INTRODUCTION

• Aflatoxins are poisonous chemical compounds produced by certain fungi
• The effects of aflatoxins are acute symptoms of severe illness appearing very quickly. Longer term chronic or cumulative effects on health, including induction of cancers and Immune Deficiency
• Various food stuffs and animal feed are usually contaminated with aflatoxins.
• High risk commodities include maize, rice, nuts and pulses.
• Fungal development takes place before and after harvest and particularly when harvesting takes place under high humidity and warm weather conditions.

• This is exacerbated by improper drying, poor storage, exposure to moisture and insect damage/activity.
# Mycotoxigenic Fungi

<table>
<thead>
<tr>
<th>Mycotoxin</th>
<th>Commodity</th>
<th>Fungal source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deoxynivalenol/nivalenol</td>
<td>Wheat, maize, barley</td>
<td><em>Fusarium graminearum</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>F. culmorum var. crookwellense</em></td>
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<tr>
<td>Zearalenone</td>
<td>Maize, wheat,</td>
<td>As above</td>
</tr>
<tr>
<td>Ochratoxin</td>
<td>Barley, wheat coffee</td>
<td><em>Aspergillus ochraceous</em>, <em>Penicillium verrucosum</em></td>
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<tr>
<td>Fumonisin</td>
<td>Maize</td>
<td><em>Fusarium moniliforme</em></td>
</tr>
<tr>
<td>Aflatoxin B1, B2</td>
<td>Maize, peanuts</td>
<td><em>Aspergillus flavus</em></td>
</tr>
<tr>
<td>B1, B2, G1, G2</td>
<td>Maize, peanuts</td>
<td><em>A. parasiticus</em></td>
</tr>
</tbody>
</table>
PREDISPOSING FACTORS:

- Temperature 10-40°C
- Grain moisture above 13%
- Humidity 65-70%
- b) stress condition results in shrivelled grains which are more susceptible to attach by Aflatoxin producing fungi.
- Harvesting methods.
- Drying methods.
- Shelling methods.
- Dusting.
- Storage structures.
- Storage materials.
HISTORY OF AFLATOXIN INCIDENCES IN KENYA.

• 2003 - 68 people died of aflatoxin poisoning in Eastern province.
• 2004- 123 people in Eastern province out of the 341 reported cases died of aflatoxin poisoning.
• 2005- 23 out of 63 the reported cases of aflatoxin poisoning in Eastern province were fatal.
• 2006-28 out of 78 reported cases in east province were fatal.
• 2007- 21 out of 84 cases in Eastern province were fatal. 16 of these cases occurred in Igembe District Meru.
• 2008- 2 cases out of 6 reported cases were fatal.
• 2009- no fatal cases were reported but:
  - 31,000 bags of maize condemned in Mbeere
  - 1,213 bags of maize condemned in Bura irr. Scheme

• 2010- widespread detection of aflatoxin in maize in Eastern, and coast provinces.
History of Acute Aflatoxicoses Outbreaks

Western India 1974
Taiwan 1967
Uganda 1970
Malaysia 1988

35°N 35°S
2004 aflatoxin outbreak areas
Clinical (n=32)
Current outbreak

• Eastern, coast and parts of central provinces have, since experienced several seasons of severe and widespread crop failures leading to food shortages.
• However, the October/November season 2009 saw good rains.
• This coupled with the ongoing government interventions on improved food production; farmers realized good yields above the targeted production.
• The March/April 2010 rains started earlier than normal and a large number of farmers had not harvested their crop.
• The rains continued during the months of February, March, April, May affecting harvesting and general post harvest management of produce.
i)) In November 2009, trained 120 Extension officers from coast province on crop post harvest management.

ii) On 28th January 2010, the ministry issued a national alert to all Provincial Directors of Agriculture and District Agricultural Officers to mitigate against possible Aflatoxin outbreak by up-scaling campaigns on proper post harvest management.

iii) Ministry conducted a national crop storage needs assessments in January 2010.

iii )In January 2010 the Ministry recorded 3 Radio programmes on crop post harvest management which were aired by KBC.

iv) In March 2010 the Ministry went on air in a 1 hr KBC live programme on crop post harvest management.

ii) PDA Eastern conducted 4601 field day with a total attendance of 186,707 farmers and took 6639 moisture meter reading with readings ranging from 10.2-19%, by April. These are in progress.
FARMERS CHALLENGES

• Difficulties in shelling maize that was not dry.
• Difficulties in drying maize to the recommended moisture content of 13.5.
• Rotting due to excessive moisture content.
• Aflatoxin contamination
• Increased cost of harvesting and handling.
SURVEY ON SAFETY OF FARMERS PRODUCE IN AFFECTED AREAS.

- NCPB detected high levels of aflatoxin in maize presented by farmers above 10ppb.
- NCPB suspends grain purchase.
- Ministry of Agriculture and Ministry of Public health and sanitation collected samples in affected areas.
- Samples analyzed by four different institutions.
SURVEY RESULTS

• 15% of maize in upper Eastern Province is safe with aflatoxin level below 10ppb. while 85% of the maize is unsafe for human consumption.
• 40% of maize in Lower Eastern is safe with aflatoxin level below 10ppb while 60% of the maize is unsafe for human consumption.
• On average 22% of the maize in Eastern Province is safe for human consumption.
• Estimate of 3million bags of Maize 90kg each currently being held by farmers.
• 2,340,000 bags of maize needs mopping up from farmers.
RECOMMENDATIONS.

- Mopping up of the unsafe maize form farmers by Government through NCPB.
- Mopped up maize can be used for Industrial purposes.
- Capacity building of subject matter specialists at district level through training and provision of support materials.
- Provision of stationary dryers 2 in lower Eastern, 1 in at Sagana and another at Meru region.
- Provision of about 32 mobile dryers.
- Procurement of Grain Moisture Meters for use by extension officers for monitoring moisture content in stored grains.
- Procurement of rapid test kits for use at NCPB purchasing depots.
- Procure Aflatoxin Rapid tests kits for Ministry of Public Health and sanitation for surveillance of Aflatoxin at household level.
OUTCOME OF HUMAN EXPOSURE TO AFLATOXIN.

DEATH

- Liver damage.
  - Jaundice
  - Immune system
  - Metabolism failure
  - Anemia
  - Weight loss

- Kidney Failure
- Immune system affection.

- Cancer.
  - Liver cancer.
  - Kidney cancer
  - Cancer in the lungs & other organs.

- Nerve damage

Suppression of Immune system
(Immunization failure, rampant occurrence of other diseases)

Out come of exposure to AFLATOXIN
(Human)

Infertility:
Feminization in males & lack of conception in female
AFLATOXIN IN MILK.

- Aflatoxin contamination in milk is through contaminated raw materials.
- These raw materials includes mainly, Maize, Sunflower seeds and cotton seeds,
- Aflatoxin B1 and B2 in feed is converted by cattle into aflatoxin M1 and M2 and secreted in the milk.
- To stop contamination of milk by aflatoxin, The answer is using Aflatoxin free raw material.