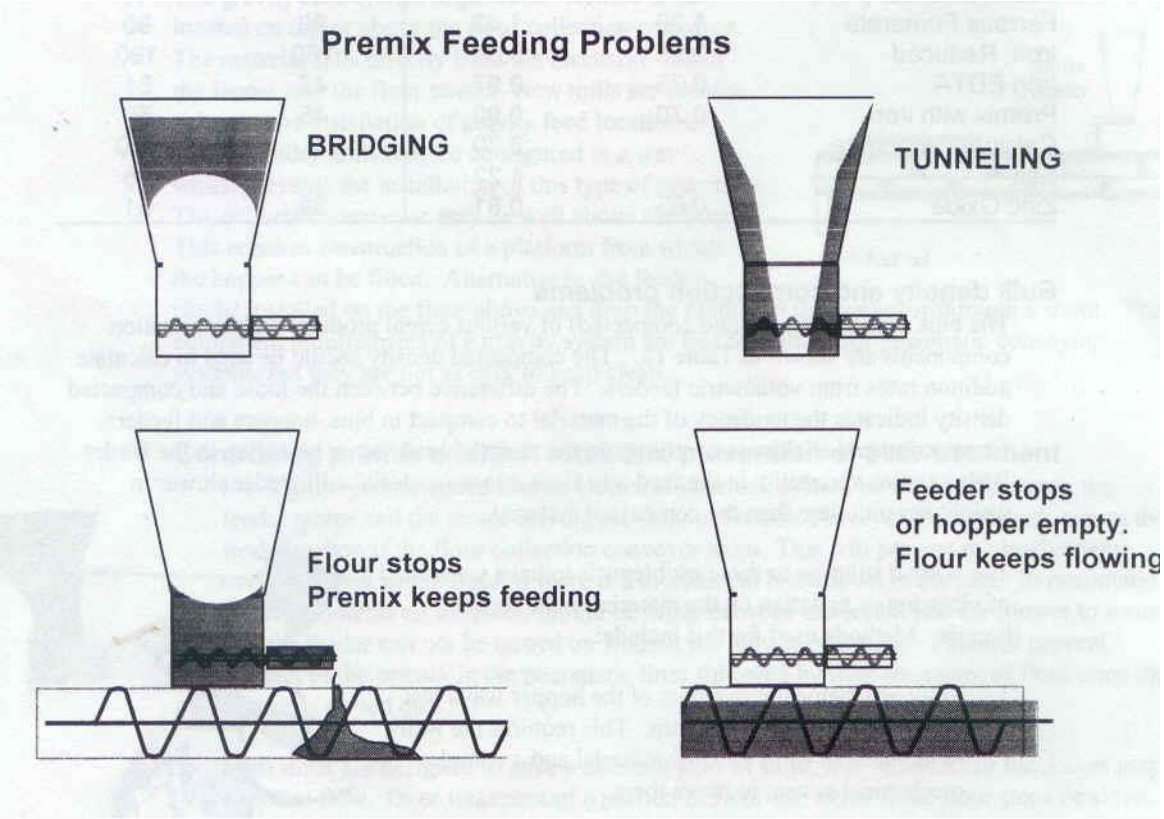
Mill Size	60 MT	100 MT	200 MT	360 MT
Flour	45	75	150	187.5
Kg/min	31.25	52.08	104.17	347
Premix	200 g/MT	200 g/MT	200 g/MT	200 g/MT
Add Rate	6.25 g/min	10.6 g/min	20.8 g/min	69.4 g/min
Premix use	3.0 kg/ 8 hr	5.1 kg/ 8 hr	9.9 kg/ 8 hr	33 kg/ 8 hr

Feeder Calibration



- Direct Drive Motors
- Volumetric Feeders
- Determine minimum and maximum discharge for premix
- Premix weight and volume based on density of components

Feeder Problems - Diagnosis



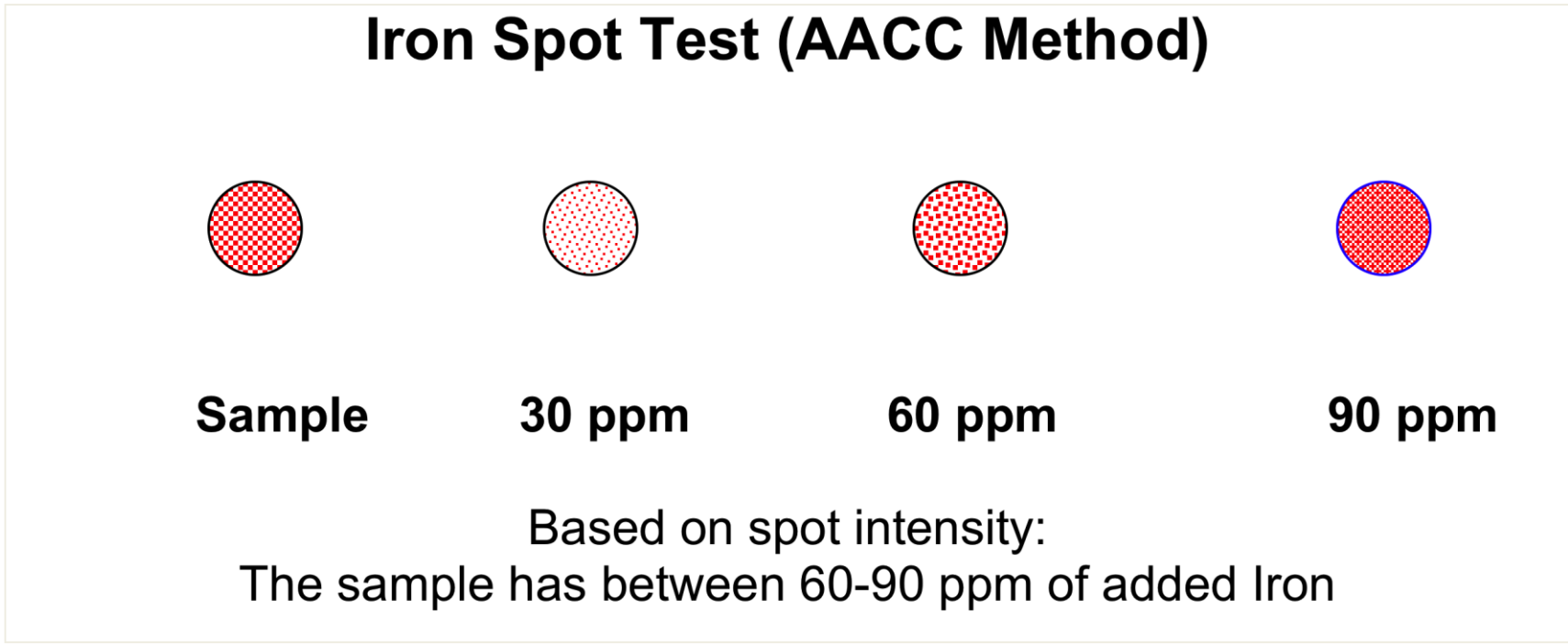
Feeder Problems - prevention

- Bridging – use of stirring device inside feeder hopper – agitator or screw mixing
- Tunneling – use of stirring device
- Mill stops, feeder continues – electrical interlock between mill and feeder
- Feeder empty or stops – audible alarm system

FORTIFICATION AT THE MILL
Equipment requirements

- Collection Conveyor with Paddles or cut/folded flights (maximize agitation)
- Feeder with mechanical or electronic controls to adjust feed rates
- Conveying system to deliver premix to flour
- Weigh Scale to verify premix addition rates (QC check)

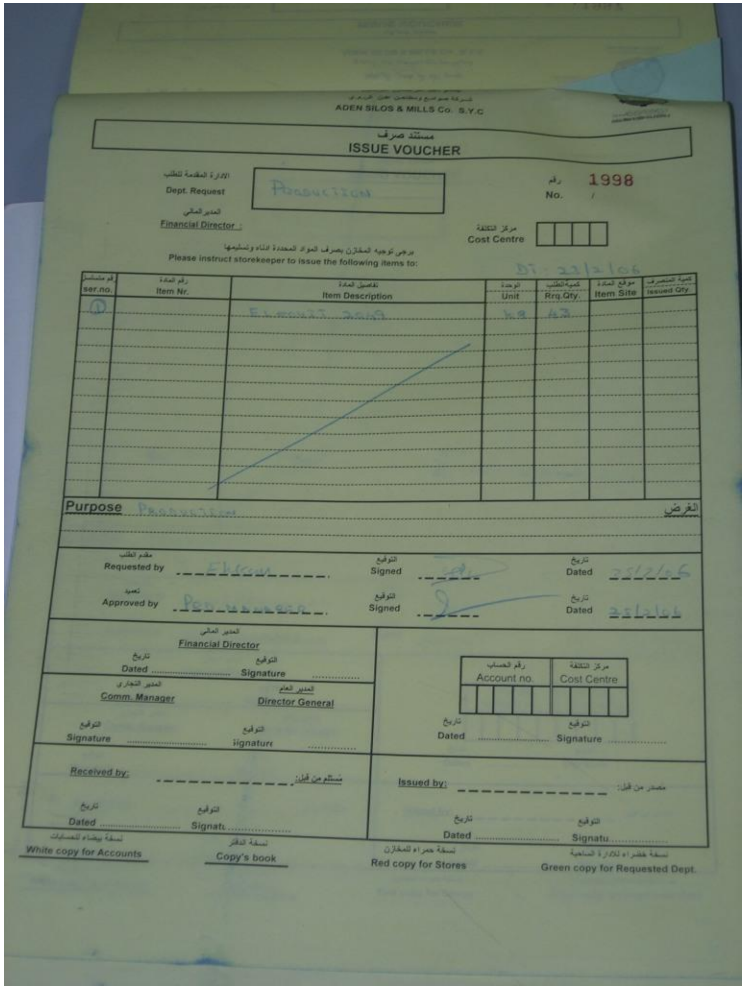
Iron Spot Test Diagram



Premix Control Records

- Why?
- To verify that premix is being added at the correct levels using inventory control system.
- Can be calculated weekly or monthly

Yemen Flour Mill Premix Stock Release form – millers copy



ADEN SILOS & MILLS Co. S.Y.C

مستند صرف
ISSUE VOUCHER

الإدارة المقدمة للطلب
Dept. Request: PRODUCTION

رقم
No. 1998

المدير المالي
Financial Director :

مركز التكلفة
Cost Centre

يرجى توجيه المخازن بصرف المواد المحددة ادناه وتسليمها
Please instruct storekeeper to issue the following items to:

رقم متسلسل ser.no.	رقم المادة Item Nr.	تفاصيل المادة Item Description	الوحدة Unit	كمية الطلب Rrq.Qty.	موقع المادة Item Site	كمية المنصرف Issued Qty
1		[illegible]	kg	[illegible]		

Purpose: PRODUCTION — الغرض

مقدم الطلب Requested by: [illegible] — التوقيع Signed — تاريخ Dated 25/2/06

تعميد Approved by: [illegible] — التوقيع Signed — تاريخ Dated 25/2/06

المدير المالي Financial Director — تاريخ Dated — التوقيع Signature

رقم الحساب Account no. — مركز التكلفة Cost Centre

المدير التجاري Comm. Manager — التوقيع Signature

المدير العام Director General — التوقيع Signature

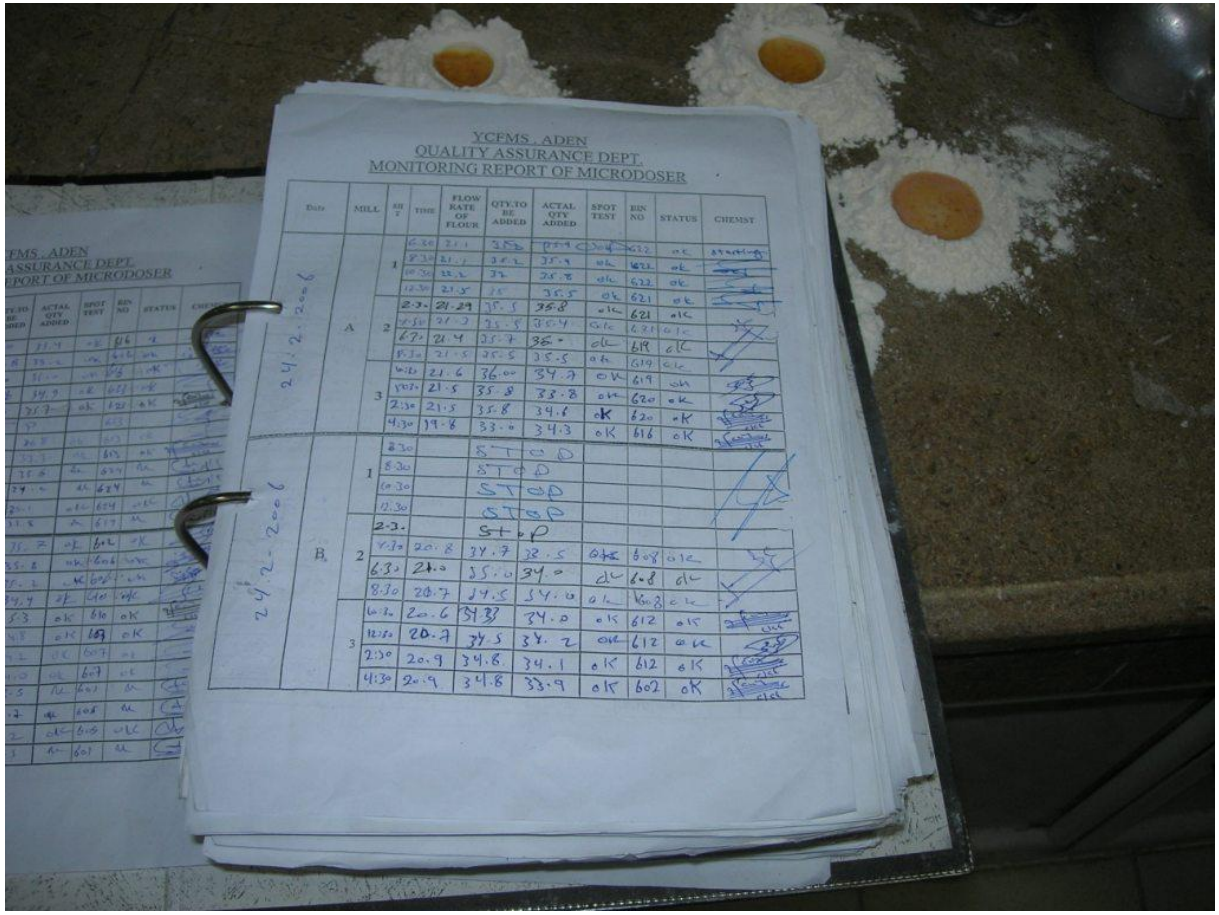
تاريخ Dated — التوقيع Signature

Received by: — مستلم من قبل: — تاريخ Dated — التوقيع Signature

Issued by: — مصدر من قبل: — تاريخ Dated — التوقيع Signature

نسخة بيضاء للحسابات White copy for Accounts — نسخة الدفتر Copy's book — نسخة حمراء للمخازن Red copy for Stores — نسخة خضراء للادارة الطالبة Green copy for Requested Dept.

Yemen Flour Mill
– QC Monitoring Report Form



Premix Control Record Calculation

- A. Starting Inventory kg
- B. Amount purchased kg
- C. Ending Inventory kg
- D. Amount used (A+B-C) kg
- E. Fortified Flour produced MT
- F. Actual Addition Rate (D/E x 1000) g/MT
- G. Target Rate* g/MT
- H. Percent of Target (F/G x 100) %
- * Based on supplier specifications

Accuracy of system
WFP Afghanistan Example

- 3 mills in Peshawar and Quetta
- Flour milled for WFP Afghanistan's Women's Bakery Project 1999-2005
- Based on premix stock release system tied to flour orders
- Final assessment
- Premix addition was within ± 3.0% of target addition rate

For additional information, visit:

www.FFInetwork.org/wheatflour/atlanta08/

www.FFInetwork.org/wheatflour

Flour Fortification Initiative

A Public-Private-Civic Investment in Each Nation