Challenges to the food industry without a harmonized approach to dehydration factors

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CLA/RISE Regulatory Conference
April 26, 2018
Overview

1) Introduce McCormick & Company, Inc. and provide a brief background on spices and herbs.

2) Discuss dehydration factors and their significance, and provide context for the need of a harmonized approach in their application.

3) Recommend a solution to address the current challenge.
McCormick: the *Taste you Trust™*
A 129-year commitment to leadership in food safety and quality

1889  “Make the best someone will buy it”
Willoughby McCormick

2017  “We view food safety and superior quality as a key differentiator for McCormick”
Lawrence Kurzius
McCormick’s Global Product Portfolio

- **Spices and Herbs**
- Seasoning Mixes
- Condiments (e.g. mustard)
- Pour-over sauces
- Marinades, Glazes and Rubs
- Salad Dressings

- Gravy Mixes
- Cooking Sauces
- Jams
- Teas
- Batters and Breading
- Dessert Mixes and Baking Aids
In 2018, McCormick Delivers the *Taste You Trust™* on a Global Scale
McCormick manufactures, markets and distributes flavor products including spices, seasoning mixes and condiments to the entire food industry – retail outlets, food manufacturers and foodservice businesses.

- **$4.8 Billion** in sales
- **66%** Americas **21%** EMEA **13%** APZ
- **11,000** Employees Worldwide
- **53 Facilities** in **26 Countries**
- **60%** Consumer **40%** Industrial

> **150 brands** in more than 150 **COUNTRIES AND TERRITORIES**

Every day, no matter where or what you eat, you can enjoy food flavored by McCormick.
Spices 101

• Aromatic part of a plant with concentrated flavor used to season food.

- Root – Ginger & Turmeric
- Bark – Cinnamon
- Flower – Saffron
- Bean – Vanilla
- Fruit – Nutmeg & Mace, Pepper
- Pod – Chilies
- Seed – Cumin
Culinary Herbs

- Green Leaves or needles of perennials, biennials, or annual plants that are used for flavoring or to garnish food.

**Annuals**
- basil
- chervil
- cilantro
- dill

**Biennials**
- parsley

**Perennials**
- chives
- mint
- tarragon
- thyme
Culinary Herbs

- Wild grown like some thymes and oregano
- Small holder grown – basil, oregano,
- Large cultivation – oregano
- Most are still sun dried
Global Spice Map
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Dehydration factor (DF)

- The European Spice Association (ESA) experts looked at data from company labs and literature to calculate the relation of dry matter of the fresh herb to the dried product.

*water content values are sourced from the USDA National Nutrient Database for Standard Reference Release 28
ESA derives dehydration factors which are officially recognized by the European Union

Letter to the editor

Kontakt:
Gerhard Weber
Fachverband der Gewürzindustrie e. V.
Reuterstraße 151
D-53113 Bonn
16 September 2008

- Allows for the consideration that drying has on concentrating pesticide residues when establishing MRL in dried products.
- Stipulates how dehydration factor should be applied with respect to existing limits established by Regulation.

When assessing the MRLs the pesticide residues found in a dried product have to be put in relation to the fresh product. Article 20 of Regulation 396/2005 permits in the case of dried products (e.g. herbs) the concentration caused by the drying process be taken into account when determining the maximum residue level.

ESA recommends a harmonised pesticide residue assessment

The European Spice Association proposes the application of dehydration factors for dried products (e.g. herbs) in order to have a harmonised MRL assessment. Members of ESA are associations and companies of the spice industry from 15 European countries and Egypt, India, Turkey, Sri Lanka. The dehydration factors mentioned below should be applied in such a way that the pesticide limit fixed in the Regulation for the specific product should be multiplied by the dehydration factor. The result of the multiplication should then be compared with the result of the analysis.
ESA derives official dehydration factors

- ESA recognized that:
  - different drying processes can lead to different dehydration factors.
  - the water content of herbs can vary according variety and place of origin.
- These dehydration factors are averaged.
- If the dehydration factor is not appropriate for a specific product, the company must document the water content of the fresh product and the derived dehydration factor.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Dehydration factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>basil</td>
<td>7</td>
</tr>
<tr>
<td>celery leaves</td>
<td>10</td>
</tr>
<tr>
<td>chervil</td>
<td>5</td>
</tr>
<tr>
<td>chives</td>
<td>7</td>
</tr>
<tr>
<td>coriander leaves</td>
<td>13</td>
</tr>
<tr>
<td>dill tops</td>
<td>7</td>
</tr>
<tr>
<td>garlic</td>
<td>3</td>
</tr>
<tr>
<td>laurel leaves</td>
<td>7</td>
</tr>
<tr>
<td>lovage leaves</td>
<td>7</td>
</tr>
<tr>
<td>marjoram</td>
<td>7</td>
</tr>
<tr>
<td>onion</td>
<td>9</td>
</tr>
<tr>
<td>oregano</td>
<td>6</td>
</tr>
<tr>
<td>parsley leaves</td>
<td>6</td>
</tr>
<tr>
<td>mint</td>
<td>7</td>
</tr>
<tr>
<td>capsicums</td>
<td>10</td>
</tr>
<tr>
<td>rosemary</td>
<td>7</td>
</tr>
<tr>
<td>sage</td>
<td>7</td>
</tr>
<tr>
<td>savory herb</td>
<td>7</td>
</tr>
<tr>
<td>tarragon</td>
<td>7</td>
</tr>
<tr>
<td>thyme</td>
<td>7</td>
</tr>
</tbody>
</table>
How to calculate the dehydration factor

\[ DF = \frac{(100 - \%H_2O \text{ in dried food})}{(100 - \%H_2O \text{ in fresh food})} \]

= \frac{(100 - 14.56)}{(100 - 94.52)} = 15.6

For ESA, the H\textsubscript{2}O content in dried food is 0. Therefore the equation from above becomes:

= \frac{100}{(100 - \%H_2O \text{ in fresh food})}

= \frac{1}{[1-(\%H_2O \text{ in fresh food} /100)]}

= 18.2

*water content values are sourced from the USDA National Nutrient Database for Standard Reference Release 28
Dehydration factor in practice

• The established tolerance for metaldehyde for raw tomatoes in the US is 0.24 ppm. If sun-dried tomatoes have metaldehyde levels above 0.24 ppm, then EPA considers them to be unsafe.

• The MRL for metaldehyde for fresh tomatoes in the EU is 0.15 ppm. Therefore, the MRL for sun-dried tomatoes would be the product of 0.15 ppm and 18.2 (DF), which is 2.73 ppm, and is \(\sim 10\) times higher than in the US.

• In the EU, one could also take the analytical result of the sun-dried tomato and divide that by the dehydration factor and verify that the quotient falls below the fresh limit of 0.15 ppm.
EPA does have an established tolerances for a few dehydrated commodities/pesticide combinations

- The established tolerance for benzovindiflupyr for dried tomatoes is 4 ppm and 1.5 ppm for raw tomatoes in the US.

- In the EU, the allowable level for benzovindiflupyr for fresh tomatoes is 0.7 ppm. Therefore, the level for dried would be $0.7 \times 18.2 = 12.7$ ppm, ~3 times greater than what would be allowed in the US.
Crop Grouping of Herbs and Spices in the US

<table>
<thead>
<tr>
<th>Representative commodities</th>
<th>Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crop Subgroup 19A. Herb subgroup.</strong></td>
<td>Angelica; balm; basil; borage; burnet; camomile; catnip; chervil (dried); chive; chive, Chinese, clary; coriander (leaf); costmary; culantro (leaf); curry (leaf); dillweed; horehound; hyssop; lavender; lemongrass; lovage (leaf); marigold; marjoram (Origanum spp.); nasturtium; parsley (dried); pennyroyal; rosemary; rue; sage; savory, summer and winter; sweet bay; tansy; tarragon; thyme; wintergreen; woodruff; and wormwood.</td>
</tr>
<tr>
<td>Basil (fresh and dried) and chive.</td>
<td>Transport and carriage is not included.</td>
</tr>
<tr>
<td><strong>Crop Subgroup 19B. Spice subgroup.</strong></td>
<td>Allspice; anise (seed); anise, star; annatto (seed); caper (buds); caraway; caraway, black; cardamom; cassia (buds); celery (seed); cinnamon; clove (buds); coriander (seed); culantro (seed); cumin; dill (seed); fennel, common; fennel, Florence (seed); fenugreek; grains of paradise; juniper (berry); lovage (seed); mace; mustard (seed); nutmeg; pepper, black; pepper, white; poppy (seed); saffron; and vanilla.</td>
</tr>
<tr>
<td>Black pepper; and celery seed or dill seed.</td>
<td>Transport and carriage is not included.</td>
</tr>
</tbody>
</table>
A comparison of EPA’s dried to fresh herb MRL ratio to ESA’s dehydration factor

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Pesticide</th>
<th>EPA raw MRL (ppm)</th>
<th>EPA dried MRL (ppm)</th>
<th>EPA dry/raw MRL factor</th>
<th>ESA DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herb subgroup 19A</td>
<td>Fludioxonil</td>
<td>10</td>
<td>65</td>
<td>6.5</td>
<td>7</td>
</tr>
<tr>
<td>Basil</td>
<td>DCPA</td>
<td>5</td>
<td>20</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Basil</td>
<td>Fenamidone</td>
<td>30</td>
<td>200</td>
<td>6.7</td>
<td>7</td>
</tr>
<tr>
<td>Basil</td>
<td>Fluopicolide</td>
<td>40</td>
<td>200</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Basil</td>
<td>Mandipropamid</td>
<td>30</td>
<td>200</td>
<td>6.7</td>
<td>7</td>
</tr>
<tr>
<td>Basil</td>
<td>Oxathiapiprolin</td>
<td>10</td>
<td>80</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Basil</td>
<td>Napropamide</td>
<td>0.1</td>
<td>?</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Chives</td>
<td>Avermectin B1</td>
<td>0.01</td>
<td>0.02</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Chives</td>
<td>Methoxyfenozide</td>
<td>30</td>
<td>?</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Coriander leaves</td>
<td>Bifenthrin</td>
<td>6</td>
<td>25</td>
<td>4.2</td>
<td>13</td>
</tr>
<tr>
<td>Coriander leaves</td>
<td>DCPA</td>
<td>5</td>
<td>?</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Coriander leaves</td>
<td>Sethoxydim</td>
<td>4</td>
<td>?</td>
<td></td>
<td>13</td>
</tr>
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</table>
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Recommendations

1) EPA should consider approving the use of dehydration factors for establishing tolerances in dried products.
   • *Have EPA adopt ESA’s DF approach and accept their recommended values, OR*
   • *Have EPA do their own analytical assessment and establish their own recommended dehydration factors.*

2) EPA should consider establishing more tolerances for dehydrated products for various pesticides.

3) EPA should consider accepting tolerances for dehydrated products from other authoritative bodies.
Thank you!