**Trace Metal Analysis of Commercial Pet Food for Toxic Metals by ICP and ICP-MS**

Ralph Obenauf, Patricia Atkins, Lazo Erneyi & William Driscoll  
SPEX CertiPrep  
203 Norcross Ave., Metuchen, NJ 08840  
www.spexcertiprep.com

The pet food recalls of 2007 have increased awareness of the inadequate testing of ingredients in the pet food industry. Pet food is a multi-billion dollar a year business divided into dry or five large corporations which produce 80% of US pet food and smaller premium or gourmet pet food companies which produce the remaining 20%. The quality of many of the ingredients used for pet food is often considered to be inferior or unfit for human consumption. "Premium" brands claim to have superior ingredients and quality. Claims of the quality of premium ingredients do not offer data as to the potential toxicity of elements which may be found in those ingredients. The purpose of our study was to examine pet foods from various sources to determine if they contained potentially toxic ingredients and if higher quality ingredients equated to less toxic sources to determine if they contained potentially toxic elements in those ingredients. The ingredients do not offer data as to the potential toxicity of elements which may be found in those ingredients. Claims of the quality of premium ingredients is often considered to be inferior or unfit for human food. Four or five large corporations which make dry foods for cats and dogs increased awareness of the inadequate quality control of dry foods for cats and dogs. From local NJ supermarkets, chain stores, budget stores and "gourmet" brands, we purchased samples of dry cat and dog food which had been sampled by several laboratories. Our purpose was to determine if they contained toxic metals such as Uranium, Cadmium, Thorium, Lead, Selenium, Arsenic, etc.

**Sample Preparation**

**Dry Food Sample Preparation**
- 13 to 16 g of dry pet food samples were ground to an uniform powder consistency using SPEX CertiPrep Prep/PrepME under sterile conditions.
- 8700 Preps/PrepME, 9850 Mid-Sizer Auto Vial Mill with 8850 Preps/PrepME Auto Vial Adapter.
- The same operating program was used for all samples:
  - Processing: 12 minutes
  - Cyclone: 5
  - Grinding time: 2 minutes
  - Costing time: 2 minutes
  - Rate: 12 Hz

**Wet Food Sample Preparation**
- Wet pet food was homogenized in a blender.
- Sample container emptied into blender and blended to smooth consistency.
- If food was unable to be completely homogenized, DI water was added until it was at a time until until smooth consistency was achieved.
- Samples were tested and calculated as served and not by dry weight basis.

**Sample Digestion and Analysis**
- Samples digested in CEM Mars 5 Microwave Unit. XP-1000 Vessels
- 1 g of sample added to vessel with 10 mL high purity Nitric Acid.
- Microwave program:
  - Temperature: 20 minutes
  - Pressure maximum: 800 psi
  - Power: 1000 to 1500 W
  - Hold for 15 minutes
- Digestion blanks run on each vessel prior to sample digestion.
- Digest of samples were diluted 250 to 1000 times before analysis on ICP MS.

**Results**

**Toxic Trace Elements**
- Large variability of composition between samples.
- High pb (low ppm levels of 11 out of 17 elements examined found in the samples).
- 1 ppm Cs, Mo, As, Pb, Se, Sn, In & V
- 0.5 ppm to 1 ppm: Co, Hg, I, Bi
- Human food compared favorably to pet food in terms of toxic metal contamination.
- Toxic elements were not found in wet food samples at levels generally less than those in pet food.

**Uranium**
- Uranium levels above 250 ppb were found in six samples.
- 0.5 ppm to 1 ppm: 2 µg Thallium (>3x RfD limit)
- High ppb / low ppm levels of 11 out of 17 elements examined.
- Seven samples of pet food contained significant amounts of Uranium from 500 to 1000 ppm.
- A 10-lb cat eating 5 cups (150 g) of dry food or 1 large can of wet food (175 g) with the maximum contamination would be consuming above:
  - 79 µg Arsenic (<2x RfD limit)
  - 13 µg Cadmium (<2x RfD limit)
  - 1.9 µg Mercury (<1x RfD limit)
  - 6 µg Thallium (<1x RfD limit)
  - 42 µg Uranium (<1x RfD limit)

**Dry cat food contained more contamination which exceeded human RfD guidelines than wet cat food.**

**EPA (RfD) Reference Dosage Comparison**

**Trace Elements found in Pet Foods**
- Concentrations of toxic trace metals were highest in dry food vs. wet food as served.
- Dry dog food had the largest number of significant toxic metal spikes.
- Wet cat food had the overall lowest number of toxic metals.
- Seven samples of pet food contained significant amounts of Uranium from 500 to 1000 ppm.
- Significantly high concentrations of toxic metals were found in many of the food samples.

**Conclusions**

- The pet food recalls of 2007 have increased awareness of the inadequate testing of ingredients in the pet food industry. Pet food is a multi-billion dollar a year business divided into dry or five large corporations which produce 80% of US pet food and smaller premium or gourmet pet food companies which produce the remaining 20%.
- The quality of many of the ingredients used for pet food is often considered to be inferior or unfit for human consumption. "Premium" brands claim to have superior ingredients and quality. Claims of the quality of premium ingredients do not offer data as to the potential toxicity of elements which may be found in those ingredients. The purpose of our study was to examine pet foods from various sources to determine if they contained potentially toxic elements and if higher quality ingredients equated to less toxic elements present in the food.
- This study is not a comprehensive study of all potential contaminants found in pet foods. The random samples tested were deemed to be snapshots of the overall levels of toxic elements that could be consumed by pets.