Making Pet Food More Human
### TABLE OF CONTENTS

**Making Pet Food More Human**  
Many of the same concerns and demands for human nutrition are reflected in what owners want for their pets.  
   
**Post-Process Liquid Ingredient Addition**  

**Sucking the Cost—and Complexity—out of Conveying Systems**  

### AD INDEX

<table>
<thead>
<tr>
<th>Company</th>
<th>Website</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>APEC</td>
<td><a href="http://www.apecusa.com">www.apecusa.com</a></td>
<td>8</td>
</tr>
<tr>
<td>Tuthill</td>
<td><a href="http://www.tuthill.com">www.tuthill.com</a></td>
<td>3</td>
</tr>
<tr>
<td>Cablevey</td>
<td><a href="http://www.cablevey.com">www.cablevey.com</a></td>
<td>14</td>
</tr>
<tr>
<td>Vac-U-Max</td>
<td><a href="http://www.vac-u-max.com">www.vac-u-max.com</a></td>
<td>11</td>
</tr>
</tbody>
</table>
At the HEART of your Material FLOW

Vacuum Pumps
Handle specialty gases with reliability.

Rotary Positive Displacement Blowers
Built for rugged use.

Engineered Solutions
Custom system solutions for any application.

Count on Tuthill to keep your operations flowing at peak performance. Backed by 125+ years of engineering experience and manufacturing in the USA.

Our experts will size the best vacuum pump, positive displacement blower or complete system for your chemical application.

Contact your local Tuthill representative today.

1-800-825-6937 | info.tuthill.com/chemicalprocessing

©2019 Tuthill
Making Pet Food More Human

Many of the same concerns and demands for human nutrition are reflected in what owners want for their pets.

By Pan Demetrakakes, Senior Editor

“...he thinks he’s people.” And well he might, considering the food he gets.

Appealing to owners’ taste buds has always been standard strategy for pet food marketers. But it seems like each year, the “humanization” of pet food gets carried to new heights. If it appeals to people, chances are that somewhere, someone will apply it to food for dogs, cats and other furred or feathered companions.

Perhaps the broadest such trend is toward natural ingredients. Owners are eschewing artificial ingredients in pet food as surely as in the food they buy for themselves. This tendency no doubt received a boost from high-profile scandals about tainted pet food, the worst being the 2007 melamine contamination in pet food ingredients sourced in China. According to a survey by market research firm GfK, about 78 percent of new pet foods and treats marketed during 2017 made “natural” claims. The second-highest claim for new products was “grain-free,” at 53 percent.

In a high-profile manifestation of the drive toward natural pet foods, Petco, one of the largest pet care retailers in America, announced in November that it will phase out food or treats with any kind of artificial ingredients by next May. CEO Ron Coughlin said in an interview with Fox Business, “If you think about the pet we love, do we want ethanol to be served to them? Do we want sulfur dioxide?”

PET GOURMETS

Another sign of the drive toward natural ingredients is the proliferation of boutique pet food companies with gourmet ingredients. Snif-Snax Inc. (www.snifsnax.com) boasts that its products have only two ingredients: smoked salmon and sweet potatoes.

“The most important fact about Snif-Snax is that it evolved from a leading global
producer of smoked salmon products which supplies restaurants, hotels, retailers and cruise lines around the world,” says acting COO Chris Hlubb. “Thus, our product comes from trimmings from those facilities which are making the salmon we enjoy and provide daily to discerning consumers.”

Snappy Tom Pet Supply (www.snappytom.com) also caters to the natural market, with real fish and meat, no artificial additives and grain-free formulations. “Today there is a demand for true natural ingredients along with human grade non-chemical vitamins and minerals,” says Robert Hernandez, national sales manager. “Pet owners want real meat and fish and no [by] products in their pets’ food.”

Demands that owners are now making on pet food go beyond natural ingredients to get very specific. These include probiotics and other digestion-aiding ingredients, as well as formulations that are gluten-free, protein-rich, non-GMO and include omega-3 fatty acids, glucosamine/chondroitin and more. A continuing popular trend is micro-targeted nutritional benefits for different kinds of pets, including by age, size, weight, activity level, type of fur, allergies and other conditions and factors.

**PROCESSING VARIETY**

Processing and packaging methods will have to keep up with this demand for variety in pet foods, as well as broader trends that affect all foods, says Nigel Lindley, business development manager for Ever Extruder (www.everextruder.com).

“Due to significant changes in protein availability and general raw material costs, the tools for flexibility in processing have become more valued,” Lindley says. “Computer control, traceability and, we believe, sustainability will become prominent. As end users become more and more knowledgeable on feeding their pets and also environmentally focused, highlighting this on the bag or packet, to distinguish choice of both producer and product, will be an up-and-coming trend.”

The choice of processing method largely depends on the moisture content of the product—which, in turn, depends on its intended use.

Freeze-dried pet food is an established but niche
category, mostly used for higher-end, high-protein products. Frozen food is even more niche, due to its expense and the fact that it’s mostly carried in retail stores dedicated to pet food. It’s considered a “gourmet” item, sometimes used as a “topping” or additive to dry food. An alternative method is air-drying, usually used for meat-based pet food and chewy treats. Air-dried meats have a relatively long shelf life and usually don’t need to be reconstituted with water.

Wet food is either retorted in solid cans or extruded, usually in meat-heavy formulations with about 60 to 70 percent moisture. Extrusion allows the product to be cooked, then packaged in aseptic pouches, an increasingly popular option.

THE DRY FACTS
But dry pet food is still by far the most popular kind. More than 80 percent of the pet food sold in the U.S. is dry dog food kibble, according to GfK. And the great majority of that is extruded.

One of the biggest advantages of extrusion is that it allows the product to cook while forming, by heat that’s either generated through friction or introduced externally. Not only is this faster and more energy-efficient, it cooks the food more thoroughly and safely, improves digestibility due to factors like increased gelatinization of starches, and allows more options for appealing product shapes.

“As a continuous processing tool, the extruder performs feeding, mixing, cooking, flavoring and shaping, in an enclosed, precisely controlled environment that ensures product consistency and process reliability,” says Gilles Maller, vice president of sales at Clextral Inc. (www.clextral.com).

The choice between mechanical and external heat, almost always steam, as an energy source in an extruder is sometimes driven by cost factors instead of processing considerations. Galen Rokey, director of process technology for the companion animal division of Wenger
Manufacturing (www.wenger.com), says that, in most cases, externally supplied heat costs about half as much as mechanical energy. Some Wenger extruders come with “thermal twin technology,” which enables users to introduce steam heating per their preference.

More generally, extrusion allows flexibility in processing, Maller says. “One extruder can process multiple products by varying the production parameters (recipe, cooking temperature, screw configuration, residence time, etc.) and offers great flexibility to process a range of raw materials. This advantage is very important today with the trend of humanization of pet foods that has resulted in many new ingredient formulations.”

This kind of flexibility enables extruded pet food to be made to fit specific pet profiles, such as age, gender, energy requirements and nutritional restrictions, by allowing automated startup and shut down for product changes and simplified changeovers, he says.

Clextral’s innovations to extruders often used for pet food include Preconditioner+ with Advanced Filling Control, which improves the process of precooking the product before it enters the extruder barrel. Among other benefits, this allows pet food processors to add high levels of meat emulsion to the other ingredients prior to extrusion.

Another Clextral innovation is Evolum+ with Advanced Thermal Control, a self-learning technology that monitors process conditions and adjusts to changes to maintain process and product consistency. Maller says this allows for up to 70 percent more process stability and up to 20 percent energy savings.

As pet food becomes more versatile and, yes, more “human,” processing techniques will have to evolve and become more sophisticated to keep pace.

“We all see humanization of pet foods still being a predominant factor in the coming years and the challenges that go with that,” Lindley says. “With demand and supply on proteins and protein quality changing pet food recipes on a regular basis, processing technology is placed at the fore to handle such a wide range of specifications.”
CUSTOMIZED PROCESSING SOLUTIONS TO MEET YOUR CHALLENGES

APEC has been engineering custom process solutions to solve the challenges of pet food manufacturers since 1992. We understand that you work in an ever-changing industry. That’s why we have continued to innovate our process and control systems to improve your performance, quality and bottom line. Whether it’s from our extensive equipment line or a custom solution, you can rely on APEC for exceptional:

Dry & Liquid Coating | Weighing | Mixing | Batching | Blending

PROCESSING THE INGREDIENTS FOR SUCCESS

+1 (616) 374-1000
www.apecusa.com
heat intensive processing has created a need to add ingredients downstream from the extrusion or drying process. Some of the necessary vitamins and nutrients are heat sensitive and lose much of their effect at temperatures that are encountered in conditioning and extrusion of feeds.

The following information is an overview of methods used in our industry, as well as others, to apply micro ingredients after the extrusion process. For the purposes of this talk we will be defining micro ingredients as those ingredients that are added at a rate of less than one percent.

GENERAL CONSIDERATIONS
When using ingredients in any process it is necessary to examine the characteristics of the ingredient to insure that the method of controlling and metering the ingredient is appropriate. These characteristics include density, viscosity, pH, percent needed to apply, desired accuracy, and optimal temperature. For example, liquid animal digest is quite acidic and systems should be designed to withstand the corrosive nature of the ingredient. Feeders and pumps should be sized for the appropriate flow for the desired percentage of ingredient being applied. When the ingredients are being applied after the cooling process, the application system should be placed as close as possible to the packaging or load out system in order to minimize the build-up of liquid ingredients on material handling equipment. In any coating system there are two issues that must be addressed: control of metering and method of application.

CONTROL OF METERING
The preferred method for achieving accuracy in the proportioning of ingredients into a process is by weight. The most accurate weighing processes are batch processes. This becomes problematic in the addition of ingredients after extrusion or drying since these processes are continuous. The goal is to achieve a weight for the product without interrupting the process flow. There are three principle methods for measuring the flow of material in a continuous flow. They are volumetric, mass flow, and loss in weight. In all of
these methods we consider the flow of the carrier ingredients, in this case extruded product, to be the master flow. All other additives are slaved from this master flow.

In volumetric metering the master flow of material is sensed by the number of revolutions of a screw conveyor, rotary feeder, or belt conveyor. We calibrate the material flow by measuring how much product has run through the system in a given amount of time. It is important to have a method to divert material from the process flow so that check weights can be done to confirm calibration.

The flow of liquid additives is sensed by the number of pulses we receive from a positive displacement liquid meter (nutating disk, turbine, or piston) or the number of revolutions that we see from a tachometer mounted on a positive displacement pump, or the number of cycles from a diaphragm type pump. If dry additives are to be added to the product stream, then these are sensed in the same manner as the master flow.

The advantage of this type of system is that the up-front cost is low and that the overall system is simple. This type of system works quite well if the density of the products stays constant and if the formula of liquid to dry does not need to be frequently changed.

The disadvantage of this type of system is that it does not provide very good accuracy (1-2%). It also does not take into account changes in density or viscosity, so if the moisture or temperature of the product changes the system has to be recalibrated.

In mass flow metering the master flow of product is sensed with a weigh belt, weigh feeder, impact scale, or centriflow meter. This type of measurement integrates the weight of the product with a tach signal from a conveyor or over a specified time period.

The preferred liquid meter in this case is a mass flow coriolis-type meter. This meter measures a shift in frequency and position of a tube that is proportional to the mass flowing through the tube. This in turn tells us the mass of product flowing through a tube in a specified period of time.

The advantage of this type of system is that the measurement is unaffected by changes in density or viscosity. The accuracy is quite good (.5-1%). The disadvantage is the higher up-front cost.

In mass flow metering the master flow of product is sensed with a weigh belt, weigh feeder, impact scale, or centriflow meter. In order to accomplish this type of weighing

Download the complete white paper here.

www.FoodProcessing.com
Bulk Material Handling. Guaranteed Solutions.

Providing 65 years of bulk material handling expertise to process industries worldwide. From components to full automated systems, VAC-U-MAX solves bulk material handling challenges - since 1954.

The Activator™ Bulk Bag Unloading System

• Clean Design for Dusty Environments
• Utilizes "No-Maintenance" Actuators with 50% Less Compressed-Air, Eliminates Rods & Seals
• Most Effective Flow Promotion - Applies Force to Four Bottom Edges Instead of Two Sides
• Stainless Steel Product Contact Surfaces Standard
• Discharge options - VAC-U-MAX Pickup Adapter for Vacuum Conveying, Screw Discharger or Rotary Valve for Metered Feed, and Flexible Screw or Aero-Mechanical Conveyors

Let us Solve your Bulk Material Handling Challenges! Visit vac-u-max.com/bbu or call (800) VAC-U-MAX.
Sucking the Cost—and Complexity—out of Conveying Systems

Today's economic mandate is one of simplicity and cost-efficiency.

By Bruce Boyers for Vac-U-Max

In choosing a system for the safe, clean conveyance of materials, it seems that the choices can be remarkably complex. Prior to such a choice, a facility is usually operating with live personnel, open conveyor belts and implements such as buckets. While employees may be protected by proper clothing, masks and goggles, materials are exposed to air and dirt, waste is a constant worry, and expensive equipment is endangered by particulates that can slow or jam it. In today's operating environment, with its constant economic pressures and forced attention on the bottom line, it then becomes mandatory for companies to seek alternatives and improvements such as pneumatic conveying systems. It seems so simple.

Why, then, when having to confront all the possible options for such a system, does it appear to require an engineering degree? And even those folks are going to have a hard time when posed with questions such as: Should the system be dilute phase or dense phase? Should the system be vacuum, pressure or combination? Given the physical properties of your materials, how exactly will they be best conveyed? What is the friction factor of your solids? How do you calculate the expected losses of pressure throughout the system? Given that oxygen doesn't mix well with some chemicals, what gas should you utilize? It even gets worse when you find you have to figure in factors such as solids velocities in horizontal, diagonal and vertical pipe runs and gas densities.

OKAY, HOLD UP!
Let's take a deep breath, a giant step back, and remember our original reasons for wanting to do this in the first place. The reasons are relatively simple and, fortunately, so are the choices involved.

In evaluating a pneumatic conveying system, a company wants to be convinced of three basic pieces of information:
1. Is the system going to truly automate a process?
   If a particular process now involves five personnel, can most or all of those personnel actually be eliminated from the process and assigned elsewhere? Will it actually be possible to run that process with little to no further attention, save perhaps periodic monitoring?

2. Is the system really reliable?
   Will the system run 24x7 without babysitting? Will it stand up to the required process; is it robust and seriously proofed against breaking down? How much maintenance will it require?

3. What is the actual cost of the system?
   The overall price of a system is only the beginning of such a question. How quickly would the system pay for itself? How much actual time and cost will be saved by its implementation?

These questions each tie into one another, and each and all must be answered in detail. Fortunately, if reliable expert assistance is sought, that first set of horribly niggly engineering-type questions need not be solved by a facility, and the important questions as above can be answered fully by an outside expert and to a facility’s satisfaction.

An understanding of material characteristics is essential when designing a vacuum transfer system—experts often already possess data about a particular substance’s behavior and will test within a proposed configuration to ensure it will work properly. This knowledge must, by necessity, be extensive; for example, there are often several product grades within the same product group and those forms may have completely different characteristics such as free flowing, sluggish or non-free flowing. One grade of zinc oxide may have the consistency of talc, while another might be more cohesive and adhere to inside surfaces of conveying tubes.

Experts in pneumatic conveying solutions, such as Vac-U-Max, an early pioneer of vacuum technology, are skilled in designing proper solutions based on application-specific needs. Rather than trying to dazzle you with the complexity of the technology, a pneumatic conveying company who routinely designs and builds custom pneumatic conveying solutions will most likely have an idea of how to tailor a system to meet present and future needs and will be able to provide solutions that work properly out of the box in the facility.

VAC-U-MAX has large-scale testing facilities at its New Jersey headquarters where tests are performed to confirm material flowability and the required convey rate for materials specific to end user applications.

Download the complete white paper here.
Gentle Clean Reliable Conveying

Decades of Global Experience Worldwide Experts in Cable Conveying Solutions

47
Years in Business

66
Countries Served

900+
Products Moved

30,000+
Conveyors Distributed

Leader in Tubular Drag Conveying • Dust-Free Enclosed System
Clean-in-Place Options • Low Maintenance • Energy-efficient
Starts & Stops Under Load • Gentle on your materials!

www.cablevey.com (641) 673-8451