



PET FOOD MAGAZINE

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PROCESS & FORMULATION



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PROCESS & FORMULATION

EDITORIAL

Welcome to a new edition of **All Pet Food Magazine**, this time focused on pet food Processes & Formulations, which implies the selection and combination of ingredients to create a balanced and nutritious diet. Pet food manufacturers work closely with nutritionists and veterinarians to develop formulas that meet the specific needs of the different pets and life stages. However, it's important to note that specific formulations and processes may vary between pet food producers.

We'll also discuss **trends in formulations that currently lead the world pet food market**.

Formulation trends are too many and vary each year, and we can name research, development, and even AI entering our industry. In this issue, we unravel the myths of ancient or ancestral grains, as well as their use in pet food.

Among the new trends, we can find Torula Yeast (*Candida utilis*), a type of edible deactivated yeast, which grows in wood alcohols and is used when deactivated and dried to provide flavor and improve nutrition.

But this is only the beginning. The issue covers other interesting topics, such as cellulose and lignocellulose in dog food, a new type of enzyme at the service of palatability, and the challenges of nutritionists today. Do you want to know how a pet food formula is designed? Armando Enriquez, one of our columnists, explains it in detail. Finally, we'll expand our knowledge about fibers, as well as the presence of mycotoxins in the food of our beloved pets. JRS and Bühler, two of our clients, contribute all their knowledge on these important issues.

Talking about processes

The universe of food processing is amazing, in addition to being the key to the success of all formulas. Here is where the hard research work of formulators and nutritionists is reflected.

In this new issue, you can find some advances in processing, as well as innovative tools, such as formula management software implementation developed by Northwind, the key to maximizing plant performance.

Accuracy is addressed as a crucial factor in the extrusion of the different pet food formulas for both dogs and cats, as well as some criteria for an effective and successful process (nutrition + extrusion). For their part, Bühler introduces its SORTEX LumoVision, a solution that uses the spectral scale to remove mold from pet food.

Finally, you will be able to enjoy an interview with Sebas Van Den Ende, VICTAM's General Manager, who gives us a brief reference to a mandatory event of the Feed Industry, established for many years in Europe. Of course, VICTAM LatAm captures all the attention since this is the first time it will happen in Latin America.

This **All Pet Food Magazine** issue will be distributed both in VICTAM LatAm and **CIPEU 2023**, which will take place on September 27 and 28 in Zaragoza, Spain, in partnership with Feria Zaragoza.

Equipo editorial

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ANCIENT, ANCESTRAL GRAINS MYTH OR SUPERFOODS?

By All Pet Food

Ancient or ancestral grains have long been discussed and used in the pet food industry. But what is known about them so far? What can we say about its benefits in dog food? What is their impact on food palatability?

Ancient, ancestral grains

When we talk about ancient grains, we talk about millet, quinoa, spelt, amaranth, and teff, to name just a few. **This term refers as they have been found in many geographies and cultures and because they have suffered minimal alterations over a very extended period of time.** When used for pet food production, these types of grains go through minor processing stages.

Scientific evidence

A lack of knowledge can lead us to think these ancient grains are new to the pet industry, but nothing could be further from the truth. In fact, there are scientific studies that prove some of its characteristics and advantages.

Pezzali and Aldrich (2019) evaluated the digestibility of a cereal-free food containing potato, pea, and tapioca starch

versus another containing ancient cereals, such as spelt, millet, and sorghum. **They found no differences in digestibility.**

Scientists at the University of Illinois say ancient grains are a prime example of an increasingly popular trend in human and, consequently, pet food. For their study, 10 adult female Beagles ate, for 10 days, 1 of 5 dog food formulas, which included up to 40% rice or 1 of 4 ancient grains: amaranth, white proso millet, quinoa, or grits. By analyzing their droppings and blood data, they discovered that when carbohydrates are used as the main source (up to 40%) in extruded foods for adult dogs, **ancestral grains are well accepted, with no detrimental effects on stool quality or macronutrient digestibility.**

Furthermore, oats and amaranth inclusion were especially beneficial in changing the fermentative end products indicating a butyrogenic effect. Although oats did not have a significant

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impact on postprandial glycemic or insulinemic responses in healthy dogs in this study, it can be inferred that they may benefit obese, insulin-resistant, or diabetic dogs.

Ancient grains benefits

Each grain offers its own characteristics and advantages. In these cases, since they have not been refined, like white rice or other grains, the nutrients remain, whereas when the grains are refined, they lose vitamins, minerals, fiber, and much of their nutritional value during the milling process.

Digestibility

Ancient grains provide prebiotics and fiber. They are especially used for dogs with food sensitivities or obesity problems. **They are easy to digest and can help maintain a healthy weight.**

Nutritional quality

The nutritional quality of food is essential to have healthy pets. Ancient grains are very high in nutrients such as fiber, protein, omega-3, omega-6, B vitamins, zinc, and magnesium, and boost the immune system and thyroid function. For example, the proteins and vitamins found in quinoa help promote good muscle health, boost metabolism, and improve brain health. Millet and sorghum, meanwhile, are perfect for gluten-free diets, as they are rich in antioxidants and help fight inflammation in older dogs or those with chronic inflammation problems.

Lightly processed ingredients

Most superfoods for dogs are made from ancient grains. **This is due, in part, to the way they are processed.**

Reduced absorption rate

Ancient grains are less of a burden on the digestive tract because **they are easier to digest and break down, preventing potential blood sugar spikes and digestive problems from slower absorption.**

Healthy ingredients

These types of grains are not selectively bred nor have they been modified over time, which is why they are considered more natural and healthy.

From myth to reality with scientific studies

The lack of knowledge about these ingredients arises from comparing ancestors' diets to today's pets. If we look at the diet of a wolf or wild cat, we do not see them eat grains directly, but

The term ancestral refers as they have been found in many geographies and cultures and because they have suffered minimal alterations over a very extended period of time.

these are found in what their prey has eaten, and they are what their bodies need as evolved species.

Today, **we know that the advantages of ancestral cereals are multiple,** from providing a more dense nutrient profile and less processed varieties to presenting the least allergenic potential. All these details position ancient grains as premium and a trend in pet food.

Therefore, **we need to listen to our audiences to design formulas that meet their needs and those of their pets while driving the most detailed research** to fully understand the power and impact of these ingredients.



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CHAIN PROCESS, CONSTANT IMPROVEMENT: EXTRUSION, BINDERS, PALATABILITY, AND MORE

By All Pet Food

Nutrition, process, sustainability, viability, and other practical issues influence pet food manufacturers decisions when designing their formulas. Extrusion is one of those problems, especially how it interacts with other fundamental factors, such as binders or the palatability of a final product.

Precision, a key factor in extrusion

Extrusion occupies a central place in pet food production, but it is not the only thing that matters: **it does not make sense to focus exclusively on it if accurate and integral material and ingredient management is not achieved throughout the whole production process.** Being the most common method of producing dry pet food, it involves several operations, such as mixing, heating, kneading, cutting, and shaping. Here the key is to obtain perfect homogeneous mixtures of the ingredients used in the formula.

Some criteria for an effective and successful process

Nutrition and extrusion

Nutritional quality is the main point, which is obvious but impossible to forget. **The first and most important thing in a pet food formula must be nutrition**, so the final product, regardless of the chosen production process, must be complete and balanced. With this in mind, **one must consider how the selected ingredients react in the extrusion process.** Depending on its nature, this can be easy or rather challenging.

Secondly, we can talk about product uniformity and texture. To pets, consumers and judges of our offers, product

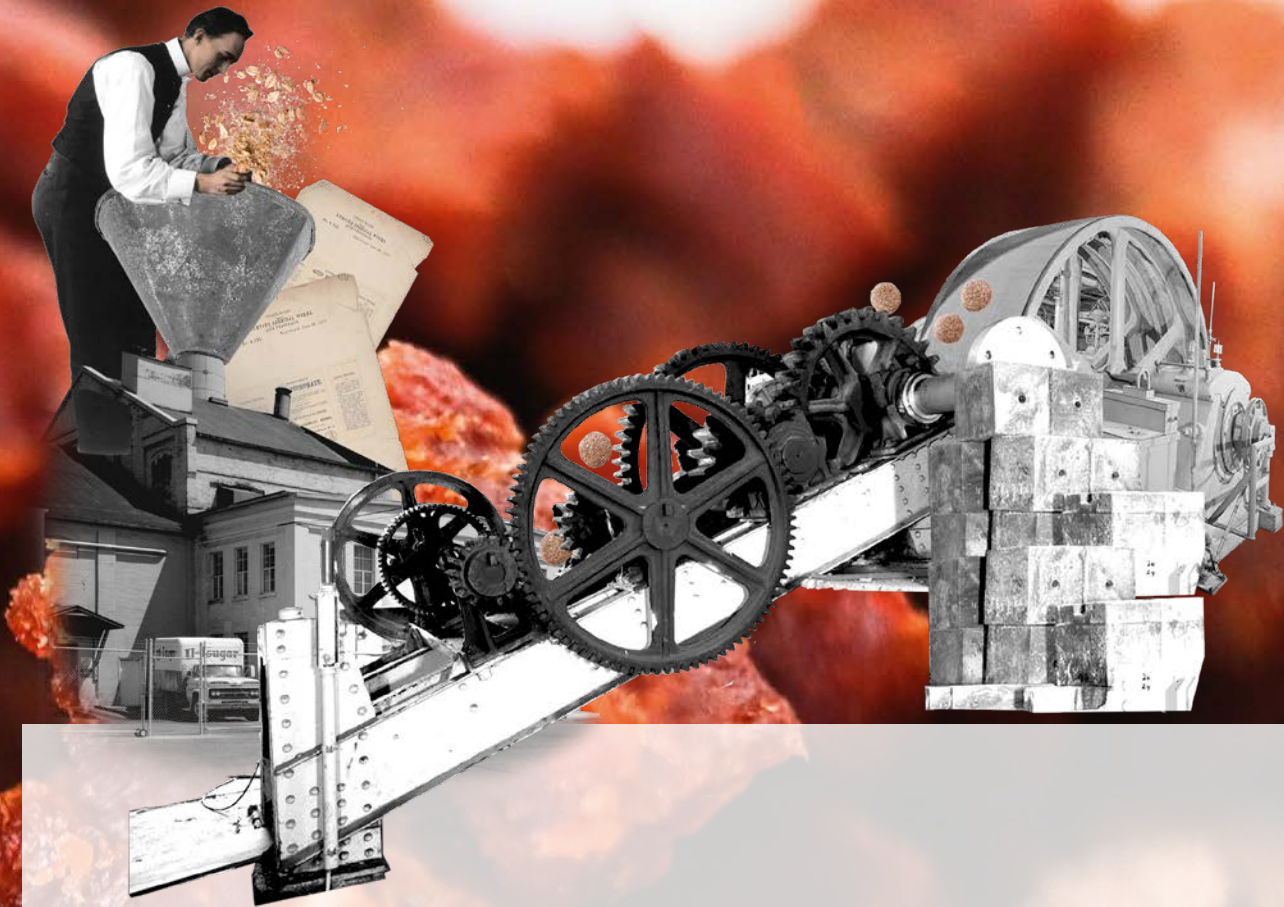
palatability is crucial, as no nutrient can nourish without good palatability.

Additives and binders

We can also mention additives as one more component of pet food formulas that can have various purposes. Some can be: guaranteeing longevity and food safety, maintaining texture and color, and preventing water activity, ingredient deterioration, and oxidation, among others. In addition, they are specially used to increase palatability and flavor, an important sensory characteristic for both dogs and cats. In fact, it's what defines whether or not the pet chooses our food. These can impact first-choice palatability, which means they make it the first food chosen or achieve a continuous choice effect, a preference sustained over time. These types of ingredients added to formulas are widely used. However, that does not exempt them from being controversial in a context in which those who make purchasing decisions prefer to know all the ingredients that their pet food contains and where this type of addition is increasingly rejected, often due to ignorance.

Marketing and sustainability

For the last couple of years, there are two additional points gaining more and more ground: **marketing and sustainability.** On the one hand, marketing is a crucial tool to get our product, with a great process and palatability, to



reach the right hungry mouths. **To design a great product to remain stored in our warehouses is completely pointless.** And, on the other hand, considering (or not) the environmental impact can be, nowadays, one of the factors that take off or bury a brand's name. **Today's consumers want to buy what takes care of everyone's future.**

Different factors, some products, only one goal

Producers are deepening their research and experimentation to answer with the best possible quality to new market demands. Currently, we can summarize these needs in the following most significant challenges:

- Fresh refrigerated meat, neither frozen or dehydrated
- Higher quality – use of mechanically deboned skeletal muscle and primary organs, not by-products
- Unadulterated materials
- Non-traditional, grain-free, or alternative ingredient formulas
- More food shapes, like croutons or bone shapes, and not just brown and round
- Higher rates of meat inclusion (30-75%)

The truth is, with every new trend, new challenges arise. The greater inclusion of meat, for example, presents, from a manufacturing point of view, a challenge in terms of extrusion. But no matter how big the hurdle, **staying on top**


of trends and meeting customer expectations is most important.

Conclusion

The improvement of production practices and, consequently, of the characteristics of final products depends on the processes chosen and the ingredients used. **A crucial point, within a sea of innovative technology, attractive proposals, and emerging raw materials, is to remember, depending on the type of food produced, and determine what nutritional benefit we seek to achieve,** either in a final product or with the addition of certain additional components.

As an industry, **we must have the ability to review and attack challenges from all angles, and for successful development,** we already know the keyword: innovation.

Looking carefully at the path traveled in recent times, we do not doubt that experts from various areas are working to improve and overcome any obstacles in terms of formulation requirements, hardware development, process controls, and specifications of a final product, with the objectives in mind of increasing productivity, minimizing costs, successfully satisfying our customers, maintaining the highest quality standards, eliminating human error, improving efficiency and optimizing security.



TORULA YEAST FOR A MORE PALATABLE, DIGESTIBLE, AND NUTRITIOUS CAT FOOD

By All Pet Food

Yeast products from the sugar and alcohol industries are used in pet nutrition as a source of protein or additional ingredients, with potential benefits for intestinal functionality or feed palatability, among other things.

Yeast in pet food

Sustainability in the pet food industry is an ongoing debate that often focuses on the ingredients used in it. **Today, protein sources are under scrutiny, especially for their effects on ecosystems and societies**, since the resources and conditions needed to develop them can be harmful to various ecosystems.

Currently, the best-known type of yeast is nutritional yeast, used to add protein to various foods, although it is also a flavoring agent. There are many different strains of inactivated yeast, and each has a different flavor. One deactivated yeast is Torula yeast, but others used in the market are active, such as beer or bakery yeast.

Torula yeast

Torula yeast (*Candida utilis*) is a type of inactivated yeast and is one of approximately 1,500 types of tiny, single-celled fungi. Torula edible yeast grows on wood alcohols and is used when deactivated and dried for flavoring and nutrition.

The truth is that, generally, **being low on the food chain reduces the environmental impact of a protein source, and mushrooms live near the bottom of it.** Raising mushrooms as new pet food ingredients as one that would otherwise go to waste, reduces the environmental impact of animal nutrition. **This yeast feeds on the woody biomass left over from the manufacture of wood products, and because wood waste is plentiful, renewable, and does not compete with human food crops, considerable sources of protein can be extracted.** Indeed, it's possible to affirm it has favorable properties for extrusion as well as benefits for the animal's digestive system. Torula yeast is free of allergens and heavy metals.

Torula yeast in pet food

For pet food, Torula yeast may have an advantage over other novel proteins. It is an AAFCO-approved ingredient with a history of safe use. In 2019, feeding trials tested it in dog food and found the fungal protein source works on par with chicken meal, and a more recent study found evidence that torula yeast can also serve for producing cat food.

A study at the University of Kansas looked at the use of yeast in pet food. **Torula yeast, as well as brewer's and whey yeast, have been categorized as nutritional yeasts when fed as inactive microbial biomass, primarily for their nutritional value.** Among the most traditionally used in livestock nutrition, Torula yeast is the most favored in terms of its flexibility of carbon sources and growth capacity. It can metabolize xylose and its oligomers, allowing growth on low-value cellulosic waste materials. Thus, **it enables large quantities of microbial protein to be produced from a sustainable and cost-effective growth medium.** In addition, producing yeast from cellulosic material has a lower carbon footprint compared to soybean, pea protein, and chicken meal, the elements on which the study's comparisons are based.

All four cat foods, with these ingredients, were prepared using single screw extruders under similar processing conditions. **The study found that Torula yeast is highly digestible by cats and even increased their preference for food containing it while aiding processing and kibble formation.**

Furthermore, under similar processing conditions, this yeast resulted in a more extended product, particularly in the radial direction, which caused the lowest density and hardness. **The study determined that Torula yeast can be safely included in feline diets, with levels limited for fecal quality considerations.**

In palatability tests, cats chose more food with Torula yeast than those with chicken meal. However, there was no difference from the other ingredients. On the other hand, **the crude protein of Torula yeast digestibility was similar to the other three formulations, with an average of 89.97%.** Yet, fats digestibility was lower for this (92.52%) than for the other protein sources.

Conclusion

Yeast-based ingredients are playing an increasing role in the premiumization of pet food as a source of improved health and wellness for pets in hundreds of pet food markets worldwide. Yeast is no longer only used to improve palatability, but interest is now growing in the value and impact it might have in increasing immunity levels and improving gut health.

In this sense, Torula yeast seems a great alternative to incorporate into formulas, although, and while even there is very recent research, **experts in the field recommend further investigation to evaluate postbiotic analysis, the mechanisms of the functionality of raw materials, and the implications of protein ingredients on urinary health in cats.**

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CELLULOSE AND LIGNOCELLULOSE, PROVIDING FIBER TO DOG FOOD

By All Pet Food

Obesity in pets, especially dogs, is a key problem for the pet food industry, both for their owners and producers. Today, countless pets suffer the effects of a poor diet or lack of knowledge on their bodies, organs, muscles, and joints for years of carrying an overweight that has only had a highly negative impact on their health.

Fiber is an alternative to combat obesity and help these pets reduce their daily food intake and, consequently, have an impact on their weight. But it is not the only cause in which fibers are used, such as, for example, cellulose fiber or lignocellulose.



Fiber in dog food?

Fiber is a complex carbohydrate resistant to dogs' digestive enzymes. Several sources of fiber are commonly used in pet foods, including beet pulp, bran, tomato pulp, buckwheat, and powdered cellulose. In simple words, fiber moderates how quickly food moves through the digestive system, which helps regulate intestinal activity.

Dogs do not have a physiological need for fiber. A natural canine diet contains little to any fiber. However, it can be beneficial for today's dogs, including **improving gut**

health, strengthening the immune system, weight management, diabetes, and anal gland disorders.

Cellulose, a usable but controversial fiber

Cellulose is a fiber found in the cell wall of plants. It is found in the bark of trees and plant leaves. It is an insoluble fiber, which means it either cannot be dissolved in water or absorb it.

Today there are different positions on cellulose fiber since certain professionals affirm that, although it is a fiber that increases food volume, it does not have any nutrients,

so it must simply be added to the formula and not a main ingredient. **Those who defend powdered cellulose in dog food cite ease of use, necessary fiber content, and cost-effectiveness as some of its main advantages.**

An alternative: lignocellulose

Lignocellulose is an alternative that, according to some recent studies, could be a vegetable fiber with great potential for our industry. It is the main component of the cell wall of plants and is a source of XOS (Xylo-oligosaccharides) compounds, which stimulate the growth of beneficial bacteria for the intestinal flora and serves as a type of dietary fiber.

Studies and research

Scientists from the University of Veterinary Medicine in Hanover, Germany, and Mansoura University in Egypt conducted a study in which 8 Beagle dogs were given 1 of 4 foods for 14 days. These foods were the same except for the fiber they contained: **powdered cellulose, granulated cellulose, lignocellulose, and a control food without additions.**

It could be shown that all 3 fiber types **led to lower caloric intake** by the dogs, compared to the control diet. At the same time, **no cellulose decreased or affected palatability.** And while fecal quality was not affected by fiber sources, the feces of dogs consuming fiber foods were wetter, compared to those on the control food.

Thanks to this study, the professionals were able to affirm that **lignocellulose can be used as an alternative to cellulose as a fiber source in wet dog food.** Since **lignocellulose reduces gross energy digestibility as cellulose,** it can also be used in feed for overweight dogs.

Conclusion

Choosing the best ingredients for each pet food formula is not easy, considering all the factors that need to be considered: consumer desires, nutritional value, costs, production, availability, and regulations.

In the case of cellulose and lignocellulose fiber, as mentioned above, **the latest studies have shown that the incorporation of a specific source of this type can improve the health and well-being of companion animals.**

Research carried out for industry experts as well as for pet owners is critical to **moving toward an increasingly science-based, safer, and consumer-focused food industry.**

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ENZYMES AT THE SERVICE OF PET FOOD PALATABILITY

By All Pet Food

Each pet has its own personality, and there is no better way to find out than by confronting them with food. Their sensory requirements in relation to the color, smell, and taste of what they like, together with the growing humanization, make it a constant challenge to capture the stomach of each one of them. Therefore, additives are often used to increase intake, promote digestion and absorption by improving appetite.

Palatability: the key to winning pets' hearts
Palatability is the ability of a food or ingredient to arouse a pet's interest in eating and promote satiety. Because these feeding experiences depend on various factors such as packaging, formulation, processing, and the quality and stability of raw materials, among other things, **pet food palatability is more like a science.** Food perceptual properties (taste, smell, and texture), as well as our hedonic or pleasant reaction to that food, combine to compensate for palatability.

In the case of dogs and cats, **they base their judgments about food palatability on three sensory factors: its aroma, texture, and macronutrient composition.** And here comes the greatest challenge: **what they like is not the same as what we humans perceive,** so the task is focused on identifying what really attracts pets from each factor to win them over.

Of the three factors mentioned, **the aroma is the most important one, since it makes food pass the "first filter"**. Then there is texture, which also plays a key role in food appeal, and can be affected by processing conditions, nutritional content, ingredient formulation, and palatants use, for example.

Enzymes, a path to superior palatability
Palatants are ingredients used specifically to enzymatically break down animal fats and proteins to give food a sensory boost and play a critical role in food choice. They are what help food taste, look and smell better. Fat, salt, protein, yeast, and other flavors are examples of some palatants used to enhance flavors, especially in dry foods, where the biggest challenge is to increase craving because, as we already know, no superfood is effective if it is not consumed.

Palatability is the ability of a food or ingredient to arouse a pet's interest in eating and promote satiety.

Today's pet foods are made primarily from meat, fish, and grain by-products. **The addition of enzymes can value food and improve its nutritional profile,** concentrate, and improve flavors, among other benefits.

In this sense, **enzymes are a resource that provides specific and controlled solutions through chemical and physical interactions that manage to improve texture, nutrition, and palatability of pet food products.**

Current investigation

Plant solutions

But, now, to the historical challenge of achieving great palatability so that pets choose our food proposal, we must add the humanization challenge. This is promoting the **introduction of proteins of vegetable origin,** which present completely different problems to what is known by the industry, in terms of how to improve their flavor, texture, and digestive properties.

For this reason, **research is currently being carried out on plant-based palatants production, but from yeast and products based on it specifically.**

Improving by-products

Another use given to enzymes is to reduce processing and waste costs, **using them specifically to improve meat by-products, raw material in most cases very nutritious, but with a bad reputation among pet owners.**

Since the particle size and fat proportion, protein, fiber, and starch in by-products also contribute to the texture of pet food ingredients, **protease, and lipase enzymes can be used to modify meat and fish by-products, as well as proteins of plant origin to improve their physicochemical properties and create the desired flavor and texture attributes:**

- Proteases **break down the linear chains of amino acids in proteins into smaller peptides, which improves protein digestibility.** The breaking of these peptide bonds releases the amino acids, **improving their accessible protein content and increasing their nutritional value.** The use of proteases to improve digestibility is particularly important in **differentiating pet food ingredients, based on the animal's life stage and dietary requirements.**

- Lipases are effective in **breaking down fats** to release free fatty acids. The increased level of free fatty acids contributes to **a lipolyzed flavor, producing unique and concentrated flavor profiles.** The intense tastes generated through lipase enzymes **improve protein and ingredients palatability.**

This process is known as **enzymatic hydrolysis,** and it has the ability to **improve protein processability by modifying its physicochemical properties,** achieving greater solubility and lower viscosity.

Conclusion

Palatability is a crucial food quality to meet pets' calorie and nutrient requirements. No matter how high the raw materials' quality is or how well-balanced the key components are, unappealing foods are not going to be chosen by our end consumers because, even if a pet food is formulated to offer all the necessary ingredients a dog or a cat needs if the animal does not consume it, it will be absolutely pointless.

That's why high-quality pet food formulas should be designed to be both tasty and nutritious. Getting the right combination of flavor and texture for different pet food products is a complex and challenging process, and, as the needs and demands of the industry change, we must also change the way we leverage our food offers.



The twin screw extruders, ExTS 616 and ExTS 718, are the ideal solution for the extrusion of pet food with high inclusion rates of meat slurries or fresh meat.

The twin screw extruders ensure complete utilization of starch, allowing for higher flexibility in the formulation and enabling a higher feed conversion ratio.

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Pet food

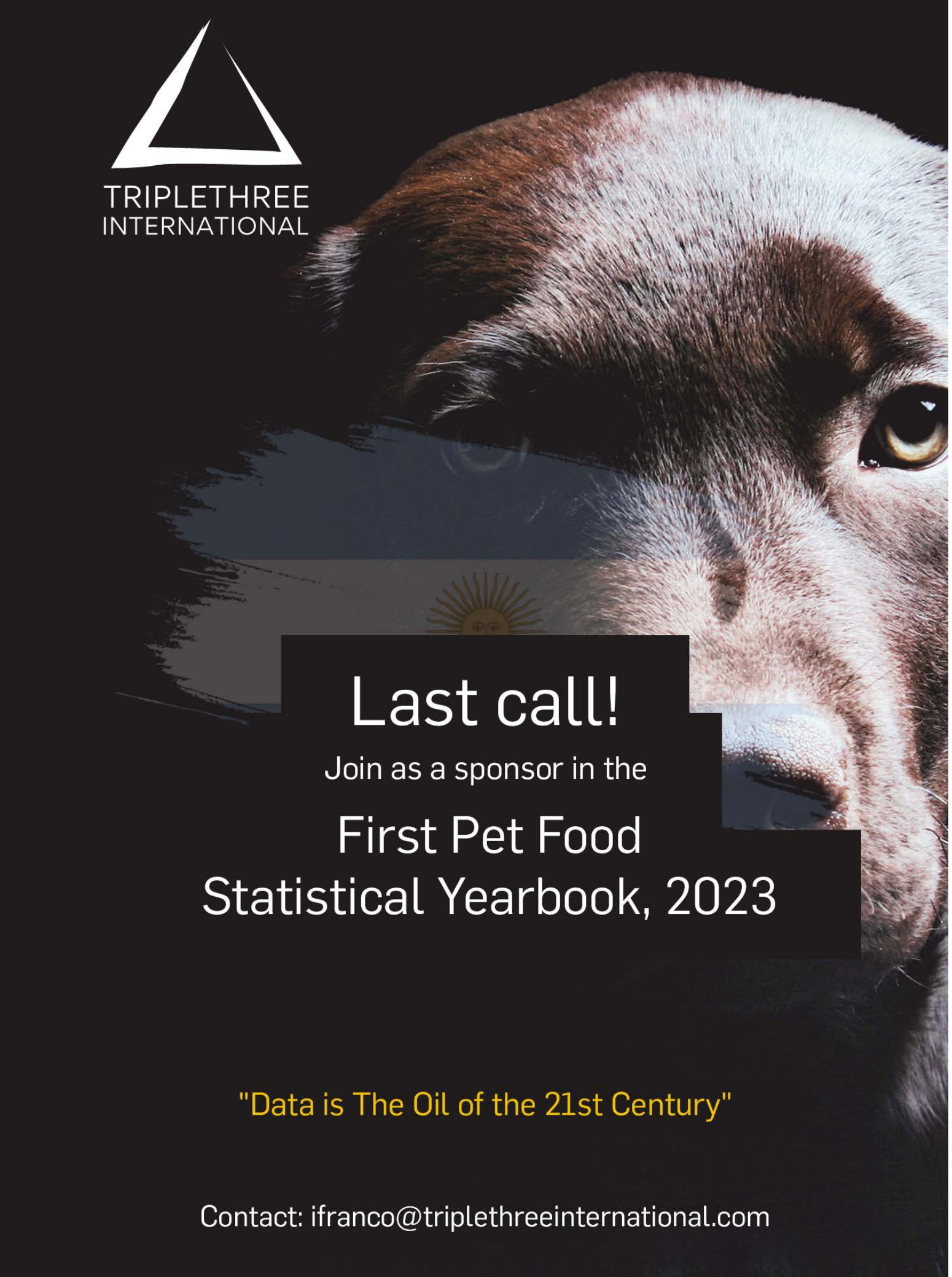
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PALATABILITY: THE IMPORTANCE OF PRODUCING PALATABLE FOOD

By All Pet Food

The pet food industry is growing rapidly at a worldwide level, and that's great news for all! However, even though new products are developed, palatability research is still balanced between traditional methods and those who want to innovate.

In a study done by professionals from Australian and New Zealander universities, research analysis and compilation were carried out to gather information about the importance of palatability and its drivers in certain pet foods.



The pet food industry and growth does not stop

The pet food industry is an important sector of the rapidly growing pet care market. However, while the number of new and innovative products keeps growing, **research and development to assess their performance follow traditional palatability methodology.** These focus on analyzing the amount of food consumed by using one and two-bowl tests.

Nowadays, we know that, although foods are primarily formulated to provide complete and balanced nutrition,

palatability is a crucial factor in determining the success or failure of a product in the marketplace and its likelihood of repurchase.

Nutritional requirements of dogs and cats

Cats and dogs are members of the carnivore order. While the name implies that both are specialized carnivores, **each species originated from different branches: the domestic cat is part of the Felidae family, whereas the domestic dog is part of the Canidae family.** Nutritional requirements, feeding behavior, and food selection choices vary considerably between the two species.

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Compared to their carnivorous wolf ancestors, **today's domestic dogs can consume food of both animal and non-animal origin** and are, therefore, classified as facultative carnivores.

For their part, cats are one of the most recently domesticated mammal species. They are solitary hunters who often hunt prey much smaller than their body mass, requiring them to do it several times a day to meet their needs. **They are classified as intermittent eaters who consume multiple small meals over a 24-hour period, and are generally much more picky, compared to dogs: they can detect small differences in the food composition offered to them. Unlike dogs, they are obligate carnivores in their methods of ingesting, digesting, and metabolizing meat-based diets,** as without animal protein, cats can suffer from severe nutritional deficiencies.

How do they behave?

Both cats and dogs tend to display **neophilic behavior, defined as a tendency for new and unknown food, as opposed to neophobia, the avoidance of it.** In some cases, already somewhat extreme, cats can show metaphilia, the demand to change a portion of food once it becomes familiar to their palates.

Preferences and palatability

With the increasing number of pet foods available on the market, palatability has become the main criterion used to measure product performance. These foods' physical and chemical properties, linked to the promotion or suppression of eating behavior during the preabsorption period, **are those that define, to a large extent, whether or not their owners will buy one food again or not,** since they have a direct relationship with **the perception of pleasure or taste during consumption.**

Palatability tests

The consumption test (how much food is consumed over time) is the most widely used technique to assess food palatability. It can be applied by seeking to analyze the palatability of a single product or by comparing more than one with another to determine group preferences.

One-bowl test

In this test, a single product is presented to a defined number of animals and repeated over several days to eliminate environmental influences. **It is useful to reflect more accurately the different options provided at homes.**

Currently, the problem with this test is that it does not show a real preference for any specific food and, furthermore, it does not provide enough information to be able to certify an improvement in a product.

Two-bowl test

The two-bowl test is the other traditional method of palatability testing for research and involves presenting 2 foods simultaneously to an animal for a defined period, allowing the animal to choose and show its preference.

Behavior as a measure of palatability

Pets can't speak about their preferences and tastes, so **studies**

should focus on assessing their behavioral response to various foods to obtain an additional objective measure of palatability.

Regarding this, in the case of cats, for example, in a study by Van den Bos, it was possible to identify **certain physical responses that seemed to be related to liking or aversion to different foods, also known as taste reactivity tests.** The taste for food was distinguished by licking and sniffing their feeder, licking their lips, and grooming their face. Food refusal was differentiated by licking and sniffing food and nose licking. Another defining aspect is the time cats spend sniffing food.

Biological aspects

In addition to differences in feeding behavior and nutrient requirements, **the main factors influencing cat and dog food preferences also vary. In dogs, preference for odor has been identified as the likely palatability driver** in a study (Hall, 2017) in which dogs were presented with two bowls of 1 out of 4 chicken-flavored foods and, in 89 % of the tests, consumed more of the food they had initially selected. In another study carried out by Roberts in 2018, it was concluded that **dogs could choose their preferred diet before trying it, and it is possible that the smell was a key factor in making this picking.**

In the case of cats, they use both smell and taste to detect and select food. Although not as highly developed as dogs, **they use their smell sense to recognize both new and trusted scents. Food preference is often strongly influenced by their mothers' food choices and exposure to food during pregnancy via amniotic fluid,** even in the first few years of life. This limited exposure to different foods in their first years can result in a preference for that taste, known as the primacy effect. However, it may not be seen in practice, as some cats show neophilia to various options. Additionally, **when cats face two familiar and abundant types of food, they will eat a mix of both to obtain a wide variety of nutrients and maximize long-term nutritional benefits.** Regarding food selection, several studies have proven that the most influential aspect of the decision is taste, smell, and color.

The future can't wait!

Pet food palatability is a key aspect for both manufacturers and pet owners. Currently, traditional palatability testing methods are used to assess the acceptance and preference of balanced pet foods and snacks. However, there are gaps in our knowledge in this area, and more research is needed to determine the fundamental factors responsible for choosing one food over another. Modern techniques such as metabolomics can unlock this knowledge, but, we'll say it again: investment is needed for its successful development.

Taking a collective approach that uses both traditional palatability testing methods and modern testing can be the fair and balanced way to determine the optimal level of ingredient inclusion, maximize palatability, recognize the nutrients responsible for driving preference, and more.

Studies should focus on assessing their behavioral response to various foods to obtain an additional objective measure of palatability.



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CHALLENGES FOR THE CANINE AND FELINE NUTRITIONIST AND PET FOOD FORMULATOR FOR THE UPCOMING YEARS

By: Ludmila Barbi T. Bomcompagni and Érika Stasieniuk

In recent years, the pet food market has experienced significant growth worldwide. Pet owners are increasingly concerned with providing quality, healthy food for their four-legged companions. This constantly evolving demand presents several challenges for formulators and developers of new products in the pet food market.

In this article, we will discuss some of these challenges and approaches to overcome them.

Proper nutrition:

The main challenge when formulating and developing products for the pet food market is ensuring proper pet nutrition. Each species has specific nutritional requirements, and products must be formulated to fulfill them. In addition, we have to consider factors such as age, size, breed, and individual health conditions. Formulating nutritionists must ensure that products are balanced and meet all necessary nutritional requirements.

Knowing the ingredients in depth:

Finding and using quality ingredients is another challenge facing pet food developers. **It is important to ensure that**

the ingredients used are safe, healthy, and meet regulatory standards. Knowing the nutritional composition of each raw material, the digestibility of the ingredients for each species, and thinking about the interactions between nutrients during the digestive process of animals should also be questioned by the formulating nutritionist. Not only do the points mentioned above matter, but **the choice of ingredients must also be very well thought out since it must comply with the minimum cost proposed for the formula, the availability of purchase considering the seasonality of each raw material, and the possible fluctuations in the availability in the market.** In addition, some tutors are increasingly concerned with the origin of the ingredients, so their choice must also be guided by the product market positioning of the product that the nutritionist is formulating. Finding reliable suppliers and establishing long-

term partnerships is essential to ensure the consistency and quality of the ingredients used in pet foods.

Understanding additives, their functions, and purposes:

The industry of additives for animal nutrition is constantly evolving thanks to the development of new products and technologies. A pet food formulator must keep up with these updates and advances in the field of additives to optimize pet food formulations and deliver high-quality products. Some additives are used as preservatives to extend the shelf life of pet foods. **A pet food formulator must understand how these additives work, as well as the proper dosages to ensure food safety and good shelf life.**

Palatability:

Pet food can be nutritionally balanced, but if it is not appetizing and acceptable to pets, it will be rejected by guardians and the animals themselves. **Palatability is a major challenge when formulating new products. Pets have individual preferences, and their tastes may vary.** Companies and their development teams must invest in extensive research and testing to ensure that their products are tasty and attractive to animals, while also meeting nutritional needs.

Processing considerations:

Pet food processing is an additional technical challenge. It is necessary to ensure that food is manufactured consistently, maintaining the integrity of ingredients and preserving essential nutrients. **The pet food formulator must know the extrusion processes and their pre- and post-processing,** as so many parameters can affect product quality, such as grinding, time/temperature inside the extrusion barrel, shear, friction, density, dried, and covered. Extrusion is one of the types of processing that the formulator must master, but the dynamics of product diversification for this market require that these professionals learn about new forms of processing, such as autoclaving, dehydration, freeze-drying, and other innovations that may arise.

Innovation and market trends:

The pet food market is constantly evolving, driven by trends and consumer demands. Product developers must be aware of the latest trends and innovations in the industry, which includes the development of specialized products for specific needs, such as food for pets with food allergies, diets for weight loss, and organic and natural foods, among others. **Keeping up with these trends and innovations requires continuous market research and flexibility to adapt to changes.**

The pet food market presents significant challenges for formulators and product developers. Proper nutrition, choice of quality ingredients, palatability, processing considerations, and innovation is critical to success in today's marketplace. **With so many challenges, a pet food formulator must be a multi-faceted professional.** The association and collaboration between the pet food nutritionist, researchers, and alliances between public and private institutions are important for the training of these professionals. They also promote science and technology for this market and to overcome these challenges, develop healthy and attractive food for pets, ensuring the health, and longevity of pets and owners' satisfaction.

The main challenge when formulating and developing products for the pet food market is ensuring proper pet nutrition.



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HOW IS A FEED FORMULA DESIGNED?

By MVZ. Armando Enríquez de la Fuente Blanquet

The word formula comes from the Latin “formulae,” which means ‘rule’ or ‘frame.’ Therefore, a formula is made up of a series of patterns and rules on which the solution of a matter depends on following. For its part, a portion of food is a substance that has the property of providing the necessary nutrients for an organism to fulfill its basic functions. For example, a recipe for a cake is a food formula made up of ingredients, quantities, and methodology, the result of which is food for a dietary purpose.



The main problem when formulating foods is to satisfy the nutrient requirements. Then, we talk about formulating a balanced food. There are several methods used to balance rations, from the simplest to the most complex and technical ones. Among them, we can find trial and error, simultaneous equations, Pearson’s square, and linear programming. For balancing rations, ingredients are combined to meet the protein, fat, fiber, amino acids, fatty acids, vitamins, and minerals that pets require for health and well-being. Within the formula of the balanced pet food (the recipe), two ingredients require special attention in their precision. I am talking about the vitamin premix and the mineral premix, which are generally separate formulas, as they are made up of more than one nutrient inside.

The amounts of vitamins and trace minerals required are few, and they are in the order of micrograms or a few milligrams per day. That is why it has been decided to add them through a premix. Vitamins and trace minerals are essential substances for life. If we supply less than their daily requirement, we will certainly see how the subject develops severe deficiency symptoms that lead to manifestations of deficiency or syndromes.

Regularly, the pet food formula contains 1 or 2 of these ingredients: a premix of vitamins and minerals when it is one, or a premix of vitamins and premix of minerals when it is two. Now we analyze the design of the premix formulation that will be included in the complete pet food.

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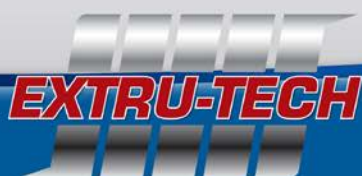


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The steps in a premix formulation are:

1. Defining the premix:
 - a. The first step will be to know which species it aims for: dog, cat, or something else.
 - b. Then it has to be decided which pet's life stage is: age, size, weight, activity level, race, physical problems, and the like.
 - c. Our "claim," or value proposition, which can go into the premix.
 - d. What kind of pet food are we going to manufacture? This can be dry, humid, or semi-humid, in very general terms.
 - e. Gathering the data of the process parameters, as well as temperatures, humidity, pressures, and times, among others.
 - f. Knowing the rest of the ingredients of the complete formula of the balanced food: corn, meals of animal origin, oilseed pastes, additives, etc.
 - g. Having a well-defined shelf life which we must guarantee, be it one or two years.
2. Ingredient selection:
 - a. Speaking of vitamins, their forms must be selected according to the production process the food will undergo: microspheres, spray-dried, coated crystals, adsorption, etc.
 - b. Regarding trace minerals, we must consider that the inorganic source will affect the vitamins more than the organic or hydroxy sources.
 - c. Also, we should keep in mind that trace minerals vary in molecular structure as well as in performance in animals.
 - d. It must also be considered that the premix can be the means to add other ingredients that require precision, such as omegas, some vegetables, mycotoxin binders, and natural or synthetic antioxidants, among others.
 - e. The vehicle is an important player in the design because it will give it density and properties for correct mixing. They can be vegetables, minerals, or both.
3. Estimating the super-addition, mainly in vitamins:
 - a. Any portion of food must meet the nutritional requirements indicated by international guides such as AFFCO, FEDIAF, or NRC. Therefore, the final product must contain this recommended minimum level at the end of its shelf life. I always suggest starting with a safety margin, that is, above the minimum level suggested by nutritional guidelines. This way, even if the dog or cat eats a little less, or has a higher consumption than the average, that daily dose would ensure that symptoms of vitamin deficiency will not occur.
 - b. The food manufacturing process involves temperature,

humidity, pressure, oxygen, and more. If one or more of these elements affect the vitamins, an over-addition is necessary to compensate for the loss due to processing, so we can reach the desired level.

- c. Once the food leaves the production line, it will travel to the market, where it will be available for the pet parent to purchase. In addition, it can also remain on the shelf for some time, and we must also consider a loss due to storage.
4. Premix test:
 - a. The design of the premix on paper is one and, in reality, things may be different. That is why it is important to produce a sample and carry out a mixture, content, and physical analysis.
 - b. If the premix complies with what was designed, food manufacturing should be run and, once again, carry out a content analysis – now of the pet food–.
 - c. We should not forget the shelf life analysis.
5. Final part:
 - a. When the premix complies with the design, and we know the product physically, we need our plant personnel to be trained on the importance of this ingredient and the care that must be given to it.
 - b. Once we have finished the premix, let's take it to production!

Pet food formulation must be adequate and precise, particularly with two micronutrients that must have our attention during the formulation: vitamins and trace minerals. The design of the vitamin and mineral premix is as relevant as the design of the food itself, and their development process should be as meticulous as possible.





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TECHNOLOGY SHOWCASE

In this issue of All Pet Food Magazine, we highlight the latest innovations that can optimize your pet food operations. We take a look at innovations from different leading companies in the Pet Food market.

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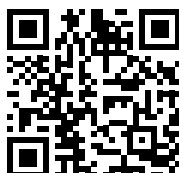
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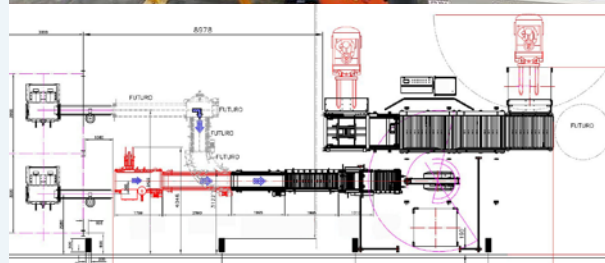
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PALLETIZING SYSTEM PALLET FORMATION

Ferraz developed, a few years ago, an automated system with a robot to attend to the process of forming pallets in the animal feed production industries.

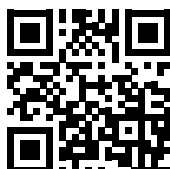
The objective of such equipment is, mainly, to reduce the volume of labor necessary for the operation of a balanced factory, thus reducing the operational cost, in addition to guaranteeing the uniformity of the disposition of the finished pallets, in terms of bags setup per layer, number of layers, etc.

This system can receive bags from one or more bagging lines as long as it is within the total production limit of approximately 13 bags per minute or 780 bags per hour, just as they can be filled on one or even two pallets at a time, considering the model with two automatic pallet feeding systems and two conveyor belts for ready-made pallets.

The bags can have, for example, 7, 10, 15, 25, 30, or even 40 Kg. The standard pallet models used in such an automated system measure 1200 x 1000 mm or 1500 x 1300 mm, but it is possible to customize the system to receive pallets of other sizes.

Brochure

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DID YOU KNOW ABOUT ALL THE CONTROL STAGES COMMERCIAL FOOD SHOULD GO THROUGH TO GUARANTEE THE QUALITY THAT REACHES THE PET'S PLATE?

By Dra. Bonauro M. Candela.

The commitment to pets' health and life quality has made commercial food go from being an accessory to a complete and balanced product to cover their needs at each life stage. There is more and more information, and tutors approach the office with more concerns, but also more knowledge, some of it correct and some not, as well as with new demands. There is a large offer, and veterinarians should have tools to be able to discern between the different nutritional proposals, not only about the pet's needs according to species, age, size, and particular situation or physiological state but in the knowledge of the manufacturing company and interpretation of the quality offered.

On the one hand, we must consider the table of centesimal composition as well as the specific protein contribution, fat and metabolizable energy. However, it should always be linked directly to the list of ingredients to determine not only quantity but quality. This list should have its ingredients in descending order, so those foods that contain animal protein in the highest order are superior to those that do not.

On the other hand, there are more ways to add value to food and improve diets with nutraceutical ingredients and upgrade the proposal according to specific needs, such as oral, joint, and urinary care, among others.

Likewise, manufacturing companies must or should go through multiple controls, from raw materials selection

to final product preparation. The goal should not only guarantee the contribution of the necessary nutrients but also their safety. Some of these controls are physical, chemical, sensory, and microbiological, and they are carried out at different stages of the process. In addition, there are standards and entities that regulate the production process and may differ by country.

For instance, EU regulations detail which safe ingredients and additives can be used in pet food manufacturing. The ingredients can be of animal or vegetable origin. Many of the animal-derived ingredients used in pet foods come from parts of them not consumed by humans for cultural or habitual reasons. **Today the importance of caring for finite resources in many parts of the world is a fact, and sustainability has also taken an important place in this**

area.

Plant-based ingredients are often common in both human and pet nutrition (corn, rice, wheat, oats, etc.). Others are specific to pet food.

Pet food manufacturers include intake instructions on the food label, including storage and handling requirements. Guardians should evaluate the container for information on the expiration date and batch of the product. A responsible pet food manufacturer will take safety and quality very seriously and have their own defined processes and standards that help ensure the safety and quality of their ingredients and products.

These should start with trusted suppliers and go all the way to feeding the cat or dog and are likely to include:

- Reliable suppliers selection
- Defined specifications for raw materials, periodic inspections, and tests they may require a certificate of analysis from the supplier.
- Nutritional profile, color, texture, digestibility and palatability, and technical parameters such as moisture content. Routine product testing.
- Visual inspection of the grinding process
- Measurement of quantities of raw materials
- Controlled temperatures and cooking times
- Regular sampling and testing of final products
- Registration of ingredients through batch records, final product pallets, and their destinations to ensure traceability
- Microbial testing routine
- Regular verification of packaging integrity
- Metal detection or contamination with foreign objects
- Verification of nutritional adequacy through analysis of raw materials or final products or feeding studies using nutritional guidelines
- A responsible manufacturer may choose to implement voluntary third-party audits and certifications through a third-party accreditation institute.

Stages that lead the raw material to be the food consumed by pets:

1. Raw materials reception, sample and storage
2. Weighing and dosing
3. Grinding and mixing
4. Preconditioning and extrusion
5. Drying
6. Oiling
7. Flavoring
8. Cooling

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FUNCTIONALITY BEYOND NUTRITION

By JRS

Fibers in pet foods are enjoying growing popularity. However, fiber is not just fiber. Knowing all about the different sorts of fibers and their opportunities achieved by unique processing is a science in itself. The scientists of the JRS' R&D department and Application Centers know all about the various functionalities of fibers and their proper use - ready to solve technical challenges during pet food production and provide numerous health benefits for all beloved pets.

Fibers as natural and renewable plant-based materials are ecological products at their best. Because of their multifunctional properties and compatibility with nearly all other substances, fibers provide solutions for many everyday products.

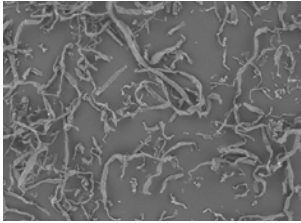
The selection of the right raw material and the mechanical manufacturing process is of paramount importance, as this allows the particle size and structure to be tailored, and the properties of the fibers depend, to a large extent, on these parameters.

Through a finely tuned interaction of suitable milling technology and fractionation, optimized products can be manufactured.

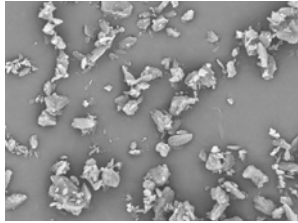
Advanced milling technology

An impact mill acts on a fiber material with high shear forces. This results in strong fibrillation of the material, resulting predominantly in long, thin fibers (picture 1). In turn, these are characterized by a high binding capacity for liquids, be they water, oil, or others.

In contrast, a cutting mill mainly shortens the fiber length but is not able to split fiber bundles into individual fibers very well. Therefore, this grinding system mainly produces shorter particles with a less pronounced fiber structure (Picture 2). These particles are less effective but have a better flow, dosing, and mixing ability.



Picture 1: Long Fiber



Picture 2: Short Fiber

Other so-called “rotor-stator systems,” which allow a very small grinding gap, are predestined for fine powder production. Although these powders do not have high functionality, they can be used in higher concentrations and can be easily and homogeneously incorporated into a wide variety of formulations. They also have good sensory properties.

Applied Knowledge

Having the possibility to understand how a structure or matrix of the fiber after a dedicated processing upgrade looks like is an innovative competitive advantage. Structural differences of various fibers can help to indicate certain functional properties, which are sometimes known in the industry but more often not known or not deep enough explored. This is the moment where scientific transparency meets technical application, researching the functional benefit of a new potential product in a real application like in main meals or snacks. For that, JRS has set up a pilot facility in 2017 where exactly this kind of internal research is happening. Only after enough internal trials and critical analysis, the products are manufactured on a larger scale to run first trials with

dedicated customers. By doing that, it is possible to develop real innovative product concepts, which are new to the market before they become standard across the pet food world.

Globally, **there are thousands of innovation pipelines and marketing concepts creating a high demand for new innovative solutions. Having the right knowledge and the right products in place is key to being a constant part of new product developments and strategic partnerships.** However, even in daily production, there are challenges where fiber can help to have a more efficient production. Some of them can generate a network, helping to keep the shape of a product intact or keeping a gravy clear during sterilization. Others can avoid syneresis in raw meat food or all meat sausages, ensuring that excess water can be held over shelf life. There are many more examples of what fiber can deliver beyond the nutritional benefit for pets. **Fibers designed by nature in combination with research & development plus technical application knowledge are the future road for many new ideas around the globe beyond nutrition.**



Fibers for Life.

Every Fiber Sparks New Ideas for Pet Food

- > Nutritional Benefits with dietary fibers
- > Boost efficiency with functional fibers
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DEADLY MYCOTOXINS IN PET FOOD COST PET HEALTH AND BRAND TRUST, BÜHLER HAS AN ANSWER

By Bühler

In 2021, the FDA (Food and Drug Administration) alerted customers of fatal levels of aflatoxin, a strand of mycotoxin that attacks the liver, found in 1,000 lots of pet food. From the bad batch, it is reported that 130 dogs died. This statistic provoked lawsuits and anger from dog owners and the wider industry. However, the damage of mycotoxin contamination does not stop there.

London (England), April 05, 2023 – Mycotoxins, a poisonous chemical found in the corn used in pet foods, are causing animal sickness and irreparable brand damage. To solve this issue, **SORTEX LumoVision, a solution developed by Swiss technology group Bühler, uses the spectral scale to kick out mold from pet food**, keeping the costs of market recall down and pets safe.

In 2021, the FDA (Food and Drug Administration) alerted customers of fatal levels of aflatoxin, a strand of mycotoxin that attacks the liver, found in 1,000 lots of pet food. From the bad batch, it is reported that 130 dogs died. This statistic provoked lawsuits and anger from dog owners and the wider industry. However, the damage of mycotoxin contamination does not stop there.

Product recall is expensive

One of the major costs of mycotoxin contamination is market recall. Recalling a product from the market is not cheap, in fact, **the Grocery Manufacturers Association (GMA) discovered that the average cost of the market recall is USD10 million in direct costs alone.** The financial hits of product recall include: disposing of the product, reimbursing customers, and business interruption. The GMA survey showed that 81% of respondents deemed the financial risk of market recall to be “significant to catastrophic.”

Contaminated product damages brand image

Financial costs and damage to health are not the only repercussions of mycotoxin contamination. Once the media are

aware of the situation, brand image can take a significant hit. **For consumers, it takes a lot to repair trust in a brand,** and while brand damage is difficult to measure, this can further cost companies millions in lifetime value.

Contaminated product can cause mass waste

Before the LumoVision, contaminated grain would have been disposed of in large amounts. During testing, if the batch has a high concentration of mycotoxin, in many cases, the entire batch is destroyed. In fact, as few as 2 highly contaminated grains in 10,000 can render an entire batch unsafe. **The Food and Drug Association (FDA) estimates that USD932 million is lost per year to crops contaminated with mycotoxin.** This removal of the contaminated material may protect the consumer, but it costs businesses and the environment a lot more.

What can be done?

Bühler SORTEX faced the challenge of mycotoxin contamination head-on. After discovering a breakthrough “invisible indicator” of contamination on the spectral scale, **Bühler created the LumoVision, an optical sorter that can reduce the aflatoxin level by up to 90%** (as indicated by industrial trials). This reduction brings many samples to regulation levels, saving companies from the costs of large-scale material waste and market recall.

It works by analyzing the color each kernel fluoresces as it passes under powerful UV lighting in the sorter. It is known

that contaminated kernels fluoresce a specific bright green color, a substance called kojic acid, which is produced by the *Aspergillus* fungus at the same time as it produces aflatoxin. LumoVision’s proprietary, highly sensitive cameras and a powerful LED-based UV lighting system can precisely detect this color of fluorescence. Within milliseconds of detection, air nozzles deploy to blow contaminated kernels out of the product stream.

When dealing with toxins, early intervention is critical. This is not only important in reducing the toxins consumed by pets, but also to lower wastage and the environmental footprint. Without proper cleaning and sorting, poisonous mycotoxins can cause large-scale wastage of materials, mass market recalls, and harm to pets.

Dr. Gerardo Morantes, Director of Food Safety-Americas Region at Bühler, had the following to say: “Mycotoxins are a worldwide concern. However, technology made possible by Bühler SORTEX enables a preventative solution, meaning that mycotoxins can be dealt with early, stopping the spread and removing the contamination to meet regulatory standards.”

Without intervention, mycotoxin contamination can bare a large cost for businesses, including, brand reputation, market recalls and material waste. With the SORTEX LumoVision, brands can stay profitable, customers can stay happy and pets can stay safe.





THE INTERVIEW

SEBAS VAN DEN ENDE

General Manager at VICTAM

He started his professional career at the Marketing Department of a Packaging company in the Netherlands, and later, at the same company, he changed his role as Export Manager for Latin America. In 2000, he made his first steps in the world of exhibitions as he started as Event Manager at Amsterdam RAI, the biggest exhibition organizer in the Netherlands, while he kept organizing events in Brazil and Mexico.

“For VICTAM, the pet food segment is growing in importance. Pet food is now one of the main segments of the event, both at the exhibition as in the parallel conference program.”

This issue’s interviewee is Sebas Van Den Ende, General Manager at VICTAM. Let’s meet the man that has launched one of the most important events of the pet food industry.

1. How did you start with VICTAM? What’s (or has been) your biggest challenge as the General Manager?

After 5 years of working with events and exhibitions for a company, I moved to Brazil, where I launched the Latin American Branch of the RAI Group, but, unfortunately, just after the office was launched, a management switch changed strategic vision, and the Brazilian office was not needed anymore.

By then, in 2006, I saw big opportunities in Brazil, so I decided to stay in Brazil and launched our own exhibition company. This was the right time at the right place, as Brazil was booming and got the attention because of attracting the World Cup 2014 and the Olympics 2016.

In a short time, we built a portfolio of successful events and the developments in Brazil, drew the attention of international event organizers, and eventually, we sold our company to one of them.

After the required management handover period, we decided to return to the Netherlands in the beginning of 2018.

After some side steps, I felt like returning to the event industry, and exactly at that time, VICTAM came along.

Even though the industries for animal nutrition and grain processing were completely new for me, organizing and developing events in these industries is not very different from any other B2B industry, and it gave me the advantage to see things with an open mind. When I started at VICTAM in 2018, the challenge was to get a more balanced portfolio and to have a better coverage of the world. In the process of developing our portfolio, having partnerships and joining existing events

were key elements. The idea was to have more qualitative good VICTAM events, but not necessarily more events in the industry, creating a win-win for organizers and participants. In 2019, we signed three important partnerships to execute this strategy, but unfortunately, just after signing the contracts we faced the COVID-19 outbreak. This changed a lot, not only for our industry, but also it strongly influenced our partnerships and internal organization.

The biggest challenge, so far, is very clear: to overcome the Coronavirus pandemic. And although the world has overcome it, the landscape in exhibition land is still misty and it will take time before everything is back to normal.

2. When did you realize it was time to arrive in LatAm? What were the reasons that made you take the risk?

When I lived in Brazil, we were always looking at new segments for our exhibition portfolio, and it was very clear that the agribusiness, like livestock, soy, sugar cane, corn and grain had a huge potential. We never touched these industries, as they have strong stakeholders, and we felt you need a well-established exhibition brand to convince them in this field.

As soon as I started at VICTAM, it was obvious that Latin America was a continent that had our priority to research and after doing this it confirmed the potential we noticed before.

As Latin America was a blind spot in our portfolio, the market showed potential and our exhibitors were positive about exhibiting in the region, we decided to launch an event in the continent. Latin America, of course, is much more than Brazil, so the question was where to launch VICTAM LatAm. Argentina, Brazil, Chile, Colombia, Ecuador and Peru are all very important markets for our exhibitors and we considered all of them as possibilities.

We decided to launch our event in Sao Paulo, as Brazil is the biggest country in the continent and has Sao Paulo, a central

and important hub. There are flight connections to all major cities in South America and there are good facilities to organize events. Of course, my knowledge and connections in Brazil were also factors in the decision as we could start the event in the third gear.

After we had received market support from our founding companies (Andritz, CPM, Famsun, Wengerand Zheng Chang) and some national and international associations, we launched our first edition for October 2023, in September last year.

3. Which are the plans for VICTAM in LatAm? Will it take place in different countries of the region? Which periodicity will it have?

VICTAM is part of a foundation with the mission of benefiting the animal nutrition industry. For us, the result of the event for our participants is more important than the financial results. After all, the profit we make will go back to the industry by donations to projects and research. Our objective with our events is having bi-annual events in 4 regions (Asia, Europe, Latin America and Middle East/Africa) in the world.

For our event VICTAM LatAm, as this will be a bi-annual event, the next edition will be in October 2025. Whether we stay in Sao Paulo or move the event to other countries is not decided yet and also will depend on the results of the event and the feedback from our participants. In the future, we hope that VICTAM will close partnerships and co-host with other events and strategic partners, so that it grows together with other events of the continent. The most important thing is that we answer according to the needs of the market: it's not only about what's convenient for us but rather about meeting our customers' needs.

4. How do you see the growth of the pet food industry in the near future?

The pet food industry is a rapidly growing sector, and it is expected to continue to expand in the near future. The increasing number of pet owners, combined with the growing awareness of the importance of pet nutrition, is driving the demand for high-quality and healthy pet food. As a result, the industry is likely to continue to transform and bring along new innovations that cater to the specific needs of pets. Some of these innovations include the use of precision nutrition, sustainable practices, nutrigenomics, alternative protein sources, automation and Blockchain.

As a leading global animal feed event organization, we have to make sure to do continuous research to not lag behind and follow all the trends to maintain high-end knowledge by organizing the right conferences with the right topics and by the right people. Overall, the pet food industry is set to remain a key player in the global food industry, as pets continue to play an important role in the lives of millions of people around the world. Therefore, for VICTAM, the pet food segment is growing in importance. Pet food is now one of the main segments of the event, both at the exhibition as in the parallel conference program.

5. What's your point of view, as VICTAM General Manager, regarding new needs, such as sustainability and circular economy?

As the industry is expected to continue to focus on sustainability and environmentally friendly practices, consumers become more conscious of their impact on the planet. It is clear that if we want to live with so many people on earth, we must do this in a responsible way, so that the next generations will be proud of us instead of blaming us.

I believe that the feed and grain processing industries have an important role to play in promoting sustainability and circular economy practices. There is a growing awareness among consumers and industry stakeholders about the need to reduce waste, conserve resources, and minimize the environmental impact of industrial processes. Thus, it is important for the industry to adopt sustainable practices that support the circular economy. This can be achieved through the implementation of these practices and promotion through different channels (online). As for the offline practices, promotion of sustainability through workshops, seminars and other sessions during the events.

In our industry, these are important themes and we give it quite some attention. In our conference program there are several sessions about sustainability and exhibitors we always challenge to have innovations to stimulate this circular economy.

We believe that an event like VICTAM, where so many people from different parts of the world come together can contribute to the environment goals.

6. In your experience, what's the most important factor for a successful networking event?

Obviously, the most important factor for a successful networking event is to meet the right people. Meeting people with the same interests, meeting people who can help you with a need, problem or question. The more of these contacts the better it is. If you can combine these meetings, with seeing the solutions, feeling a machine and listening to interesting sessions you have a successful networking event.

7. What would you say to professionals, producers and manufacturers that are yet not participating in any networking event to encourage them?

We believe that our event in Sao Paulo this October will be a big success. Around 150 companies already signed up, which exceeded our goals for this first event. This will be an event for the whole continent, and we already see quite some registrations from feed mills and pet food producers from several countries from South America. It will be a complete event where companies will meet potential and existing clients from the whole continent.

To all feed mills, cooperatives, self-mixing farms and flour processing companies, please register on line and check out the event. Visiting the event will be a one stop experience where you see the latest technology from all over the world, innovative ingredients for nutrition and a very diverse conference program for all kinds of topics.



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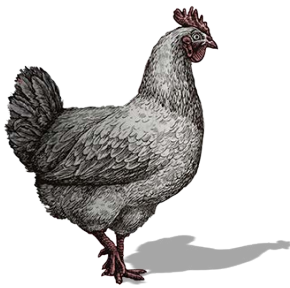
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POULTRY BY-PRODUCTS FROM REFRIGERATORS AS POTENTIAL INGREDIENTS FOR PET NUTRITION

By Msc. Josiane Aparecida Volpato

Poultry meat is the most consumed food of animal origin and represented 40% of world meat production in 2020, with the United States being the largest producer and responsible for 17% of this production, followed by China and Brazil (FAO, 2023).

In 2022, Brazil slaughtered 6.1 billion birds, which corresponds approximately to a volume of 12.89 million tons of carcasses produced in inspected establishments (IBGE, 2023). Of these, 4.7 million tons of inedible fresh by-products are transformed into approximately 693.3 MT of poultry offal meal (HVA), 506.1 Mton. of poultry fat, 593.6 MT of feather meal and 118.2 thousand tons of blood meal, a process known as rendering (ABRA, 2021).

To transform these by-products into flour, these products are sent to specific processes. In the case of viscera, it must be processed the same day, or in a maximum of 24 hours, as regulated by the Normative Instruction 34/2008 of the Ministry of Agriculture. Thus, all the visceral content, not intended for human consumption, is transported from the slaughterhouse to

the “fat plant” (the name given to the establishment responsible for recycling the material), also known as the “rendering plant.”

The offal rendering process undergoes heat treatment in digesters, which cook the material until much of the water present in the fresh offal evaporates, reaching the frying stage. The total processing time is approximately 60 to 90 minutes, with greater variations, depending on the characteristics of the material processed. After this cooking time, the dough is unloaded in a place to extract part of the oil from the dough by gravity, known as a percolator. After, the dough is pressed to remove excess oil, then milled, and the process is completed, giving instead of poultry offal meal.

In general, poultry offal meal is an excellent source of

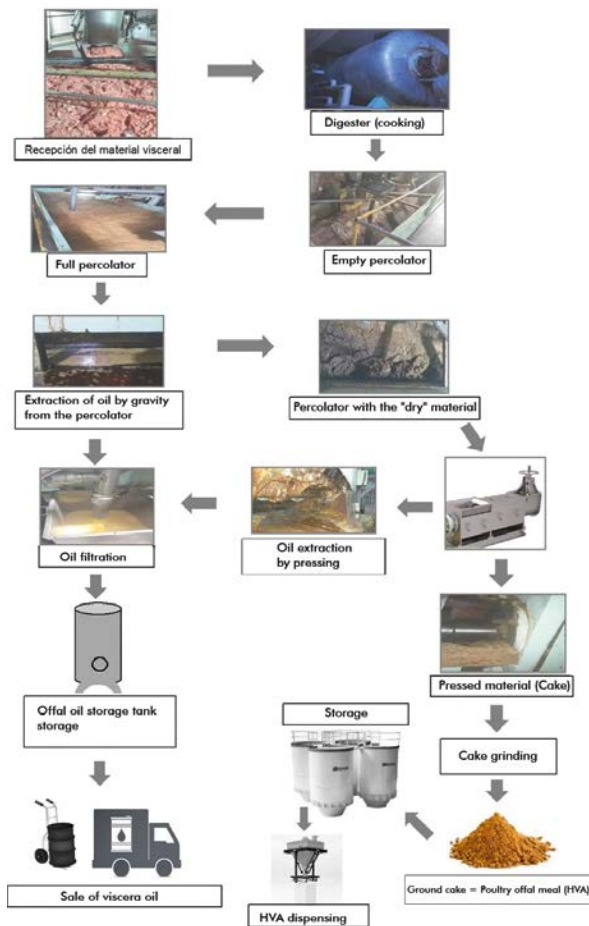


Figure 1: Production flow diagram of a "rendering plant."

essential nutrients for non-ruminant animals, with 60 to 70% protein, considered a good quality protein because it has a good amino acid profile and digestibility, it is rich in minerals (calcium, phosphorus, potassium, iron) and contains an average of 10 to 14% fat, rich in omega-6 fatty acids.

However, due to the quality of the visceral raw material and the forms of processing, there are currently some classifications for poultry offal meal on the market, which are:

Standard viscera meal: a product resulting from the processing of poultry viscera that allows the inclusion of bone parts (heads and feet).

Meal of viscera with high ash: the product obtained with the inclusion of mechanically separated meat residues (CSM). It has a lower cost compared to other types, however, by presenting a high percentage of mineral matter, it limits the inclusion in the formula.

Low ash offal meal: a product composed solely of visceral material, where the inclusion of heads and legs is allowed, as long as it does not exceed the maximum level of mineral material allowed. It is highly sought after by the pet food industry due to its nutritional quality, and it has higher levels of inclusion in formulations.

Hydrolyzed viscera meal: a product obtained by adding enzymes (proteases) during the processing of the raw material, together with a controlled and less aggressive thermal process.

Thus, with the application of proteases during the process, lysis occurs, which means the "breakdown" of proteins, releasing bioactive peptides that can benefit animals (McCalla et al., 2008). In addition to having other bioactive and functional properties such as antioxidant and ACE (angiotensin-converting enzyme) inhibitory activity, it is also widely used in hypoallergenic food formulations.

A study with hydrolyzed chicken protein in dogs with dermatitis problems showed a 63% reduction in secretions caused by allergy (Zhao et al., 1997). Cats fed the diet containing enzyme-hydrolyzed offal meal had lower serum angiotensin-converting enzyme (ACE) activity than those fed the conventional offal meal diet (Miltenburg et al., 2021).

Another factor that can interfere with the protein quality of poultry viscera and which few processing plants analyze is the heat treatment that the visceral material receives. If process time and temperature are not controlled, the protein can undergo oxidation and complexation of the thermosensitive amino acids with other nutrients. This makes them less available or even unavailable to the animal.

However, with the advancement of industrial technology, process control has been automated and is increasingly out of human control, which has contributed to reducing variations in the process, preventing each operator from determining their ideal process point. Therefore, if it is well processed, it is possible to improve the protein quality of poultry offal meals and increase the benefits that can be added, such as meal digestibility (table 1).

The temperature and processing time of poultry offal meal

T. de process	Process T°C	Crude protein (%)	Digestibility*	Reference
127 minutes	118	68,1	72,3	Ribeiro et al., 2019
108 minutes	106	60,8	84,8	Ribeiro et al., 2019
82 minutes	98,9	66,5	89,0	Volpato et al., 2023
180 minutes	115	67,7	76,3	Bellagamba et al., 2015

*Digestibilidad In Vitro

Table 1. Digestibility values (%) of the flour depend on the processing

is high, and when foods are processed at high temperatures, a non-enzymatic browning and flavoring reaction occur, known as the Maillard reaction (Cramer et al., 2007; Venir et al., 2009), which makes possible the presence of Maillard reaction products in thermally processed flours. Therefore, it is important to identify and quantify which products and what are the effects of these products on animal health, whether harmful or beneficial.

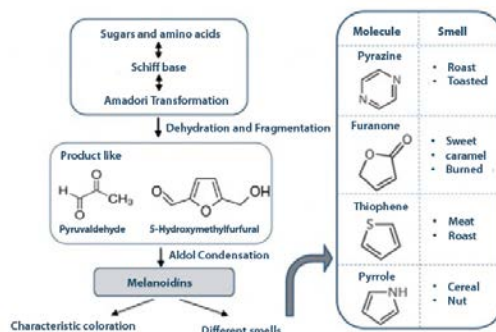


Figure 2: Schematic representation of the Maillard reaction and formation of "flavor" melanoidins in foods. Source: Tamanna and Nahmood, 2015.

One product of the Maillard reaction that has attracted attention for its beneficial effects on human nutrition is melanoidins. Melanoidins are high molecular-weight polymeric macromolecules originating in the last stage of the Maillard reaction. They give flavor, and texture and are responsible for the brown color of thermally processed foods (de la Cruz et al., 2019, Pérez-Burillo et al. 2020)).

In human nutrition, the prebiotic, antioxidant, antimicrobial, antihypertensive, anti-inflammatory, and even anticancer effects of melanoidins from various heat-treated foods have already been studied, and because it presents this variety of benefits, this compound has been considered a potential functional ingredient, despite having few studies in animal nutrition and none found in the nutrition of dogs and cats.

In a study (Aljahdali et al., 2020) which evaluated the impact of the consumption of barley malt melanoidins on the intestinal microbiota of mice, it was shown a decrease in pathogenic bacteria (*Dorea*, *Oscillibacter*, *Alisipetes*) and a predominance of beneficial bacteria (*Lactobacillus*, *Parasutterella*, *Akkermansia*, *Bifidobacterium*), suggesting a remarkable prebiotic potential of the melanoidins present in the ingredient. Another study (Serran et al., 2018) evaluated the presence of melanoidins in fish diets, which presented an increase in the postprandial antioxidant capacity of blood plasma.

There is a large number of by-products that have more or less underutilized melanoidins, such as coffee residues, distilled cane bagasse, sugar cane molasses, brewery waste, and other ingredients, which are exposed to thermal processes such as poultry entrails meal. However, what remains is to quantify these melanoidins and study their effects on animal health, since what is known is that the products of the Maillard reaction have been attributed a decreased nutritional quality effect due to lower protein digestibility and particularly advanced glycation end products, which have been associated with health problems and diseases such as aging, diabetes, and atherosclerosis.

Yet, melanoidins are high molecular weight polymers resistant to digestion, which reach the colon and are fermented by local bacteria. Due to this fiber-like effect, dietary melanoidins are associated with prebiotic properties (Morales et al., 2012; Tagliazucchi and Bellesia, 2015).

Recently, in a pilot study at the State University of Maringá (UEM), laboratory analysis was carried out to verify the number of melanoidins in a residue from the HVA process, and a concentration of 113.68 mg/g was found in this melanoidins residue. The result aroused interest in learning about the effects of melanoidins from meal processing on pet nutrition.

The first test was related to palatability and acceptability, for this a palatability test was carried out in cats using the two-recipient method, in which the diet containing melanoidins presented greater palatability, a result observed by the Intake Index, which is the proportion of consumption of food A concerning food B. In this test, the animals consumed 68% of the food (Figure 3) with more melanoidins in relation to the control food without melanoidins, where consumption was at a rate of 32%.

Ingredient Palatability Test with Melanoidins

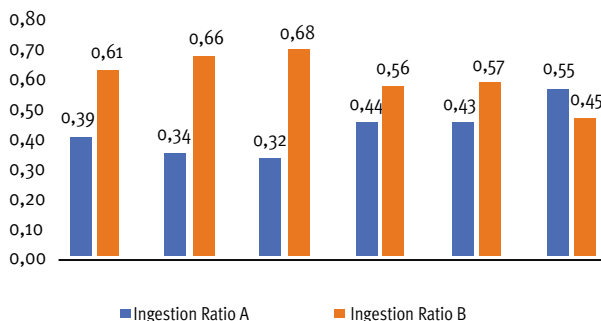


Figure 3: Palatability test of ingredients with melanoidins (CN = negative control).

Given the acceptance by the animals, the next stage of the study will be to produce poultry offal meals under controlled process conditions, changing only the process temperature to determine the effect on the formation of melanoidins (Figure 4), the preference for animals, and effects related to intestinal



Figure 4: Stages of research with melanoidins in HVA.

health.

With this study, it will be possible to characterize the effects of melanoidins in poultry offal meal on pet nutrition and include in their composition their percentage of melanoidins, which, in addition to being an accessible and good-quality ingredient for the pet food sector, it can increase the benefits of this ingredient, characterizing it as bioactive offal meal, when the level of melanoidins present is reported.

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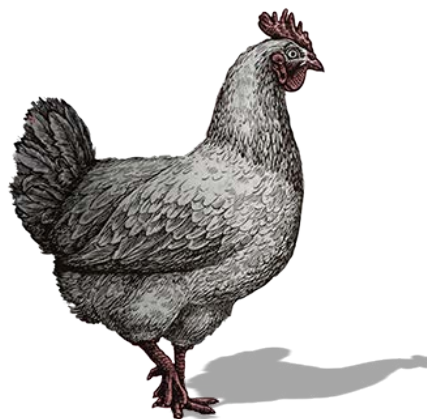
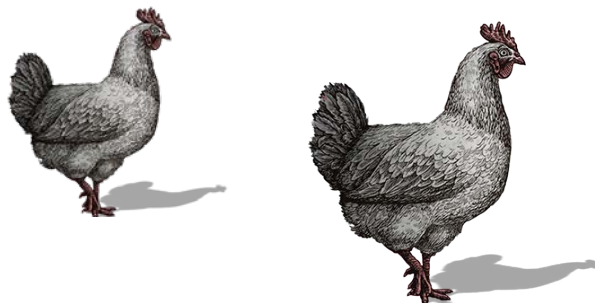
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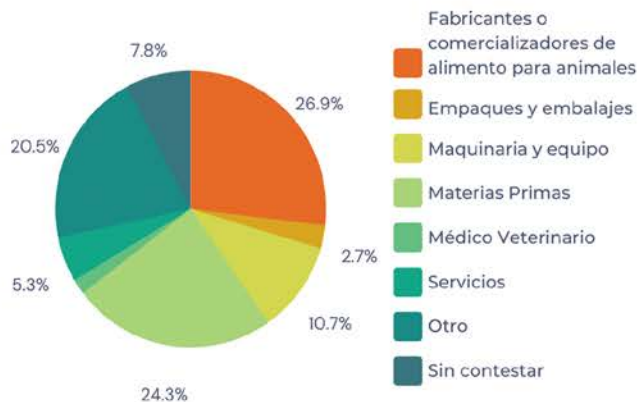
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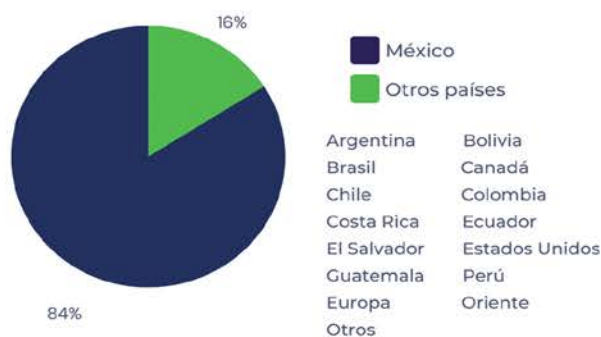
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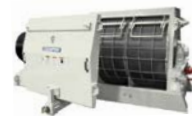
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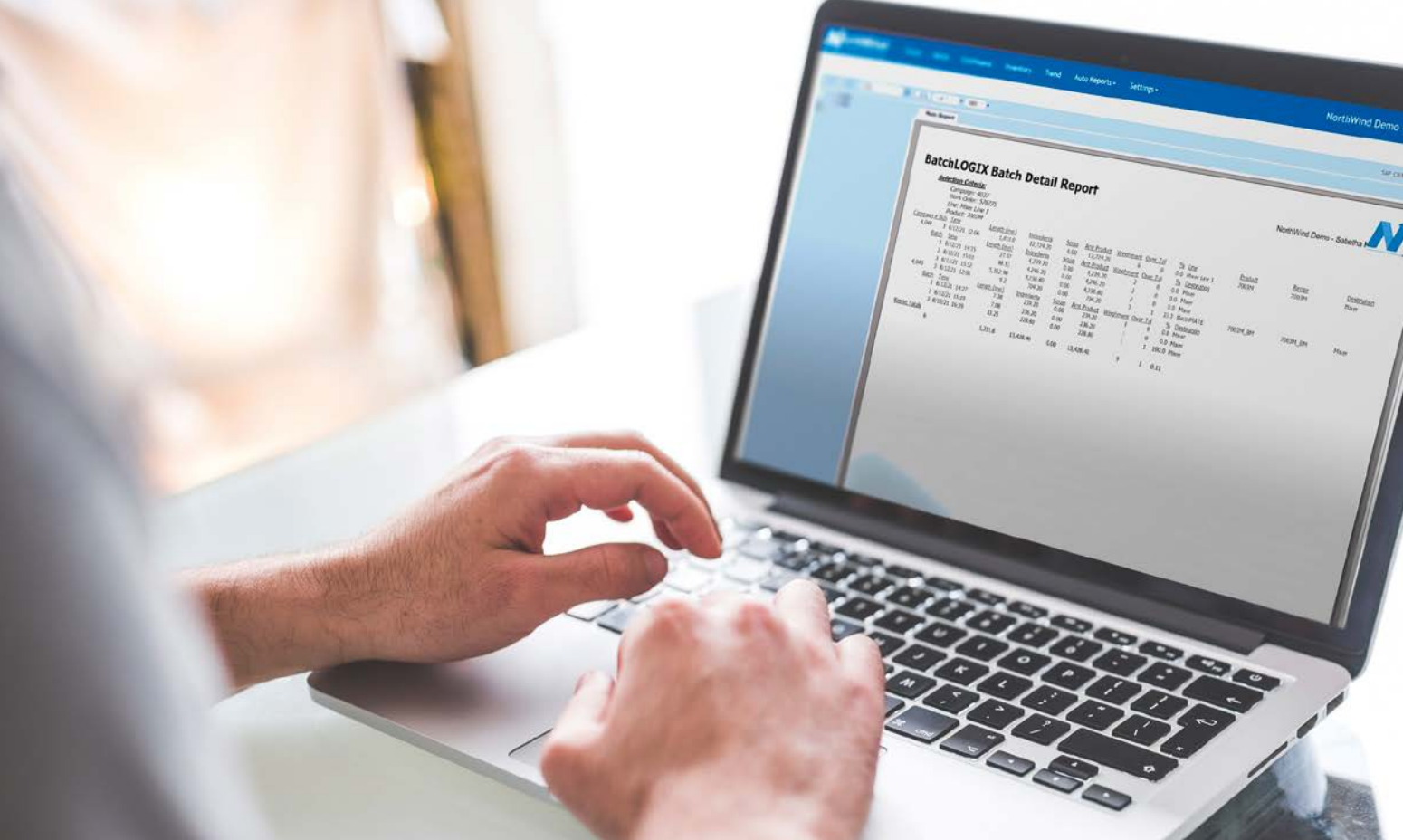
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FORMULA MANAGEMENT SOFTWARE FOR PET FOOD PRODUCTION


By Eduardo Martínez - NorthWind Technical Services

We are living in an era where pet humanization is at its highest. Pets are often viewed as being more than animals, they are considered family members. Pet owners care about their pet's diets and expect high quality and consistency in the food they feed their pets. This demand for quality pet food makes the industry more complex and competitive than ever before. The emphasis on brand consistency and transparency has made automation one of the best allies for the pet food industry.

Automation streamlines the manufacturing process and allows manufacturers to easily monitor and make modifications to the production process from anywhere. Implementing good formula management software gives manufacturers product consistency, lot tracking, and production reports, and it can be easily integrated with ERP (Enterprise Resource Planning) software for a seamless solution.

Importance of Formula Management

Implementing the right formula management software is key to maximizing plant performance. This software manages and stores all the formula information for the plant, as well as important process information for lot tracing and production analysis. This includes raw material delivery and storage, final product storage, mapping materials throughout the entire process, and important batch, campaign, and ingredient



usage details. It is worth spending time researching formula management software to ensure the package implemented aligns with your business needs.

Common Features

- Create and store recipes
- Recipe modification
- Ingredient location mapping
- Ingredient parameters
- Lot tracking
- Production records
- Campaign Management

Manufacturers often use several software packages to have these features and encompass all processes within the plant. When looking at a system that can fully handle all production needs, features, additional advanced features are needed.

Advanced Features

- Recipe modifications from the HMI
- Ingredient location mapping
- Process variables
- Micro-ingredients and micro-batching management
- Integration with ERP and MES (Manufacturing Execution System) software
- Capability of handling both batching and continuous processes

Formula management software, such as NorthWind's BatchLOGIX®, provides all the common and advanced features in one robust platform. With features such as material mapping, recipe creation, process variables, micro-ingredient tracking, and production reports, it's able to fulfill production demands. NorthWind offers additional integration that connects the plant floor to the rest of the business. By integrating with the plant's ERP system, data continually transfers back and forth from both systems for seamless and high-level business management.

Formulas

Formulas for pet food production are complex and need a robust piece of software to handle all variables and both batching and continuous processes within the plant. Often recipes only refer to the amount of each material needed, but there is a lot more that goes into establishing product consistency than simply ingredient amounts or weights. To produce a consistent product, formulas should include both ingredient and process variables and the entire production process from micro-ingredients through continuous extrusion.

Ingredient Parameters

Ingredient parameters include setpoints, rate tolerances, and upper and lower setpoint trim allowance. Setpoint is the target ingredient rate, tolerance is a percent of error acceptable, and trim allowance is the amount that the setpoint can be adjusted by the operator during production. For example, an ingredient has a setpoint of 100kg/hr, tolerance at 10%, and a trim



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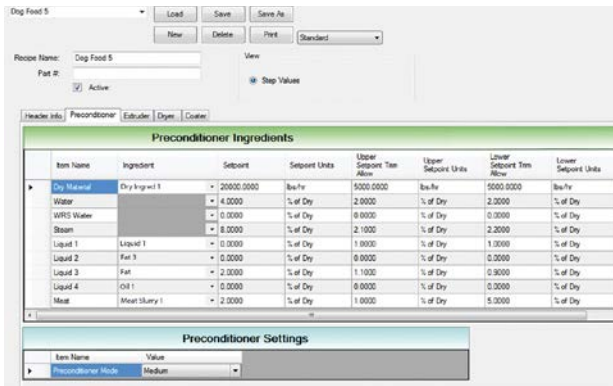


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allowance of 10kg/hr. The operator could adjust the ingredient rate and call for 110kg/hr. The actual rate could potentially be 121kg/hr and still be within the acceptable tolerance.

Process Variables

Process variables are all the mechanical setpoints on the production floor. For example, a few of the extruder's common process variables include Head Temperatures, Die Temperature, and Die Pressure. These variables are critical for complying with quality standards, making them a vital piece of the formula.

Micro-ingredients Batching

Hand-batched micro-ingredients are important and often high-dollar ingredients that play a significant role in the final product. This part of the process is often handled separately from the formula management software. Because this step is not included in the formula management and plant automation system, errors often occur during the weighing and lot tracking of these ingredients. BatchMATE® by NorthWind connects the hand batching step to the rest of the plant by automating the hand batching process and including the steps in the formulas. Once connected, BatchLOGIX can track the lots and produce production reports.

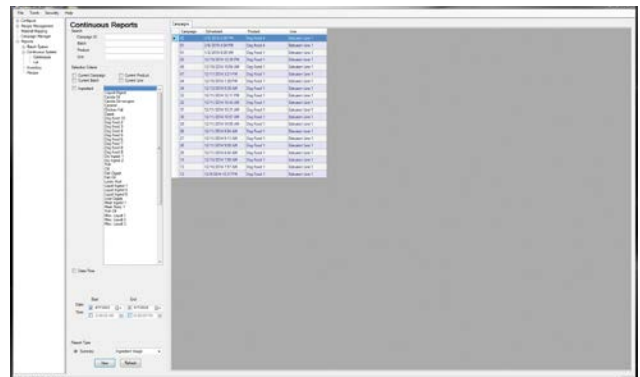
Lot Tracking

Lot Tracking is one of the most critical aspects of any Formula Management Software. The lot tracking process starts from the receipt of raw materials through the final product. By tracking lot numbers in this way, the system can pull specific lot information for each campaign and batch. This is invaluable when a non-compliant lot or a major fault is detected by the quality department. Using the information provided by the lot tracking feature, production data can be analyzed, and contaminated ingredients and products can be identified, isolated, and pulled from the batch or campaign.

Production Reports

Production Reports are key for any Formula Management Software. The information provided in these reports helps in scheduling production and can be helpful in identifying the cause of missed targets and other inefficiencies. Production reports can also identify when to schedule maintenance and other necessary stops for production. Ingredient usage and run reports are also available to ensure quality and production targets are being hit.

Some of the key benefits of good production reporting are business insights, higher customer satisfaction, higher efficiency, and better data-driven decisions.



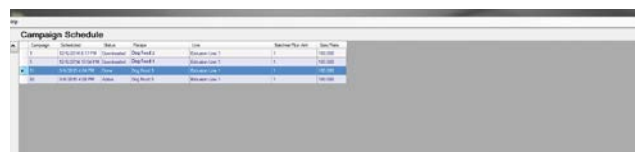
ERP Integration

Integrating the plant floor with the rest of the business allows for production data to be seamlessly used throughout the business. It is common for APIs (Application Programming Interfaces) to be written for connecting the plant floor to the ERP system.

Having the ability to share data between the different systems is a huge advantage to companies, with this they can schedule production and analyze production in real-time. When all the data is readily available, business decisions are now easily backed by data.

Conclusion

Whether scaling recipes into a batch or metering ingredients into a continuous system, quality formula management software is key to maximizing plant performance and increasing product consistency. BatchLOGIX® has the scalability to accommodate systems of any size with the flexibility to incorporate all processes within a pet food production facility.





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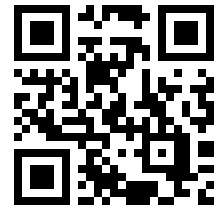
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COMPANY WITH HISTORY



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THE MISSION



How it all started

APC's history dates back more than 35 years when its scientists discovered the powerful role of Plasma-derived functional proteins in piglet immune system maintenance. Since then, they have obtained extraordinary, consistent and effective results not only in birds but also in other species. Spray-dried plasma (SDP) and red blood cell products are used in animal feed and other industries to add value through their unique properties that positively impact billions of animals yearly.

What do they do?

At APC, they help animals achieve the best performance through innovative functional proteins with a positive impact on their animal health and contribute to obtaining a quality product. Its plasma-based ingredients are functional, palatable, and label-friendly, offering feed, treats, and supplement companies the opportunity to manufacture a better quality product at better value-price relation.

Ingredients for holistic health

Dogs and cats are attracted to meat-based food and need it to achieve their best performance. Meat by-products are important ingredients that ensure meeting pet nutritional and health needs. They are backed by decades of scientific research that demonstrate a systemically proven effect, modulating inflammation at its source. Taken orally, functional plasma proteins do not interfere with the body's natural immune response to inflammation but help the immune system respond more quickly and effectively.

Connected to the world



Components



Atomized plasma AP 920

Plasma is a potent ingredient used in animal diets to support immune health which positively influence key performance measures, as well as offer benefits to processing functionality.

Product applications

Dry foods, treats, and supplements

In dry applications, plasma offers the opportunity for a different kind of functionality: supporting immune health while substituting for less desirable ingredients. To enhance health-focused dry foods, treats, and supplements, plasma is a unique ingredient with research-backed health benefits.

Moist and semi-moist foods

Plasma can be used as a quality binder for traditional manufacturing benefits, such as making gravy bits firmer, improving texture, and creating a gravy that pets like

APC IN VIDEO



<https://bit.ly/3qG0UYy>

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WET, MOIST & SEMI-MOIST PETFOOD

In wet, moist and semi-moist applications, plasma-based ingredients can be used for traditional, functional manufacturing benefits while providing a superior finished product. They help make a more homogenized loaf, firmer chunks with fewer crumbs, improves texture and creates a gravy pets love.

- Improves extruder efficiency
- Helps form a cohesive end product
- High solubility in liquids
- Improves water holding
- Improves gelling and emulsification
- Creates a thick, rich gravy



DRY PETFOOD, TREATS & SUPPLEMENTS

Choose plasma-based ingredients to elevate your health focused dry, treat and supplement products. In these applications, plasma offers the opportunity for a different kind of functionality – supporting immune health while replacing less desirable ingredients.

- Supports whole body health
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- Helps balance calcium / phosphorus from meat meals

Learn more at:
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WATCH THEM *thrive*



Cat and dog food are driving Italian market growth



According to the 16th edition of the Assalco-Zoomark Report, in 2022, sales of dog and cat food products totalled € 2,759 million in the Italian market. Compared to the previous year, sales by value were up 11.4%, influenced by the strong inflationary dynamics in all product categories. In terms of volume, more than 673 thousand tons were sold, an increase of 0.8% over 2021.

<https://bit.ly/3JKVBh3>



CPM relaunches its website and announces the acquisition of IDAH company



The group launched its new website, which with an interface more adapted to provide a great, practical, and fast user experience, presents all the solutions it offers to the market in one place. In addition, true to its purpose of Feeding, Promoting, and Building, it has completed the acquisition of IDAH, a company that offers technological solutions for the food industry.

<https://bit.ly/3NLdCNF>



CIPEU and ANFAAC come together to train the pet food industry



In May, a collaboration agreement was signed between the Congress of the Pet Food Industry in Europe (CIPEU) and the National Association of Pet Food Manufacturers (ANFAAC) to develop different activities that are the point of meeting within the framework of CIPEU 2023.

<https://bit.ly/3NYBXAN>



Ancestral philosophy in pet food



Alican presents WILD Ancestral Diet, a line of pâtés for dogs and cats. This launch brings a unique product to the Argentinian market, due to its type of formulation, concept, and design.

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