This presentation is part of the

Agriculture and Nutrition Global Learning and Evidence Exchange

(AgN-GLEE)

held in Guatemala City, Guatemala from March 5-7, 2013.

For additional presentations and related event materials, visit: http://spring-nutrition.org/agnglee-lac
Aflatoxin in Guatemalan Maize: First exposure estimate, 2012

Olga Torres, LDM
Ronald T. Riley, USDA
Jorge Matute, CIENSA

Spring Meeting, March 5-7 2013
Aflatoxins B1 and B2 in Maize samples purchased at local markets in 22 Depts. Of Guatemala, July-Oct 2012
Frequency and Distribution of Aflatoxina B1 & Total Fumonisins in corn (640 samples collected in the 22 departaments of Guatemala, 2012)

Aflatoxin B₁

- <20 ppb: 73% (180 out of 640)
- 20-50 ppb: 76% (1011 out of 58)
- 50-200 ppb: 8.3% (58)
- 200-500 ppb: 6.6% (58)
- >500 ppb: 4.5% (58)

Total Fumonisins (B₁+B₂+B₃)

- <2 ppm: 59% (2.6 ppm, 640, SEM 0.1)
- 2-4 ppm: 21% (2.6 ppm, 582, SEM 0.1)
- 4-5 ppm: 11.3% (2.4 ppm, 58, SEM 0.3)
- 5-10 ppm: 5.7% (2.4 ppm, 58, SEM 0.3)
- >10 ppm: 2.4% (2.4 ppm, 58, SEM 0.3)

Clean vs Moldy

- Clean Aflatoxin B₁: 97/582
- Moldy Aflatoxin B₁: 1011/58

- Clean Total Fumonisins: 2.6/582
- Moldy Total Fumonisins: 2.4/58
The 8 municipios with higher rates of stunting in Guatemala

- 1 San Mateo Ixtatán, Huehuetenango
- 2 San Rafael Independencia, Huehuetenango
- 3 San Miguel Acatán, Huehuetenango
- 4 San Juan Atitán, Huehuetenango
- 5 Santiago Chimaltenango, Huehuetenango
- 6 Concepción Tutuapa, San Marcos
- 7 Comitancillo, San Marcos
- 8 Nebaj, Quiché
Estimate of total aflatoxin exposure

<table>
<thead>
<tr>
<th>Indicator</th>
<th>% &gt; 20 ppb</th>
<th>Number of cases with high levels of aflatoxin (%) / Average of Concentration of Total aflatoxins (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% homes exceeding 20ppb (&gt;= 20ppb)</td>
<td>14.0% (4.5, 23.4)</td>
<td></td>
</tr>
<tr>
<td>Average Aflatoxin (ppb)</td>
<td>11.5 ppb (2.0, 20.9) (min= 0, max=134)</td>
<td>Municipios</td>
</tr>
<tr>
<td>Exposure to Aflatoxins by Kg body w child per day</td>
<td>86.8</td>
<td>23.9</td>
</tr>
<tr>
<td></td>
<td>89.1</td>
<td>312</td>
</tr>
<tr>
<td></td>
<td>41.7</td>
<td>2116</td>
</tr>
<tr>
<td></td>
<td>6641</td>
<td>405.5</td>
</tr>
</tbody>
</table>
Disruption of sphingolipid metabolism as the mechanism of action for fumonisin-induced diseases in:

- Humans
- Horse
- Pig
- Goat
- Rabbit
- Mink
- Rat
- Mouse
- Turkey
- Chicken
- Duck
- Catfish
- Trout
- Carp
- Corn seedlings
- Tomato

**Fumonisin B$_1$ Promotes Aflatoxin B$_1$ and N-Methyl-N’-nitro-nitrosoguanidine-Initiated Liver Tumors in Rainbow Trout**

David B. Carlson,* David E. Williams,† Jan M. Spitsbergen,‡ P. Frank Ross,§ Charles W. Bacon,¶ Filmore I. Meredith,§ and Ronald T. Riley§

1992- present - Disruption of sphingolipid metabolism as the mechanism of action for fumonisin-induced diseases in-----

**TABLE 1**
Liver Tumor Incidence in Trout Fed FB$_1$ Alone or Following AFB$_1$ Initiation$^a$

<table>
<thead>
<tr>
<th>FB$_1$ (ppm)</th>
<th>FB$_1$ only$^b$ (%)</th>
<th>AFB$_1$ initiation$^c$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 (n = 68)</td>
<td>35% (n = 94)</td>
</tr>
<tr>
<td>3</td>
<td>0 (n = 73)</td>
<td>39% (n = 87)</td>
</tr>
<tr>
<td>23</td>
<td>0 (n = 21)</td>
<td>61% (n = 62)*</td>
</tr>
<tr>
<td>104</td>
<td>0 (n = 50)</td>
<td>74% (n = 81)*</td>
</tr>
</tbody>
</table>

$^a$ Initiation before exposure to FB$_1$

$^b$ Percentage of tumor-bearing trout

$^c$ Percentage of tumor-bearing trout

*Corresponding author.