AAFCO Proficiency Testing Program: 2019 Participation

Albuquerque Mid Year Meeting, 2020
Animal Feed Scheme

- Equine Feed
- Porcine Feed, Medicated
- Dry Dog Food
- Goat Feed, Medicated
- Alfalfa Pellets
- Beef Mineral
- Poultry Feed
- Beef Feed, Medicated
- Catfish Feed
- Sheep Feed, Medicated
- Dairy Feed, Medicated
- Llama Feed
- Swine Feed, Residue

# Labs

- 201921
- 201922
- 201923
- 201924
- 201925
- 201926
- 201927
- 201928
- 201929
- 201930
- 201931
- 201932
## Animal Feed Scheme
### 2019 Z-Cut Homogeneity Screen

<table>
<thead>
<tr>
<th>Sample Code</th>
<th>Sample Name</th>
<th>Z-Cut %RSD</th>
<th>% Protein</th>
<th># in Z-Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>201921</td>
<td>Equine Feed</td>
<td>1.56%</td>
<td>15.3</td>
<td>75</td>
</tr>
<tr>
<td>201922</td>
<td>Porcine Feed, Medicated</td>
<td>0.00%</td>
<td>18.5</td>
<td>86</td>
</tr>
<tr>
<td>201923</td>
<td>Dry Dog Food</td>
<td>0.00%</td>
<td>24.5</td>
<td>101</td>
</tr>
<tr>
<td>201924</td>
<td>Goat Feed, Medicated</td>
<td>1.14%</td>
<td>16.9</td>
<td>92</td>
</tr>
<tr>
<td>201925</td>
<td>Alfalfa Pellets</td>
<td>1.78%</td>
<td>17.8</td>
<td>82</td>
</tr>
<tr>
<td>201995</td>
<td>Beef Mineral</td>
<td>0.00%</td>
<td>4.4</td>
<td>36</td>
</tr>
<tr>
<td>201926</td>
<td>Poultry Feed</td>
<td>0.00%</td>
<td>22.0</td>
<td>89</td>
</tr>
<tr>
<td>201927</td>
<td>Beef Feed, Medicated</td>
<td>1.04%</td>
<td>18.0</td>
<td>92</td>
</tr>
<tr>
<td>201928</td>
<td>Catfish Feed</td>
<td>0.00%</td>
<td>33.0</td>
<td>84</td>
</tr>
<tr>
<td>201929</td>
<td>Sheep Feed, Medicated</td>
<td>0.00%</td>
<td>13.5</td>
<td>85</td>
</tr>
<tr>
<td>201930</td>
<td>Dairy Feed, Medicated</td>
<td>0.00%</td>
<td>19.1</td>
<td>85</td>
</tr>
<tr>
<td>201931</td>
<td>Llama Feed</td>
<td>0.78%</td>
<td>24.0</td>
<td>86</td>
</tr>
<tr>
<td>201932</td>
<td>Swine Feed, Residue</td>
<td>0.00%</td>
<td>15.8</td>
<td>83</td>
</tr>
</tbody>
</table>
Pet Food Scheme
2019 Z-Cut Homogeneity Screen

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Sample Name</th>
<th>Pass Z-Cut %RSD</th>
<th>% Protein</th>
<th># in Z-Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>201941</td>
<td>Soybean Hulls</td>
<td>0.00%</td>
<td>10.3</td>
<td>31</td>
</tr>
<tr>
<td>201942</td>
<td>Field Peas</td>
<td>0.00%</td>
<td>21.6</td>
<td>31</td>
</tr>
<tr>
<td>201943</td>
<td>Wheat Bran</td>
<td>1.96%</td>
<td>18.9</td>
<td>31</td>
</tr>
<tr>
<td>201944</td>
<td>Dried Whole Egg</td>
<td>0.59%</td>
<td>50.8</td>
<td>27</td>
</tr>
</tbody>
</table>
Z-Score Indications in 2019 Animal Feed and Pet Food Schemes

<table>
<thead>
<tr>
<th></th>
<th>Compliance 2 &gt; Z &gt; -2</th>
<th>Warning 4.9%</th>
<th>Actionable 3 &lt; Z &lt; -3</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFS</td>
<td>90.0%</td>
<td></td>
<td>5.1%</td>
</tr>
<tr>
<td>PFS</td>
<td>90.9%</td>
<td>4.2%</td>
<td>4.9%</td>
</tr>
</tbody>
</table>
### 2019 Analyte Participation

**“Proximates” (F, Fi, A, M, P)**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Total # Tests Run in 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>(000) Urea (%)</td>
<td></td>
</tr>
<tr>
<td>(001) Loss on Drying (%)</td>
<td></td>
</tr>
<tr>
<td>(002) Protein, Crude (%)</td>
<td></td>
</tr>
<tr>
<td>(003) Fat, Crude (%)</td>
<td></td>
</tr>
<tr>
<td>(004) Fiber, Crude (%)</td>
<td></td>
</tr>
<tr>
<td>(005) Ash (%)</td>
<td></td>
</tr>
<tr>
<td>(007) Urease (%)</td>
<td></td>
</tr>
<tr>
<td>(008) Fiber, Acid Detergent (%)</td>
<td></td>
</tr>
<tr>
<td>(009) Fiber, Neutral Detergent (%)</td>
<td></td>
</tr>
<tr>
<td>(010) Moisture (%)</td>
<td></td>
</tr>
<tr>
<td>(011) Loss on Drying (%)</td>
<td></td>
</tr>
<tr>
<td>(400) Water Activity (Units)</td>
<td></td>
</tr>
<tr>
<td>(012) Starch (%)</td>
<td></td>
</tr>
<tr>
<td>(412) Starch, Dietary (%)</td>
<td></td>
</tr>
<tr>
<td>(013) Fat, Acid Pretreat (%)</td>
<td></td>
</tr>
<tr>
<td>(014) Fiber, Total Dietary (%)</td>
<td></td>
</tr>
</tbody>
</table>
2019 Analyte Participation

“Minerals”

Total # Tests Run in 2019

Compare with Minerals
2019 Analyte Participation

“Heavy Metals” (10 Duplicate Labs)
Feed & Pet Food (42 Labs) vs Minerals Scheme (28 Labs)

(516) Arsenic, Total (ppm)
Total # Tests Run in 2019

(518) Cadmium (ppm)

(520) Chromium (ppm)

(526) Lead (ppm)

(529) Mercury (ppb)

(539) Nickel (ppm)

Compare with Minerals Scheme: 78 Arsenic Tests Run Over 4 Samples in 2019.
2019 Analyte Participation

“Vitamins Etc…”

Total # Tests Run in 2019
2019 Analyte Participation

“Amino Acids”

Total # Tests Run in 2019

(120) Alanine (%)  (121) Arginine (%)  (122) Aspartic (%)  (124) Cysteine/Cystine (%)  (125) Glutamic (%)  (126) Glycine (%)  (127) Histidine (%)  (128) Isoleucine (%)  (129) Leucine (%)  (130) L-Lysine (%)  (131) Methionine (%)  (132) Phenylalanine (%)  (133) Proline (%)  (134) Serine (%)  (135) Threonine (%)  (136) Tryptophan (%)  (137) Tyrosine (%)  (138) Valine (%)  (139) Taurine (%)  (140) Lysine Free (%)  (141) Methionine Free (%)
2019 Analyte Participation

“Drugs”

Total # Tests Run in 2019

- (365) Monensin (ppm)
- (351) Chlortetracycline (ppm)
- (354) Decoquinate (ppm)
- (361) Lasalocid Sodium (ppm)
- (382) Sulfamethazine (ppm)
- (373) Oxytetracycline (ppm)
- (388) Tylosin (ppm)
- (391) Narasin (ppm)
- (386) Tiamulin (ppm)
- (360) Carbadox (ppm)
- (393) Ractopamine Hydrochloride (ppm)
- (389) Virginiamycin (ppm)
- (323) Diflubenzuron (ppm)
- (348) Bacitracin (ppm)
- (357) Ethoxyquin (ppm)
- (377) Pyrantel Tartrate (ppm)
- (379) Salinomycin (ppm)
- (381) Sulfadimethoxine (ppm)
2019 Analyte Participation

“Fatty Acids”

Total # Tests Run in 2019

(702) Butyric Acid (4:0) (%)
(704) Caproic Acid (6:0) (%)
(706) Caprylic acid (8:0) (%)
(708) Capric acid (10:0) (%)
(710) Lauric Acid (12:0) (%)
(714) Myristic Acid (14:0) (%)
(716) Palmitic Acid (16:0) (%)
(718) Palmitoleic Acid (9c-16:1) (%)
(720) Margaric acid (17:0) (%)
(722) Stearic Acid (18:0) (%)
(724) Oleic Acid (9c-18:1) (%)
(728) Linoleic Acid (9c,12c-18:2) (%)
(728) alpha-Linolenic Acid (9c,12c,15c-18:3) (%)
(730) Arachidonic Acid (20:4) (%)
(732) Gondoic Acid (11c-20:1) (%)
(736) Arachidonic Acid (5c,8c,11c,14c-20:4) (%)
(738) Mead Acid (11c,14c,17c-20:3) (%)
(740) Eicosapentaenoic Acid EPA (5c,8c,11c,14c,17c-20:5)
(742) Behenic Acid (22:0) (%)
(744) Erucic Acid (13c-22:1) (%)
(746) Docosapentaenoic Acid n-3 DPA (7c,10c,13c,16c,19c-22:5)
(748) Lignoceric Acid (24:0) (%)
(750) Docosahexaenoic Acid DHA (4c,7c,10c,13c,16c,19c-22:6)
(752) Nervonic Acid (24:1) isomers (%)
(754) Total n-3 Polyunsaturated (Omega-3) Fatty Acids
(756) Total n-6 Polyunsaturated (Omega-6) Fatty Acids
(758) Total Saturated Fatty Acids (%)
(762) Total Monounsaturated Fatty Acids (%)
(764) Total cis Monounsaturated Fatty Acids (%)
(768) Total Polyunsaturated Fatty Acids (%)
(770) Total Fat (equivalent to NLEA) (%)
(772) Total Fatty Acids (%)

AAFCO Proficiency Testing Program
AAFCO PTP Animal Feed Scheme
AAFCO PTP Pet Food Scheme
2019 Method Participation
18 Methods

Calcium (019)

- (019.00) Ox-Mn04 Vol. (%)
- (019.02) Hach Method (%)
- (019.03) Semiauto (Autoanalyzer) (%)
  - (019.08) EDTA (%)
- (019.09) Ion-selective electrode (%)
  - (019.31) AAS, Dry ash (%)
  - (019.32) AAS, Open vessel (%)
  - (019.33) AAS, Microwave (%)
  - (019.34) AAS, Dry ash (%)
  - (019.35) AAS, Open vessel (%)
- (019.41) ICP, Dry ash (%)
- (019.42) ICP, Open vessel (%)
- (019.43) ICP, Microwave (%)
  - (019.44) ICP, Dry ash (%)
- (019.51) ICP-MS, Dry ash (%)
- (019.52) ICP-MS, Open vessel (%)
- (019.53) ICP-MS, Microwave (%)
- (019.99) Miscellaneous (%)

Total # Tests Run in 2019
2019 Method Participation

12 Methods

PROTEIN (002)

- (002.00) Crude, Crude (%)
- (002.01) Crude, Auto Kjel-Foss (%)
- (002.02) Crude, Semiauto Analyzer
- (002.03) Crude, Hach Method (%)
- (002.04) Crude, Copper Catalyst (%)
- (002.05) Crude, Copper, Boric Acid (%)
- (002.06) Crude, Combustion N Analyzer
- (002.08) Crude, Cu/Ti (%)
- (002.09) Crude, Selenium Catalyst (%)
- (002.10) Crude, Block dig/distillation (%)
- (002.11) Crude, NIR (%)
- (002.99) Crude, Miscellaneous (%)

Total # Tests Run in 2019
2019 Method Participation

6 Methods

Tryptophan (136)

Total # Tests Run in 2019

- (136.00) Alka-Hydrol Post-col Ninhyd (%)
- (136.01) Alka-Hydrol Rev Phase LC UV (%)
- (136.02) Alka-Hydrol Post-col OPA De (%)
- (136.03) Alka-Hydrol + IS RP LC FI (%)
- (136.05) Pre-col AQC Der (%)
- (136.99) Miscellaneous (%)

0 20 40 60 80 100
## 2019 Animal Feed & Pet Food Schemes

### # of Unique Labs Participating in Analyte Group Analysis

<table>
<thead>
<tr>
<th>Analyte Group</th>
<th># of Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximates (F, Fi, A, M, P)</td>
<td>264</td>
</tr>
<tr>
<td>Minerals</td>
<td>219</td>
</tr>
<tr>
<td>Heavy Metals (As, Cd, Cr, Pb, Hg, Ni)</td>
<td>42</td>
</tr>
<tr>
<td>Vitamins Etc...</td>
<td>56</td>
</tr>
<tr>
<td>Amino Acids</td>
<td>58</td>
</tr>
<tr>
<td>Sugars &amp; Total Sugars</td>
<td>21</td>
</tr>
<tr>
<td>Drugs</td>
<td>48</td>
</tr>
<tr>
<td>Fatty Acids</td>
<td>12</td>
</tr>
</tbody>
</table>

Compare with Minerals Scheme:
33 Labs in 2019
2019 Analyte Participation

Minerals Scheme

(015) Aluminum (ppm)
(017) Boron (ppm)
(021) Cobalt (ppm)
(022) Copper (ppm)
(023) Fluorine (ppm)
(024) Iodine (ppm)
(034) Selenium (ppm)
(036) Sulfur (%)
(038) Molybdenum (ppm)
(041) Vanadium (ppm)
(516) Arsenic, Total (ppm)
(518) Cadmium (ppm)
(520) Chromium (ppm)
(526) Lead (ppm)
(529) Mercury (ppb)
(539) Nickel (ppm)

Total # Tests Run in 2019
Z-Score Indications in Minerals Scheme (Horwitz ffp SD for PT)

2019:
4 Samples
922 Tests

<table>
<thead>
<tr>
<th>Compliance</th>
<th>Warning</th>
<th>Actionable</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 &gt; Z &gt; -2</td>
<td>82.4%</td>
<td>8.0%</td>
</tr>
<tr>
<td>3 &lt; Z &lt; -3</td>
<td>9.6%</td>
<td></td>
</tr>
</tbody>
</table>
2019 Analyte Participation

Mycotoxin Scheme

Total # Tests Run in 2019
Z-Score Indications in Mycotoxin Scheme
(Modified Horwitz ffp SD for PT)

4 Samples
201961 to 201964
1,379 Tests

<table>
<thead>
<tr>
<th>Modified Horwitz 2018 Adjustment</th>
<th>Compliance $2 &gt; Z &gt; -2$</th>
<th>Warning</th>
<th>Actionable $3 &lt; Z &lt; -3$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>89.0%</td>
<td>5.7%</td>
<td>5.3%</td>
</tr>
</tbody>
</table>
# 2019 Scheme Participation Ordering Numbers

<table>
<thead>
<tr>
<th>Scheme</th>
<th># Labs Placing Order</th>
<th># Samples Ordered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet Food Ingredient Scheme</td>
<td>74</td>
<td>90</td>
</tr>
<tr>
<td>Minerals Scheme</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>Mycotoxin Contaminants Scheme</td>
<td>74</td>
<td>80</td>
</tr>
<tr>
<td>Animal Feed Scheme</td>
<td>261</td>
<td>280</td>
</tr>
</tbody>
</table>
Talking About Participation:

How many Duplicate Analytical Tests are submitted by Labs for the 2019 Samples?

Test Case: AAFCO Animal Feed Scheme
271 Participating Labs in 2019
Test Case: AAFCO Animal Feed Scheme

2019 # Duplicate Tests per 2,484 Lab Submissions

Number of Duplicate Tests per Submission

Number of Submissions

Number of Submissions
Test Case: AAFCO Animal Feed Scheme

2019 # Tests per Lab Submission
1st Four Bins Expanded

![Bar chart showing the number of submissions for different numbers of duplicate tests per submission for the AAFCO Animal Feed Scheme in 2019. The x-axis represents the number of duplicate tests per submission ranging from 0 to 20, and the y-axis represents the number of submissions. The bars are color-coded and show the distribution across different bins.](image-url)
Test Case: AAFCO Animal Feed Scheme

Some Takeaways:
- That’s a Mean 138 Duplicate Analyses /Lab/Year.
- 271 Labs submitted data 2,484 times in 2019.
- That’s approximately 9 Samples/Lab/Year. **NOT 13!**
- 1,062 Tests offered in DRW.

<table>
<thead>
<tr>
<th>Number of Duplicate Tests per Lab Submission</th>
</tr>
</thead>
<tbody>
<tr>
<td># Duplicate Tests/Sample/Lab</td>
</tr>
<tr>
<td>Median = 12</td>
</tr>
<tr>
<td>Mode = 4</td>
</tr>
<tr>
<td>1 Duplicate Test</td>
</tr>
<tr>
<td>&gt;= 30 Duplicate Tests</td>
</tr>
<tr>
<td>&gt;= 70 Duplicate Tests</td>
</tr>
</tbody>
</table>
HAPPY NEW YEAR, 2020

Comments, Queries?