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- Aflatoxin basics
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Good growth

Stimuli and deterrents to global petfood sales

Per Euromonitor International, global sales of dog and cat foods will grow from US\$42 billion to US\$48 billion. This will happen over the period from 2005 to 2010. Following are some of the stimuli and deterrents to growth.

Stimuli to growth

- Continued growth of single household families and declining birth rates in major developed markets are increasing the popularity of pets for companionship.
- A key growth stimulus has been the emerging Asia-Pacific markets, most notably South Korea and China.
- Increased pet health awareness has driven sales of functional petfoods claiming to aid joint health, coat and skin health, oral health and support of the immune system. Organic and “natural” products have also benefited.
- Demand for convenient petfood.
- Increased penetration of multi-national manufacturers has spurred growth in Eastern Europe, Russia, Mexico and South Korea.
- Increasing segmentation of the petfood market (by lifestage, breed, pet size and activity level) also spurred sales growth.

Growth in dog and cat food sales is expected to be especially strong in Eastern Europe.

— T.Phillips



- Increased distribution of superpremium dog and cat food through supermarkets.
- Packaging innovations, such as single-serve pouches for wet petfoods.
- Western European growth has been enhanced by the strengthening of the euro against the US dollar.

Growth deterrents

- The continuing sluggish performance of the US economy.
- The maturity of both Western European and North American petfood markets.
- Falling birth rates in major petfood markets.
- The trend towards smaller dogs due to increased urbanization and increased pressure on living space.
- In many developing markets, low

consumer affluence, inefficient distribution networks and consumer skepticism of the benefits of manufactured petfoods, were all obstacles to growth.

- Expanding private-label penetration.

Robust expansion

Growth in dog and cat food sales is expected to be especially strong in Eastern Europe, as Poland, the Czech Republic and Hungary will benefit from membership in the EU. The least developed regions in petfood, such as Africa and the Middle East, are expected to experience the strongest constant value growth between 2006 and 2010.

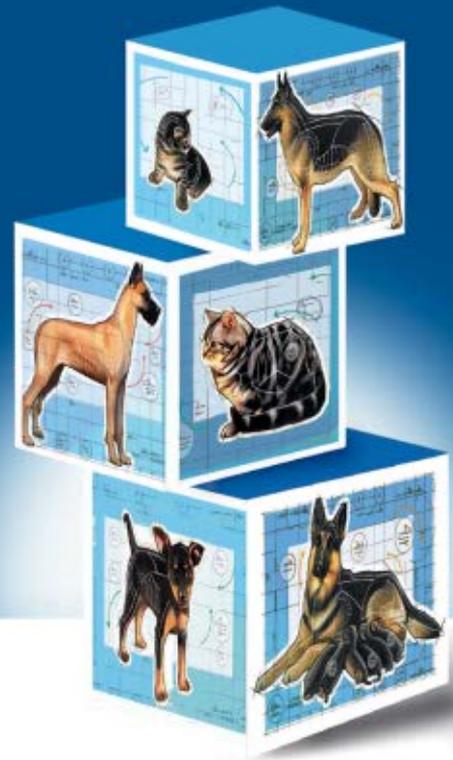
Dr. Phillips is the editor of Petfood Industry magazine. He can be reached at Watt Publishing Co., Tel: +1.815.734.5644, Fax: +1.815.734.5649, E-mail: phillips@wattmm.com, Website: www.petfoodindustry.com.

Euromonitor International has its headquarters in the UK. For more market information and analysis from Euromonitor see www.petfoodindustry.com, the digital version of this magazine and our biweekly E-newsletter—after May 15, 2006.

Petfood sales trends

Table 1. Global sales of petfood and pet care products in US\$billions. From Euromonitor’s Integrated Market Information System for the petfood industry. For more information, go to www.euromonitor.com. Source: Euromonitor International, 2006.

	2005	2008	2010
Petfood and pet care products	\$58.3	\$63.8	\$67.0
Dog and cat food	42.1	45.8	48.0
Other petfood	3.1	3.3	3.5
Pet care products	13.1	14.7	15.5



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Industry News

More petfood for Del Monte

Del Monte Foods Co., which also recently bought cat food manufacturer Meow Mix for US\$705 million, added the Milk-Bone brand from Kraft Foods in a deal worth about US\$580 million. Del Monte said the effective cost of the acquisition will be offset by close to US\$125 million of future tax benefits which Del Monte expects to achieve as a result of the acquisition.

This acquisition is part of Del Monte's larger plan to focus on having strong brands. "Milk-Bone, with its strong brand position in the fast-growing and dynamic pet snacks category, will significantly strengthen our overall competitiveness in the pet business," chairman and CEO Richard Wolford said. Milk-Bone is a leader in dog snacks, generating revenue of about US\$180 million in 2005.

The sale includes the company's Milk-Bone manufacturing facility in Buffalo, New York, USA, and the Sherburne Pet Food Testing Center in Sherburne, New York, USA. As part of the transaction, approximately 230 Kraft employees, including the East Hanover, New Jersey business team, the operations team at the Buffalo facility and technicians at the Sherburne Center, will join Del Monte.

This transaction is subject to regulatory approval and will close shortly after all regulatory approvals have been received. The company expects the deal to close in 2007.

Japanese petfood sales down

Japan's petfood sales fell by 0.6% in the fiscal year ending March 31, 2005, according to data published in *AnimalPharm* (March 17, 2006) and released by the Japanese Ministry of Agriculture, Forestry and Fisheries (JMAFF). The downturn posted in spite of a 1.2% sales volume increase during the same time period. In terms of volume sales, 799,500 tons of petfood were sold in that period (up 1.2% from the previous year), for a total of ¥242.1 billion (~US\$2 billion).

Dog food made up 61.3% of this total and cat food 32.8% of sales. Domestically, prepared petfoods accounted for 38.4% of sales and imports accounted for 61.6%.

Doane reports financial results

Doane Pet Care Company recently reported net sales and earnings results for its fiscal 2005 fourth quarter and full year. Due to the October 24, 2005 acquisition of the Company's Parent by Ontario Teachers' Pension Plan Board, results for the fiscal 2005 fourth quarter and full year periods are on a combined basis to include results of operations for the predecessor and successor periods.

For the fourth quarter of fiscal 2005, net sales were US\$249.2 million, compared to US\$271.0 million for the fourth quarter of fiscal 2004—a decrease of 8.0%. This decrease was primarily due to the company's domestic cost-sharing arrangements and the related impact of passing through lower commodity costs, as well as the impact of the previously-announced discontinuation of non-manufactured product distribution in the US. In addition, the positive benefit of higher European sales volumes was moderated by unfavorable foreign currency exchange rate fluctuations, which had a 2.3% negative impact on total net sales.

For fiscal 2005, the company's net sales decreased 5.7% to US\$991.6 million on a combined basis from US\$1.1 billion for fiscal 2004. The company reported a net loss of US\$44.7 million on a combined basis for fiscal 2005, compared to a net loss of US\$45.6 million for fiscal 2004.

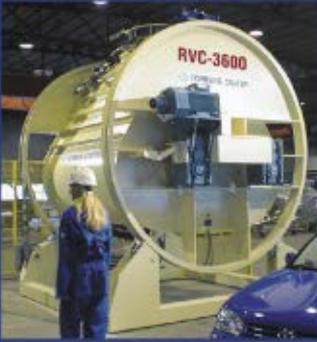
Excess vitamin D₃ prompts petfood recall

Mars Inc. recently recalled seven lines of its Royal Canin dog and cat foods after discovering an overage error in the formulation of its diets. Royal Canin company executives said they recalled the food as a precaution due to elevated levels of vitamin D₃.

The affected brands were voluntarily recalled everywhere in North America in February. Once Royal Canin discovered the problem, the company recalled the food and notified thousands of vets across Canada and the United States. Royal

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Canin also set up a hotline for concerned pet owners and vets to call.

US cow tests positive for BSE

An Alabama cow recently became the USA's third case of bovine spongiform encephalopathy (BSE). The US Department of Agriculture (USDA) confirmed the infection March 13. This animal did not enter the human food or animal feed chains, according to the Department's chief veterinarian, John Clifford. "We would not anticipate that this would impact our ongoing negotiations," Clifford said. "Our product is safe. We've got a number of interlocking safeguards."

The incident originates from samples taken from a non-ambulatory cow in Alabama by a private veterinarian who euthanized the animal. The samples were forwarded first to one of USDA's diagnostic laboratories at the University of Georgia. The USDA's

Animal and Plant Health Inspection Service (APHIS) announced March 15 that the second of two confirmatory tests conducted on the animal had returned a positive result.

The animal in question resided on the Alabama farm for only one year. The USDA has begun a comprehensive investigation surrounding the animal. This will include locating other animals born in the same herd within one year; determining offspring; and working with the Food and Drug Administration on its feed history.

Clifford noted that it is highly irregular to discover the animal disease in more than one animal in a herd or in the animal's offspring. Nonetheless, his agency plans to test all relevant animals. APHIS will continue to work closely with the state of Alabama to learn more about this animal's history, and the results of its epidemiological investigation will be shared with the public. All animals of interest will be tested for BSE.

Waters Corporation acquires VICAM

Waters Corporation announced it has purchased the food safety technology business and associated net assets of VICAM (Watertown, Massachusetts, USA) for undisclosed terms. "What initially attracted Waters to VICAM was its leadership position in this important segment of the food testing business, coupled with its strong customer commitment and their focus on creating relationships with relevant regulatory agencies," said Dr. Mark Baynham, director-chemistry and consumables marketing, Waters Corporation.

Ray McElhaney joins HJ Baker & Bro.

H J Baker is pleased to announce that Ray McElhaney has joined the Feed Group. He will be located in Little Rock, Arkansas, USA. McElhaney brings with him numerous years of sales, purchasing, logistics and merchandising experience in the pet and animal food industry.



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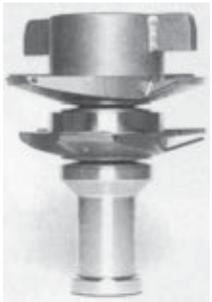
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Ray was formally with Pilgrim's Pride Corporation and most recently with 3D Corporate Solutions.

Omega Protein moves to Texas

Effective April 17, 2006, Omega Protein will relocate their Marketing and Logistics Department from Hammond, Louisiana, USA to Houston, Texas, USA. New address and phone numbers are: Omega Protein, Inc., 2101 CityWest Blvd, Bldg. 3, Ste. 500, Houston, Texas 77042 USA, Tel: +1.713.623.0060, Marketing Fax: +1.713.940.6166, Logistics Fax: +1.713.940.6177.

Urschel expansion

Urschel Laboratories, Inc. has expanded its Product Test Cutting Facility. The construction of an additional 5,000 square feet (1,500 square meters) at an approximate cost of US\$950,000 accommodates the demand for the company's free, no-obligation test cutting of customers' products on Urschel equipment. The new space also facilitates on-going research and development and offers increased storage for Urschel. This addition on the north side of Urschel headquarters has more than doubled the previous area of the test cutting facility. ➔



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Roaming Petfood Forum

BY TIM PHILLIPS, DVM / PHOTOS: MARTY WITTIG

This was my lucky year. At Petfood Forum, April 3-5, 2006, Roy Leidahl, then publisher of *Petfood Industry*, took over my usual moderation duties. Therefore, I was free to roam. It was great and I enjoyed myself immensely. Here is some of what I heard:

- Job security is not what it used to be, as evidenced by recent changes in ownership at Milkbone, Meow Mix, Nutro, NuPetra and Greenies.
- The cost of in-home palatability tests is 2-5 times that of traditional kennel and cattery palatability tests.
- Petfood company marketing people should attend Forum to get good ideas. "Many of my best new product development ideas have come from Petfood Forum," stated the marketing VP of a large superpremium petfood company. He went on to say, "Suppliers should target petfood company marketing people, because they drive the purchasing decisions."
- Bain Capital, a global private investment firm, will probably finalize their purchase of Nutro Products, Inc. by May 2006. The purchase price is estimated at \$US1.5-2 billion. Nutro and Bain have emphasized that they intend to maintain Nutro's exclusive commitment to the pet specialty store channel.
- A large petfood company will soon purchase Greenies. (Shortly thereafter, Mars Inc. signed an agreement to acquire S&M NuTec LLC, the North Kansas City, Kansas, USA-based manufacturer of Greenies® dog treats, for an undisclosed price.)
- CanCog Technologies Inc. provides proprietary predictive screening of new therapeutics for both humans and companion animals. The company is exploring a method of testing palatability that reduces variability, and so, requires fewer test subjects (www.CanCog.com).



For the foreseeable future, Petfood Forum will continue to be held at the Hyatt Regency O'Hare Hotel.

Next year

Next year Petfood Forum will be in Chicago, April 16-18, 2007. Topic and speaker ideas are welcome (e-mail me at Phillips@wattmm.com). Focus will be in Chicago, April 18-19, 2007. Again, topic and speaker ideas are welcome.



Petfood Forum's Monday night reception is one of its most popular events.

Petfood Forum 2006 drew 952 attendees from 30 different countries. Focus on Palatability attracted 232 attendees from 27 different countries.



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Mycotoxin management

Get the best from your laboratory results and prevent problems

BY CARRIE MAUNE

The issue of mycotoxins in raw ingredients may be one of the most challenging for petfood manufacturers to successfully control. The very nature of mycotoxins makes them difficult to manage at best. There are many variables that must be considered. Each growing season is different; not every commodity is affected in the same way; contamination levels are measured in parts per million (ppm) and parts per billion (ppb); not all animals are effected by the same toxin in the same way; and, in addition to everything else, improper sampling and poor testing procedures can produce extremely costly inaccurate results. These variables are enough in themselves to cause any QA manager sleepless nights.

With all of these parameters, it is understandable why the mycotoxin issue is not only extremely troublesome, but also potentially very costly to manage. This article will briefly review some important concepts that can help.

What are mycotoxins, and where do they come from?

Mycotoxins are simply chemical compounds—more specifically, toxic chemical compounds that are produced by molds. The contamination process begins in the fields as crops are growing. Different molds favor different temperature and moisture conditions. This means that different weather conditions produce different toxins. Some molds, such as the ones that produce aflatoxin, thrive in hot, dry conditions. Other molds, such as the ones that produce deoxynivalenol (also known as DON or vomitoxin), thrive with cooler wetter conditions.

After commodities are harvested, toxin production can continue if storage conditions are not properly maintained. Toxin concentrations can also increase with commodities that have not been dried to below 13-14% moisture.

See page 28 for basic information on mycotoxins.

Use testing resources wisely

It's important to know what toxins are routinely found in the commodities most widely used in petfood manufacturing. Many ingredients in petfood formulations are not at substantial risk. Properly test those ingredients that pose potential problems before they become problems in the finished product. The following ingredients routinely cause concern for petfood manufacturers: ▶Corn and corn products: Aflatoxin, vomitoxin (DON), fumonisin and zearalenone. ▶Wheat and wheat products: Vomitoxin. ▶Cottonseed and cottonseed products: Aflatoxin. ▶Peanut meal and peanut products: Aflatoxin. ▶Soybean meal and soybean hulls: Not typically contaminated; however, be aware that occasionally vomitoxin, T-2 and HT-2 can occur—especially if water damage or improper storage has occurred.

Aflatoxin can cause serious liver problems in dogs and



PHOTO: DOM CASTALDO

cats. Literature cites 100 ppb as a potential level for liver problems; however, in natural occurrences those levels are lower—perhaps more like 60 ppb to 80 ppb. Vomitoxin can cause feed refusal and vomiting. Literature cites 2 ppm to 5 ppm as having effects on refusal for pets. Zearalenone is an estrogenic toxin and causes reproductive problems. Be aware of this for any type of specialty diets that may be fed to breeding animals. Fumonisin is extremely problematic with any type of diet for equine. Levels for equine (and rabbits) are 1 ppm total fumonisin in the finished diet.

Sampling is ALWAYS an issue

Sampling contributes more to variability of results than any other component of mycotoxin management. This is crucial with in-coming raw commodities. Mycotoxins are not evenly distributed, plus you are looking for extremely low levels of contamination. Large samples of whole grains must be collected and sub-sampled properly. Make sure that the entire probed sample is ground finely and then mixed well before taking an analytical sample for testing.

Know what to expect from your testing system

Never take mycotoxin results at face value. There are many components that go into making up just one number, and you must be aware that any of these components can have a large impact on the final result. When you review results, understand that they actually represent a statistical range dependent on the combined variability of the sampling, sub-sampling and test method.

For instance, aflatoxin that is reported at 23 ppb may actually represent any number in the range from 18 ppb to 28 ppb. If the sample was tested over several days, the result may be anywhere in that statistical range. If your action level for aflatoxin is 20 ppb, this range can be troublesome. Remember that on in-coming commodities, variability at this level is typically not going to cause animal health issues.

If you conduct mycotoxin testing internally, it is important to run routine checks on your complete testing system. False-positive results—and more importantly, false-negative results—cause enormous problems. If you run mycotoxin tests internally, make sure that you have a known-positive reference sample at a documented contamination level. Use this periodically to check your system's overall performance and quantitation accuracy. This is especially beneficial to run if you have not triggered a positive result on your samples for a while, or for training new analysts.

This reference sample can help confirm your testing technique. A known-negative reference commodity is also beneficial if you begin to reject commodities and want to ensure that you are not getting false-positive results from your testing system. Finally, make sure that if you test a variety of matrices that the testing system is properly evaluated for all of the matrices. Testing finished product

Mycotoxin test kits

This information was excerpted from an article by Dr. Charles P. Woloshuk, Department of Botany and Plant Pathology, Purdue University, for the Cooperative Extension Service.

Mycotoxin analysis kits

The most accurate and reliable method of analyzing mycotoxin levels is to send test samples to professional laboratories for analysis. This, however, is often not practical because of the cost or the time required for analysis. Because of the need for fast determination of mycotoxin levels, a variety of mycotoxin test kits are sold that are easy-to-use and relatively inexpensive.

Before purchasing a mycotoxin test kit, it is important that one determines what type of information is required. Even though the technology in the analysis of mycotoxin kits is constantly improving, the information derived from the kits is basically of two types—quantification or threshold levels. Quantitative test kits determine the exact amount of mycotoxin and are often needed by industrial grain handlers who must document the quality of their starting materials or finished product. Special equipment must be purchased for kits that measure mycotoxin levels. Threshold kits will let the user know if the mycotoxin level is above a targeted amount. Results from these kits are determined by visually assessing the color in a reaction cup or the presence of a line with the newest technology.

Nearly all of the mycotoxin test kits that are commercially available use immunotechnology (antigen/antibody reactions). These kits are easy-to-use, and for some mycotoxins results can be obtained in less than five minutes. The central ingredient in these kits is the antibodies that bind specific mycotoxins. Because of the specificity of the antibodies, a separate kit must be purchased for each mycotoxin. Purchasing test kits from reputable companies and carefully following the instructions can reduce errors that lead to false-positive and false-negative results.

These technologies are constantly being improved and companies are striving to make the detection kits more accurate, sensitive, easier to use, less expensive and more rapid.

Some of the companies who produce these kits are:

- ▶Neogen Corporation (www.neogen.com)
- ▶Romer Labs Inc. (www.romerlabs.com)
- ▶Vicam (www.vicam.com)
- ▶Envirologix (<http://www.envirologix.com>)
- ▶R-Biopharm AG (www.r-biopharm.de)

can produce more variables than testing in-coming grain. Know the limitations of your system.

If you send samples out to a contract lab, ask what type of methodology is being used to analyze samples. Make sure that naturally-contaminated, positive controls are in place, as well as both known-spike samples and known-negative samples. These tools are good checks to have in place. Most methods have approvals. Make sure that the method that is being used has been validated and approved for the toxins with which you are concerned.

Never take mycotoxin results at face value.

If you have known samples available, periodically send a known check sample blindly through the system to confirm the quality of your contract lab's performance. Record these checks in the event that your product quality is ever questioned. If your contract lab is using a test kit, make sure that an approved chromatography or other analytical method confirms the positive results.

Unfortunately, everything boils down to test results, and utilizing incorrect test results has the potential to cost far more

incorporated into the agreement, or at the very least obtain some pre-shipment samples to determine if there may be a problem with the shipment. If you have accepted, or know that you have no alternatives but to accept mycotoxin contaminated grain, utilize the grain as effectively as possible.

Remember that mycotoxins concentrate in the dockage, so sifting fines may also be an option for some facilities to reduce the overall contamination. If possible, divert the commodities to diets for species that are not as sensitive to mycotoxins. If possible (and legal) blending commodities

may offer a solution for contaminated grain. When blending, however, remember it is much more difficult to blend down highly-contaminated products to a uniform contamination level than it sounds.

How can you protect against losses?

Mycotoxin management systems ultimately function like an insurance policy. Not every facility requires the same insurance plan. It is important to tailor a mycotoxin management program to fit the needs of individual facilities. The best way to minimize the mycotoxin risks is to define the parameters that you can control such as the testing procedures, sampling procedures and in-coming commodities that will be tested.

Additionally, define those parameters that are out of your control such as weather patterns and the inherent variability of mycotoxin results. Maximize the things that you can control. Design good sampling protocols. Implement testing system controls to help ensure accurate results. Make mycotoxin testing training mandatory and document the results of new analysts to make sure that the test system produces accurate results for everyone. Document the qualifications of your contract lab. Know the strengths and weaknesses of your overall testing system and put controls in place to monitor weaknesses.

It almost seems like a contradiction in terms, attempting to manage something with so many variables. In the past three to four decades, mycotoxins have been researched, tested, litigated, discussed (and yes, probably even "cussed"), but they haven't been eliminated. For now, the best approach to mycotoxin management is a well thought-out program that incorporates solid sampling and testing procedures and utilizes all of the information available to understand the year-to-year problems that may arise.

A good mycotoxin management program can increase product worth and customer satisfaction and perhaps, in the end, the QA manager may even sleep better. ➔

Ms. Maune is president of Trilogy Analytical Laboratory, in Washington, Missouri, USA. She can be reached at Tel: +1.636.239.1521, E-mail: carrie@trilogylab.com, Website: www.trilogylab.com.

Mycotoxins:

Five key ways to protect your brands

1. Know the rules. (For US FDA guidelines, see p. 30.)
2. Sample well.
3. Use correct tests correctly.
4. Seek out crop information.
5. Tailor a program to fit your specific needs.

than just money. Keep in mind that major problems generally don't involve mycotoxin management systems that didn't differentiate between 18 and 35 ppb aflatoxin, or between 1 and 2 ppm vomitoxin, but rather the system that misses higher-level mycotoxin contamination altogether.

What happens when mycotoxins are a problem?

Recognize that some years are just going to be problematic. Getting information on the potential problems while the crops are still in the fields can give you some extra time to make additions, changes or improvements to the mycotoxin management system that is already in place. Many companies track crop conditions and have a pretty good idea of what toxins will be surfacing and what areas of the country will be hit the hardest. By using this information early in the season, the possibility of purchasing commodities out of the affected area will be an option.

If that is not possible, explore the option of using purchasing agreements that contain some type of mycotoxin testing provision. Perhaps maximum mycotoxin levels can be

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CAGELESS PREFERENCE TESTING

RFID and the sensory evaluation of feline foods

Millions of dollars are spent annually on traditional palatability testing of feline petfoods using antiquated methods that give researchers and product developers just two small tools to work with—consumption and first choice. And, unfortunately in these cases, the cats must spend much of their lives in cages. Now, with a new technology, we have figured out how to collect data from a taste panel residing in a freely-housed group environment.

The application of radio frequency technology has shifted the paradigm and moved preference testing into the 21st century. Radio frequency identification (or RFID) technology significantly increases the number of tools available and, consequently, the amount of knowledge gained from the testing of feline foods. In fact, we legitimately can't call it palatability testing anymore, but instead refer to it as the sensory evaluation of feline foods.

In 2004, Preference Technology, Inc.

began the process of adapting RFID to feline preference testing. Because there is no manual or book available that demonstrates how to get from concept to reality, my company did it the “old-fashioned” way and learned by trial and error. The system was christened on December 11, 2005 and its functionality has since exceeded our expectations.

RFID SYSTEM BASICS

At our facility, each panel of feline testers wears a special collar equipped with an RFID microchip. The chip identifies each particular animal when it approaches the testing area. Each cat has access to four feeding stations, where RFID and load cell equipment capture every bit of data that make up what we call a “meal event.” When cats dine, the data are time stamped and transmitted to a data collection computer. Data are transmitted when the cat is within approximately four inches of the food. The data collection computer is linked to our database server where the raw data can be

RFID VS. TRADITIONAL TESTS

Table 1. Comparison of RFID versus traditional preference testing method (i.e., two-pan testing).

Metric	RFID	Traditional two pan
Per panel/per animal consumption of both diets by test period	Yes	Yes
Per animal first choice and first approach	Yes	Yes
Per panel and per animal consumption per diet per hour and test period	Yes	No
Diets approached/sniffed per panel and per animal by hour and test period	Yes	No
Number of meals per panel and per animal by hour and test period	Yes	No
Amount of each meal event per animal	Yes	No
Rate of consumption per panel and per animal by hour and test period	Yes	No

“sliced and diced” and summarized in a comprehensive report.

As can be seen in Table 1, RFID technology can capture more information than a traditional two-pan test. The flexibility of RFID provides a wider range of information from a colony of animals allowed to roam freely. This provides for a test that more closely mimics “in-home” preference testing.

USING RFID TECHNOLOGY

The system’s ability to capture data for “approaches/sniffs” is of particular use for aroma development projects. Figure 1 demonstrates how many times a panel of 20 cats approached the feeding stations and sniffed the two diets during a 14-hour feeding period.

As can be seen, Diet 2 elicited a greater number of approaches than Diet 1. The calculated ratio of approaches/sniffs for the diets was 1.0 for Diet 1 and 1.40 for Diet 2. Breaking down the data in this study by hour, it can be seen in Figure 2 that Diet 2 rather consistently aroused more curiosity throughout the 14-hour test period.

GROUP HOUSING

Cats housed in an RFID setting are allowed to roam freely in their environment. This allows a testing facility to provide a more humane lifestyle for its colony of testing animals. Also, the environment more closely resembles an in-home setting and provides data that more closely resemble a true pet’s home life.



Preference testing required the use of cages before RFID data capture was implemented at our facility.



After RFID—animals are allowed to roam freely in their environment, allowing for a more enriched lifestyle.

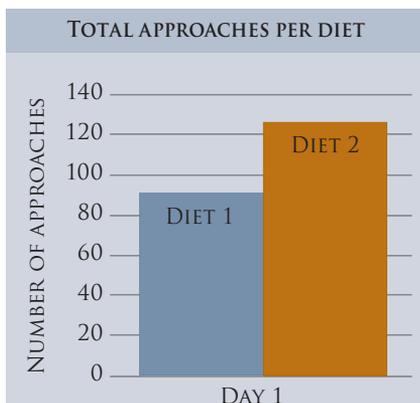


Figure 1. Total approaches per diet. Number of approaches/sniffs at the feeding stations recorded during a 14-hour feeding period. Data transmitted when animal is within approximately four inches of the food.

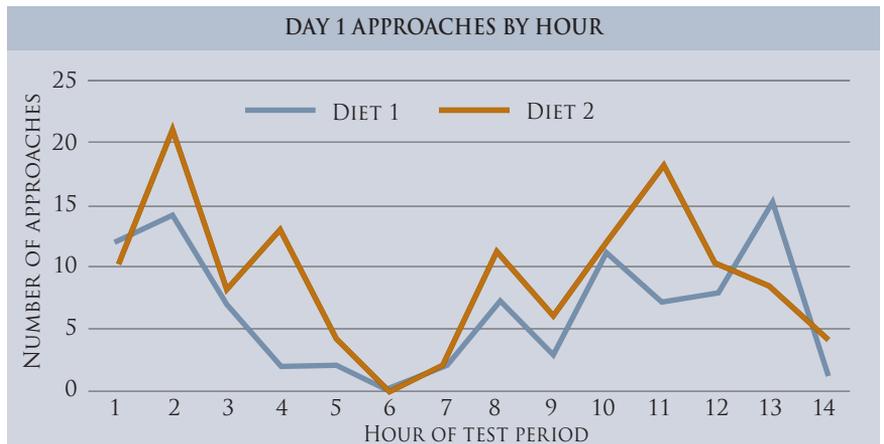


Figure 2. This chart shows the distribution of approaches/sniffs for two diets by hour during the 14-hour test period.

Results from numerous tests using the same test foods for group-housed panels and individually-housed panels validate that both groups produce very similar palatability results.

OTHER RFID CAPABILITIES/BENEFITS

There are numerous advantages to using RFID technology in testing feline food preferences. Because data can be recorded for each approach/sniff, RFID testing allows for the use of four bowls rather than just two and panels are capable of testing three or four foods simultaneously.

The use of four bowls allows for a degree of randomizing, which minimizes issues of handedness and bowl placement memorization. Because the feeding stations are designed to accommodate the ability of the cats to discern aromas, considerable aroma-related knowledge is also yielded by the RFID system. The functionality of the system also works very well for treat testing protocols.

THE FUTURE OF RFID IN PETFOOD

After having worked with the technology for two years and utilizing the system for a wide variety of tests, I believe the application of RFID technology for the sensory evaluation of feline foods is truly an industry innovation, and its application will expand as we continue to test the capabilities. We are currently contemplating:

- » Canine palatability testing;
- » Monitoring dog and cat colony health by employing the use of algorithms on food and water intake data;
- » Employing the use of modeling software to assist customers with reducing research and product development time and cost; and
- » Broadening the aroma data collection concept with the addition of a peripheral electronic nose.

I believe the use of this technology will become the standard in the industry over the next several years as manufacturers continue in their quest for the humanization of petfoods.

Mr. Fuller is co-owner of Preference Technology, Inc. He earned his BS in Business Administration in 1975 from Upper Iowa University. Contact: 2275 East 1400 North Road, Watseka, IL 60970 USA, Tel: +1.815.473.4035, Fax: +1.815.473.4048, E-mail: ron_fuller@direcway.com.

E-News

Armstrong International launches new global website

Armstrong International's new website makes it possible to review every Armstrong product, service and system solution online while tailored to your

industry. Product literature and technical specifications are available as downloads, as well as online CAD drawings. Guests of the site can complete online forms to request a free assessment of their steam, condensate return and hot water systems. Request for quotes are also available for over 20 product families. Through an E-commerce component, guests may buy many Armstrong products online. You

can even learn about steam online by joining Armstrong University. To learn more, visit www.armstrong-intl.com, or call +1.269.273.1415.

The Wi-fi net widens

As reported by emarketer.com, municipal Wi-fi networks currently cover only about 1,500 square miles worldwide. But according to *Wireless Mesh Networking*, a new report released by ABI Research, by 2010 the area covered will increase to 126,000 square miles. To put the latter figure in perspective, it means that by 2010 municipal Wi-fi networks worldwide will blanket an area larger than the country of Poland, or the state of New Mexico.

The report projects that the bulk of the new Wi-fi growth will occur in North America and the Asia-Pacific region, and to serve these burgeoning networks more than one million wireless mesh routers will be shipped in 2010. The manufacturing revenues from those shipments are expected to exceed US\$1.2 billion.

According to the report, four significant trends are energizing this emerging market:

- Many local governments wish to deploy municipal broadband networks for public safety—as well as increased government efficiency.
- Alternative ISPs see mesh networking as enabling their own broadband service facilities to compete with incumbent service providers.
- Wireless mesh networking technology is seen as an efficient and cost-effective means of providing broadband access to underserved areas. This will be particularly true as the municipal Wi-fi trend moves from larger cities into smaller towns.
- Potentially, wireless mesh networking technology can serve as a competitive tool for cable operators.

Legal impediments to municipal Wi-fi deployment are also falling. While municipalities initially faced regulatory restriction in terms of local government funding or their roles as broadband service network operators, that is less the case today, because the networks are increasingly provided by a third-party operator, who owns and operates the network. ➔

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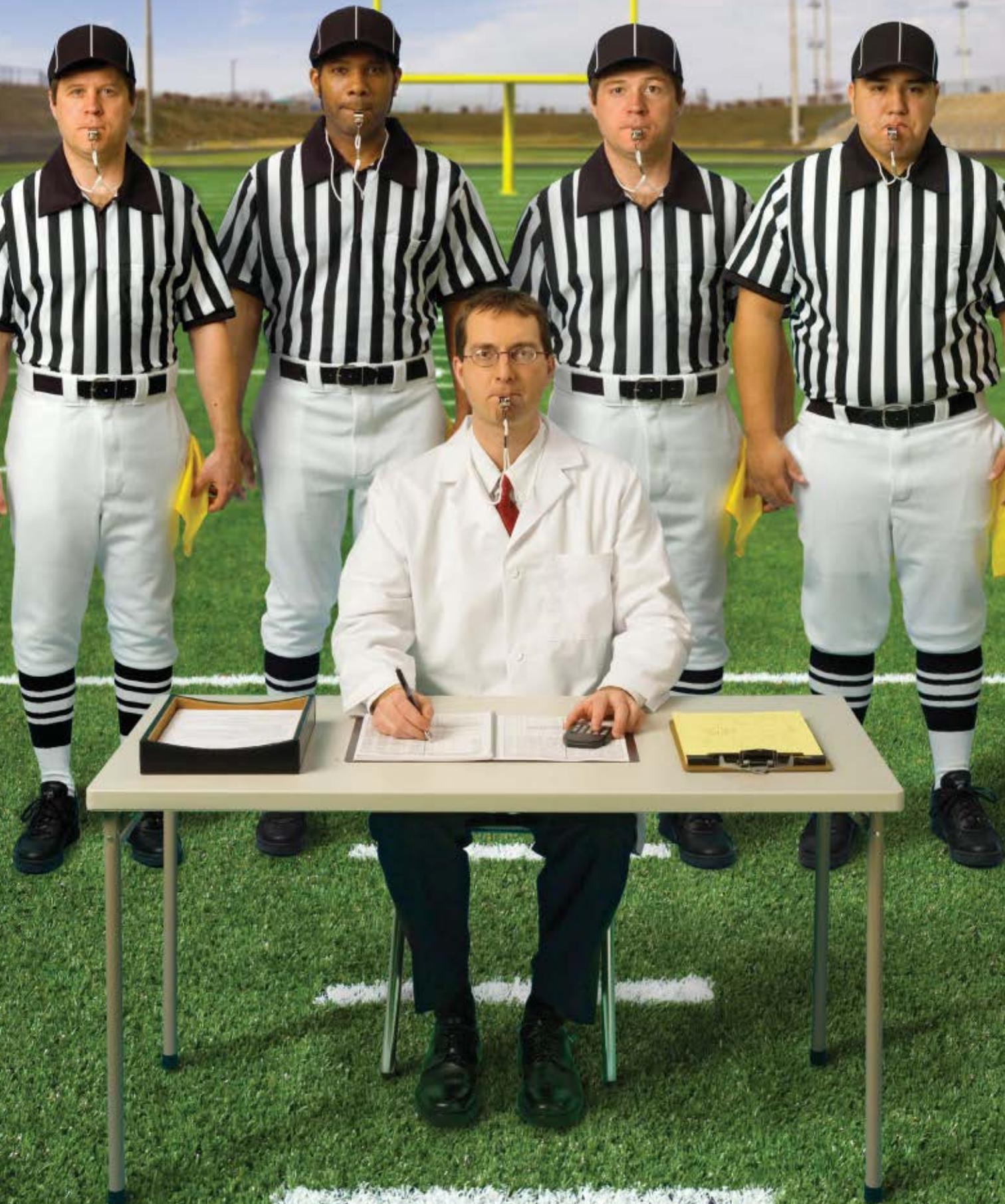


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Laboratory directory

A key to services provided by independent laboratories worldwide

Petfood Industry is pleased to present its third annual laboratory guide. Companies are listed alphabetically. Many companies have more than one facility worldwide. Contact the company for information on locations. **Boldfaced** companies have an advertisement in this issue—see page listed.

Services key:

- L1> Nutrient analysis.
- L2> Nutraceutical analysis.
- L3> Microbiological assay.
- L4> Drug/antibiotic/pesticide residues.
- L5> GMO screening.
- L6> Mycotoxin testing.
- F1> Palatability trials.
- F2> Complete and balanced claims/lifestage testing.
- F3> Digestibility.
- F4> Urine pH.
- A> Additional studies available.

A&L Analytical Laboratories, Inc.
2790 Whitten Road, Memphis, TN
38133 USA, Tel: +1.800.264.4522,
Fax: +1.901.213.2440, Contact: Scott
McKee, E-mail: smckee@allabs.com,
Website: www.allabs.com

Services provided: L1, L3

ABC Research Corporation
3437 SW 24th Avenue, Gainesville, FL
32607 USA, Tel: +1.352.372.0436,
Fax: +1.352.378.6483, Contact:
Larry Clement, E-mail: info@abcr.com,
Website: www.abcr.com

Services provided: L1, L2, L3, L4, L6

Barrow-Agee Laboratories, Inc.
1555 Three Place, Memphis, TN 38116
USA, Tel: +1.901.332.1590, Fax:
+1.901.398.1518, Contact: Michael
Hawkins, E-mail: mhawkins@balabs.
com, Website: www.balabs.com

Services provided: L1, L3, L4, L6

Blue Ridge Kennel

Blue Ridge Kennel
PO Box 1207, Wetumpka, AL
36092 USA, Tel: +1.334.567.8195,
Fax: +1.334.514.2638, Contact:
Paul Plessner, E-mail: paulplessner
@msn.com

Services provided: F1
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Carolina Analytical Services LLC
17570 NCHwy 902, Bear Creek, NC
27207 USA, Tel: +1.919.837.2021,
Fax: +1.919.837.2110, Contact:
Jennie Stewart, E-mail: jenniestewart
@wave-net.net

Services provided: L1, L3, L4, L6

Central Testing Labs Ltd.
Unit 9-851 Lagimodiere Blvd.,
Winnipeg, MB R2J 3K4, CANADA,
Tel: +1.204.237.9128, Fax:
+1.204.233.0489, Contact: Harold
Thiessen, E-mail: haroldt@ctl.mb.ca,
Website: www.ctl.mb.ca

Services provided: L1, L2, L3, L6

Cornerstone Labs, LLC
3043 Airways Blvd., Bldg. B,

Suite 7, Memphis, TN 38131
USA, Tel: +1.901.398.4001,
Fax: +1.901.398.4223, Contact:
Sam LaBonia, E-mail: slabonia
@cornerstonelab.com, Website: www.
cornerstonelab.com

Services provided: L1, L4, L5, A
Additional services: Antioxidant testing,
mineral analysis and fatty acid profiles
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NC 27893 USA, Tel: +1.252.206.7071,
Fax: +1.252.206.1305, Contact: Brian
Grawburg, E-mail: bgrawburg@cra
ftechnologies.com, Website: www.
crafttechnologies.com

Services provided: L1, L2, A
Additional services: In addition to the
analyses of raw ingredients and finished
products, we also provide analytical services
for biological fluids.
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Dairy One
730 Warren Road, Ithaca, NY
14850 USA, Tel: +1.607.257.1272,
ext. 2172, Fax: +1.607.257.1350, E-
mail: forage@dairyone.com, Website:
www.dairyone.com

Services provided: L1

Diversified Laboratories, Inc.
4150 Lafayette Center Drive, Unit
600, Chantilly, VA 20151-1200
USA, Tel: +1.703.222.8700, Fax:
+1.703.222.0786, Contact: Terry
Slover, E-mail: info@diversifiedl
aboratories.com, Website: www.
diversifiedlaboratories.com

Services provided: L4, A
Additional services: Fats and oils chemistry
on ingredients.

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LA 70001 USA, Tel: +1.504.297.4330,
Fax: +1.504.297.4335, Contact:
Carlos Navarro, E-mail: carlosnavarro

@eurofinsus.com, Website: www.
gmotesting.com

Services provided: L1, L2, L3, L4, L5, L6,
F1, F2, F3, F4



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TN 38119 USA, Tel: +1.901.272.7511,
Fax: +1.901.272.2926, Contact: Jan
Harris, E-mail: janharris@eurofinsus.
com, Website: www.eurofinsus.com
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F2, F3, F4

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USA, Tel: +1.641.472.9979, Fax:
+1.641.472.9198, Contact: Bill
Thompson, E-mail: info@genetic-id.com,
Website: www.genetic-id.com

Services provided: L5, A
Additional services: Animal speciation testing
for products exporting to China and Korea.

Great Lakes Scientific, Inc.
PO Box 166, 2847 Lawrence
Street, Stevensville, MI 49127
USA, Tel: +1.269.429.1000, Fax:
+1.269.421.1550, Contact: Dr.
Wayne Gleiber, E-mail: gls@gslab.
com, Website: www.gslab.com

Services provided: L1, L3, L4, L6

Holmes Laboratory Inc.
3559 US Route 62, Millersburg,
OH 44654 USA, Tel: +1.330.
893.2933, Fax: +1.330.893.3094,
E-mail: info@holmeslab.com, Website:
www.holmeslab.com

Services provided: L1, L6

Industrial Laboratories of Canada
Inc.

Unit #55, 6535 Millcreek
Drive, Mississauga, ON L5N
2M2, CANADA, Tel: +1.905.
858.8630, Fax: +1.905.858.0771,
Contact: Roger Mathur, E-mail: roger_

m@industriallabs.ca, Website: www.
industriallabs.ca

Services provided: L1, L2, L3, F2, F3, F4

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01246-902 São Paulo/SP, BRAZIL,
Tel: +55.11.3068.2915, Fax:
+55.11.3062.5363, Contact: Odair
Zenebon, E-mail: ozenebon@ial.sp.gov.
br, Website: www.ial.sp.gov.br

Services provided: L1, L3, L6

**Integrated Biomolecule Corp./
IBC Labs**
2005 E. Innovation Park Drive, Tucson, AZ
85755-1966 USA, Tel: +1.520.219.2900,
Fax: +1.520.219.6090, Contact:
Robert S. Green, E-mail: lab@integ
atedbiomolecule.com, Website: www.
integratedbiomolecule.com

Services provided: L1, L2, L3, L4

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Laboratory**
1800 Denison Avenue, Manhattan, KS
66506 USA, Tel: +1.785.532.5650,
Fax: +1.785.532.4481, Contact: Dr.
Gary Anderson, E-mail: ganders@vet.
k-state.edu, Website: www.vet.k-state.
edu/dept/diagnlab

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Fax: +1.217.356.4959, Contact:
Stephanie Watts, E-mail: swatts8147
@aol.com

Services provided: F1, F2, F3, F4
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PO Box 216, Austin, MN 55912
USA, Tel: +1.507.437.6483, Fax:

+1.507.437.2829, Contact: Dr. Doug Bibus, E-mail: bibus@smig.net
Services provided: L1, L2, A
Additional services: Fatty acid and lipid testing/consulting.

Medallion Laboratories
9000 Plymouth Avenue North, Minneapolis, MN 55427 USA, Tel: +1.763.764.4453, Fax: +1.763.764.4010, Contact: Vicki Dunn, E-mail: info@medlabs.com, Website: www.medallionlabs.com
Services provided: L1, L3, L4, L6

Microbac – Friend Laboratory
32 Ithaca Street, Waverly, NY 14892 USA, Tel: +1.607.565.3500, Fax: +1.607.565.4083, Contact: Dick Hammer, E-mail: dhammer@microbac.com, Website: www.microbac.com
Services provided: L1, L2, L3, L4, L5, L6

Microbac Laboratories, Inc.
2000 Corporate Drive, Franklin Corporate Center, Wexford, PA 15090 USA, Tel: +1.924.934.5078, Fax: +1.924.934.5088, Contact: Tom Zierenberg, E-mail: tzierenberg@microbac.com, Website: www.microbac.com
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Midwest Laboratories, Inc.
13611 B Street, Omaha, NE 68144 USA, Tel: +1.402.334.7770, Fax: +1.402.334.9121, Contact: Sue Ann Seitz, E-mail: sueann@midwestlabs.com, Website: www.midwestlabs.com
Services provided: L1, L2, L3, L4, L6
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2826 S. Elm Eugene Street, Greensboro, NC 27416 USA, Tel: +1.336.273.1737, Fax: +1.336.273.2615, Contact: Al Murphy, E-mail: amurphy@mothermurphys.com, Website: www.mothermurphys.com
Services provided: F1, A
Additional services: Manufacture flavors for petfood and feed products.

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Checkerboard Square, St. Louis, MO 63164 USA, Tel: +1.800.423.6832, Fax: +1.314.982.1078, Contact: Lynn Loudermilk, E-mail: lloudermilk@purina.com, Website: www.NPAL.com
Services provided: L1, L2, L3, L4, L6, A
Additional services: Experts in analytical testing of petfoods and petfood ingredients.



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620 Leshler Place, Lansing, MI 48912 USA, Tel: +1.517.372.9200 (ext. 325), Fax: +1.517.372.0108, Contact: Tammy Ritter, E-mail: foodsafety@neogen.com, Website: www.neogen.com
Services provided: L3, L5, L6
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New Jersey Feed Lab Inc.
PO Box 06650, Trenton, NJ 08650

USA, Tel: +1.609.882.6800, Fax: +1.609.882.5530, Contact: Carl W. Schulze, E-mail: _carl@njfl.com, Website: www.njfl.com
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Additional services: Special strengths in fat-by-acid hydrolysis testing, peroxide value, ethoxyquin, proximate and minerals. Superb turnaround time.

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Massey University, Private Bag 11222, Palmerston North, NEW ZEALAND, Tel: +64.6.350.5869, Fax: +64.6.350.5657, Contact: Fliss Jackson, IFNHH, E-mail: F.S.Jackson@massey.ac.nz, Website: http://nutritionlab.massey.ac.nz
Services provided: L1, L3, F1, F2, F3, F4, A
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Ontario Nutri Lab Inc.
6589 First Line, RR #3, Fergus, ON M2W4, CANADA, Tel: +1.519.843.5669, Fax: +1.519.843.5676, Contact: Jan McKeown, E-mail: onlab@ontariolab.com
Services provided: L1, F1, F2, F3, F4

Pet Food Solution, Inc.
562 State Road DD, Auxvasse, MO 65231 USA, Tel: +1.573.387.4575, Fax: +1.573.387.4400, Contact: Mr. Eric Blair/Dr. Guy Bouchard, E-mail: eblair@petfoodsolution.com; bouchard@petfoodsolution.com, Website: www.petfoodsolution.com
Services provided: F1, F2, F3, F4, A
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2275 E. 1400 North Road, Watseka, IL 60970 USA, Tel: +1.815.473.4035, Fax: +1.815.473.4048, Contact: Ron Fuller, E-mail: ron_fuller@directway.com
Services provided: F1, A
Additional services: The sensory evaluation of feline foods and treats utilizing group-housed panels. Turnkey RFID systems for catteries performing palatability testing.
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2275 E. 1400 North Road, Watseka, IL 60970 USA, Tel: +1.815.473.4035, Fax: +1.815.473.4048, Contact: Ron Fuller, E-mail: ron_fuller@directway.com
Services provided: F1, A
Additional services: The sensory evaluation of feline foods and treats utilizing group-housed panels. Turnkey RFID systems for catteries performing palatability testing.
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2275 E. 1400 North Road, Watseka, IL 60970 USA, Tel: +1.815.473.4035, Fax: +1.815.473.4048, Contact: Ron Fuller, E-mail: ron_fuller@directway.com
Services provided: F1, A
Additional services: The sensory evaluation of feline foods and treats utilizing group-housed panels. Turnkey RFID systems for catteries performing palatability testing.
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Romer Labs, Inc.
1301 Stylemaster Drive, Union, MO 63084 USA, Tel: +1.636.583.8600, Fax: +1.636.583.6553, Contact: John Caupert, E-mail: john.caupert@romerlabs.com, Website: www.romerlabs.com

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Services provided: L1, L3, L4, L6, F2, F3

SGS North America Inc.
PO Box 13484, Memphis, TN 38113 USA, Tel: +1.901.775.1660, Fax: +1.901.775.3308, Contact: Sandy Holloway, E-mail: sandyholloway@sgs.com, Website: www.sgs.com
Services provided: L1, L3, L4, L5, L6

Shuster Laboratories, Inc.
85 John Road, Canton, MA 02021 USA, Tel: +1.781.821.2200, Fax: +1.781.821.9266, Contact: Katie Griffin, E-mail: katie.griffin@shusterlabs.com, Website: www.shusterlabs.com
Services provided: L1, L2, L3, L4, L6

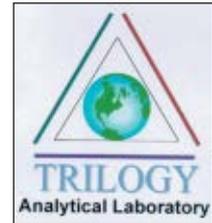
Silliker, Inc.
900 Maple Road, Homewood, IL 60430 USA, Tel: +1.708.957.7878, Fax: +1.708.957.1483, Contact: Jessica Sawyer-Lueck, E-mail: info@silliker.com, Website: www.silliker.com
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Additional services: We now perform dental studies.
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Utrechtseweg 48, 3700 AJ Zeist NETHERLANDS, Tel: +31.30.694.46.21, Contact: Jan Meiling, E-mail: jan.meiling@tno.nl, Website: www.tno.nl/voeding
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Services provided: L3, L6
See ad on page 9

Universal Testing
229 Radio Road, Quincy, IL 62305 USA, Tel: +1.217.222.8854, Fax: +1.217.224.3719, Contact: Erich Jacobsen, E-mail: erichjacobsen@mineral-analysis.com, Website: www.mineral-analysis.com
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► If your company is not listed here, to be included in future listings, contact: Jenny Kvamme, 122 S. Wesley Ave., Mt. Morris, Illinois 61054 USA, Tel: +1.815.734.5637, Fax: +1.815.734.5649, E-mail: kvamme@wattmm.com.

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F2 > Claims/lifestyle testing.

F3 > Digestibility.

F4 > Urine pH.

A > Additional studies available.

	L1	L2	L3	L4	L5	L6	F1	F2	F3	F4	A
A&L Analytical Laboratories, Inc.	✓		✓								
ABC Research Corporation	✓	✓	✓	✓		✓					
Barrow-Agee Laboratories, Inc.	✓		✓	✓		✓					
Blue Ridge Kennel, See ad on page 42							✓				
Carolina Analytical Services LLC	✓		✓	✓		✓					
Central Testing Laboratory Ltd.	✓	✓	✓			✓					
Cornerstone Laboratories	✓			✓	✓						✓
Craft Technologies, Inc., See ad on page 44	✓	✓									✓
Dairy One	✓										
Diversified Laboratories				✓							✓
Eurofins GeneScan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Eurofins Scientific, Inc., See ad on page 31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Genetic ID					✓						✓
Great Lakes Scientific, Inc.	✓		✓	✓		✓					
Holmes Laboratory Inc.	✓					✓					
Industrial Laboratories of Canada Inc.	✓	✓	✓					✓	✓	✓	
Instituto Adolfo Lutz	✓		✓			✓					
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Kansas State University Diagnostic Laboratory			✓	✓		✓				✓	✓
Kennelwood Inc., See ad on page 16							✓	✓	✓	✓	
Lipid Technologies, LLC	✓	✓									✓
Medallion Laboratories	✓		✓	✓		✓					
Microbac—Friend Laboratory	✓	✓	✓	✓	✓	✓					
Microbac Laboratories, Inc.	✓	✓	✓	✓	✓	✓					
Midwest Laboratories Inc., See ad on page 42	✓	✓	✓	✓		✓					✓
Mother Murphy's Laboratories							✓				✓
NP Analytical Laboratories	✓	✓	✓	✓		✓					✓
Neogen Corporation, See ad on page 17			✓		✓	✓					
New Jersey Feed Lab, Inc.	✓		✓								✓
Nutrition Laboratory, Massey University	✓		✓				✓	✓	✓	✓	✓
Ontario Nutri Lab Inc.	✓						✓	✓	✓	✓	
Pet Food Solution Inc.							✓	✓	✓	✓	✓
Preference Technology, Inc., See ad on page 37							✓				
Romer Labs, Inc., See ad on page 45						✓					✓
SDK Laboratories	✓		✓	✓		✓		✓	✓		✓
SGS Control Services, Inc.	✓		✓	✓	✓	✓					
Shuster Laboratories, Inc.	✓	✓	✓	✓		✓					
Silliker, Inc.	✓	✓	✓	✓	✓	✓					
Summit Ridge Farms, See ad on page 47							✓	✓	✓	✓	✓
TNO Quality of Life	✓	✓	✓	✓	✓	✓			✓		✓
Trilogy Analytical Laboratory, See ad on page 9			✓			✓					
Universal Testing	✓	✓							✓		✓
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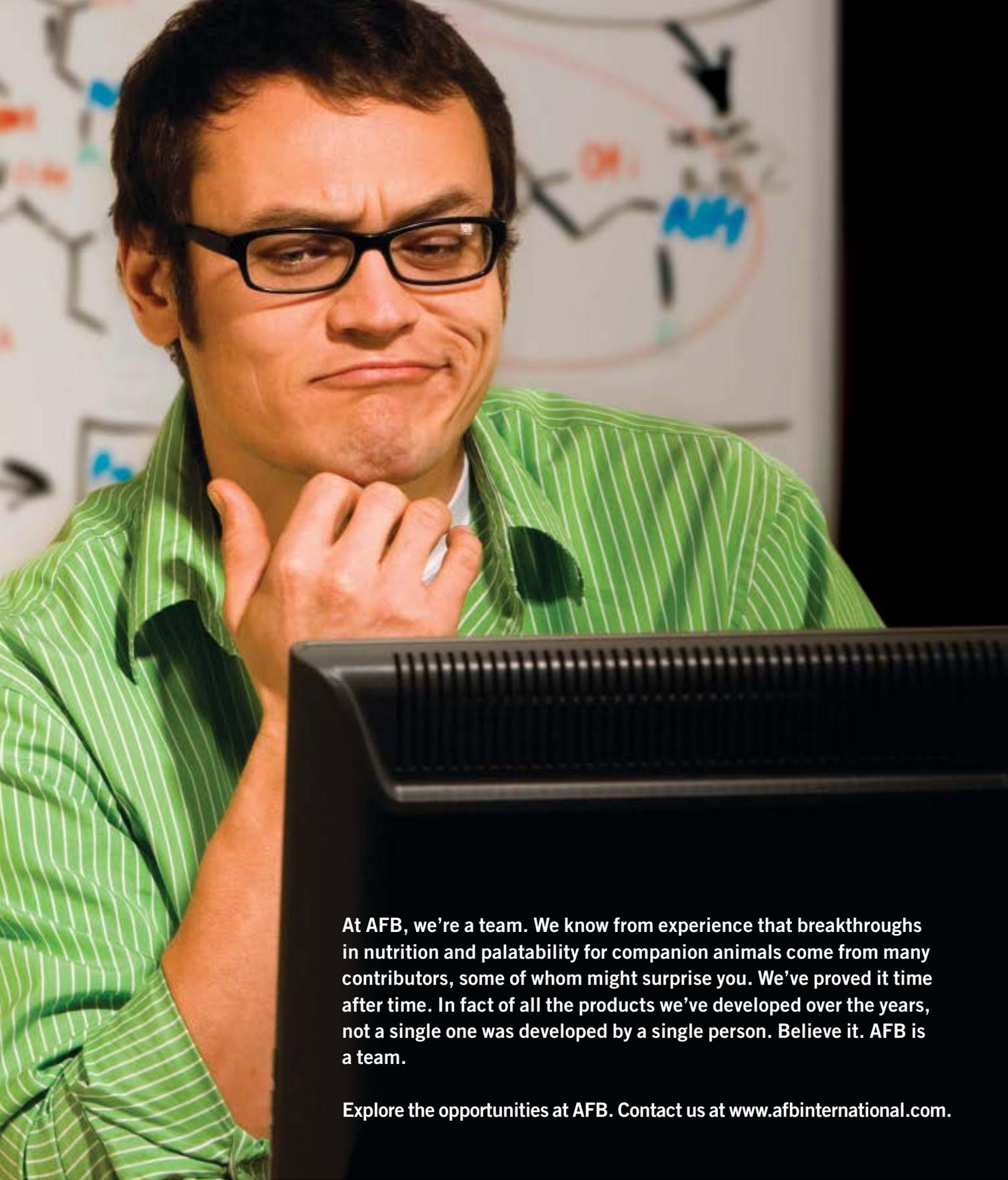
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Reliable PALATABILITY measurement

Keys to developing the best test protocols for pet treats



Acceptability is the most important criteria when evaluating treat palatability.

These days, pet owners gauge their pet's quality of life based on good health and enjoyment of their food and treats. Rewarding their pets with snacks is perceived to be a way to provide a better quality of life. Thus, treats and snacks are given and consumed in a very different way from complete petfoods (i.e., kibble, wet or semi-moist foods). As a result, methods used to measure the palatability of these products require very specific protocols and criteria.

Specific test protocols

Pet owners often use treats to reinforce their emotional relationship with their animal. Physical contact is an essential part of the reward, and consequently, most snacks are given by hand. To respect this particularity, any palatability testing

protocols elaborated require that biscuits or chewy sticks be directly presented to the animals by the technician. In protocols for liquid or paste formula complementary products, the product is placed on the finger or on kibbles.

Since the purpose of a snack is to be accepted by all animals, treats protocols should be set up to measure the product by single acceptability. Monadic tests, in which only one product is given to the dog or the cat, can answer this difficulty. These types of tests are very well tailored for chewing bones such as rawhides or injection-molded products.

Test duration must be defined according to the product type. In order to assess the specific functionality of a treat (for example, a dental care claim for a product that is chewed for a long time) a test should last ten to fifteen minutes per animal, or be adapted to the treat manufacturer's specific duration target.

Specific test criteria

Acceptability is the most important criteria when evaluating treat palatability. Acceptability is defined as the percentage of animals which have taken and totally consumed the product. This specific percentage can provide a precise estimation of the "zero refusal" expected for a treat. Usually, less than 15% of refusals is considered to be well accepted.

Snacks preferences can also be measured using "versus" tests. In this case, specific criteria like the number of animals that have first taken or consumed one of the items are assessed. Animal behavior is key to estimating snack/treat palatability. As pleasure is one of the treat benefits, it is essential to develop criteria used to describe pet behavior while the treat is consumed. Therefore, during the entire test, each animal should be continuously observed according to several behavior patterns. For instance, how the treat is taken or chewed should be analyzed. Does the dog take the snack quickly from the hand? Is the chewing delayed? Does the cat eat slowly and partially finish the treat? All these criteria can much better prove the attractiveness of the treat than solely a consumption ratio. 

Ms. Larose is palatability measurement manager for Panelis. She can be reached at Tel: +33.2979.38080, Website: www.spf-diana.com/diana/filliales/PANELIS/index/index.htm.



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ANIMAL NUTRITION

Aflatoxin basics

Penicillin's deadly cousin—past and present

BY GEORGE BURDOCK, PHD & JAMES GRIFFITHS, PHD

Molds have served humans for centuries in the production of foods (e.g., ripening cheeses and sausages). These living organisms produce various fungal metabolites—some of which we use as antibiotics (i.e., penicillin), and some with the potential to produce severe adverse health effects.

The toxic substances which are produced by molds are termed mycotoxins. A mycotoxin is produced under special conditions of moisture and temperature. Not all types of mold (fungi) can produce mycotoxins. In fact, some fungi are able to produce mycotoxins only in special conditions—such as at specific levels of moisture, stress and the correct temperature. Even those with the ability to produce mycotoxins may not produce them all the time. The absence of mycotoxins doesn't ensure the absence of fungal spores, so it's possible for fungi to “appear” when the temperature and humidity are right.

Mycotoxins are defined as “secondary fungal metabolites that are produced from primary metabolites and secreted into the microenvironment around the mold, and when consumed or absorbed by animals and humans can cause illness or behavioral changes” (Cousins, *et al.*, 2005). Mycotoxins represent a diverse group of chemicals that can

occur in and on a variety of plants from which food is derived, but those representing the greatest hazard occur in commodities, which tend to be consumed in large amounts by a large percentage of the population (such as peanuts and the cereal grains, barley, corn, rye and wheat).

Poisoning by a mycotoxin is termed mycotoxicosis. Active research on mycotoxins is a fairly recent development, since reports of mycotoxicosis were relatively infrequent and occurred in remote places of the globe where proper agricultural practices were not exercised. As a result,

interest in mycotoxins remained only a curiosity for researchers until publication of a series of reports in 1960-1963. These reports linked the death of turkeys in England (so-called “turkey X disease”) and ducklings in Uganda with the consumption of peanut meal feeds containing mold products produced by the contaminant *Aspergillus flavus*—a condition termed aflatoxicosis.

Discovery

The additional discovery of aflatoxin metabolites (e.g., aflatoxin M₁ found in the milk of cows consuming aflatoxin-contaminated feed) led to more intensive studies of a number of mycotoxins and to the

identification of a variety of

these toxins associated with adverse human and animal health effects. Aflatoxins were first identified by their

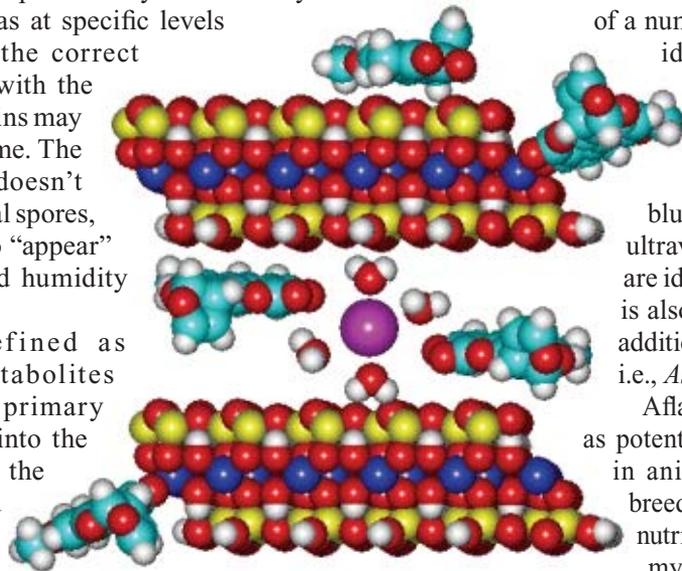
blue or green fluorescence with ultraviolet light, but now, subgroups are identified as B₁, B₂, G₁, and G₂. It is also now known that at least one additional mold produces aflatoxin—i.e., *Aspergillus paraciticus*.

Aflatoxins are most often described as potent liver toxins, but their effects in animals vary with species (and breed), dose, length of exposure and nutritional status. Among the various mycotoxins, the aflatoxins have been the subject of the most intensive research because of the extremely potent hepatocarcinogenicity and the observed toxicity of aflatoxin B₁ in rats—the most commonly

used experimental model. Suppression of the immune system seems to be a common effect, making the animal more susceptible to newly-acquired disease, a senescent disease becoming fulminant or an infection resulting from stress or trauma. The losses sustained from companion animal toxicity and death are incalculable.

Sources

As noted earlier, aflatoxin is a product of the mold growing on the commodity. The two primary sources



Model for sorption of mycotoxins onto the surface of clay. Current research into mycotoxin reduction involves the mixing of certain types of clays with the contaminated grain. Image credit: Dr. Tim Phillips, TAMU.

of mold contamination emerge during the growth of the plant—with certain conditions favoring *Aspergillus* sp. growth such as drought and other stresses which allow insect damage and mold attack, as well as inadequate storage conditions.

Since the discovery of their potential threat to health, progress has been made in decreasing the level of aflatoxin in specific commodities. Control measures include use of resistant crops (with genes inserted to produce natural pesticides preventing the survival of insects that carry mold spores on their bodies) and ensuring adequate storage conditions (primarily by lowering the moisture content of the grain, preventing mold growth). These precautionary steps are followed by careful monitoring of susceptible commodities for aflatoxin level and banning the lots that exceed the regulatory “action level” of 20 parts per billion for aflatoxin B₁ (because it is the most toxic type and is regarded as the “sentinel” substance for all other aflatoxins).

Once a batch is found to contain a higher than tolerable amount of aflatoxin, the batch must be discarded in its entirety. Under certain circumstances, a batch may be rehabilitated with the use of radiation to destroy the mycotoxin, or the batch may be blended with mycotoxin-free grain to lower the overall amount. Current research into mycotoxin reduction involves the mixing of certain types of clays with the contaminated grain to absorb the mycotoxin, but this technique is still in the experimental stages.

Other toxins of interest

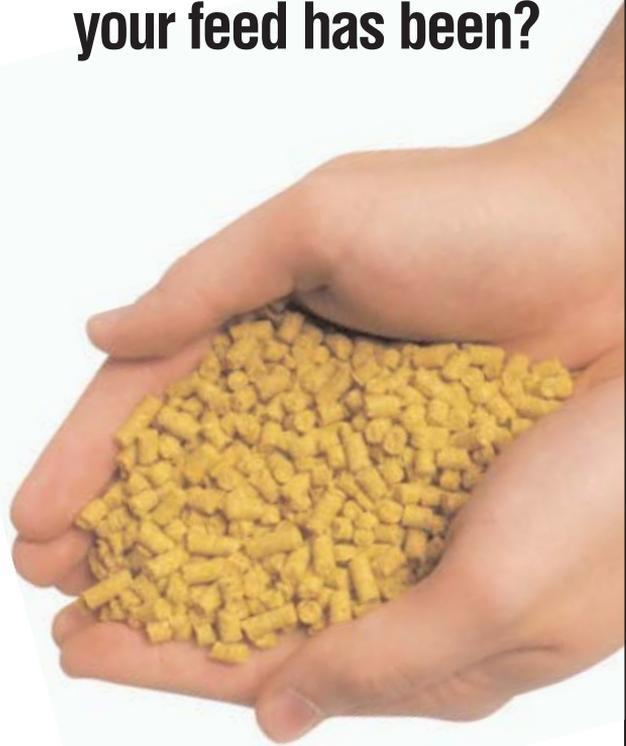
Aflatoxin represents just one type of mycotoxin produced by *Aspergillus*. It is known that another mycotoxin, cyclopiazonic acid (a muscle tissue toxin), is often produced concomitantly with aflatoxin, but the effects of aflatoxin (especially at high levels) are so dramatic that the effects of cyclopiazonic acid are not seen.

Aspergillus flavis represents only one of approximately 70,000 known species of fungi. There are potentially hundreds of thousands of unique mycotoxins, but only 300 have been positively identified. Discovery of a new mycotoxin most often follows a tragic poisoning after exposure to large amounts; but because mycotoxins usually occur in small amounts, it is possible they account for a number of insidious conditions (including birth defects, impaired immunity and decreased disease resistance, cancer promotion, mental illness and generalized, non-specific conditions resulting in decreased life span of man and animals).

At this point in the development of knowledge of mycotoxins, researchers are unwilling to guess what types of mycotoxins might be discovered and what the sum of their effects might be. →

Drs. Burdock and Griffiths are experienced toxicologists working at Burdock Group, a company consulting in food additives and dietary supplements. Company website: www.burdockgroup.com.

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Mycotoxins & petfood

Dealing with the fungus among us

Recent events in the petfood industry have caused many petfood manufacturers to revisit their existing programs for mitigation of potential problems with mycotoxin contamination. In my view, it's hard for a company to be too careful, because the price to pay (economic and otherwise) if the system fails, can be devastating—not only to the company involved but also to the industry as a whole.

Thus, a good understanding of the sources and reasons for contamination and an effective monitoring system for ingredients and products are paramount. Part of this understanding must be knowledge of the regulatory issues surrounding mycotoxin contamination of petfood.

FDA guidance

The US Food and Drug Administration (FDA) has issued guidance for three types of mycotoxins: Aflatoxin, fumonisin and deoxynivalenol (commonly called vomitoxin, or DON). This isn't an exhaustive list of potential contaminants, though; and other mycotoxins (e.g., ochratoxin, zearalenone) also can be troublesome. However, at present FDA handles contamination issues with mycotoxins, other than the three mentioned above, on a case-by-case basis.

A Compliance Policy Guide on "action levels" for aflatoxin was first issued in 1979, with the last revision in 1994. The FDA website address that takes you to that document is http://www.fda.gov/ora/compliance_ref/cpg/cpgvet/cpg683-100.html. It provides specific maximum tolerable amounts for aflatoxin in various feedstuffs (e.g., corn, cottonseed meal, and peanut products) intended for various species. Action levels for petfood fall under the "all other" category, which is set at 20 parts per billion (ppb). Importantly, this level applies to the total aflatoxin content ($B_1 + B_2 + G_1 + G_2$).

For fumonisin, there's a 2001 "Guidance for Industry" document that can be found

Manufacturers are NOT allowed to dilute a commodity containing excessive amounts of a mycotoxin.

— D. Dzanis



at <http://www.fda.gov/cvm/fumonisin.htm>. Again, petfoods fall under the "all other" category. The guidance recommends a total fumonisin ($FB_1 + FB_2 + FB_3$) content in corn and corn by-products intended for petfoods not to exceed 10 parts per million (ppm). The further stipulation is that corn or corn by-product not exceed more than 50% of the petfood formulation.

Unfortunately, the 1993 letter to state agricultural directors from FDA regarding advisory levels for vomitoxin in animal feed is not available on FDA's website. However, I'm sure that if you contacted the Division of Animal Feeds in FDA's Center for Veterinary Medicine a copy would be happily provided. The advisory level for grains and grain by-products intended for petfood is 5 ppm vomitoxin, with the presumption that the ingredient does not comprise more than 40% of the petfood product.

Other important notes

As I understand FDA policy on the matter, manufacturers are NOT allowed to dilute a commodity containing excessive amounts of a mycotoxin in order to bring it below any existing guidance level. For example, if your shipment of corn is found to contain 20 ppm fumonisin, you cannot arbitrarily decide to cut it in half with uncontaminated corn to bring the average content down to the 10 ppm recommendation, then go on to merrily include that mixed corn in your petfood product. Similarly, you aren't allowed to use a grain containing 10 ppm vomitoxin

in a petfood based on a justification that the grain ingredient is to comprise only 20% of the product instead of the 40% presumed in the FDA advisory letter.

Manufacturers may also be aware of products on the market intended to bind or inactivate mycotoxins. It is my understanding that these substances or processes are NOT approved by FDA for these purposes (http://www.fda.gov/cvm/CVM_Updates/mycoxtup.html). Thus, a petfood company that uses these products, particularly in lieu of a sound monitoring program, does so at its own risk.

Hopefully, a good monitoring system will detect any excessive levels of mycotoxins in incoming ingredients and allow you the opportunity to reject the load. However, if for some reason you're stuck with a shipment of contaminated material, or have already used that material in a petfood, it is prudent to seek guidance on how to dispose of the ingredient or product safely and appropriately.

In some cases, FDA may agree to a diversion request where at least some of its value can be recouped. Information on diversion requests can be found at: http://www.fda.gov/ora/compliance_ref/cpg/cpgvet/cpg675-200.html.

Dr. Dzanis is a writer and independent consultant for the petfood and animal feed industries on matters related to veterinary nutrition, labeling and regulation. He can be reached at Tel: +1.661.251.3543, Fax: +1.661.251.3203, E-mail: dzanis@aol.com.



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Taurine

Does it need to be added to dog and cat foods?

One of the first reports in the literature regarding taurine was its isolation from ox bile in 1901; hence its name was derived from “Taurus” the bull. That’s why, among other reasons, today it is found associated with energy drinks like Red Bull®—fueling the perception of strength and vitality. Interestingly, sales of taurine are larger and growing faster in the energy drink market than in pet, infant formula or medical/nutritional applications. Whether or not it is of benefit for this use is not completely clear. Regardless, taurine nutrition of dogs and cats has been a subject of considerable intrigue for quite some time.

What is taurine?

Taurine differs structurally from other amino acids in that a sulfonic acid group (SOOH) replaces the customary carboxylic acid (COOH) group; thus imparting different properties to this β -sulfonic amino acid. It is concentrated in the myocardium, retina and neutrophils. Taurine, while not oxidized for fuel by mammals, has numerous functions including bile acid conjugation, osmotic regulation, cell membrane stabilization, modulation of cellular calcium flux, neuronal excitability modulation, metabolic antioxidant capacity and xenobiotic elimination.

Synthesis of taurine occurs in the liver from cysteine and methionine and is dependent upon vitamin B₆ (pyridoxal-5'-phosphate) as a co-enzyme. Two key enzymes in taurine synthesis are cysteine dioxygenase and cysteine sulphinic



Taurine deficiency can also lead to dilated cardiomyopathy.

— G. Aldrich



acid decarboxylase which are responsible for the conversion of cysteine to cysteine sulphinic acid and hypotaurine, respectively. The activity of these two enzymes is very low in the cat, but adequate in the dog. Further, the cat and dog cannot conjugate bile acids with glycine; rather, taurine is used exclusively. Thus, a constant dietary supply of taurine or its precursors is necessary because of this substantial turnover or drain on taurine stores.

Physiologic roles

Inadequate taurine leads to reproductive problems in the female and impaired growth and development of the kittens and puppies. Chronic taurine deficiency leads to permanent visual impairment and irreversible blindness in the cat (i.e., feline central retinal degeneration). With the loss of taurine, regulation of calcium and potassium ions across the photoreceptor cell pigment-epithelial barrier is lost. Taurine deficiency can also lead to dilated cardiomyopathy (DCM). While once considered only a cat problem, recent reports would suggest that DCM is occurring in

certain breeds (e.g., Newfoundlands) or sizes (e.g., giant-breeds) of dogs or those genetically predisposed (e.g., Portuguese Water Dogs) to the condition. These dogs have been shown to have a lower ability to synthesize taurine (Ko, 2005) and/or the dietary source of taurine or sulfur amino acids may be marginally deficient or nutritionally unavailable (Backus, 2003; Delaney, *et al.*, 2003). The condition appears to be reversible with taurine supplementation (Alroy, *et al.*, 2001; Fascetti, 2003) and quite possibly with other supplemental sulfur amino acids. This has prompted some petfood companies to include small amounts of taurine not just in cat diets, but in dog diets as well. At one point, inclusion of taurine in dog diets was frowned upon by FDA and state feed control officials. However, for now, it appears that FDA has agreed to allow the labeling of taurine guarantees and the inclusion of taurine on the ingredient panel of dog foods too.

Dietary taurine

Taurine is found in the milk of humans and companion animals, but

cow's milk is a poor source. Thus, it is part of parenteral (e.g., milk replacer) solutions for humans and pets alike. For common petfood ingredients, the highest taurine content can be found in marine-based proteins (e.g., fish and crustaceans) followed by terrestrial animal proteins (e.g., meats and rendered protein meals; Spitze, *et al.*, 2003). Dog and cat diets containing high-quality marine and animal-based proteins usually have enough sulfur amino acids and taurine to meet the animal's requirements without supplementation. However, bioavailability in heat-damaged protein meals or indigestible protein from feather, hair, or wool may not provide adequate taurine or precursor sulfur amino acids.

Dietary requirements for taurine are also greater for high-moisture processed petfoods (e.g., cans, pouches). Heat treatment does not

destroy taurine; rather, its loss is thought to be due to an increased taurine degradation by intestinal bacteria and/or loss through increased bile acid conjugation. Vegetable proteins and grains have very low to non-detectable levels of taurine. Some have even been implicated in lowering circulating taurine (e.g., rice bran, barley, isolated soy protein). Given these challenges and ingredient options, synthetic taurine (2-aminoethanesulfonic acid) is often required. Synthetic or crystalline taurine is produced primarily in China, with small amounts from Japan. It is a white, crystalline powder freely soluble in water that is almost pure with a concentration commonly exceeding 98.5%. Supplementation is typically at less than 0.2% of the diet, so no adverse effects on palatability or diet acceptability have been noted.

Essential and conditionally essential

Taurine is an essential nutrient in the cat diet and may be conditionally essential for dogs. Adequate levels of methionine and cysteine can relieve some of the nutritional requirement for taurine. Providing taurine as a separate ingredient is essential when plant-based ingredients outweigh animal and marine ingredients. At a minimum, adding taurine to the diet provides "insurance" should *de novo* synthesis or base ingredients become inadequate. →

Dr. Greg Aldrich is president of Pet Food & Ingredient Technology, Inc., whose focus is to facilitate innovations in foods and ingredients for companion animals. He can be reached at Tel: +1.785.271.0238, Fax: +1.785.271.6238, E-mail: aldrich4@cox.net.



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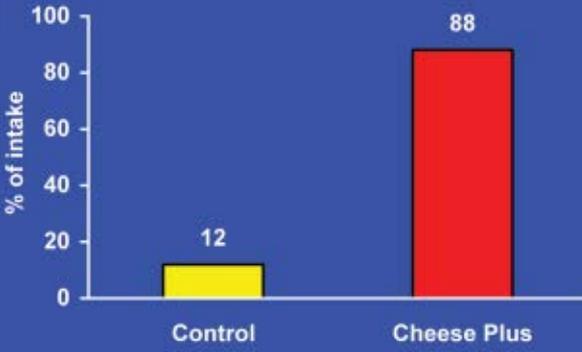
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Cheese Plus Cheese Product Palatability for Dogs



Group	% of Intake
Control	12
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Dogs showed a 7.3 to 1 preference for a commercial diet supplemented with Cheese Plus.

(research available upon request)

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Mycotoxin testing

How petfood manufacturers can avoid common pitfalls

I am an independent consultant to several petfood companies, both domestic and international, in the field of mycotoxin testing. In light of the recent episode of dog deaths following consumption of aflatoxin-tainted food from Diamond Petfoods, I would like to offer some advice.

Hopefully, as a petfood company, you are testing for mycotoxins in the incoming ingredients for your petfood products and especially testing for, at least, aflatoxins. Of course not all ingredients are even potentially involved with contamination by toxigenic fungi. However, you should know which mycotoxins are of concern, based on the ingredients you use. You should determine your criteria for accepting or rejecting these incoming ingredients. Next, you should choose a test kit based on these criteria and it should perform acceptably in your hands.

“Poorsampling is the primary source of testing error—anywhere from 40-90% of the total errors.”

— J. Richard



Primary pitfall: Sampling error

Most of the error in testing for mycotoxins is in sampling. You should be cognizant of the appropriate methods of sampling the various kinds of vessels delivering commodities to your facility. However, let us assume then that you have adequately sampled the incoming vessels and have prepared the sample according to specifications for analysis with the selected test kit.

Other pitfalls

When using the test kit, make sure that you do not “cut corners” as the test kit has been validated by the manufacturer using the exact criteria and procedure as in the test kit directions. Also, make sure the test kit was validated by the manufacturer for the specific commodity on which you are applying the test. Test kit manufacturers do a good job of validating their test kits before offering them on the market



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and usually they are approved by an outside agency, such as the USDA (GIPSA) or AOAC International, for specified commodities or products.

As a petfood manufacturer you should form a partnership with the test kit manufacturer and if you have reason to suspect that the test kit is not performing adequately, contact the manufacturer and work together to determine if and where there is a problem. Test kits are validated based on their performance in comparison to a reference method of analysis with a high degree of accuracy and sensitivity such as High Performance Liquid Chromatography (HPLC). So, if you question the results of your test kit, use some of the samples and have them tested with HPLC to determine if there is a problem.

Something wrong? Check it out

Remember that mycotoxin testing includes sampling, sample preparation and analysis. As I said above, poor sampling is the primary source of testing error—anywhere from 40-90% of the total errors. The analysis part usually contributes the lesser amount of total uncertainty or error. So, believe your test kit as it has been validated, BUT if you think there is something wrong, make sure to “check it out” by working with the test kit manufacturer and have identical samples tested with the test kit and HPLC.

Now that you have adequately tested incoming ingredients of potential involvement with mycotoxins, I suggest that you periodically pull some product from the line and send it to a laboratory that is capable of doing HPLC analysis of the finished product, because it is highly unlikely that the test kit that you are using is validated for use on your finished products and possibly could not pass any validation criteria.

Risk management

All of these above points are part of a Total Quality Assurance Program for Risk Management of Mycotoxins that has been instituted by many petfood companies. This

program is integrated with their general quality assurance and HACCP programs. It offers a means to consistently and accurately monitor for mycotoxin problems and a means to deal with loads of grain that may have been inadvertently purchased and subsequently found to be contaminated. ➔

John L. Richard is a consultant to the petfood industry, including Romer Labs, 1301 Stylemaster Drive, Union, MO 63084-1156 USA, johnrichard@romerlabs.com, Tel:+1.636.583.8600, Fax: +1.636.583.6553, Website: www.romerlabs.com.

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Research Notes

Immunologic responses to soy protein

This study was conducted in order to assess whether dogs with experimentally-induced type I hypersensitivity against soy protein would respond to soy hydrolysate and develop cutaneous or gastrointestinal tract reactions after intradermal and oral challenge exposure. Twelve naïve Beagle puppies (9 sensitized and 3 control dogs) were sensitized against soy protein by administration of allergens during a 90-day period.

After the sensitization period, serum

concentrations of soy-specific IgE were determined and an intradermal test was performed to confirm the dogs were sensitized against soy protein. An intradermal challenge test and oral challenge test with native and hydrolyzed soy protein were conducted on six sensitized and two control dogs. High serum concentrations of soy-specific IgE and positive results for the intradermal test were observed for the nine sensitized dogs after completion of the sensitization process.

Sensitized dogs challenge exposed

with hydrolyzed soy protein had a reduced inflammatory response after intradermal injection and no clinical response after an oral challenge exposure, compared with responses after intradermal and oral challenge exposure with native soy protein. Soy-sensitized dogs did not respond to oral administration of hydrolyzed soy protein. Thus, hydrolyzed soy protein may be useful in diets formulated for the management of dogs with adverse reactions to food.

Source: Puigdemont, A., Brazis, P., Serra, M. and Fondati, A., 2006. Immunologic responses against hydrolyzed soy protein in dogs with experimentally-induced soy hypersensitivity. *Am J Vet Res* 67:484-488.

Evaluation of contamination of raw meat diets

This study was conducted in order to evaluate bacterial and protozoal contamination of commercially-available raw meat diets for dogs. In a prospective longitudinal study, 240 samples from 20 raw meat diets for dogs (containing beef, lamb, chicken or turkey), 24 samples from two dry dog foods and 24 samples from two canned dog foods were evaluated.

Each product was purchased commercially on four dates approximately two months apart. Three samples from each product at each sampling period were evaluated via bacterial culture for non-type-specific *Escherichia coli* (NTSEC), *Salmonella enterica* and *Campylobacter* spp. Antimicrobial susceptibility testing was performed on selected isolates. Polymerase chain reaction (PCR) assays were used to detect DNA from *Cryptosporidium* spp, *Neospora* spp and *Toxoplasma* spp in samples obtained in the third and fourth sampling periods.

One hundred fifty-three of 288 (53%) samples were contaminated with NTSEC. Both raw and prepared foods contained NTSEC during at least one culture period. *Salmonella enterica* was recovered from 17 (5.9%) samples, all of which were raw meat products. *Campylobacter* spp was not isolated from any samples. In

Key concepts

► **Soy can help manage allergies** (*Am J Vet Res* 67:484-488): Hydrolyzed soy protein may be useful in diets formulated for the management of dogs with adverse reactions to food.

► **Bacterial risk great with raw meat diets** (*JAVMA* 228:537-542): There is a risk of foodborne illness in dogs fed raw diets, as well as possible risk for humans associated with the dogs or their environments.

► **Fatty acids benefit skin and haircoat condition** (Nestlé Purina Nutrition Forum): Increased levels of fatty acids linolenic acid, alpha-linoleic acid and zinc supplementation showed improved skin and haircoat conditions as compared with other diets. Improvements with increased total fat in the second phase of the trial were clearly seen while the increased LA/ALA/zinc combination also contributed to fatty acid balance.

► **High-protein or high-carbohydrate diets aid weight loss** (Nestlé Purina Nutrition Forum): Weight loss with a high-protein, low-carbohydrate diet resulted in a greater loss of fat mass, allowing higher energy intake to induce the same body weight loss rate.

► **Special diets may ease EPI** (*JAVMA* 228:225-229): Responses to three different special diets varied among individual affected dogs. Because responses to the feeding regimens were unpredictable, it is suggested that feeding regimens be individually formulated for dogs with exocrine pancreatic insufficiency (EPI).

► **Digestibility and flatulence tested** (*Am J Vet Res* 67:88-94): The objective of this study was to determine an optimal window for determining peak flatulence and evaluate the effects of oligosaccharides and supplemental β -mannanase in soybean meal-based diets on nutrient availability and flatulence. Diets containing <22.4 g of stachyose/kg and <2 g of raffinose/kg did not alter digestibility or increase flatulence in dogs.

91 of 288 (31.6%) samples, there was no gram-negative bacterial growth before enrichment, and in 48 of 288 (16.7%) samples, there was no aerobic bacterial growth before enrichment. Susceptibility phenotypes were variable. *Cryptosporidium* spp DNA was detected in three samples.

From this study it was found that bacterial contamination is common in commercially-available raw meat diets, suggesting that there is a risk of foodborne illness in dogs fed these diets, as well as possible risk for humans associated with the dogs or their environments.

Source: Strohmeier, RA, *et al.*, 2006. Evaluation of bacterial and protozoal contamination of commercially-available raw meat diets for dogs. *JAVMA* 228:537-542.

Effect of dietary PUFAs and zinc on skin and haircoat condition

Diet effects on skin and haircoat were investigated in canines. Twenty-four normal adult dogs were acclimated to a commercial diet (9% fat as-is) for 12 weeks (Phase I). For the next 12 weeks (Phase II) the dogs were divided into three groups and fed one of three treatment diets (13% fat as-is). Phase II diets used similar ingredients and similar nutrient profiles except that: Diet A contained lower yet adequate amounts of dietary zinc and linoleic acid (LA) than diet B. Diet C was similar to B in zinc and LA but contained more α -linolenic acid (ALA).

An evaluation panel conducted skin and haircoat condition scoring on weeks 0, 4, 7 and 12 (Phase I) and weeks 14, 16, 19 and 24 (Phase II). Coat glossiness, softness, scale, greasiness and overall condition were evaluated. Transepidermal water loss (TEWL) and skin hydration (HYDR) were determined at selected time points using a Tewameter® and Corneometer®, respectively. Plasma samples were also collected at selected times and used to determine phospholipid fatty acid profiles and zinc concentrations. The hypothesis was that increased LA, ALA, plus zinc (diet C) would improve skin and haircoat conditions and fatty acid profiles compared with the other diets.

Repeated measures ANOVA (parametric data) and Kruski-Walls

analysis (categorical data) were used for data analysis. All three Phase II diets caused significant improvements of both subjective and objective measures compared to the basal (Phase I) diet. Diet B resulted in statistically significant improvements compared to diet A for skin scores and HYDR. Diet C effects were not different from Diet A and B, but provided a desirable fatty acid

balance. Improvements with increased total fat in the Phase II diets were clearly seen while the increased LA/ALA/zinc combination also contributed to fatty acid balance.

Source: Hester, SL, Kirby, NA, Wright, AS, Rees, CA, Kennis, RA, Zoran, D and Bauer JE, 2005. Effect of dietary polyunsaturated fatty acids and zinc on plasma lipids and skin and haircoat condition in canines. Proceedings of the Nestlé Purina Nutrition Forum, St. Louis, Missouri, USA.



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New pouch-filling machine

Doboy Inc. introduces their latest additions to the bagging line, the PouchBoss™ DH (dual-head) pouch-filling machine. The PouchBoss line offers an economical approach to automatic filling and sealing of pre-made pouches. Available in both a single-head and a dual-head version, the PouchBoss fills hard film laminate or foil pouches from 6-in. to 16-in. wide with up to 10 lbs. of free-flowing dry or semi-moist media. A diving hopper filling mechanism eliminates spillage and contaminated seal areas.

The PouchBoss features an operator interface panel and product menu selection, stainless steel construction, large-capacity bag magazine and diving head product hoppers. Toolless changeover of jobs adds to the machine's overall ease-of-use. Five hundred bags can be shingled into the single filling lane of the PouchBoss SH or 1,000 for the dual-lane DH. Rates of up to 25 per minute on a PouchBoss SH, or 45 per minute on a PouchBoss DH can be obtained.

Doboy Inc., A Bosch Packaging Technology Company, 869 S. Knowles Avenue, New Richmond, WI 54017 USA, Tel: +1.715.246.6511, Fax: +1.716.246.6539, Website: www.doboy.com.



Pleated filter

Airguard's DP® and DP Max pleated panel filters have been upgraded from MERV 6 to MERV 7, making them ideal for collecting dust and particulate in a broad range of commercial and industrial applications. Because the filters exceed ASHRAE Standard 62 air-cleaning specifications, they are suitable for installation upstream of cooling coils.



DP and DP Max pleated filters feature a proprietary high-loft media that is exclusive to Airguard. This uncharged media is a special blend of cotton and polyester fibers whose dust-holding capacity increases as the filter loads. The 4-inch deep pleats have individual die cut fingers that separate and stabilize each pleat for maximum dust-holding performance and longer service life. Consistent pleat shape, count and spacing assure best-possible performance.

The filters maintain their integrity over their entire service life and will not collapse or delaminate. The expanded metal pleat support grid is galvanized steel for maximum rust protection and flutter-free operation.

Airguard, PO Box 32578, Louisville, KY 40232 USA, Tel: +1.502.969.2304, +1.800.999.3458, E-mail: mailbag@airguard.com, Website: www.airguard.com.

Shrink film offers strong packaging

Bemis Clysar Inc. introduces the new Clysar LE Gold, a strong, clear shrink film that offers superior shrinkwrap performance in packaging products that can be bent out of shape or collapse due to force applied by the film while shrinking. Clysar LE Gold is a strong, clear, bi-axially oriented heat-shrinkable film with unsurpassed ease of use, under a very wide operating range, which makes for smoother running and better results from packaging machines. In addition, LE Gold creates tight corners and strong, durable seals, providing excellent optics and an unmatched, clean shrink appearance.

Clysar LE Gold maintains all the characteristics that have made Clysar the leader in the shrink film industry. LE Gold is compatible with all sealing mechanisms and provides a durable seal over a wide range of conditions. LE Gold does not corrode sealing mechanisms, reducing operating costs and extending the life of the equipment.

LE Gold is extremely durable, even under freezer temperatures. It's highly resistant to tearing and maintains its flexibility and strength with age. LE Gold is supported by the technological expertise of The Bemis Company, a worldwide leader in flexible packaging excellence.

Bemis Clysar, Tel: +1.888.425.9727, Website: www.clysar.com.



Two-gallon planetary mixer design

Charles Ross & Son Company has announced completion of its new Double Planetary Mixer incorporating Teflon-coated and patented "HV" blades.

The new HV Blade enables the mixing of ultra-high viscosity formulations. The new blade design offers many other advantages, including:

- Design capable of mixing products up to 8,000,000 cps;
- Assists in the rapid incorporation of light and difficult-to-wet solids such as fumed silica;
- Cleans the walls and bottom of the vessel during the mix cycle;
- Teflon coating assists in fast cleaning between batches and color changes;
- Eliminates climbing of viscous materials during the mix cycle; and
- Produces a continuous, balanced mixing action, which eliminates amperage spikes and enables the mixer to handle extremely high viscosities.

The "DPM" model is available with a new range of optional features, including sanitary designs, special benches, vacuum and pressure sealing options. A full range of sizes is available from half-pint through 750 gallons working capacity.

Charles Ross and Son Company, PO Box 12308, Hauppauge, NY 11788 USA, Tel: +1.800.243.ROSS, Fax: +1.631.234.0691, E-mail: sales@mixers.com.

Automatic retort control systems

Dixie Canner Company introduces an improved instruments system for automatic control of steam cook only or steam cook with pressure cool processes in Dixie retorts. The operator is no longer required to manipulate the steam, water and air valves in order to control the process operations. With the Dixie Retort and Instruments Package #5 and its PLC-based control with touchscreen interface, the operator simply enters desired set-points for cook time and temperature and, if pressure cool is required, set-points for cooling pressure and time. A push of the start button initiates the processes. The retort automatically proceeds through all necessary cycles and alerts the operator when processing is complete.

A Recipe Download Program is now available with each of Dixie's Automatic Retort Control Systems. This program permits up to six process set-point recipe downloads. All recipes are repeatable until recipe changes are input.

Dixie Canner Company, PO Box 1348, Athens, GA 30603-1348 USA, Tel: +1.706.549.1914, Fax: +1.706.549.0137, E-mail: sales@dixiecanner.com, Website: www.dixiecanner.com.

Feeders for majors, minors and dry palatants

AccuRate®'s volumetric and gravimetric Mechatron® dry material feeders are built to feed majors, minors and dry palatants for petfood processing applications. The precise feeding accuracies of the Mechatron help manufacturers avoid inconsistencies in the flavor and quality of petfood. Offered with either a flexible or stainless steel hopper and helix configurations that allow for feed rates from .002 to 1,137 cubic feet per hour, the Mechatron feeder line provides manufacturers the

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Dust collection cyclones

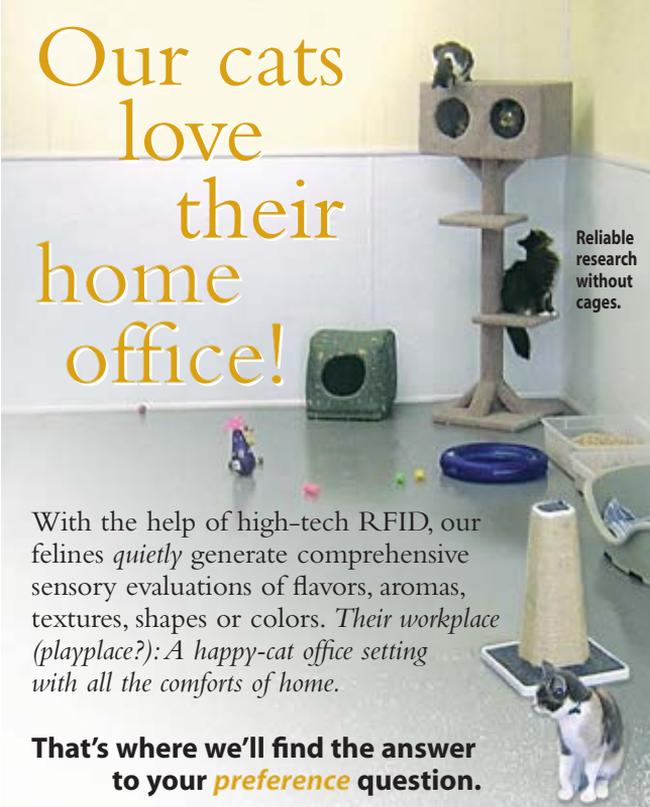
Airlanco manufactures three models of dust collection cyclones. HE Series cyclones provide high-efficiency separation of dust and particulates from plant and process air. They can handle high temperatures, high moisture content and high airflow. HE cyclones are often gauged to meet the demands of very high air volumes. HV Series cyclones are built to handle very large air volumes and are designed for outdoor installations where physical size is unrestricted.

RC-Series cyclones are typically used as primary receivers for dry bulk solids in pneumatic conveying systems. Airlanco dust collection cyclones are manufactured in carbon or stainless steel with round or square inlets. Economical Airlanco cyclones operate without any filter media to clean or replace and are custom made for their intended applications.

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ACVIM Annual Forum

May 31-June 3, 2006, New Orleans, Louisiana USA. Contact: ACVIM, 1997 Wadsworth Blvd., Suite A, Lakewood, Colorado 80214-5293 USA, Tel: +1.303.231.9933, Fax: +1.303.231.0880, E-mail: ACVIM@ACVIM.org, Website: www.acvim.org.

AVMA Annual Meeting

July 15-19, 2006, Honolulu, Hawaii USA. Contact: AVMA, 1931 North Meacham Road, Suite 100, Schaumburg, Illinois 60173 USA, Tel: +1.847.925.8070, Fax: +1.847.925.1329, E-mail: avmainfo@avma.org, Website: www.avma.org.

IFT Annual Meeting and IFT Food Expo

July 22-26, 2006, Orlando, Florida USA. Contact: Institute of Food Technologists, 525 W. Van Buren, Suite 1000, Chicago, Illinois 60607 USA, Tel: +1.312.782.8424, Fax: +1.312.782.0045, E-mail: info@ift.org, Website: www.ift.org.

Glee

September 17-19, 2006, National Exhibition Centre (NEC), Birmingham, England. Contact: Adam Ash, Tel: +1.609.921.0222, Fax: +1.609.921.0292, E-mail: a.ash@whitehoundadv.com, Website: www.gleebirmingham.com.

American Association of Cereal Chemists (AACC) Annual Meeting

September 17-20, 2006, The Moscone Center, San Francisco, California USA. Contact: American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, Minnesota 55121-2097 USA, Tel: +1.651.454.7250, Fax: +1.651.454.0766, E-mail: aacc@scisoc.org, Website: www.aaccnet.org.

National Annual Pet Industry Trade Show

September 17-18, 2006, Toronto, Ontario, Canada. Contact: Pet Industry Joint Advisory Council-Canada (PIJAC), 2442 St. Joseph Blvd., Suite 102, Ottawa, Ontario K1C 1G1 Canada, Tel: +1.613.834.2111, Fax: +1.613.834.4854, E-mail: executiveoffice@pijaccanada.com, Website: www.pijaccanada.com.

SuperZoo

September 20-22, 2006, Mandalay Bay Convention Center, Las Vegas, Nevada USA. Contact: World Wide Pet Industry Association (WWPIA), Tel: +1.800.999.7295, Website: www.wwpia.org.

Pet South America International Trade Show

September 27-29, 2006, Sao Paulo, Brazil. Contact: VNU Business Media do Brasil, Tel: +55.11.3873.0081, ext. 110, Fax: +55.11.3873.1912, E-mail: pet@vnu.com.br, Website: www.petsa.com.br.

VIV China

September 27-29, 2006, Beijing, China. Contact: Richard de Boer, VNU Exhibitions Europe, PO Box 8800, 3503 RV Utrecht, Netherlands, Tel: +31.30.295.2714, Fax: +31.30.295.2809, E-mail: richard.de.boer@vnuexhibitions.com, Website: www.vnuexhibitions.com or www.viv.net.

Pet Industry Christmas Trade Show

October 6-8, 2006, Donald E. Stephens Convention Center, Rosemont (Chicago), Illinois USA. Contact: HH Backer Associates, Inc., 200 S. Michigan Avenue, Suite 840, Chicago, Illinois 60604 USA, Tel: +1.312.663.4040, Fax: +1.312.663.5676, E-mail: hhbacker@hhbacker.com, Website: www.hhbacker.com.

PetExpo (Trade Only)

October 11-17, 2006, Brisbane Convention & Exhibition Center, Brisbane, Australia. Contact: Pet Industry Association of Australia Ltd (PIAA), PO Box 7108, Baulkham Hills Business Center, Baulkham Hills NSW 2153, Australia, Tel: +61.2.9659.5811, Fax: +61.2.9659.5822, E-mail: info@piaa.net.au, Website: www.piaa.net.au.

Pet Food Institute Annual Meeting & Suppliers Mart

October 23-24, 2006, Chicago, Illinois USA. Contact: Pet Food Institute, 2025 M Street, NW, Suite 800, Washington, DC 20036 USA,

E-mail: info@petfoodinstitute.org, Website: http://www.petfoodinstitute.org.

National Renderers Association Annual Convention

October 24-28, 2006, Laguna Niguel, California USA. Contact: National Renderers Association, Inc., 801 North Fairfax Street, Suite 207, Alexandria, Virginia 22314 USA, Tel: +1.703.683.0155, Fax: +1.703.683.2626, E-mail: renderers@nationalrenderers.com, Website: www.renderers.org.

Pet Food Association of Canada

October 26-27, 2006, Vancouver, BC, Canada. Contact: PO Box 35570, 2528 Bayview Avenue, Toronto, Ontario M2L 2J7 Canada, Tel: +1.416.447.9970, Fax: +1.416.443.9137, E-mail: info@pfac.com, Website: http://www.pfac.com.

2007

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January 31-February 2, 2007, Georgia World Congress Center, Atlanta, Georgia USA. Contact: US Poultry & Egg Association, 1530 Cooledge Road, Tucker, Georgia 30084 USA, Tel: +1.770.493.9401, Fax: +1.770.493.9257, Website: www.poultryegg.org or www.afia.org.

Global Pet Expo

February 22-24, 2007, Orlando, Florida USA. Contact: APPMA, 255 Glenville Road, Greenwich, Connecticut 06831 USA, Tel: +1.203.532.3601, Fax: +1.203.532.0551, E-mail: gpe@appma.org, Website: www.globalpetexpo.org.

VIV Asia

March 7-9, 2007, Bangkok, Thailand. Contact: Richard de Boer, VNU Exhibitions Europe, PO Box 8800, 3503 RV Utrecht, Netherlands, Tel: +31.30.295.2714, Fax: +31.30.295.2809, E-mail: richard.de.boer@vnuexhibitions.com, Website: www.vnuexhibitions.com or www.viv.net.

NGFA Annual Convention

March 18-20, 2007, St. Francis, San Francisco USA. Contact: National Grain and Feed Association, 1250 Eye St., NW, Suite 1003, Washington, DC 20005 USA, Tel: +1.202.289.0873, Fax: +1.202.289.5388, E-mail: info@ngfa.org, Website: www.ngfa.org.

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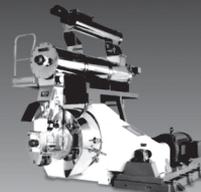
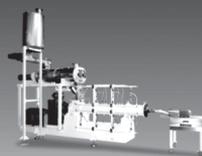
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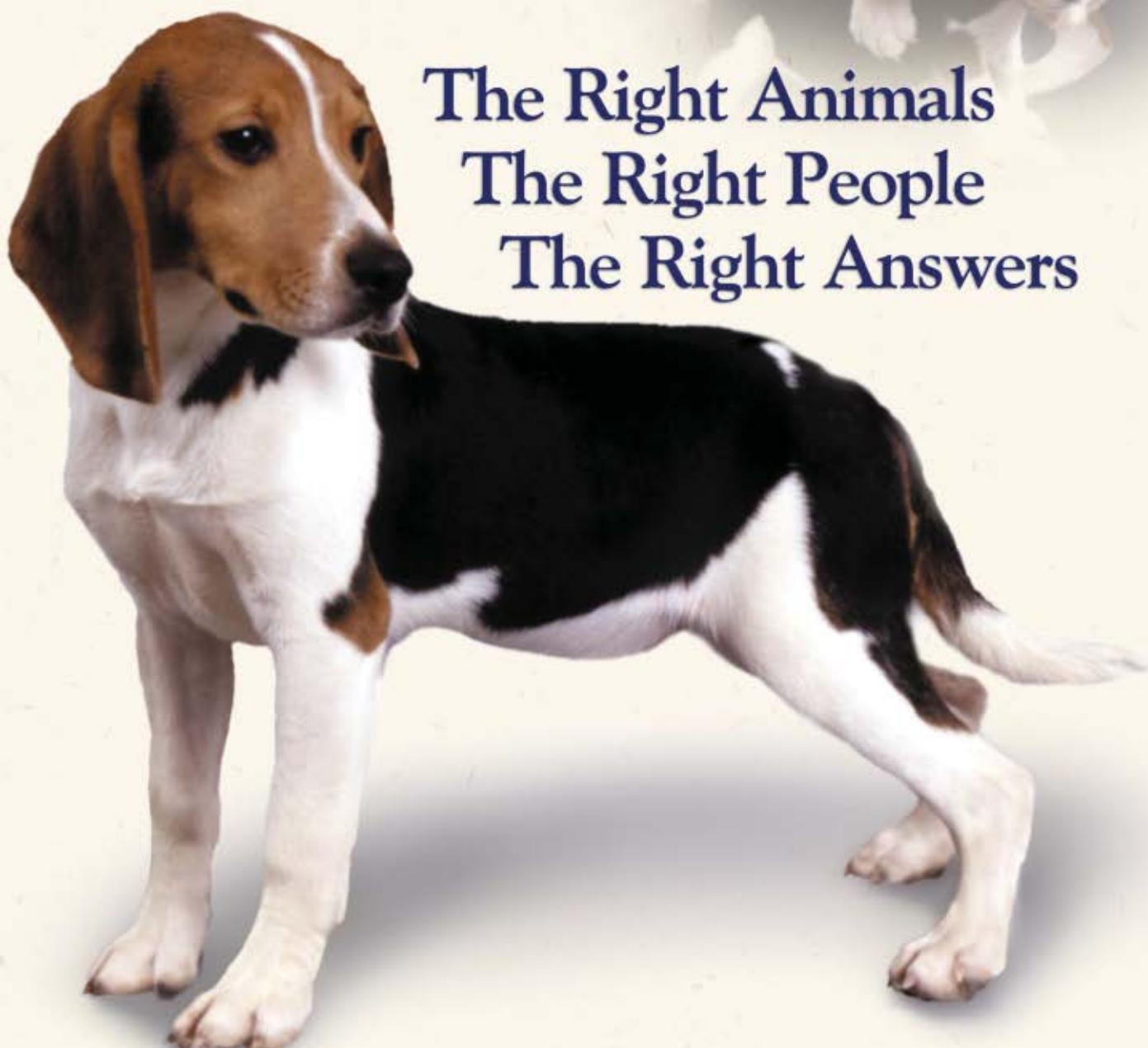
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Keys Mfg Co Inc	45	1.217.465.4001	1.217.465.2123	www.keys-mfg.com
LaBudde Group Inc	42, 44	1.262.375.9111	1.262.375.9058	www.labudde.com
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Maverick Ranch Lite Beef	43	1.303.294.0146	1.303.294.0623	www.maverickranch.com
Midwest Agri Commodities	43	1.218.863.4100	1.218.863.4102	www.mwagri.com
Midwest Laboratories Inc.	42	1.402.334.7770	1.402.334.9121	www.midwestlabs.com
Mill Technology Co Inc	43	1.763.553.7416	1.763.553.7417	www.milltechnology.com
Neogen Corp	17	1.517.372.9200	1.517.372.0108	www.neogen.com
Nestle Purina PetCare Co	44	1.314.268.8810	1.314.771.5099	www.investmentrecovery.com
New Technology Inc	42	1.479.787.6772	1.479.787.9957	www.newtechnology.com
NuPetra LLC	2	1.330.665.1999	1.330.665.2195	www.nupetra.com
Orafti Animal Nutrition	27	32.16.801.582	32.16.801.592	www.orafti.com
Pappas Inc	8	1.313.873.1800	1.313.875.7805	www.pappasinc.com
The Peterson Co	23	1.269.979.1600	1.269.979.9227	www.thepetersoncompany.com
Petfood Ingredients Inc.	9	1.843.884.6135	1.843.881.1710	www.petfoodingredients.com
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Preference Technology	39	1.815.473.4035		
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Rothsay	44	1.905.628.2258	1.905.628.8577	www.rothsay.ca
SK Food Intl	8, 43	1.701.356.4106	1.701.356.4102	www.skfood.com
SPF Diana	7	33.2.97938080	33.2.97938474	www.spf-diana.com
Summit Ridge Farms	47	1.570.756.2656	1.570.756.2826	
Toll Packaging Group	42	1.217.784.4238	1.217.784.5071	www.tollpackaging.com
Trilogy Analytical Laboratory	9	1.636.239.1521	1.636.239.1531	www.trilogylab.com
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