The Extru-Technician

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UNDERSTANDING SPECIALTY Meat-Add Pet Food and Treats



WELCOME LETTER

WELCOME, AND THANK YOU FOR YOUR CONTINUED INTEREST IN THE EXTRU-TECHNICIAN.

>> In this issue, we will focus on specialty meat addition for petfood and treats, as well as the importance of the preconditioner and the role it plays in producing these types of pet products. Will Henry, Extru-Tech research & development manager, will begin by defining specialty meat-add and explaining some of the industry practices that he's seeing.

We will also discuss preconditioning with the validated Extru-Tech Aseptic Dual Preconditioner for food safety and consistency. Learn the importance of the preconditioner and how its design affects product quality. As always, we hope you find this issue of The Extru-Technician informative as we share our expertise and experience regarding specialty meat-add for pet food and treats and the affect the preconditioner can have on the overall product.

Please continue to share your comments and thoughts with us; we appreciate the feedback and look forward to offering solutions.

Sincerely,

Rachel Cardwell Marketing Specialist

The Extru-Technician brought to you by Extru-Tech, LLC



CORPORATE OFFICE

PO Box 8, 100 Airport Road, Sabetha, KS 66534 +1.785.284.2153 Tel +1.785.284.3143 Fax extru-techinc@extru-techinc.com www.extru-techinc.com

ADMINISTRATIVE STAFF -

R. Scott Krebs President of Wenger Groups

EQUIPMENT SALES STAFF

Tom Scott Regional Capital Equipment Sales Manager tscott@extru-techinc.com +1.785.284.2153

Osvaldo Munoz

Regional Capital Equipment Sales Manager Latin America osvaldom@extru-techinc.com +1.785.285.8866

Cristian Paredes Director of Sales Latin America

cparedes@extru-techinc.com +5.049.992.3987

Alberto Germany Latin American Sales Consultant agermany@extru-techinc.com +5.696.609.1550

Bob Annan

Director of European Sales boba@extru-techinc.com +1.785.284.2153 **Cody Bletscher**

Director of Sales Asia cbletscher@extru-techinc.com +1.785.284.2153

Doug Coverdale Sales Engineer dougc@extru-techinc.com +1.785.284.2153

Erik Ganstrom Sales Engineer Technician eganstrom@extru-techinc.com +1.785.284.2153

EXTRU-TECH, INC.

PART SALES STAFF Darryl Becker darrylb@extru-techinc.com +1.785.284.2153

Mike Dunlap miked@extru-techinc.com +1.785.284.2153

Roger Brey rogerb@extru-techinc.com +1.785.284.2153

MARKETING & EDITORIAL STAFF

Norm Schmitt Business Development Manager norms@extru-techinc.com +1.785.284.2153

Rachel Cardwell

Marketing Specialist rcardwell@extru-techinc.com +1.785.285.8064

Will Henry

Director of Research & Development willh@extru-techinc.com +1.785.284.2153

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UNDERSTANDING SPECIALTY Meat-Add Pet Food and Treats

Preconditioning with the validated Extru-Tech Aseptic Dual Preconditioner for food safety and consistency

By Will Henry, Extru-Tech research & development

Increasingly, consumers are demanding higher meat inclusion in dry pet food and treats, and manufacturers are responding in a number of ways. Specialty meat-add pet food/ treat is any product that incorporates meat at an inclusion rate of 30 percent or more (see sidebar, "Understanding Inclusion Rates"). It is a way of talking about meat content without the quality judgments implied by labels such as "premium" or "super premium," while still recognizing that the meat content is higher than the industry average. The specialty meat-add bar is set to a minimum of 30 percent for two primary considerations: extrusion and drying. Both operations will require a review as inclusion levels above 30 percent will Jus_OI I Shutterstock.com

impact design and operations—not that extreme measures must be taken to make production successful, but changes to usual practices need to be considered. For example, inclusion levels of meat at 30 percent or higher will require a larger meat handling and delivery system. For the dryer, drying time and temperatures must be recalculated to ensure performance. The meat can be in any form. Common options include fresh, mechanically deboned meat; enzymatically stabilized meat; dehydrated meat; or spray-dried meat. Similarly, meats may range from the muscle meats commonly found in supermarket meat cases to organ meats and other process byproducts.



Aseptic Dual Preconditioner (ADP) offers a unique counter rotating beater design, which lowers replacement cost and time.

Meat Type Affects Function

Meat can be employed in different forms and still have similar nutritional benefits. Whether meat is fresh, frozen, raw, dried, formed into a meal, or so forth does not significantly affect the presence of digestible proteins and most micronutrients.

However, these factors do affect the way the meat functions in a recipe.

One of the main concerns when creating a specialty meat-add formula is ensuring that the final product holds together. The type of meat

used in a recipe can affect its binding properties. For example, fresh, mechanically deboned meat is effective as a functional binder, holding ingredients together to form a cohesive, durable kibble that can stand up to handling.

But processing meat prior to the preconditioner such as cooking or drying—can decrease a meat's functionality as a binder.

One way to understand this is to think about cooking a hamburger. When you make a hamburger at home, the moisture distributed throughout the freshly ground meat interacts with the fat and proteins to hold the patty together. But once you have cooked the burger, you cannot regrind it, mash it back together, and expect the shape to hold.

The same thing happens in pet food manufacturing. The more processing meat has gone through prior to the preconditioner, the less it will behave as a functional binder.

If a recipe is designed for one type of meat, replacing it will require recalibrating preconditioner settings or adjusting the recipe for example, adding functional binders such as eggs, plasma, or gums—to accommodate the changes.

For economic considerations regarding different meat types, see sidebar "Yield Loss with Fresh Meat."

Preconditioner Design Affects Product Consistency and Quality

The goal of preconditioning is to produce a homogenous partially cooked mix so that there is less wear and tear on the extruder and the extruder can produce at higher rates while ensuring that every kibble ends up with similar properties. To get a homogenous mix, all ingredients must receive exposure to the same amounts of moisture, temperature, and mechanical energy. Let's go back to the analogy of cooking at home. When baking a cake in your kitchen, it is easy to ensure uniform treatment. All you need to do is put ingredients in a bowl, mix them together, and then bake the batter for a set period.

But preconditioning is not so simple. You do not add all the ingredients at once. Instead, preconditioning is a continuous cooking system in which new ingredients are constantly added to the process. To ensure even cooking, whatever gets added to the vessel first should be the first to leave it. This is the **first in**, **first out** principle.

But not all preconditioner designs follow this principle. In some, ingredients added later move through the preconditioner more quickly than ingredients added first. As a result, portions of the batch are cooked for a short period of time, while others cook for a long period. This results in an inconsistent final product. The proprietary dual-shaft design of Extru-Tech's Aseptic Dual Preconditioner (ADP) allows ingredients to move through at an even and predictable pace, maintaining a first in, first out basis through the preconditioner. Even mixing produces a uniform product throughout the batch—**creating consistent, predictable products from kibble to kibble.**

Proven efficacy

Extru-Tech has proven the efficacy of its preconditioners through numerous residence time distribution tests that measure the average time each particle of the mix spends within the preconditioner. The test involved adding a tracer and other ingredients to a properly calibrated Aseptic Dual Preconditioner at a steady rate. Proper calibration was important because many factors, including operating at the wrong speed or setting paddles too far from chamber walls, can affect residence time.

As the stream emerged from the preconditioner, it was assessed for concentration of the tracer. Extru-Tech found that the tracer emerged from a properly calibrated Aseptic Dual Preconditioner all together and within a narrow window of time after being added to the machine. These residence time distribution tests indicate that ingredients moved through the machine at a uniform rate—in other words, the first ingredients to enter were also the first ingredients to exit.

The ADP Preconditioner connects to a single-screw extrusion assembly

The ADP Preconditioner feeds into the extruder.

Understanding Inclusion Rates

The pet food industry has two main ways of talking about meat content in dry food: **inclusion rate** (also called percentage to dry feed rate) and **formula ratio**.

Inclusion rate compares the amount of one ingredient to the other ingredients in the recipe. If a pet food formula requires 500 pounds of fresh meat for every 1,000 pounds of other ingredients, the inclusion rate would be 500/1,000, or 50 percent.

Formula ratio compares the amount of one ingredient to the overall recipe. For example, if a pet food formula requires 500 pounds of fresh meat for every 1,500 pounds of total ingredients (500 pounds fresh meat plus 1,000 pounds of other ingredients), the formula ratio would be 500/1,500, or 33.33 percent.

The terms often get used interchangeably when discussing specialty meat-add pet products. They should not be. Because of the way they are calculated, **inclusion rate is always a higher number than the formula ratio, even though the actual amount of meat in the product remains constant**.

If the claim is made that "this equipment can manage 50 percent meat-add," follow up and ask whether the claim is about the formula ratio or the inclusion rate.

Extru-Tech's Continuous Improvement

Extru-Tech makes continual improvements to ensure the preconditioner always makes a consistent, predictable product. These include:

SPEED. Improvements in shaft speed variability allow ingredients to move through the preconditioner at a faster (or slower) rate with higher ranges of mixing intensity.

ROTATION. Manufacturers can adjust processing by changing the direction of shaft rotation.

THERMAL ENERGY. Larger steam injectors and supply lines result in more efficient thermal energy absorption and use.

INVENTION OF ADVANCED VENTING

TECHNOLOGY (AVT). AVT leverages the typical inclusion of process water and a proprietary vent design to manage the migration of dust and steam within the plant environment.

AUTOMATION. As with any process, tailored controls and integration will only improve consistency, reduce down-time, stream-line operator training, and reduce waste.

SANITARY DESIGN FEATURES. These are our most important improvements and are what enable Extru-Tech to include *aseptic*—which means free from pathogens or contamination in the name Aseptic Dual Preconditioner. Our scientifically validated process solutions further secure the pet food industry in regard to food safety. We dedicate the next section of the article to these sanitary features.

Sanitary Design: Critical for Specialty Meat-Add Pet Food

Extru-Tech has helped its manufacturers develop recipes with as much as a 135 percent meat inclusion rate, or 57.4 percent of the overall formula. But any increase in fresh or raw meat brings additional risk in the form of pathogen contamination, such as salmonella.

To address this increased risk, Extru-Tech has incorporated numerous sanitary design features into its Aseptic Dual Preconditioner that:

- Reduce horizontal ledges, which can serve as reservoirs for contaminated material and pathogen growth.
- Reduce other possible harboring points for pathogens.
- Ensure ease of cleaning with all-stainlesssteel contact points.
- Allow for better cleaning of the environment through modified equipment shielding (for example, perforated shielding).
- Employ the Energy Management Valve (EMV) to allow for automatic diversion of under-processed product, thus containing pathogens that have not been thermally destroyed. The EMV prevents underprocessed product from passing through the die and into the conveying system.

Aseptic Dual Preconditioner's counter-weighted access doors allow quick access and are operator friendly.

Yield Loss with Fresh Meat

When considering fresh meat in dry pet food formulations, it is important to be aware of yield loss or shrinkage. About 70 percent of the weight of fresh meat is water—and that water weight is lost during the production process. Chicken meal, on the other hand, is only about 3 percent water weight, so very little of its weight is lost during processing. Water weight may go even lower for a mix of dehydrated chicken protein with chicken fat.

All this means that you need much more fresh meat than dried meat or meal to create the same quantity of product. So even when fresh meat is cheaper per pound, it can lead to higher costs overall. To illustrate this, we ran a comparison between a formula with no fresh meat slurry versus a formula with 20 percent slurry. The formula with 20 percent fresh meat had a 25 percent increase in effective raw materials cost. Additionally, a further increase to a 40 percent fresh meat diet had about a 60 percent increase in effective raw material cost. It is important to note that these cost increases are only in respect to raw materials and do not consider other processing costs that may also increase, specifically the dryer utilities cost.

Most important of all, Extru-Tech has developed scientifically validated Sanitation Standard Operating Procedures (SSOP) that manufacturers can follow at the plant level. This sets it apart from SSOPs developed without full-scale testing of their effectiveness at destroying pathogens.

More than 30 repetitions of scientific testing showed that the validated SSOP consistently removed salmonella contamination from the preconditioner. This enabled Extru-Tech to rename the preconditioner as the Aseptic Dual Preconditioner. Extru-Tech did not stop with this internal testing. It has also validated the safety of multiple specialty meat-added products for its customers, including high-meat traditional cereal, high-meat grain-free, and limited-ingredient diets. This involves recreating the recipes in its biosafety lab but adding a special ingredient at the beginning: salmonella. At the end of the process, technicians assess the finished product for salmonella.

In multiple repeats of these tests, the final product came out free of salmonella contamination.

Perfect Partner for Extru-Tech Next Generation Single Screw Extruder

Extru-Tech has shown the same sort of innovation with its Next Generation Single Screw Extruder. With higher speed, higher horsepower, the Energy Management Valve, the Mid-Barrel Valve, and its own scientifically validated SSOP, it is a natural partner to the Aseptic Dual Preconditioner. Learn more about creating specialty meat-add products with the Next Generation Single Screw Extruder in the next issue of *The Extru-Technician*!

The Extru-Technician Your drying and extrusion resource

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PETFOOD SNACKS

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FLOATING AQUA FEED

PREMIUM PETFOOD MULTI-COLOR/ MULTI-SHAPE

SO MANY SOLUTIONS FROM A SINGLE SCREW SYSTEM

DIAL UP DIVERSITY WITH A SINGLE SCREW SYSTEM

Harnessing the ability to cost effectively produce dynamic products that drive demand from a market perspective is a trait found in the most successful brands in the industry. With an Extru-Tech Extrusion System, you can cost effectively deliver high margin Premium Petfoods as well as Sub 1 Millimeter Sinking Aquafeeds on the same system.

KEY BENEFITS THAT DRIVE PROFIT TO YOUR BOTTOM LINE INCLUDE:

- Lower Capital Investment
- Lower Operating Cost
- Unlimited Ingredient Flexibility

An Extru-Tech Single Screw Extrusion System provides flexibility and production efficiencies at substantially lower operating costs than competitive extrusion systems.





