



PET FOOD MAGAZINE

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FROM MYTH TO
REALITY: IS IT A
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EDITORIAL

HAPPY NEW YEAR

With the arrival of the new year we renew energies, as well as new life and work projects. For **All Pet Food** and most of the companies in the Pet Food Industry, this year means the opportunity to meet again in person at different industry events, creating networking, as well as strengthen our ties with customers, potential customers and industry friends.

As is already known, **Ómicron** begins to play a trick on us just a few days from the IPPE in Atlanta Expo, but our planet is not the same anymore, we are more prepared from all angles to fight the new strains of **SARS-CoV 2**, so let's hope that in a few months everything will return to normal and finally this virus will no longer be a threat to human life.

As we must move on, we're planning to attend most of the industry events in the US, Europe and of course Latin America, where we will also be hosting our second edition of **CIPAL 2022**, in Buenos Aires in September, with the attendance of leading companies already confirmed and looking for visitors from the whole LATAM region and the rest of the world.

This first issue of **All Pet Food Magazine** is simply amazing as it's focused on various topics related to plant based proteins, sustainability and trace minerals, among the different nutrition trends intended for our four-legged friends.

AFB International publishes an article on the pleasure of eating in cats, as well as their preferences in food components; an investigation that includes creative methods to measure the palatability preference in cats & dogs for various types of feed, including those with multiple shapes and textures.

Due to the well-known humanization of pets and the growing trend towards veganism on the part of pet parents, ideas of food arise in line with their own values. All of this prompts pet food producers to create some plant-based pet food, but ... is this diet 100% viable? In this article you can understand the advantages and disadvantages of this diet.

In this issue we count with many articles on nutrition and ingredients, some somewhat controversial like Titanium. Anton Beynen, an industry researcher, does an extensive work where he explains its different applications and toxicity.

Certainly we can't conclude this issue without addressing some topics related to pet food processing. This time we count with an interesting article from Cablevey Conveyors, which debunks misconceptions about tubular drag conveyors. All of this and much more can be found in this new issue, which we hope you enjoy and bring knowledge to all members of our wonderful industry.

See you at the different trade shows during 2022!

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PET FOOD?

FROM MYTH TO REALITY: IS IT A VIABLE PRODUCT?

By All Pet Food

Feeding trends in humans are imposed by leaps and bounds in companion animals. The transition to veganism of many pet owners does nothing more than boost the growth of this demand in the Pet Food sector.

As we've already said plant-based Pet Food wants to step stronger. The truth is that, from science, it is not advisable to feed 100% vegan products to all Pets, as is the case with Cats, for example, who need certain nutrients that can only be obtained from meat products.

However, the humanization of Pets is increasingly evident: people—especially millennials—want to raise their animals according to their own values and ideologies. In this sense, it is to be expected that, with the trends of organic and sustainable consumption, foods that are not part of the consumption chain will be sought.

In fact, the latest 2019 statistics from the United States found that, with more than 80,000,000 Pets, there are currently more Pets than children under 18 years of age.

A 100% plant-based diet, is it viable?

The most recent study at the MDPI, conducted by Dr. Andrew



Knight, states that it is entirely possible to feed a Dog a 100% vegan diet, as long as the food chosen is complete and nutritionally balanced.

This is possible mainly for one reason: Dogs are not what they used to be. Historically they have been compared and associated with wolves, but our companions have evolved throughout the evolution of the human being. Their genetic component has been moving more and more away from what allowed comparison with wolves, which allows them to survive today—and live fully—with a type of diet that is not based on animals. Ingredients that were previously unthinkable in your digestive system, such as starch, today are even absorbed and used for energy production.

For proper nutrition, Dogs do not need meat, they need protein, fat, vitamins and minerals, all of which can be found in a plant-based diet. Today's domesticated dogs have the ability to metabolize carbohydrates, and in most cases, subsist and thrive on a diet with considerably less protein than their wolf ancestors; today dogs are not considered facultative carnivores, if not omnivores.

As cats and dogs became domesticated over time, human food waste have become more and more prevalent, inevitably leading to physiological adjustments to process more plant-based foods and components.

In addition, most pet owners who seek to lead a more sustainable life every day (which includes a plant-based diet), understand that eating certain animals and protecting others is, in short, an irony. By opting for vegan pet food they reduce the killing of living beings and the pollution that comes with the treatment of meat and the depletion of the oceans.

The most important thing to achieve a quality vegan Pet Food: proteins

The great challenge that is presented when creating vegan formulas for Dogs is the replacement of the protein provided by meat products.

When choosing which protein to include in the formula, it is not only important to consider its nutritional quality, but also its long-term sustainability since, if we are making a change towards a more sustainable and environmentally friendly food, it is prudent to ensure that its environmental impact is the least possible. Likewise, producers must take into account the availability of the product in order to obtain it continuously and supply the market with the requested demand.

Some of the most used vegetable proteins, both for humans and animals, are soybeans, peas or beans, lupins, wheat and corn. At the moment it is innovating with chickpeas, lentils and beans, and particularly it is studying the benefits and the nutritional component of two plants: duckweed and microalgae.

Both are an interesting protein source because they can be grown in water all year round, in the right climates. Due to their natural habitat, both can grow in areas where many other foods cannot be grown, so they would not compete with other agricultural activities either.

Duckweed is an aquatic plant in the *Lemnoideae* subfamily. It has a higher amino acid concentration than other plant proteins and is comparable to animal protein, including fish meal, in terms of protein content. Its main disadvantage is that it cannot be grown in very cold climates.

Seaweed, meanwhile, can be an alternative source of protein for reasons similar to duckweed. In terms of production levels, it is estimated that a single hectare of algae can produce more than 40 tons of protein, which is very beneficial. Like duckweed, you need the right environment to be able to grow them throughout the year. Its main disadvantage is that its cell walls are more durable than those of other plants, so more processing is needed to obtain its protein.

As Dogs and Cats became domesticated over time, human food

scraps have become more and more prevalent, inevitably leading to physiological adaptations to process more plant-based foods and components.

In addition, most pet owners who seek to lead a more sustainable life every day (which includes a plant-based diet), understand that eating certain animals and protecting others is, in short, an irony. By opting for vegan Pet Food they reduce the killing of living beings and the pollution that comes with the treatment of meat and the depletion of the oceans.

The acid test: palatability

As with any other Pet Food, palatability is essential, because it is they, the dogs, who will give the last “thumbs up.” The latest published data shows that very good palatability performance can be achieved using ingredients of plant origin. To achieve this, it will be essential to take advantage of flavor modulation and masking technologies to ensure that the vegetable protein has a primitive aroma and textures similar to those of meat. It is likely that the development of a plant protein alternative will require additional ingredients.

Summary

Brands and manufacturers can—and should—prepare today to meet the growing demand for plant-based Pet Food, because it is a movement that is on the rise. As Pet Food trends closely follow human trends, plant-based protein ingredients are increasingly dominating the market.

The energies of the industry will have to be focused on manufacturing vegan alternatives and of sufficient nutritional quality to be the exclusive food of the Dogs children of millennials and of all those who bet on food, human and animal, free of animal content.

Today's domesticated dogs have the ability to metabolize carbohydrates, and in most cases, subsist and thrive on a diet with considerably less protein than their wolf ancestors; today dogs are not considered facultative carnivores, if not omnivores.



CAT EATING ENJOYMENT INFORMS PREFERENCE OF FOOD COMPONENTS

Research and Development, AFB International

Many pet parents observe that when their pet is offered a meal with multiple shapes or textures, some components are left behind, and those components are perceived as less enjoyable. Cat pet parents, for example, note their cats are inclined to lick the gravy and refuse the chunks in chunks and gravy meals, which suggests to pet parents the chunks are less enjoyable.

Research at AFB International includes creative methods to measure palatability preference in cats and dogs for various food types, including those with multiple shapes and textures. Eating enjoyment is a dimension of palatability and can be interpreted by the pet's interaction with the food, and/or by what pet parents perceive as they watch their pet eat.

In a recent study, we measured multiple responses during cats' interactions with food and summarized them as Initial Attraction (First Approached, First Tasted, Duration of First Eating Bout) and Sustained Interest (Consumption, Uptake, Food Focus) to evaluate how individual food components of a chunks and gravy meal influence eating enjoyment. We found that cats indeed preferred gravy to other components of the meal, which supports many pet parent perceptions. Additionally, chunks were avoided in favor of anything with gravy, and when chunks alone were offered versus the whole chunks and gravy meal cats primarily licked the gravy from the chunks and gravy meal.

STUDY 1

Hypotheses: a) gravy alone would be preferred over chunks and gravy and over chunks alone, and b) chunks and gravy would be preferred over chunks alone. **Supported.**



Figure 1. Components of a highly palatable commercial wet food presented in two-bowl trials.

	Gravy vs Whole	Chunks vs Whole	Chunks vs Gravy
Initial Attraction	gravy	whole	gravy
Sustained Interest	gravy	whole	gravy

Table 1. Results for the most enjoyed food component by cats in 2-bowl trials. Anything with gravy was preferred by cats.

Based on the outcome of this study, we again measured cats' interactions with foods (i.e., Initial Attraction and Sustained Interest) evaluating whether they prefer to lick rather than chew their meals. To do this we blended chunks and gravy meals in a food processor to achieve a homogenous, lick-able whole meal and offered it versus the original form of food. Specific responses within Sustained Interest indicated that the blended form of the meal was consumed more than the original form, likely because it was more efficient to consume. However, collectively, the additional measures suggested that cats enjoyed the original forms more than the blended forms.

STUDY 2

Hypothesis: Cats prefer to lick rather than chew their chunks and gravy meals. **Not supported.**

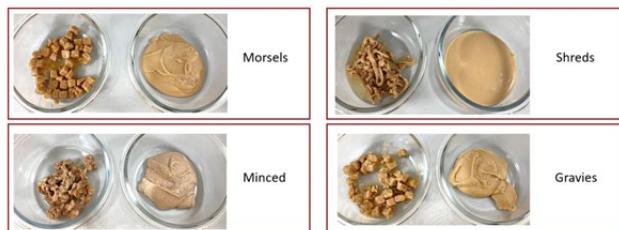


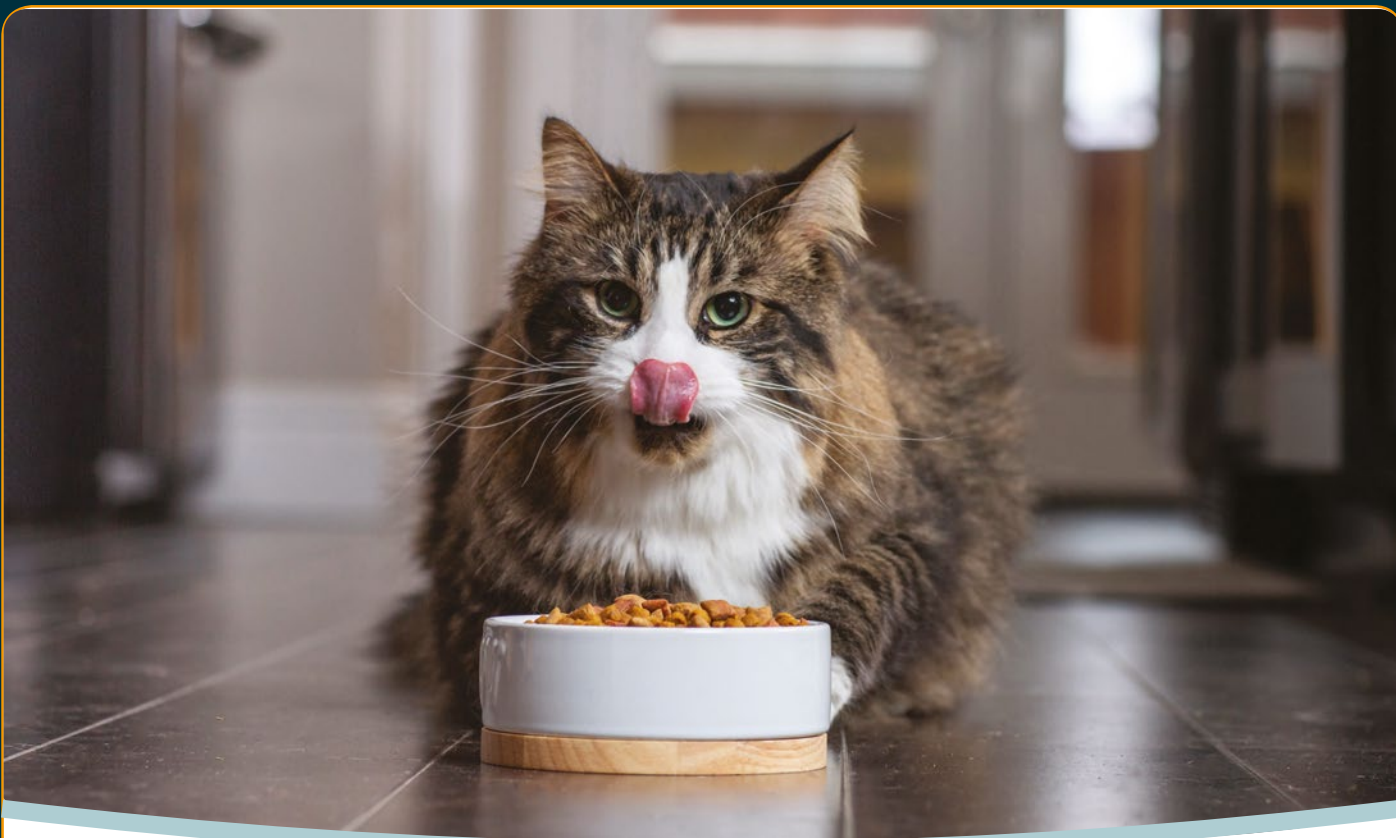
Figure 2. Blended and original (unblended) forms of four commercial products presented in two-bowl trials.

	Morsels	Shreds	Minced	Gravies
Initial Attraction	Original	Blended	Original	Blended
Sustained Interest	Original	Original	Original	Original

Table 2. Results for Eating Enjoyment in cats of blended and original forms of wet foods in two-bowl trials. In general, original forms were enjoyed more than blended forms.

Measures of eating enjoyment offer additional insight to the feeding experience of cats and dogs by describing how they are eating not just how much they eat. Here, Initial Attraction and Sustained Interest demonstrated that cats enjoy a specific component of a whole meal over other components. Unexpectedly these enjoyment measures also revealed more about our cats' eating experience: licking, although efficient, is not the primary driver of enjoyment of a wet meal.

Finally, we continuously seek to gain a better understanding of eating enjoyment as a dimension of palatability that helps to guide product improvements that ultimately provide a more satisfying eating experience for cats and their people. These methods can be applied to investigate palatability of many food matrices, such as heterogenous wet and dry foods, as well as their corresponding size, form, and texture.



DOES LICKING MEAN LIKING?

Pet parents are more likely to repurchase a food their cats enjoy. That's why cat food palatability is so important to both pet food manufacturers and pet parents.

Typical two-bowl or one-bowl trials are a valuable way to evaluate food preference and acceptance. Additionally, AFB International wanted to develop new methods to assess cat food enjoyment that would represent what a pet parent might experience at home.

To learn more about how these behavior measures can provide insight to product performance, download our white paper **"Cats' Eating Enjoyment Informs Preference for Food Components"**.



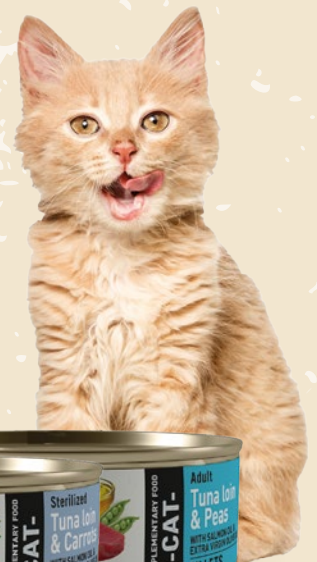
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CURRENT VISION OF FUNCTIONAL FOODS IN THE DIET OF CATS AND DOGS

By Doctor Domingo Ruiz-Canoa, Lawyer Ginés Sánchez Carrascob, Professor Marino B. Arnaoc

Cats and dogs show significant differences in the processes related to the digestion of food. Thus, while cats are carnivores, dogs appear to be omnivores like humans (Bosch et al., 2015), sharing carnivorous traits such as: salivary amylase deficiency, short gastrointestinal tract, and deficiency in vitamin D synthesis (NRC, 2006). Some studies show epidemiological relationships between food components and current diseases, of high incidence such as allergies, gastrointestinal diseases, obesity, oral health, etc. (Wernimont et al., 2020), with obesity being the most commonly observed nutritional problem in companion animals (German, 2006).

Cats and dogs have lived with humans for thousands of years (Grzeškowiak et al., 2015), leading to a strong mutual emotional bond. In today's society, human beings see their pets as close beings of emotional, therapeutic, and even psychological support, which has led to their full introduction into homes, intimately sharing the lifestyle with their guardians (de Godoy, Kerr & Fahey, 2013).

In general, most of the owners consider them as a member of the family according to some statistics (63% of these in the United States and more than 71% in Italy) (AVMA, 2012, Russo et al., 2017), proliferating coexistence with these animals; for example, in Spain there are 5.8 million cats and 9.3 million dogs in homes (ANFAAC, 2021). This trend towards humanization, especially in the urban

setting, has led to tutors selecting foods made with consumer or human-grade ingredients because they erroneously consider them as more palatable, digestible and safe (AVMA, 2012). However, such categorization is not legislated in any regulations or regulations on animal feeding.

On the other hand, companion animals are increasingly affected by diseases linked to health problems related to overweight and obesity (Theysgeur et al., 2020), such as diabetes, cancer, respiratory diseases, musculoskeletal system and skin disorders, which projects a reduction in life expectancy. The reasons and / or practices that cause these health problems in our pets are mainly:

- An excessive caloric intake due to errors or deficits in the monitoring by the owners of the recommended nutritional guidelines.
- An excessive absence or decrease in physical activity routines.
- The transmission of bad eating habits from their owners to companion animals (Marshall-Pescini et al., 2012).
- A certain confusion in the consumers before a wide and varied offer of foods.

Consequently, guardians play a fundamental role in the health of their animals, mainly through food selection, through commitment and responsibility to maintain the health and well-being of their pets, providing a nutritionally balanced diet (Grzeškowiak et al., 2015; Wernimont et al., 2020).

Today's consumers have a growing interest in knowing more about the nutritional content of foods (quantity and quality), with special detail on those nutrients that may have adverse effects on health, such as certain fats, excess sugars, some anti-feeding, etc. (Brugiapaglia et al., 2014; Realini et al., 2015). There are different studies that have shown some deficiencies in the labeling by the pet food industry of its products, the most common being: discouraged nutritional profiles, non-compliance with legislation, poor labeling of ingredients / contents (Hill et al., 2009). The correct labeling will contribute decisively when selecting a food product for pets.

Likewise, tutors look for ways to improve the health, quality of life, longevity and well-being of their companion animals, looking for foods that are most similar to human nutrition, since they tend to anthropomorphize their pets (de Godoy et al., 2013).

This context is inducing the appearance of numerous innovations in the development of healthier foods, among which the so-called "functional foods" stand out, with a prosperous future market. Func-

tional foods are those that in addition to the provision of essential nutrients (water, proteins, fats, carbohydrates, vitamins and minerals) provide health benefits when consumed regularly as part of a diet (Hasler, 2000).

In the function of foods with beneficial properties, the presence of functional ingredients (bioactive compounds, also called nutraceuticals) is key, their development being possible through strategies that allow the addition of these functional ingredients by increasing their content or limiting others that may have a negative or harmful effect. However, this new type of products, more nutritionally and functionally specialized, requires awareness on the part of the consumer, making the pet food sector responsible for transmitting the necessary knowledge so that the qualities of functional foods are understood and known.

This type of food constitutes a new category of products within pet food. In recent years, there is great interest in functional foods in the companion animal sector (Elrod & Hofmeister, 2019), even knowing that consumers are not aware or aware of their existence, transmission-understanding being fundamental of the labeling of these products for cats and dogs by consumers. The consumption of these functional foods would complement the offer of conventional products, provided that the production processes are capable of offering competitive prices to be purchased regularly.

Recently, a study has confirmed that many (the majority) of veterinarians agree with the use of functional foods when they perceive that these products are safe and effective, suggesting that a rigorous scientific rigor is applied in their commercialization (Elrod & Hofmeister, 2019).

In conclusion, companies in the pet food sector are considerably increasing the incorporation of functional foods in the diets of cats and dogs, despite the limited scientific evidence that supports its effect on these animals, so it is necessary to encourage research to determine its justification, safety and efficacy.

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TRENDS IN FREEZE-DRIED PET FOOD MIXES

By All Pet Food

Freeze-dried pet food is on the rise, and manufacturing companies and laboratories are constantly looking for ways to improve the final product to stand out in such a competitive market. And so, like the food industry itself, the pet food sector is undergoing significant changes as a result of changes in the lifestyle of owners and their pets.

The general market trend has been, for some years now, moving towards the development of foods specially designed to treat the most common problems and conditions of pets: digestive problems, in the joints, sensitive skin and coat and obesity, for example. In this sense, freeze-dried pet food is a great ally.

But what is really freeze-dried food?

Freeze drying is a process similar to dehydrating food; It is carried out with the aim of increasing its durability and nutritional quality. This special way of drying the raw material eliminates the water thanks to the product freezing, the pressure is reduced and the water it contains is sublimated by converting it into water vapor. The great benefit is that there is almost no loss of nutrients.

The truth is that, as pet owners seek new ways to perfect their pets' diet, the integration between mixers and supplements has increased: from pork, pumpkin and turkey to blueberries and green New Zealand mussels, we find every day more variety in pet food components.

Thus, it can be said that consumer trends continue to move towards preventive care and diversification of food.

Mixers are freeze-dried supplements that can be added to typical croquettes or patés, or they can be served alone as a healthy snack. These recipes typically do not contain grains, gluten, corn, wheat, soy, or by-products such as growth hormones, antibiotics, artificial colors, flavors, and preservatives.

- 17% of those surveyed said they are buying dog food toppers,

mixers and add-ons, while 14% do so for their cats.

- 18% of those surveyed agreed with the use of mixers and toppers at meals.

The reception of these new accessories is still small but it will be more and more positive.

What is the relationship between freeze drying and mixers?

In this way, there are two main factors that relate them:

Freeze drying is a "safe" process to increase the confidence and bond of pet owners with these more specialized products. It is a safety test that allows them to be more open to trying food options other than croquettes.

Although freeze-drying is a process that increases the price of dry feed, you can take advantage of its benefits by diversifying meals with freeze-dried options such as mixers or snacks to add a new variety of food. To achieve this, we need, from the industry, to create greater awareness about the benefits of a rotating diet and the intake of a wide range of nutrient sources.

"Pet lovers are beginning to understand that pets, like people, can enjoy a diverse diet instead of always consuming the same food." Keith Arnold, (<https://www.linkedin.com/in/keitharnold1/>) from Champion Petfoods

Mixers and toppers, beyond the nutritional benefit

Pet food is always aimed at providing complete nutrition. However, with the new supplements such as mixers or toppers something remarkable happens: beyond the fact that they provide a wide variety of different proteins, they are a sign of affection for pets.

The factor by which they are booming is because, quite simply, they are a product that has managed to be the most convenient, they fulfill more than one function: they are a new experience for pets, they are a pampering on the part of their owners, and they are an improvement in the nutrition of the animals.

Plus, they are a great way to hide the smell of supplements, and this is especially good for animals that are a little... exquisite.

They are also very practical for cases in which pets need more

than one supplement, since, for example, thanks to a single topper, a supplement for joints, bones, probiotics and improvement of the digestive system can be incorporated.

The wide range of uses that freeze-dried foods offer is appealing: they can be used as a food on its own, as a food supplement, or even as healthy snacks.

Companies that innovate with freeze-dried food

Some of the companies that are already encouraged to innovate and implement lyophilization in supplements and toppers are:

- **Instinct** (<https://www.amazon.com/-/es/motivadores-Instinct-incluye-recetas-natural/dp/BooYWPHTK?th=1>) offers a variety of mixers and freeze-dried dry food of different flavors and protein qualities.
- **Wellness Natural Pet Food** (<https://www.amazon.com/-/es/motivadores-Instinct-incluye-recetas-natural/dp/BooYWPHTK?th=1>) offers its mixers under the motto "no more boring bowls" and toppers to supplement the diet with protein without cereals, based on 100% raw frozen food.
- **Stella & Chewy's** (<https://www.amazon.com/Stella-ChewyS-Freeze-Dried-Mixers-Grain-Free/dp/BooN24oSQ2>) presents mixers to complement dry feed both in nutrition and in taste and palatability.

More and more people are adopting or buying pets; it is a number that is increasing worldwide. This is due, in part, to the increase in individual dwellings and the delay in paternity and maternity of the new generations.

Today, freeze-dried foods, toppers and mixers represent the greatest growth opportunity for companies both large and small in the industry.

It remains, then, to bet on continuing the development of this type of product that will bring mutual benefits: better nutritional quality and palatability for pets and an increase in sales and the pet food sector for manufacturers and distributors.

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TRACE MINERALS IN PET FOOD: WHAT ARE THEIR BENEFITS AND CHALLENGES?

By All Pet Food

Trace minerals or trace elements are a component that takes more advantage every day in pet food formulas. However, there are conflicting positions!

In this article we analyze the types of trace minerals, the different voices, advantages and disadvantages of incorporating this ingredient into pet food recipes.

Pet owners, and especially millennials, are increasingly interested in providing the best nutrition, care and quality of life for their pets. In this sense, trace elements such as zinc, copper, iron and manganese are an essential part of this formula for well-being, since they play a key role in cellular functions, oxygen exchange and other bodily processes.

What are trace elements or trace minerals?

Trace minerals are elements that are required in very small amounts to achieve a balanced diet, but which have a wide range of benefits for the proper functioning of various systems such as the immune system, musculoskeletal, skin and coat health, for example. Some of them are zinc, copper, iron and manganese. In the animal world, it must also be taken into account that the trace elements

necessary for dogs and cats are not the same.

When we talk about the incorporation of these components into a pet food formula, 2 aspects should be taken into account:

- The shape of the mineral offered.
- The amount provided.

These data significantly influence the bioavailability of the mineral in the animal's body.

Forms of the minerals offered

Inorganic

They are generally found in the form of sulfates or oxides. They are relatively soluble. Since many reactions that occur when ionized make them unavailable, inorganic trace minerals are often inefficient and must be supplied in greater amounts. As they come from

extracted sources, safety and traceability must be part of the quality assurance process to avoid the inclusion of heavy metals which, if present in a diet, can be harmful to health.

Organic

These can be divided into complexes and chelates:

Complexes

They are compounds that help keep the mineral stable or non-reactive and available for absorption.

Chelates

These have more bonds than complexes, which improves stability while preserving their availability to be absorbed if necessary. This increases the likelihood that the mineral will reach the small intestine in a way that it can be absorbed.

Trace minerals, an element of interest (and controversy)

Trace elements are a component that is equally interesting and confusing in the pet food industry. Historically, pet food formulas have relied on extracted or inorganic minerals to reach nutrient levels recommended by different associations, such as the AAFCO.

What happens, as we previously discussed, is that inorganic minerals are difficult to absorb, which is why additional amounts used to be added. Voices against this practice claim that this approach does not necessarily meet the real needs of pets, especially in the stages of infancy, pregnancy, or old age.

Seeking to transition to organic trace elements

The truth is that organic trace minerals are the most natural and the best option for pets. Opting for this option in food formulas facilitates the availability and absorption of its nutrients.

However, the use of inorganic minerals has become widespread throughout the food industry (and not only for pets), which, although they are in common use, are often ineffective.

Organic minerals have high stability, so they work better, they resist much more in the digestive tract, and as a result, the animal's body can absorb what it needs. Minerals are essential, but if they are ingested in excess, they can cause toxicity.

Why are inorganic trace minerals poor in absorption?

The structure of the inorganic mineral makes it interact with other components during the digestion process. As a result, it forms an indigestible complex that eventually ends up outside the body without being absorbed.

This is equivalent to poor bioavailability because, even though the food has trace minerals, they cannot be used by the body.

The form in which the trace mineral is present can influence the absorption of other nutrients in the intestine, such as:

Impact on the stability of vitamins

The oxidation of vitamins, such as vitamin E, can lead to a reduced vitamin function and, the cause can be the oxidation of fats by the action of trace elements.

Compromised antioxidant function

Research has confirmed that commonly used antioxidants can be compromised by inorganic minerals. In cases where the mineral bond is weak, there is a significant negative impact on antioxidant activity.

However, and despite the possible complications of the use of trace elements, various studies insist on verifying the great benefits of their use and incorporation in pet food formulas.

The latest published study, which was completed in 2020, lasted 12 weeks and included 46 older dogs between the ages of 7 and 14 with an average age of 9.8 years.

It looked at skin and coat health, hair growth, activity levels, weight, and body condition. They were observed, after a period of feeding them with formulas containing organic trace minerals, an improvement in all the aspects mentioned above.

Summarizing we can say that today's pets are part of the family, and thanks to the relevance they have gained over the years, the industry has invested more and more resources in improving their quality of life. In this sense, food has become a priority factor for those owners who seek to provide their four-legged friends with the best on the market.

With regard to today's topic, the responsibility of producers is to keep trace minerals as available as possible for their proper absorption, and preferably to use them in an organic format, in order to ensure successful nutrition and avoid any risk of intoxication.

Definitely, continuing to work on optimizing nutrition by trace elements will lead to healthier pets with stronger and longer-lasting immune, musculoskeletal and gastrointestinal systems.



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SUSTAINABILITY IN THE PET FOOD INDUSTRY

by Juan Manuel Peralta

In recent years we have witnessed an important incorporation of the concept of sustainability or sustainability in the highest level strategies of corporations, medium and small companies and national states. Each one with different degrees of practical execution, but all promoting changes and questioning the current paradigms of production, distribution and consumption of the goods that society requires to run properly.

The pet industry can't break free from this reality and innovations are being incorporated aimed at increasing sustainability and reducing the environmental impact of responsible pet ownership.

The deployment of these changes are taking place simultaneously at various organizational levels. Starting with the most formal level, all the national ones have approved laws to control industrial activity to minimize its environmental impact, in our country there is a national framework and provincial regulations, all these laws are mostly based on the sustainability objectives of the United Nations, and are the guiding framework for the other organizational levels.

Then we have several examples of second-degree institutions such as business chambers or federations, non-governmental organizations such as ISO or foundations dedicated to sustainability and certification bodies. At a more basic level are companies of various sizes, among which transnationals are clearly ahead.

It is worth to set apart between companies that produce general goods or services and the emergence of new companies that provide goods or services specifically related to sustainability, such as The Ocean Clean Up, a company whose objective is to remove floating plastic from rivers and oceans around the balloon. Finally, and not least, it is the decentralized organization of citizen-consumers, who have also incorporated new behaviors and fundamentally consistently demand greater environmental care from companies and governments.

Now, what are the specific guidelines and concepts that apply to

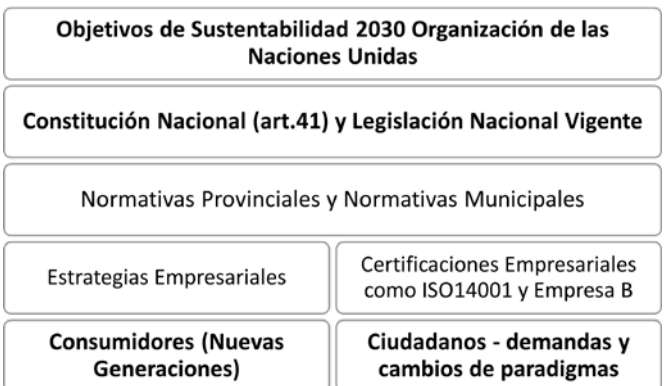


Figure 1: cascade of relationships between the different international commitments, national legislation, business strategies and demands / new behaviors of citizens around the new vision on business sustainability.

the pet industry and its social relationships

At the legal level, all companies in Argentina must comply with the regulations derived from Law 25675 (2002) National Environmental Policy, on the other hand, there is already specific legislation on climate change Law 27520 (2019) Adaptation and Mitigation to Climate Change . Each province and municipalities also got some specific regulations that are those of effective compliance for the operation of production units. The management of gaseous emissions, liquid effluents, industrial and hazardous solid waste, are

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Complexity	Low	High
Operating Cost (\$/M Ton)	1.08	2.80

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some of the key aspects for obtaining the Environmental License, a document that indicates compliance with the legislation.

In the business field, additional certifications have emerged that seek, in addition to complementing, to some extent exceed current regulations to achieve an organization oriented towards sustainability in all its operations and business strategies. The most important are the ISO 14001 Environmental Management System standards and the certification as Company B, which implies changes in the same structure of the corporate contract to include caring for the environment as a business objective at the same level of importance as the profit itself.

Of all concepts that have emerged from this new way of thinking about our activities, perhaps the most important on a practical level are the Environmental Impact Analysis and the Life Cycle Assessment. The first focuses on determining the individual incidence of an operation or ingredient with respect to standardized environmental indicators such as the emission of greenhouse gases or the contamination of bodies of water. The second monitors the entire life cycle of a manufactured product, from the purchase of its ingredients to its final disposal as waste. Both concepts help to make practical decisions and carry out objective evaluations of our industrial activities to constantly and significantly reduce the negative environmental impact, but also to increase the positive one.

Let's check the sources of information on environmental impact of the pet food industry. The most important study carried out to date was by FEDIAF (European Pet Food Industry Federation). The study did a thorough analysis on the value chain of our industry with the concept of "cradle to grave" (from the cradle to the grave, literally or the entire life cycle as it is usually used in Spanish).

The first important point to highlight are the standardized impact factors assessed:

1. Climate Change–Biogenic Climate Change–Climate Change, Use and Transformation
2. Particulate Material–Acidification–Eutrophication and Pollution
3. Water use–Land use–Fossil resources

On the other hand, the value chain was divided into four areas:

1. Ingredients
2. Manufacturing
3. Packaging
4. Use and Final Disposal (landfill, recycling, reuse)

Finally, it should be mentioned the dry and wet products for cats and dogs were all analyzed separately. Since the results of each impact factor are expressed in very different units, a qualitative comparison of each area is presented as a percentage.

Figure 2: Comparative graphic analysis of the study on the environmental impact factors carried out by FEDIAF for the pet industry in Europe. Percentage environmental impact of each of the four areas of the value chain in the four types of food, in which the category was divided to conduct the study.

The result of the analysis makes it possible to clearly differentiate between wet and dry food. Thus, for example, pet foods got a greater environmental impact due to the ingredients that compose them, and in wet foods the impact of the packaging increases in percentage, mainly due to the fact they are packaged in smaller containers.

Another interesting fact that emerges from the study is the four areas of the industrial chain, the ingredients are the ones that have the greatest combined impact, and in particular they contribute to Climate change and the Eutrophication of waterways.

Figure 3 and 4: Dry pet food./Wet pet food Quantification of the impact of each area of the value chain on the different environmental factors studied. As can be seen, the ingredients have the greatest environmental impact in this type of product.

These important conclusions emerge from FEDIAF's analysis:

- Ingredients have the greatest impact in the environmental of our industry, the generation of those ingredients in reality, and especially those of animal origin. For example, beef has an environmental impact on the climate change factor—greenhouse gas emissions that is 10 times higher than that of soybean oil, to take just two examples. (See figure 5). In dry foods, the contribution of ingredients to environmental impact is significantly higher than in wet foods.

Figure 5: Greenhouse gas emissions with impact on climate change in the production of various foods. Source Our World in Data, official database of the University of Oxford used by the UN to monitor the progress of the 2030 sustainable development goals.

- Packaging has the second highest weight in pet food manufacturing considered only the materials. In the case of packaging, its impact is due to the consumption of fossil resources and contribution to climate change, but also to the emission of particulate material. The contribution of packaging is significantly higher in the case of wet pet foods, since they use smaller containers and the proportion of packaging in the product is higher.
- Distribution is in third place as the area with greater impact on the environment, mainly due to the consumption of fossil resources, the contribution to climate change and the pollution of water courses. Being its relative impact a little higher in wet pet food than in dry pet food.

From the conclusions of the FEDIAF study it is evident that any serious initiative to reduce the impact of our industry on the environment must include ingredients and packaging, analyze two practical cases to exemplify the use of the concepts defined so far in the real world,

Changes in the packaging, and please don't confuse recyclable with low environmental impact. In 2019, North American pet food company Earth Animal considered a packaging change for its dog food Wisdom®

I wanted to understand the total environmental impact of three different flexible packaging options:

- Biological base (your existing packaging)
- Traditional multi-layer petroleum-based plastic
- Monomaterial ready to recycle

Through the services of the non-governmental association Pet Sustainability Coalition, the main benchmark in sustainability for the pet industry in the US, a comprehensive Life Cycle Assessment was carried out in order to compare the options.

The main summary is without a correct life cycle assessment an incorrect decision would have been made. Figure 6 shows a summary of the results of the life cycle assessment that was used to make the final decision.

Figure 6: Earth Animal compared the impact of fossil fuel use, greenhouse gases, and water consumption throughout the life cycle of three different packaging options. Results for every 11500 bags of 500g capacity.

As can be seen in the graphical analysis, although the bio-plastic that the company currently uses consumes a little more water during its production, it consumes fewer fossil resources in its preparation and emits less greenhouse gases. With which it is clear that bio plastic continues to be the best option globally analyzed. An important point to consider is that, through a complete life cycle assessment, it becomes clear that a recyclable material is not always the best option to make a change.

Reducing the impact of ingredients in the pet food industry.

Another case analysis carried out by the Pet Sustainability Coalition for Josera, a US pet food company, was carried out to compare the impact of two different ingredients in a hypoallergenic formula-

tion, taking into account not only the impact of the ingredient itself, but also the of its production and transport.

Figure 6: Comparison of the impact on greenhouse gas emissions with a negative impact on climate change for two formulations of a hypoallergenic product from the North American company Josera. The environmental impact was calculated taking into account all stages of the life cycle of each ingredient, from its production on the farm to its transport to the pet food factory. Data from the Pet Sustainability Coalition.

The conclusion of the study carried out by the Pet Sustainability Coalition for Josera is that the formulation of a food to reduce skin allergy problems based on insect proteins is 82% less environmentally expensive for the planet than a product based on lamb proteins. While the relative impact of the plant and mineral ingredients that make up the insect meal formulation is higher, the environmental footprint of insect protein is only 18% that of lamb. Therefore, the total environmental impact of the insect-based product is a lot lower.

It should be noted that insect proteins and plant proteins have a significantly lower environmental impact than proteins of animal origin, especially those of beef. That's why a real way to reduce the environmental impact of our industry, especially the emission of greenhouse gases, is to replace animal protein sources with vegetables and insects, which emit less greenhouse gases, use less surface area, soil and less pollute waterways.

Finally, we will briefly analyze a recent article that allows us to put the impact of the pet food industry in context. The study is only for dry foods so the total values of the industry added to wet foods are higher.

Figura 4

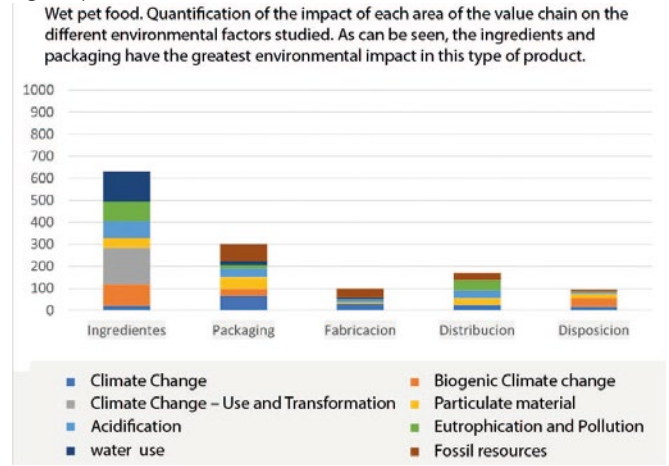


Figura 5

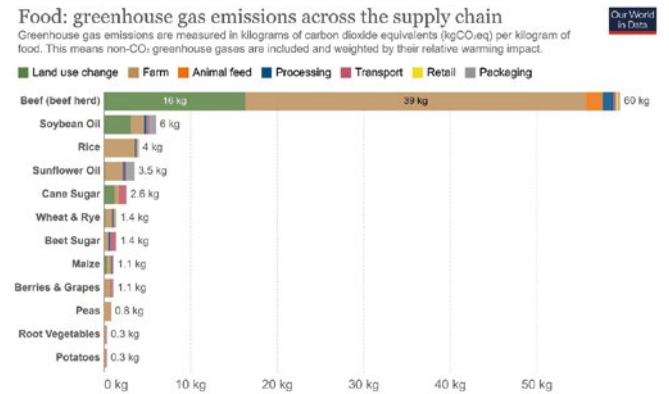


Figura 2

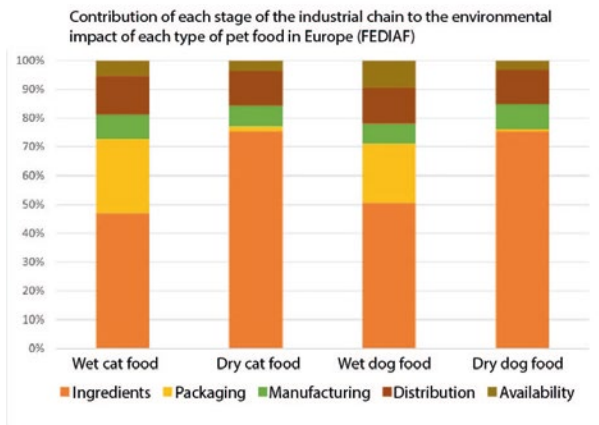


Figura 6

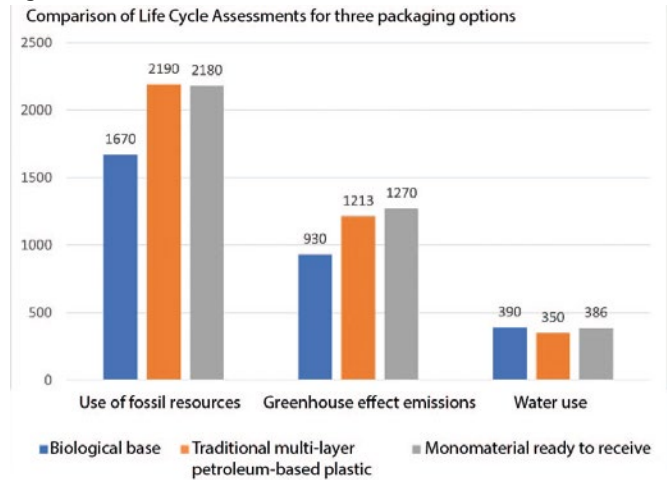


Figura 3

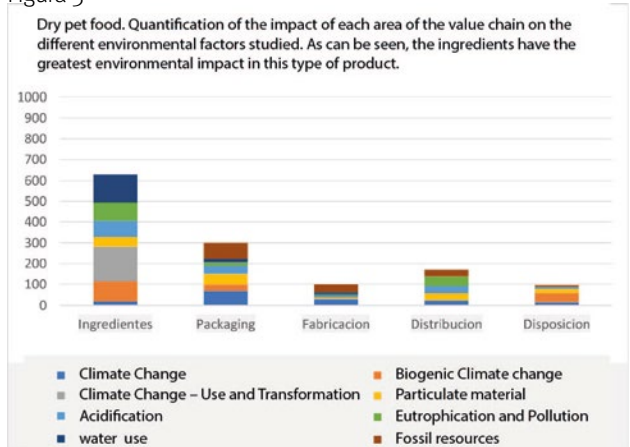
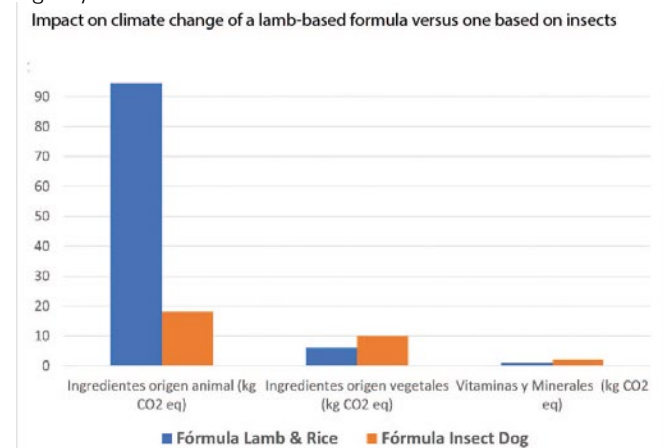


Figura 7





PET FOOD PROCESSING: DEBUNKING MISCONCEPTIONS ABOUT TUBULAR DRAG CONVEYORS

By Del Williams - Cablebey Conveyors

The cable and disc systems gently and precisely convey pet food blends for a wide range of conditions

In the pet food processing industry, walking onto the production floor with conveyor tubes winding this way and that, in and out of machinery can seem to visitors like they have stepped into a Dr. Seuss book or Willy Wonka and the Chocolate Factory movie.

For example, at a glance even industry veterans can be challenged to distinguish whether the conveyor tubes they see are screw (augur), pneumatic, vacuum, aeromechanical, tubular drag chain and disc or tubular drag cable and disc, unless they are the plant engineer or maintenance crew. In fact, many specifiers, architects, engineers, and other professionals lack substantial technical or hands-on experience with such conveyors.

This knowledge gap can result in extreme consequences when delicate pet food or precise blends must be reliably conveyed but instead, costly product destruction or inaccurate blends occur.

Misconceptions about tubular drag cable and disc conveyors will be the focus of this assessment, addressing six widely held viewpoints in the industry.

Tubular drag cable conveyors gently move product through a sealed tube using a coated, flexible stainless-steel drag cable pulled through on a loop. Solid circular discs (flights) are attached to the cable, which push the product through the tube without the use of air. These conveyors excel in transporting delicate, precise blends for a wide variety of pet food types in versatile layouts and configurations.

Misconception #1: These Conveyors are the Same as a

Screw System

“One of the most common misconceptions is that tubular drag cable and screw conveyors are identical, which is far from the case,” says Karl Seidel, marketing director of Cablevey Conveyors, a mechanical conveyor manufacturer that serves the pet food, specialty food, coffee, powder, and nut markets.

Screw systems, also known as auger conveyors, typically utilize a helical blade that moves granular materials within a tube. However, augurs can cause product damage and compromise blends. So, the units tend to be an option when material integrity is not critical, such as when conveying food waste.

Seidel notes, *“The key difference to look for is that augurs convey material with a helical screw. The transfer speed is directly proportional to the rotation speed of the screw. On the other hand, tubular drag cable conveyors transfer material between two discs pulled by a sealed cable and are designed to protect delicate products and blends.”*

Misconception #2: Conveyors Are Not Designed to Protect Blends and Mixes

When transporting a blend of pet food product or supplement with a conveyor system, maintaining a consistent mix ratio is essential, whether a coarse mix, fine powder, or larger variable-sized amalgams of different weights and shapes.

However, conventional conveyor systems are not specifically designed to precisely transport pet food blends without changing

the mix ratio. Various product material weights, sizes, and shapes can shift and disperse in open systems like bucket conveyors, and vibration can cause the blended product to shift throughout transport. Vacuum and pneumatic systems can cause smaller lightweight particles in a blend to move at different speeds than heavier or larger particulates, resulting in significant blend restructuring when the product reaches its discharge point.

In contrast, tubular drag cable conveyors are engineered to maintain precise blend ratios, which can be important to pet food industry professionals such as nutritionists and quality control experts. As an example, according to Seidel, the company's engineers have resolved the issue with a completely enclosed, compartmentalized tubular conveyor system.

"Not unlike an endless succession of train cars, each space between solid circular discs holds a predefined volume of product. Based on the manufacturer's specifications and requirements, engineers can calculate the optimal speed of the system, the most appropriate tube angles, and the proper construction design to guarantee their blended product remains consistent from input to discharge, even at high volumes," says Seidel. His company has designed, engineered, and serviced enclosed cable and disc tube conveyors for 50 years in over 66 countries.

Misconception #3: Conveyors Cannot Carry Moist, Hot, or Frozen Material

Tubular drag cable systems like Cablevey's convey pet food materials in a wide variety of forms and states including whole, powdered, pureed, chopped, moist, hot, and frozen with throughput rates up to 80,000 pounds per hour. The systems can convey material with high moisture content when some water is being conveyed

along with the product.

While the tubular conveyors are constructed of plastic components, the standard units are designed to operate at 180° F (82° C) with a high-temperature option up to 230° F (110° C), so can receive the product from ovens, fryers, or dryers, according to Seidel. Even frozen products can be conveyed, although it is important that the temperature is controlled along the path, so no melting occurs with water freezing later in the system.

Misconception #4: Conveyor Footprint and Expansion Limitations

Some in the pet food industry do not consider tubular conveyors because they mistakenly believe that the systems cannot fit within their facility's available space or accommodate its layout, which may include significant inclines or elevation changes. However, this is not the case.

Modular systems like tubular drag cable conveyors are an excellent option for complex layouts that could require curves or changes in direction, according to Seidel.

"Tubular conveyors do not have to be installed at 90 degrees and can use angles so can go in between, around, above or below existing equipment or other obstacles. That is important for existing facilities that may not have the flexibility to move something out of the way," says Seidel.

In addition, tubular conveyors are quite space efficient. Seidel notes that to conserve space, the conveyor turnaround and its inlet can stand on end, so it is only one foot across instead of three. If conveyor discharge occurs best using gravity, tubing can be run

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Misconception #5: Cleaning Requires Dismantling and Extended Downtime

Between product changeovers, many traditional conveyor systems must be disassembled, cleaned, or soaked, and then reassembled – a labor and time-intensive process. However, this is not necessary for tubular conveyors.

With tubular conveyors dry, wet, and in-line cleaning options are available, according to Clint Hudson, Cablevey Conveyors Engineering Manager. Among dry options, brush boxes and air-knives can clean the cable. Brushes and wipers can wash the tubes. To sanitize, a sponge soaked in sanitizer can be used without getting the system fully wet.

For the most thorough cleansing, the cable conveyor's wet cleaning process internally washes the tube in several steps, starting with a water rinse followed by a foaming agent, a sanitizing rinse, and a final water rinse. Once the system is thoroughly flushed out, drying is achieved by attaching urethane wipers to the tubular conveyor's discs, which "act like a squeegee" to remove any residual water.

Misconception #6: Conveyors are Indoor Installation Only

It is a misconception that tubular conveyors are only installed indoors. In fact, it is common to see portions of equipment extending outdoors. This may occur when conveying product from outside to inside such as when unloading raw material from a truck or railcar or loading finished product into similar transport. Materials may also

travel from a feed mill to a production or packaging room which may be ten feet or even one hundred feet away.

According to Hudson, when some of the equipment is utilized outdoors, and when the company is moving a moist product, it can be helpful to wrap the tubes in heat tape to prevent moisture from condensing or freezing in the tubes. The conveyor manufacturer can also provide a range of accommodations to account for the effects of wind, dust, rain, insects, and direct sunlight.

While first impressions of tubular drag cable and disc conveyors can evoke images of Dr. Seuss or Willy Wonka's chocolate factory, the equipment has been carefully designed and engineered for industrial performance, reliably conveying delicate pet food products and blends in a variety of conditions. With an understanding of the true potential of these conveyors, industry professionals will be well-positioned to take advantage of the systems' abilities to decrease downtime and increase quality production.

For more info, call toll free: 1 (800) 247-3344; Fax: +1 (641) 673-7419; email: info@cablevey.com; or visit <https://cablevey.com>.





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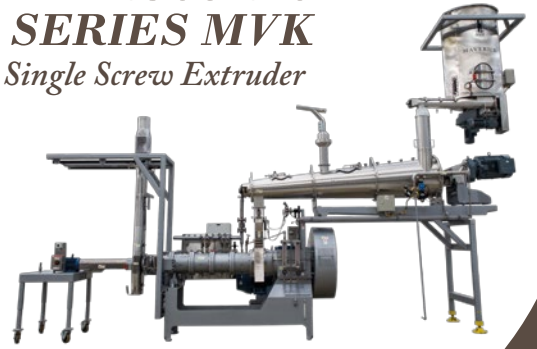
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TITANIUM IN PET FOOD: WHAT A INGREDIENT?

Right off the bat, titanium seems like an unloved ingredient in pet food. In this article, we look at the latest study published in 2020 by Anton Beynen, an industry researcher

by ALL PET FOOD

Titanium in pet food, yes or no?

Titanium dioxide is found in some cat and dog food formulas. Its function? It is used to enhance the brightness of colors and provides whitening in, for example, canned chicken or fish-based foods or bone-shaped dog treats. However, titanium dioxide generates controversy, since it has sometimes been linked to different health problems, it is even used as pigment particles for use in human foods such as chewing gums and toothpastes.

Sources such as the French Agency for Food, Environmental and Occupational Safety and Health (ANSES) affirm that there is not enough information about the risk of genotoxicity imposed by nano titanium dioxide.

Where does the titanium dioxide used come from?

The main valence state of titanium is 4+, although the 3+ and 2+ states, which are less stable, are also known. The element burns in the air when it is heated reacting to the air in the environment, and thus the dioxide is obtained.

There is also a naturally occurring titanium dioxide that is found in soils. It is a stable and insoluble compound that interacts in a limited way with biota. The release of titanium to the environment is mainly related to the extraction process and the use of products containing titanium. Therefore, if titanium reaches plants and livestock, pet foods have some titanium contributed by certain ingredients (although it may or may not be added as a bleach later).

Is it necessary in dogs and cats' diet?

Indeed, there is no evidence that titanium or any of its

components or derivatives is essential for the proper feeding of dogs and cats, and that is why the attention of new research is focused on the possible toxicity of the element. In fact, in 2006, the US National Research Council did not include it in the list of required nutrients for dogs and cats.

Is titanium dioxide toxic?

Titanium dioxide has a very low level of toxicity. For this, it is essential to get the right particle size and quantity to use it for what you want: pigmentation and whitening, for example. Currently, and in general terms, at least 39% of the particles contained in food are not of the appropriate size. These particles (nanoparticles) are those that can cause damage to the body.

Latest study on titanium and titanium dioxide

In Benyen's study, a sample of 120 dry and wet pet foods was analyzed in an amount between 0.2 to 2300 mg per kg of dry matter (or per kg of food residue after removing its humidity).

In these cases, titanium dioxide was used as a marker (due to its inoffensive, nonabsorbable and non-disruptive nature of the digestive process) to estimate faecal production in canine and feline digestibility tests without total faeces collection. Studies that focused on the use of titanium dioxide in dogs have used dietary inclusion rates of 0.4% in dry foods or around 2667 mg Ti / kg ddm.

Results

Titanium faecal recovery was determined from 0.3% titanium dioxide incorporated in dry dog food. Average recoveries were between 74 and 81% for two different diet

ABOUT THIS CONTROVERSIAL

formulas, meaning that overall apparent absorption was 23% of intake.

Encapsulated carbon dioxide was administered orally to 6 dogs at a dose of 5g per kg of dry diet. In the faeces collected during the 48 hours after administration, the recovery of titanium was 97%. In a similar experiment, 2g of titanium dioxide was mixed with newborn chicks as the sole source of nutrition. The mean fecal recovery was between 81 and 74%.

If the collection of feces in the three experiments with dogs was almost complete, we can say that the total absorption of titanium was approximately 16% of the intake, which leaves us a significant fraction ingested.

Other early studies in dogs and cats

Four cats and one dog have been fed titanium dioxide. The ore was treated with sulfuric acid and the dioxide was produced by high pressure hydrolysis. The animals received the dioxide daily, except Sundays and holidays. For cats and dogs, the number of experimental feeding days was 390/480, 390/480, 175/208, 300/368, and 390/480. The mean individual doses, expressed in g TiO₂ / kg of body weight per day, were 0.75, 0.84, 0.86, 0.80 and 0.28 g.

Results

- Oral TiO₂ (titanium dioxide) was not associated with adverse external health effects. The body weights of the cats were generally stable. The initial and final body weights of the dog were 9.2 and 25.3 kg.
- The autopsy in two cats showed no abnormalities. Titanium was undetectable in organs, bile, and bones. For a cat, the amount of titanium in the gastrointestinal tract, including the contents, was found to be 95% of the

ingested dose.

- Four cats were shown to be unaffected by feeding very high amounts of titanium dioxide for periods of up to 480 days. A growing dog was also unaffected.

What do we conclude about its toxicity?

The Committee on Minerals and Toxic Substances in Diet and Water for Animals stated that: "Titanium is essentially non-toxic in the amounts and forms normally ingested. Therefore, a specific oral toxicity of titanium has not been described and a tolerable upper limit for any domestic animal cannot be suggested".

In conclusion

At the moment, the negative health effects of titanium dioxide cannot be excluded by including it in pet food formulas. The data available on the toxicity of oral titanium in dogs and cats is insufficient, while the impact of titanium dioxide at the nanoscale has not been addressed.

We recommend further investigation of this component if you want to use it in large-scale productions to ensure the health and well-being of the animals in the short, medium and long term.

<https://www.anses.fr/fr>

<https://history.aip.org/phn/21511003.html>

<https://www.nap.edu/initiative/committee-on-minerals-and-toxic-substances-in-diets-and-water-for-animals>

Fuente: https://www.researchgate.net/publication/351050376_Beynen_AC_2021_Titanium_in_petfood

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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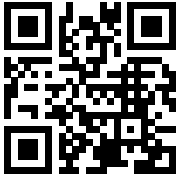




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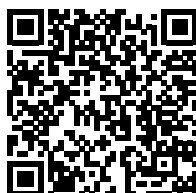
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SUSTAINABILITY IN THE PET FOOD INDUSTRY

By All Pet Food

Sustainability is on the agenda of every industry, and it should be. Caring for the present and future of our planet is no longer an option, but a duty and responsibility of all, but mainly of the great producers and manufacturers of the world.



What are we talking about when we refer to sustainability in the pet food industry?

Sustainability in the pet food industry can be defined as those practices and beliefs that could continue to be practiced, if desired, indefinitely. We speak, then, of sustainability, when there is the conscientious management of the resources and waste necessary and / or produced to satisfy the physiological requirements of pets, so that the ability of future generations to meet their environmental and social needs is not compromised. or economic.

Today there are several aspects of the industry that can be considered sustainable, such as the use of by-products from the human food industry and the decrease in the use of energy and natural resources during production.

In fact, pet food production is more sustainable than many other

human food industries in terms of ways of using farmland, energy and water.

What is the current situation regarding sustainability and pet food?

The analysis carried out in this report on the life cycle of pet food has identified that the category with the most significant impact on the environment is the production of wet food, compared to that of dry food. Likewise, it was determined that the production of food for dogs has a greater impact than that of cats.

The truth is that the excessive use of resources has become a concern as the world's population increases, and this runs for both humans and animals. The environmental footprint of pet ownership and the provision of necessary supplies are consequently growing.

But what is driving this increase in pets?

The common reasons that lead people to buy or adopt pets are:

- Have company at home and during times of physical activity, running outdoors, for example.
- Search for psychological benefits, including an increase in self-esteem.
- Lower risk of depression and greater social commitment in children.

Consequently, growing urbanized pet populations are related to negative environmental impacts, such as loss of wildlife biodiversity due to predation and disturbance and increased consumption of goods and services as a result of the process of increased humanization and concern for the welfare of pets.

Carbon footprint of the pet food life cycle

The environmental impact of a food system can be quantified by analyzing all the material inputs (energy and natural resources) and products (waste and emissions) together with their associated costs, a process known as LCA (Life Cycle Assessment).

The LCA of dog and cat food is very complex, considering the variety of raw materials, manufacturing technologies and packaging options that exist today. The environmental impact of food and agricultural systems can differ considerably, as can geographic location and manufacturing technology (extrusion, canning, baking, or freeze-drying, for example).

However, despite these many complexities, in 2018 the European Commission adopted the PEFCR as a standardized model to calculate the environmental impact for the complete life cycle of pet food for dogs and cats.

Sustainability in the pet food industry, in data

Dog food, more polluting. Dog food, both in wet and dry format, has a greater environmental impact than the one of cats, in part, probably due to the greater volume of food consumption.

Wet pet food over dry pet food

The estimated impact of wet food exceeds that of dry food. This is due to its use of natural resources for the production of the containers necessary for its conservation. In general, the most relevant impact categories for pets are climate change, eutrophication (excessive nutrient enrichment of an aquatic ecosystem), land use and the depletion of natural resources (water, minerals and fossils).

Manufacturing

The greatest potential for improvement in sustainability is within the scope of production, precisely in the manufacturing sectors and the use of farmland, energy and water.

Dog food and cat food together = less pollution than other industries

While it is true that there is much to improve in our industry, the truth is that the production of food for dogs and cats has a much lower environmental impact, compared to industries of food products for humans.

The impact on farmland is not directly affected by processing, but is affected by energy and water use which, for example, could be reduced by operational planning, the installation of more energy efficient machinery or the reduction of the amount of water used during extrusion.

Packaging

The bags and containers for pet food are commonly manufactured from layers of polyethylene plastic and its derivatives, paper

or cardboard, and / or metals such as aluminum, tin or steel. The problem, furthermore, is that most pet food packages are single-use and not recyclable.

The report states that this sector is one of the most problematic when it comes to sustainability: packaging manufacturers face many challenges in order to increase the sustainability of their products without losing effectiveness in conservation and prevention of contamination.

Conclusion

Yes, there are opportunities to improve sustainability in all phases of the pet food life cycle, including formulation, ingredient selection, manufacturing processes, packaging materials, transportation methods, reducing food waste and even in the disposal of waste.

However, the industry's current ability to adopt more sustainable practices is limited, largely due to negative perception by pet owners about, for example, novel ingredients or by-products.

Faced with this, in addition to implementing measures to transition to sustainability, we can work on educating consumers about the importance of this process and about the impact that occurs throughout the life cycle of feeding their pets.

Without question, advancing sustainable animal care practices will require a collaborative effort among pet food industry stakeholders, veterinarians and owners to achieve the common goal: to be more sustainable.



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IMPORTANCE OF PROPER MICRONUTRIENT NUTRITION

by MVZ. Armando Enríquez de la Fuente Blanquet

The nutrition of dogs in its beginnings was based on anecdotal knowledge, from domestication until the beginning of the last century. But in 1943, McCay, in his book "Nutrition of the dog", cited published studies and stressed that there was a real lack of information on this subject, more so than in other species. The result of this was that the last 30 years have been characterized by a substantial increase in research on dog nutrition, particularly with regard to nutritional needs.

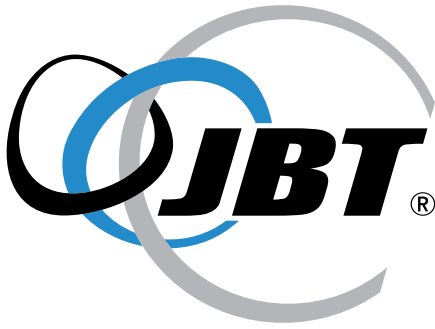
Here begins a watershed, because in the beginnings of nutritional research, nutritional requirements were based on sustaining life; there is talk of a minimum level or an adequate level of nutrients. Some authors consider that the minimum level is the level of nutrient that provides adequate nutrition, however, others consider that these levels are not optimal for the health and well-being of pets. In a sense, this is a matter of semantics. In other words, it is a matter of properly defining the various terms used to describe how much of an essential nutrient is sufficient for a given purpose.

In general, there are two types of experimental studies that involve nutrient requirements. One type is to measure the effect of feeding in increasing amounts, or dietary concentrations of the nutrient

that is evaluated on specific response criteria (growth rate, plasma concentration, etc.). This approach lends itself well to determining nutrient requirements for normal growth and development.

The second type of study is the "depletion-repletion" method. This approach is most popular for use in studies of nutrient requirements for specific functions of adult animals (maintenance, reproduction, etc.). In this case, the animals are first placed on a depletion diet, which is designed to provide a negligible amount of the nutrient to be studied, in order to determine the amount necessary to achieve physiological normality for the specific response criteria.

Currently, nutritional guidelines such as the NRC, FEDIAF or AFFCO, establish the minimum requirements of each nutrient for dogs



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and cats, based on information published with scientific evidence. In this way, the balanced pet food manufacturer formulates its pet food to meet these requirements. However, there are many variables that can cause alterations in the amount of a nutrient an animal needs that must be considered. The chemical and / or physical form of the nutrient can affect, as minimum requirements are generally determined by using available sources of nutrients. In addition, the presence and / or concentration of other substances (for example, substances that can combine with the nutrient and thus limit its absorption) can alter its use and can also affect the amount needed to meet the requirement.

The formulation of pet food must be adequate and precise, and in particular there are two micronutrients that must have our attention during the formulation: vitamins and trace minerals.

Vitamins are essential substances for life; its deprivation leads to manifestations of deficiencies or syndromes, which occur rapidly depending on the vitamin considered and the possible reserves that the body may have or the contribution it must find in its food.

The amounts of vitamins required are very small and are in doses in the order of micrograms or a few milligrams per day. At present it is rare that dogs or cats, well cared for and fed with a specific product for them, present serious symptoms of important vitamin deficiencies. However, the minimum or basic vitamin needs that are achieved with an industrial diet may not be the source where the most adequate daily dose of vitamins is located. Therefore, it is important the vitamin that is added to commercial food has the physical characteristics in an adequate number of particles that allows a uniform distribution in the food.

On the one hand, it is necessary to speak of the recommendation of minimum daily contribution; If we supply less than that amount, we will surely see how the subject develops severe symptoms of vitamin deficiency. A commercial food must include a minimum intake of vitamins, but if for some reason the needs increase, that is, if the total consumption of food decreases or there are digestive problems that partially hinder the absorption of these vitamins, we may have a deficiency.

In addition, the contribution of vitamins in pet food might have two origins: the contribution of the raw materials that make up the food, for example, grains, pasta, flours of animal origin, etc., or the addition of vitamins commercials that are manufactured industrially.

Faced with these challenges, a food must manage "safety margins". Let us suppose that the minimum daily amount of contribution of a certain vitamin is of 10 mcg / kg; the dose that we could call "safety" could be 14 mcg / kg, so that, even if the dog or cat eat a little less, or have a higher consumption than normal, that daily dose would ensure that they do not go away to produce symptoms of vitamin deficiency.

Once the minimum level with a margin of safety has been established, it should be considered that vitamins are relatively unstable and delicate molecules that are adversely affected by the effects of light, heat, oxidative processes, humidity, etc. If our vitamin suffers a loss of 30% after an extrusion process (120 ° C), then to reach 14 mcg / kg we should add 20 mcg / kg before the manufacturing process. I recommend checking the stability of each vitamin to correctly manage the adjustment of each one of them.

Finally, the food will fulfill its shelf life (period of time in which a food product preserves the properties such as nutrients, flavor, texture, color...) that the consumer expects from it and that the manufacturer guarantees.

Additionally, vitamins gradually lose activity over time. If in 12 months our vitamin is going to lose 50% of its activity, to reach the 14 mcg / kg of "safety" level, we must consider one more adjustment and we should start with an addition of 40 mcg / kg before

the process of manufacturing. The foregoing has the purpose of not causing vitamin deficiencies; precision is very important and should be calculated with supporting scientific evidence. Great care must be taken with the adjustments in the addition of fat-soluble vitamins so as not to fall into excesses or a toxicity problem.

Minerals are, in the same way, essential chemical elements for normal metabolic functioning. Water circulates between the different body compartments carrying electrolytes, which are mineral particles in solution. Both the internal changes and the water balance depend on its concentration and distribution.

According to the necessary consumption of our body and the type of mineral they can be classified as follows: minerals that are necessary in large quantities (> 100 mg / day) are macrominerals, such as Calcium, Phosphorus, Sodium, Potassium, Magnesium and Sulfur; Those required in smaller amounts (<100 mg / day) are called trace elements (trace = little) or "trace" elements, such as Iron, Copper, Zinc, Manganese, Iodine and Selenium.

There are important interrelationships between many of the mineral elements, which can affect their absorption, metabolism and action. In particular, excess or deficiency of some minerals can significantly alter the body's ability to use others from the diet. As a consequence, the levels of most minerals in the diet should always be assessed in relation to other components of the diet, in order to achieve an optimal dietary balance.

Trace minerals can bind and increase oxidation in food, destroying its valuable nutrients (vitamins, enzymes, fats and probiotics), which could reduce palatability. This can decrease the effectiveness of even the best diets. Decreased potency of trace minerals and valuable food ingredients can lead to safety concerns and general health problems in pets. Therefore, the formulation of minerals must meet the requirement of the dog or cat, and take care of its balance in relation to the rest of the nutrients present in the formulated diet.

Trace minerals vary both in molecular structure and in their performance in animals. Today there are three forms available: inorganic, organic, and hydroxy. Inorganic trace minerals have a weak bond that causes them to bind and degrade important essential nutrients. Organic and hydroxy trace minerals have stronger covalent bonds to essential metals, so they do not break down as easily, allowing greater absorption of nutrients into the bloodstream, as well as demonstrating greater bioavailability than inorganic sources.

Bioavailability could be defined as the efficiency with which an element is absorbed and reaches the systemic circulation in order to be distributed to organs and tissues, and used for physiological functions. Studies from the University of North Carolina have shown that the bioavailability of a hydroxy-Cu can be twice as high compared to a source of Sulfate-Cu.

The precision that a mineral meets the minimum requirement for the dog or cat will depend, on the one hand, on bioavailability, but taking care of the balance due to the aforementioned interactions.

Finally, based on the knowledge about the requirements and the tolerances of the nutrients, a reasonable definition of the concept of minimum requirement can be the minimum amount of a nutrient that is available to the maximum to fulfill a defined objective. As we have seen, there are numerous factors that can alter the bioavailability of a nutrient, as well as the fact that the requirement can vary depending on the response criteria that is being used to determine it.

Even the tolerances recommended by guidelines like AAFCO may not address all possible variations in nutrient needs. The important thing is that the dog or cat food contains the right level of the micro-nutrient, in an optimal balance and with the best bioavailability of the ingredient.

SUSTAINABLE TRENDS IN PACKAGING FOR PET FOOD

by Diana Mercado

"Sustainability is a trend that is here to stay. If pet food manufacturers don't jump on the bandwagon, they will be left behind."

For years, pet food manufacturers have set the goal of advancing packaging sustainability as brands have sought ways to use more environmentally friendly materials and better manage end-of-life impact.

However, recently, several key trends are making sustainability a short-term imperative. In particular, manufacturers are seeing a shift in consumer attitudes toward packaging, partnerships, and broader infrastructures, to support significant change and an ever-changing competitive marketplace.

Consumer interest in the most sustainable options

Consumers are increasingly inclined to reduce waste in landfills and protect marine ecosystems, and even commit at the level of purchases. A survey of more than 15,000 consumers revealed that nearly three-quarters are willing to pay more for sustainable packaging (Boston Consulting Group / Trivium Packaging, "Global Buying Green Report," 2020).

In a recent study, specific to the pet care industry, involving 608 buyers of premium pet food (dogs and cats):

- 75% said they would view more favorably a brand that changes its packaging to be more sustainable.
- 80% stated they are trying to reduce their impact on the environment.
- And nearly 1 in 3 said they would switch to a brand with more sustainable packaging.

(Source: "Premium Pet Food Purchaser Survey Results: Trends, Behaviors and Insights Pet Food Manufacturers Can Leverage to Convert Consumers", Mondi and Dow, 2019. See the full report at <https://northamerica.mondigroup.com/en/pet-food-packaging-research/>).

Competitive pressure from major pet food brands.

Nestlé Purina has set a public goal for 100% of its packaging to be reusable or recyclable by 2025. The company estimates that 80% of its current packaging is already recyclable.

At **Hill's Pet Nutrition**, the goals are also ambitious. The pet food manufacturer has committed to making its packaging 100% recyclable, reusable or compostable by 2025, and having 25% recycled plastic content in all its packaging. Also, it will continue to eliminate unnecessary and troublesome plastics. About 70% of Hill's global packaging (by weight) is now recyclable as of the end of 2019. Currently, it is working with its material suppliers to continue to innovate.

Mars Petcare also has a goal of 100% of its plastic packaging being reusable, recyclable or compostable by 2025 and a decrease in the use of virgin plastic by 25% by 2025. Mars says it is taking

action by eliminating unnecessary packaging, exploring reuse models, redesigning for circularity and investing to close the loop on packaging waste with recycling systems that work for businesses and communities.

Measures for Pet Food Manufacturers

As organizations seek to set and achieve sustainability goals, pet food manufacturers will be well served to:

- Minimize packaging to reduce waste.
- Design recyclable packaging.
- Implement the reuse of packaging.
- Redesign packaging with more sustainable materials.
- Choose materials of renewable origin.
- Educate consumers about packaging labels and ways to support companies with greener packaging.

"The sustainable objectives of the brands have been turned into goals with action plans to achieve success".

4 Tips for Pet Food Manufacturers Looking to Improve Packaging Sustainability

Beware of excessive reduction: Reducing packaging too much can damage the product inside, increase overall costs, and hurt brand perception.

Take into account all the sustainability factors of your material:

For example, some materials break down into microplastics. So while faster degradation may be beneficial in itself, a tradeoff like this may present a less desirable option once you look at the big picture.

Keep an eye on durability:

Material made from recycled products is not as durable and less so after every round of recycling. Increased cost and decreased overall durability mean that recycled material is not suitable for all products.

Document the origin:

If recycled content is used, the origin of the material must be known, according to ISO 11-607.

Now is the time to take action. We're really trying to get the message across, that brands don't have to wait for someone to tell them what the next phase of the pet food market should be, or how to create something for themselves every step of the way, because it often starts of the solution already exists.

Don't miss the next edition of All Pet Food to know the second part of the trends in sustainable packaging.

RECENT ADVANCES IN NUTRITIONAL IMMUNOMODULATION IN DOGS AND CATS

by Débora Bueno Silva, Ludmila Barbi and Erika Stasienuik

The relationship between people and companion animals has changed a lot in recent years and has intensified even more during the pandemic. This change led to greater care with the health and also with the nutrition of the pet.

Diets that contain nutrients capable of restoring and modulating the immune response have gained great attention in the treatment of diseases, or as prevention of premature aging, increasing the life expectancy of pets.

To receive the name of immunomodulatory, the diet must contain one or more of the specific nutrients in greater inclusion. Among the nutrients used in these diets and capable of modulating the immune system of dogs and cats, we can highlight β -glucans, prebiotics, probiotics, omega 3 and some vitamins.

β -glucans

β -glucans are the main structural components of the cell walls of yeast, fungi and some bacteria. They can also be found in cereals such as barley and oats (BROWN et al., 2003).

Studies have evaluated the immune response after dietary supplementation of β -glucans in dogs, demonstrating that β -glucans can stimulate the cellular and humoral immune response after animal vaccination (ALTUG et al., 2010; STUYVEN et al., 2010). New Research Links β -glucans with the ability to modulate blood glucose in mammals; Studies have shown beneficial effects on the intestinal trophism of mice supplemented with β -glucans (SILVA, 2012).

Prebiotics

Prebiotics are insoluble, indigestible fibers that stimulate bacterial fermentation in the colon, mainly bifidobacteria and lactobacilli, positively interfering with the health and quality of the animal's feces (NETO, 2016). The most widely used prebiotics are: fructooligosaccharides (FOS) and mannanoligosaccharides (MOS).

When combined in the diet, efficiency increases, since FOS have a greater capacity to generate short-chain fatty acids as a product of their fermentation, while MOS have a greater capacity to contribute to the stimulation of the immune system (NET, 2016), since it binds to a wide variety of mycotoxins and blocks the adherence of pathogenic bacteria by occupying sites of the epithelial cells of the intestinal mucosa, where they could adhere (BORGES et al., 2003).

Probiotics

Probiotics are living microorganisms that have effects on the intestinal microbiota, such as improving the consistency and odor of feces, regulating the immune system (VASCONCELOS, 2018), balancing the intestinal microbiota, helping to treat diarrhea (BORGES et al., 2003), among others. others, others.

Currently, the industry produces heat-resistant probiotic additives, composed of live bacteria that are encapsulated and resistant to ex-

trusion and lyophilized, remaining in a latent state until ingestion, where after finding a favorable environment in the intestine, they return to a vegetative form (CAPELLI et al., 2016).

Omega 3

Within the omega-3 family, the fatty acids with immune action are eicosapentaenoic (EPA) and docosahexaenoic (DHA), playing important roles in inflammation and immune modulation (MORAES, PELLEGRINI, 2014).

EPA and DHA compete with arachidonic acid, causing less inflammatory prostaglandins and leukotrienes, modulating inflammation in numerous diseases, such as cancer, autoimmune diseases, atopy, heart disease, kidney diseases, among others in which chronic inflammation occurs (MORAES; PELLEGRINI, 2014).

Vitamins

Vitamin A in its active form is retinol, its precursor are carotenoid pigments, such as β -carotene and lycopene. The role of carotenoids in immune function shows that they act to stimulate innate immunity, on the cellular immune response, in the production of immunoglobulins, regulate the adaptive immune system (Zaine et al. 2014).

Vitamin C has antioxidant, anticancer and immunomodulatory functions in the body. However, it is not an essential vitamin in the diet of dogs and cats, as it can be synthesized from glucose in the liver (NRC, 2006).

Over the past decades, numerous studies have examined the relationship between immune response and vitamin D status. There is evidence that vitamin D status is associated with markers of inflammation, including circulating pro-inflammatory cytokines and phase proteins. acute in a number of diseases, including obesity, inflammatory polyarthritis, diabetes mellitus, autoimmune diseases, inflammatory bowel disease and the human immunodeficiency virus.

Conclusion

Understanding the immunomodulation mechanisms by which nutrients act is essential to consider their potential use in commercial dog and cat foods. The isolated use of each of the above nutrients reflects beneficial effects on immunity, but their associated effects need to be further clarified.



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THE INTERVIEW

DANIELA MORENO

Currently, I am the Director of R&D for Latin America in the dry food and treats segments at Mars Pet Nutrition and responsible for our regional pet research center. I have more than 15 years in the pet food industry in various roles, in the areas of research and development, innovation, consumer analysis and marketing for the brands of Pet Nutrition Latin America, among which PEDIGREE® and Whiskas® stand out. I am an engineer in Food Industries from the Tecnológico de Monterrey and I have a diploma in Innovation and a certification in Business Coaching. I am fortunate to work in a very interesting category and in an incredible company, with vision and values that inspire me, because I contribute to improving the lives of pets and families, since I firmly believe that they make our lives better. I live this every day with Lucho, my own French bulldog.

by ALL PET FOOD

Being Mars Petcare a family business in the field of Pet Food manufacturers, with long-term investment projects, we would like to take the opportunity to consult you, how do you think the Pet Food market will look in a few years?

Companies must maintain diversity in our product portfolio, meeting the different needs of customers and their pets, while adapting to new shopping trends with innovative proposals that serve various types of consumers.

I believe that the relationship between pet parents will become closer and closer and in the coming years the concept of “value for money” will continue to gain relevance. Companies must maintain diversity in our product portfolio, meeting the different needs of customers and their pets, while adapting to new shopping trends with innovative proposals that serve various types of consumers.

A clear example of the changes in the market for the coming years is the vision of the new generations who are choosing to incorporate pets as one more member of their family, as well as looking for healthier alternatives according to their lifestyle. Another great opportunity is in the segment of cats in Mexico that grows above the category of dogs, because the pace of life and the spaces available to live in cities make it much easier to seek the company of a cat. According to the Pet Ownership Survey 2020, the presence of cats in homes reached 13 million vs. only 6 million in 2017. For all these reasons, we have a very positive view of the performance of the market, and our focus at Mars is to know in depth those responsible for pets, translate their needs into products that they, as well as their dogs and cats, love, always doing the right thing for our customers, consumers and their pets.

Regarding the growth of the market in your country of residence, Mexico, how much do you think the demand for Pet Food will continue to grow? What kind of food do you think will prevail? What are the current trends that could last over time?

Mars Petcare Mexico's pet food business is the fourth most important for Mars Petcare globally, which continues to represent a scenario of great opportunities.

In our country, the pet food category grew an average of 10% each year prior to the contingency. However, the market accelerated as more pets entered our homes. At Mars we are being very cautious recognizing the changes in the environment, but we believe that the category will continue to rise, closing the year with double-digit growth.

One of the most important trends that will continue in the coming years is the relevance of animal welfare. Consumers are looking for more natural foods that offer nutritional balance and help pets lead healthier and happier lives. They understand that carefully processed food can bring great benefits to the health and quality of life of their pets, which translates into a positive impact for the industry.

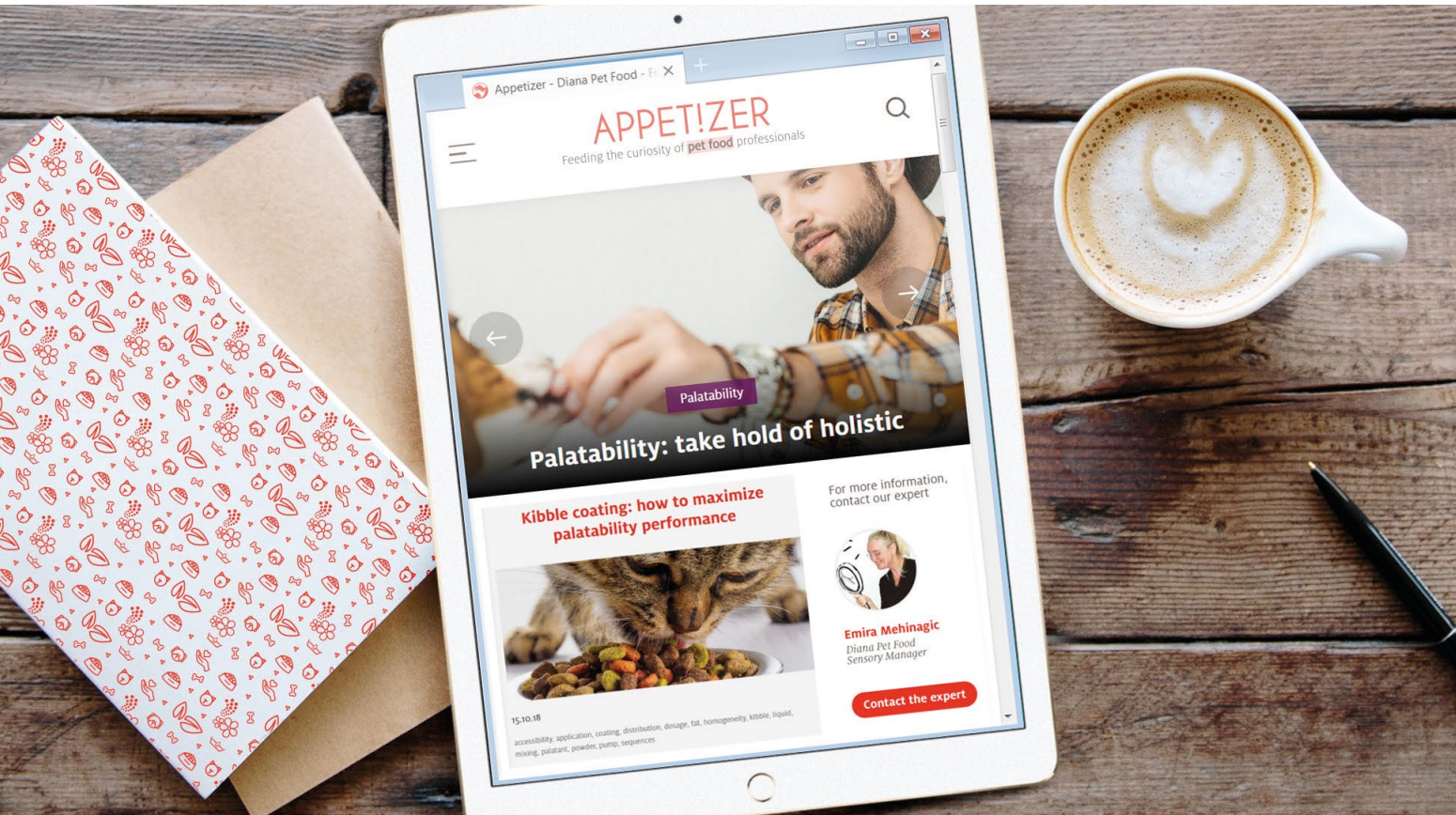
Consumers will continue to search for convenient distribution channels which will continue to cause the growth of digital commerce. We will also see more informed consumers who will seek to know who is behind the manufacture of the products they consume, the causes they support and their contribution to having a more sustainable planet.

As Director of R&D Dry and Care & Treats could you tell us if Mars is developing any new products for pets?

In this last semester of the year we innovated and evolved our product portfolio in Mexico to reach the different market segments. In this sense, we launched two new varieties of our WHISKAS® brand: WHISKAS® sterilized cats and WHISKAS® protein mix, and we relaunched the complete portfolio of dry PEDIGREE® under the concept of “Feed the good”. We also seek to satisfy the needs of pet owners interested in taking care of the nutrition of their dogs and cats, with accessible options prepared in accordance with the quality standards that characterize us, with two new brands: CHAMP® and KITEKAT® that provide an optimal balance of nutrients at a very competitive price within its category. In addition, our PAL® brand renewed its image and strengthened its formula. We also redesigned some dog treats and added new formats and weights. Our innovation agenda for 2022 is ambitious and we are working to offer options for all consumers in our category, always under the endorsement of the Waltham Research Center that scientifically supports all the products we make. You will soon see in the market some of the surprises that we are cooking.

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How important do you consider packaging to be? Do you think the type of packaging can help define the choice of a product by the pet parent?

As a global company with a diverse portfolio of food and pet care products, we know that packaging plays a very important role. Consumers are looking for a package that not only has an attractive design, but also ensures that the product was kept in optimal condition from the beginning of its manufacturing process until it reached their hands.

Another very important factor is that consumers are looking for a product that represents the company's commitment to contribute to a healthier planet through sustainable packaging. That is why at Mars we are taking steps to redesign our packaging portfolio and continue advancing towards our sustainability goals, promoting solid initiatives that reduce and improve our impact on people, the planet and the communities where we operate, in order to fulfill our Purpose: In the world we want tomorrow, the planet is healthy.

From the pandemic we saw a growth in online sales. How do you think companies will adapt to this marketing trend? Does Mars consider it positive?

Clearly, D-Commerce was the big winner in terms of marketing channel trends as a result of the pandemic: it doubled in size in less than 3 months.

Clearly, D-Commerce was the big winner in terms of marketing channel trends as a result of the pandemic: it doubled in size in less than 3 months. We consider this extremely favorable given that we had record sales through this channel and we will continue to search for new spaces, strategic alliances and formats that meet the requirements of this way of doing business. We know that this is not a fad but

a trend that is here to stay and that the pandemic has accelerated. Our consumers will continue to adopt this channel as their regular place to shop for years to come. Companies must learn to play in this channel from the way in which products are shown to consumers, to the development of efficient logistics models, forming strategic alliances with the main players of this same channel.

Another significant change from confinement is the importance that pets have acquired within the family nucleus and the requirement of pet parents when feeding them. How do you think this benefited the industry?

The impact has been very positive just because of the transformation of the role of pets. They enter fully into the family dynamics. According to the "Better Cities for Pets" study, one in three pet managers surveyed added a pet to his family during the pandemic. 86% mentioned companionship as the main benefit and 78% said they reduce their stress or anxiety level thanks to them. Another important indicator of the relevance that they have taken is the increase in adoptions in shelters. Through our Pedigree Adóptame® web app, and in conjunction with the shelters that make up the program, we saw a greater rapprochement between people and shelters. We have achieved more than 1000 adoptions from April to date.

This set of situations impacts because there are more pets to attend to and the supply of services grows. More specialized and diverse services will be needed such as: aesthetics, hotels for pets, toy libraries, accessories and others. That necessarily opens up opportunities for the entire industry and not just for the food industry. In our business, consumers are more aware, they look for proposals that are not only innovative, but also healthy, which promotes market growth.

Being Mars Petcare a company committed to the environment, what are the challenges that it intends to face in order to generate more sustainable processes?

We know our responsibility to contribute to a healthy planet by being, precisely, a global company. We want to continue leading the category, grow above it, be much more profitable, leverage innovation and advance in meeting the goals that we have established in our One Generation Sustainability Plan. In this plan, we address key areas of the United Nations Sustainable Development Goals and include ambitious goals based on science and our Five Principles.

Some of our global goals for 2025, seek that 100% of our plastic packaging is reusable, recyclable or compostable, reduce 25% the use of virgin plastic, use 30% of recycled content in plastic packaging and maintain the elimination of PVC in our supply chain.

We have tackled various environmental problems with different strategies. We choose materials that are easier to degrade and plan to increasingly reduce our carbon footprint from recipes with more sustainable sources of raw material. Likewise, we try to guide consumers about the recycling capabilities of our packaging. Some of our global goals for 2025, seek that 100% of our plastic packaging is reusable, recyclable or compostable, reduce 25% the use of virgin plastic, use 30% of recycled content in plastic packaging and maintain the elimination of PVC in our supply chain.

All this without counting the other programs in other branches of Mars such as "Por Amor al Cacao", "Tejer el Futuro", the restoration of reefs with Oceanus A.C. or the program "Charco Bendito".

Anything else you want to add?

At Mars we pride ourselves on being a family business that thinks long-term, the future of our people and the planet. We believe that the world we want tomorrow begins with the way we do business today. Our priority is to meet the nutritional requirements of companion animals by offering innovative products that help them have a longer and healthier life, so we will continue working based on our Five Principles to improve the well-being of families, their pets and contribute so that the keeping of companion animals is increasingly responsible, sustainable and simple to crystallize our vision of making a Better World for Pets.



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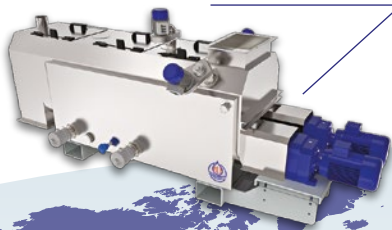
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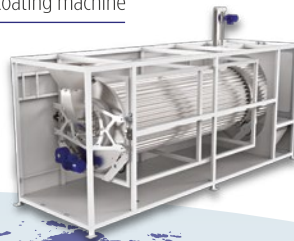
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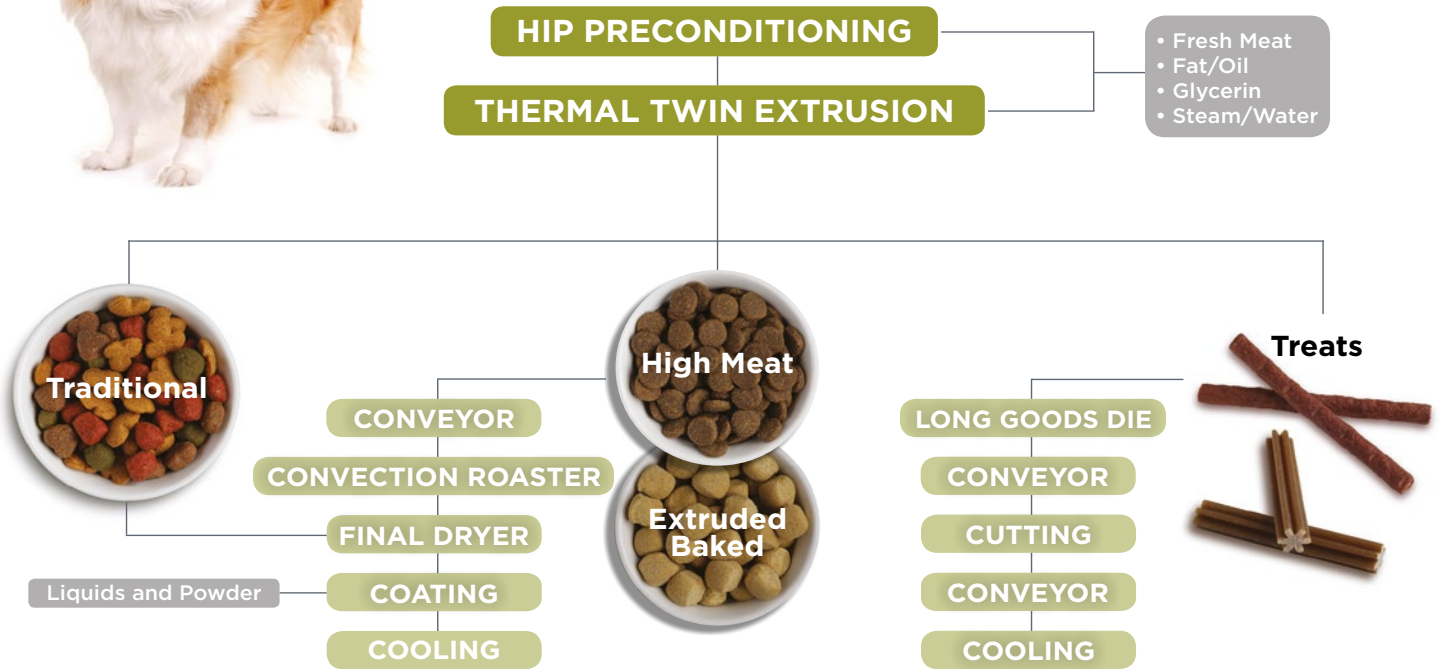
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