Recent Developments in GMP’s & HACCP
Good Manufacturing Practices

Modern GMP’s (mGMP’s)
Multiple updates, including:
- Strengthening ready-to-eat (RTE) controls
- Chemical Control Program
- Traceability
- Recall
Good Manufacturing Practices

Food Safety relies on Prevention and Control through strong programs, policies, and practices that are understood and documented.
HACCP

Hazard Analysis Critical Control Point
HACCP

A systematic approach to assessing possible risks associated with a product and determining the controls necessary to minimize or eliminate the risks of causing illness or injury.

The National Advisory Committee on Microbiological Criteria for Foods
HACCP

- Identify food safety related issues
- Identify programs that control or prevent the identified food safety issues.
- Identify process steps that eliminate or reduce the identified food safety issues
- Identify activities that can monitor and measure whether or not these programs and process steps are being controlled.
- Document results.
<table>
<thead>
<tr>
<th>Biological</th>
<th>Chemical</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathogenic bacteria</td>
<td>Mycotoxin</td>
<td>FDA study</td>
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<tr>
<td>Viruses</td>
<td>Pesticides</td>
<td>7 to 25 mm</td>
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<tr>
<td>Parasitic worms</td>
<td>Plant chemicals</td>
<td>Industry standard</td>
</tr>
<tr>
<td>Protozoa</td>
<td>Allergens</td>
<td>&lt; 4.0 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not expected</td>
</tr>
</tbody>
</table>
Non-food safety issues:
An undesirable condition or contaminant which will not cause injury or illness to the consumer

- Insects
- Hair
- Filth, Spoilage not related to food safety
- Economic fraud or other violations of regulatory food standards not directly related to safety
- Psychological trauma
HACCP

Food Safety Concerns

Biological
Food Safety Concerns
- Biological

Pathogens
Barriers / Hurdles to Growth

pH  -  < 4.6

Water activity ($a_w$)  -  < 0.86
Food Safety Concerns
- Biological

pH
- Corn tortilla - pH of 5.2
- High lime tortilla - pH of 9.0

Water activity ($a_w$)
- Tortilla - $> 9.0$
Food Safety Concerns
- Biological

Pathogens of Concern for Tortillas & Tortilla Chips

- **Salmonella**
  (raw materials and employees)

- **Listeria monocytogenes**
  (environment)
Food Safety Concerns
- Biological

Prevention
*Salmonella*

Raw materials – Approved suppliers
Sanitation
Employees – Personnel GMP’s
Food Safety Concerns
- Biological

Prevention

\textit{Listeria monocytogenes}

- Effective sanitation
- Environmental monitoring
Food Safety Concerns
- Biological

Elimination

*Salmonella & Listeria*

- Cook to an internal temperature of > 165°F Fahrenheit
Food Safety Concerns
- Biological

Prevent recontamination after cooking

Employees
- Pollinators, Break coverage
- Uniform and hands

Sanitation
HACCP

Food Safety Concerns

Chemical
Food Safety Concerns
- Chemical Sources

Raw materials
- Agricultural chemicals
- Economic fraud
- Mycotoxins
- Allergens

Plant chemicals
Food Safety Concerns
- Chemical - Mycotoxins

Aflatoxin and Fumonisin

Aflatoxin – FDA max. - 20 ppb

Fumonisin – FDA recommendation - 4 ppm
Food Safety Concerns
- Chemical - Mycotoxins

Aflatoxin and Fumonisin Prevention

Supplier controls
- Raw material specifications
- Letter of Continuing Guarantee
- Certificate of Analysis

Internal testing
- Periodic verification
Food Safety Concerns
- Chemical - Mycotoxins

Aflatoxin – Reduction
Some studies indicate that the alkaline cooking of the corn may reduce aflatoxin; however, cannot be relied upon.
Food Safety Concerns
- Chemical - Allergens

Allergens

- Protein chain
- Hyper-response by immune system
- Same immune reaction as for hay fever, animals, bee stings, penicillin allergies, etc.
Food Safety Concerns
- Chemical - Allergens

Allergy vs. Intolerance

Food intolerance

– The body cannot synthesize the material – Examples: Lactose intolerance, gluten intolerance

– Some symptoms may be the same as in food allergy.
Food Safety Concerns - Chemical - Allergens

Regulated Allergens - USA

The "Big Eight"

- P _______________________
- T _____ n _____
- M _______________________
- E _______________________
- S _______________________
- W _______________________
- F _______________________
- S _______________________
Food Safety Concerns - Chemical - Allergens

Regulated Allergens - USA

The “Big Eight”
- Peanuts
- Tree nuts
- Milk
- Eggs
- Soy (intact protein)
- Wheat
- Fish
- Shellfish
Food Safety Concerns
- Chemical - Allergens

Regulated Allergens - Canada

- The “Big Eight”

Plus

- Sesame seeds (allergen)
- Sulfites (food intolerance, not an allergic reaction)
Food Safety Concerns
- Chemical - Allergens

Prevention & Control are Essential

There is not an “acceptable level” for the regulated food allergens – if added / present, must be on the label.
Food Safety Concerns
- Chemical - Allergens

Prevention & Control are Essential

Food allergens are very stable and not removed/destroyed by typical manufacturing processes.
Food Safety Concerns
- Chemical - Allergens

Identify the regulated allergens in all raw materials
- Ingredients
- Processing Aids
- Food Contact Surfaces (packaging, inserts, etc.)
Food Safety Concerns
- Chemical - Allergens

Labeling

#1 Cause of Allergen Recalls:
Allergens not correctly identified on the label

INGREDIENT LIST:
Water, Lentils 35%, Carrots, Yellow Peas, Tomatoes, Potatoes, Modified Maize Starch, Salt, Vegetable Oil, Hydrolysed Vegetable Protein, Sugar, Vegetable Bouillon, Flavour Enhancer: Monosodium Glutamate, Colour: Beta Carotene, Spices.
HACCP

Food Safety Concerns
Physical
Food Safety Concerns - Physical

FDA study
7 to 25 mm

Industry standard
< 4.0 mm

Not expected