A WEB BASED CAT AND DOG NUTRITION INFORMATION CENTER

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

in Partial Fulfillment of the Requirements for the Degree of

Master of Professional Studies

by

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ABSTRACT

The internet as a source of information on pet food products and pet nutrition is rising among the public. Access to reliable information is questionable and misunderstanding of the information presented on pet food labels have led to misconceptions about commercial pet food products. This project aimed to bridge this gap by developing a web-based platform dedicated to providing reliable information on pet food products and nutrition of cats and dogs.

A web structure was designed using a mind map model, and a survey for pet owners was created with the objective of gathering current information on the sources of nutrition information sought after from cat and dog owners. The survey was approved by the Institutional Review Board for Human Participant in Research at Cornell University and will be tested among the Cornell University community prior to being administered to the wider population. Some of the fundamental information on pet nutrition and a section on pet nutrition myths was created the website content. The collected data from the wider survey of pet owners will guide the development of tailored web contents. Ultimately, this web-based nutrition information center will provide pet owners with factual and science-based information on pet nutrition.

BIOGRAPHICAL SKETCH

Wanshi Zhu, born on May 5th, 2000, in Hainan, China, is an accomplished individual in the field of animal science. Her passion for animals and dedication to their welfare drove her to academic pursuits. Wanshi pursued her undergraduate studies at the University of British Columbia, where she majored in Applied Animal Biology. Continuing her education, Wanshi enters Cornell university in the fall of 2022 to complete her Master of Professional Studies in animal science with a focus in companion animal nutrition and pet food products.

ACKNOWLEDGEMENT

I am deeply grateful to my family and friends for their unwavering support and encouragement throughout this journey, whose encouragement and understanding have been a constant source of motivation.

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Introduction

The goal of this Master of Professional Studies thesis was to initiate the development of a web-based cat and dog nutrition information center for the greater community, specifically for individuals who are unfamiliar with the science behind cat and dog nutrition and commercial food products. The website will be housed under the Department of Animal Science at Cornell University. The long-term goal of the project is to bridge the gap between scientific research and the public regarding nutrition of cats and dogs. The information center will consist in a comprehensive online resource that offers reliable information about pet nutrition and pet food products and accessible links to verified and reliable websites. The center will serve as a platform for pet owners seeking to understand dietary requirements, interpret information on pet food packages, be informed on current nutrition topics and research, and get the truth about misinformation and myths that are spread through unreliable internet websites. The web material will be designed to be accessible and understood by individuals that are unfamiliar with science and nutrition. The website will not judge or evaluate any commercial pet food products, nor serve as a consulting platform for diet evaluation, formulation, or medical related advice. The first chapter of this thesis is a literature review which provides a summary of the available peer-reviewed literature regarding pet owners' knowledge of pet food products and the sources of information sought by pet owners to learn about pet food and nutrition. The second chapter presents a mind map of the information center to visualize the website structure. The third chapter describes a survey that was designed to collect information in order assist in further development of web content. The fourth chapter presents the initial content of the website.

Chapter 1. Literature review

1.1. Pet owners' knowledge and understanding of pet nutrition and food products

Pet food companies follow the label model proposed by the Association of American Feed Control Officials (AAFCO). Labels provide nutritional information, including the nutrient profile and ingredient composition, but the percentage of pet owners capable of interpreting labels is low. Of the pet owners surveyed, 63.02% feel that pet food labeling is misleading, and 41.1% indicate that the information is hard to understand (Schleicher et al., 2019). Nearly 75% of pet owners are aware of calorie labeling on pet food products, and 52.4% understand or use this information (Schleicher et al., 2019). Though calorie is a common terminology that most pet owners hear on a regular basis, it is expected that the ability to interpret the calorie label is lower when presented with more complex or unusual nutrition terminology (Lemke et al., 2015).

Pet food labels share some similarities with human food labels (Schleicher et al., 2019; Lemke et al., 2015), and thus provide some degree of familiarity to pet owners. For instance, "protein" terminology is presented on human food labels, in contrast to "crude protein" terminology on pet food labels. The unit of measure for "protein" is a quantity (i.e., grams) per serving, but the unit of measure for "crude protein" is g per 100 g of food (i.e., concentration). Pet owners may not understand the term "crude protein" nor the unit of measure. Many of the animal-based ingredients in pet food are not typically used as human food ingredients. Meat and poultry by-products are typically not used in human food, and the verb "by-product" and "meal" often lead to confusion (Laflamme, 2014). As such, pet owners have misconceptions toward several ingredients (Siddiqui et al, 2022). For example, rumor about rendering of pet food ingredients is prevailing on the internet with claims that euthanized animals are rendered and used in pet foods (Meeker et al., 2015). Ingredients which supply vitamins and minerals are often written in their chemical names, and thus are associated with unhealthy claims (Siddiqui et al, 2022) and unfounded fear in buyers. A section on the myths in pet nutrition and food products is provided in Chapter 2.

The majority of pet owners believe the food they purchase is beneficial to the nutrition or medical condition of their pets (Schleicher et al., 2019). There is a disconnect however between pet owners' perception of the best food for their pets and their actual understanding and

knowledge of the food they feed. Of pet owners surveyed, 30% reported that they believe being very knowledgeable about pet nutrition, while the rest report being somewhat knowledgeable, not very knowledgeable, or neutral on this topic (Evason et al., 2020). Furthermore, because this is a self-reported assessment of their knowledge, the data is likely to be an overestimation of their perceived knowledge. The lack of knowledge and understanding of pet nutrition and food products combined with accessibility to a plethora of unreliable websites have led to a lack of trust in commercial pet food products. Additional information is needed on pet owners' knowledge regarding pet nutrition and food products, and addressed in the initial survey designed as part of this thesis and described in Chapter 3.

1.2. Demand for and source of information

Pet owners demand information regarding the diet and nutrition needs for their pets. In multiple surveys, most participants were reported to actively seek out information about pet food, and to discuss nutrition related topics with their veterinarians (Schleicher et al., 2019; Evason et al., 2020). In the study by Kogan et al. (2018) which assessed how pet owners use dog and cat Facebook groups to obtain pet health related information, 58.5% of pet owners asked questions about "diet, nutrition, vitamins, and nutritional supplements". In contrast, pet owners who feed vegan food show less interest in learning about nutrition adequacy of the pet food products (Dodd, 2019). There is a lack of studies addressing more specifically what pet owners are interested in learning about regarding pet nutrition and food products.

Of the sources of information, veterinarians are the most popular source and weighed by pet owners as the most important source for food purchasing decisions (Figures 1 and 2) (Schleicher et al., 2019). Pet owners are willing to talk about pet nutrition during veterinary visits, with 35% of pet owners always discussing pet diet and nutrition with their veterinarians and 44% of pet owners intermittently discussing with their veterinarians (Evason et al., 2020). Pet owners' general trust of veterinarians is relatively high (68.1 % cat owners and 62.7 % dog owners), but nutrition advises received from veterinarians is limited since only 43% of pet owners report they have received nutritional advice from their veterinarian in the past year (Kamleh et al., 2020).

The opinion of surveyed pet owners is that veterinary professionals are considered trusted sources of information on pet nutrition because of their authority in medical treatment (Kamleh

et al., 2020). Though nutrition is taught in all veterinary schools, the teaching is very limited and not systematically taught by professors in the field of animal nutrition or by board-certified veterinary nutritionists. In the United States, 14 out of 30 veterinary schools have faculty members who are board-certified and involved in teaching nutrition (Kamleh et al, 2020). However, less than half of the students expressed confidence that their veterinary education would adequately equip them to discuss nutrition after they graduate (Kamleh et al, 2020).

The ratio of pet owners who trust veterinarians differs depending on the products being fed. Of the pet owners feeding raw diets, 12.7% report that they trust their veterinarian very much while 39.2% report they do not trust their veterinarian very much. Of pet owners who feed a non-raw diet, 54.5% report that they trust their veterinarian very much while only 2.9% report that they do not trust their veterinarian very much (Morgan et al., 2017). The sources of information on raw food sought by pet owners feeding raw products is different from those who feed conventional pet food products. The most prevalent information source for pet owners feeding a raw diet is the internet which is utilized by 20% of pet owners. In contrast, only 9% of pet owners feeding raw products consulted veterinarians before making their decisions (Morgan et al., 2017).

The internet is the second most popular source of information (Figure 1) (Schleicher et al., 2019). The internet is a platform that gathers multiple sources including blogs, forums, social media, and websites set up by various authors. Pet owners can access both reliable and unreliable information from the internet. Veterinary clinics, academic institutions (e.g., Tufts university) and pet food companies (e.g., Hills, Purina institute, the Pet Food Institute) have websites that provide reliable information. However, anyone can freely publish content that has not been reviewed by experts in the field. Filtering out useful and reliable information becomes a challenge for pet owners. Most pet owners must judge the websites by themselves and may feel overwhelmed with the abundance of online information. The relative abundance of reliable compared to unreliable sources has not been assessed for this current project. Nearly half (49.6 %) of pet owners stated that their veterinarian never recommends using websites on pet health or nutrition (Kogan et al., 2018) despite that there are several reliable websites that are freely available.

In multiple surveys, the internet was rated as the second important factor affecting pet owners purchasing decisions. In the survey by Schlecher et al. (2020), pet owners rated the internet as 2.62 on a 5-point scale that measures the importance of source of information (Figure 2). In the survey by Kamleh et al. (2020), nearly 40% pet owners selected information read online as a factor influencing their decision on what to feed their pet. Morgan et al. (2017) reported that 53.9 % of cat owners and 30.0% of dog owners who feed raw products stated that reading about raw animal products (RAP) on a message board or website influenced them to switch to feeding RAP to their pets. Most raw meat-based diets (RMBD) are formulated and prepared by pet owners themselves. Of pet owners feeding RMBD, 30% rely on advices found online. Only a small percentage, 8%, sought guidance from veterinarians, and 5% consulted nutritionists for assistance in formulating RMBD (Morelli et al., 2019).

The internet is the main source of information for unconventional diets. As discussed before, most homemade recipes are provided on the internet (Remillard, 2008). Thirty % of pet owners hear about feeding RAP for the first time through the internet, which contributes the most compared to other sources (Morgan et al., 2017).

In addition to veterinarians and the internet, there are numerous books and magazines available that cover pet nutrition topics. Books and magazines may not be written by experts in the field. It is the third most popular source of information (Schleicher et al., 2019). Most pet owners (41.5%) have neutral attitudes toward this source (Kogan et al., 2018). Finally, though friends and family members are not the main source of information, they affect people's decisions to a certain extent (Schleicher et al., 2019). Nearly half (49.8%) of cat owners and 24.0% of dog owners who feed raw diets switched to feeding such diets because they discussed it with friends and family (Morgan et al., 2017). As much as 42.4% of pet owners felt their friends and family members are trustworthy sources of information (Kogan et al., 2018). Survey of pet owners obtaining information from pet food companies is not available in the current literature and this question is part of the survey of this project.

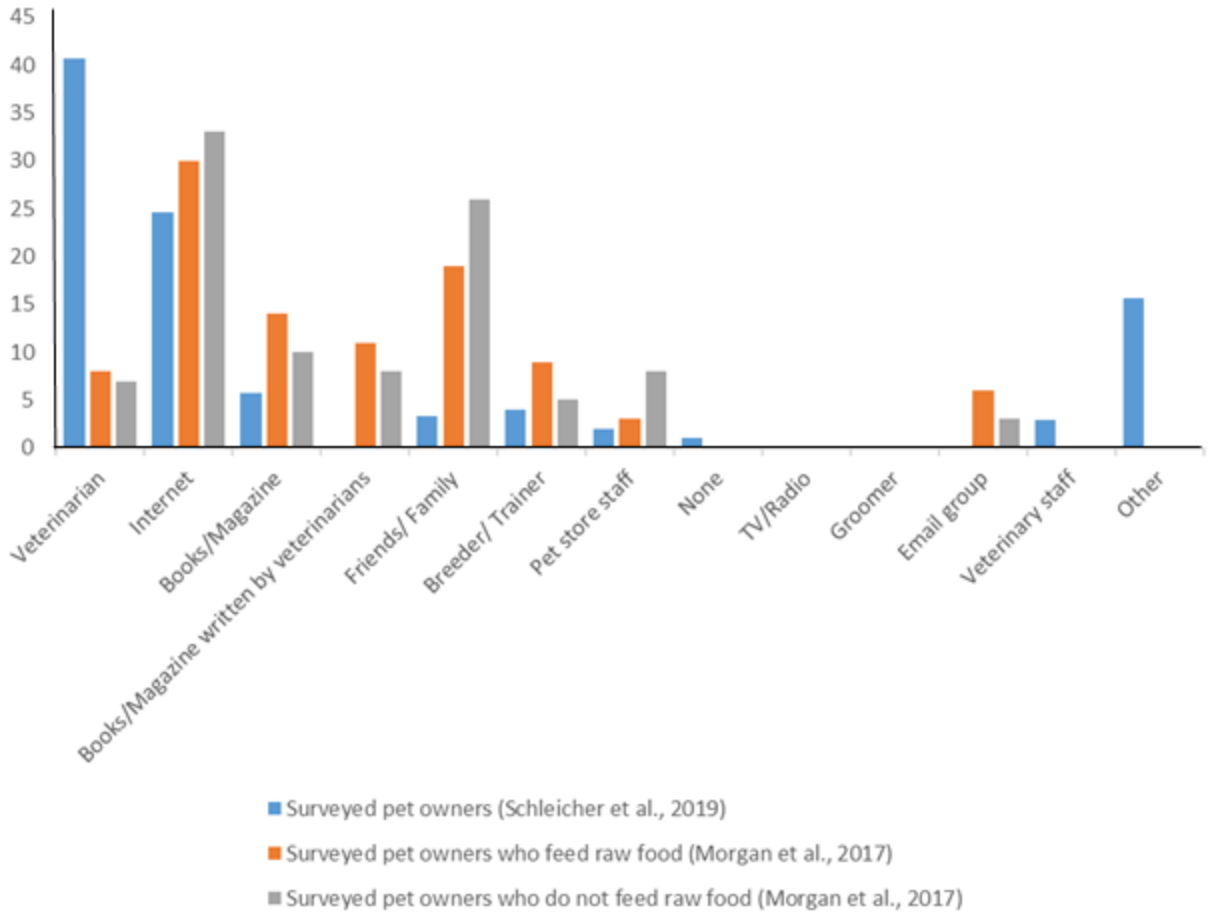

Figure 1. Percentage source of information regarding general pet food products and pet nutrition sought by the general population of pet owners and sources where pet owners first learn about feeding raw animal product (RAP) diets for pets. Adapted from Schleicher et al. (2019) and Morgan et al. (2017).

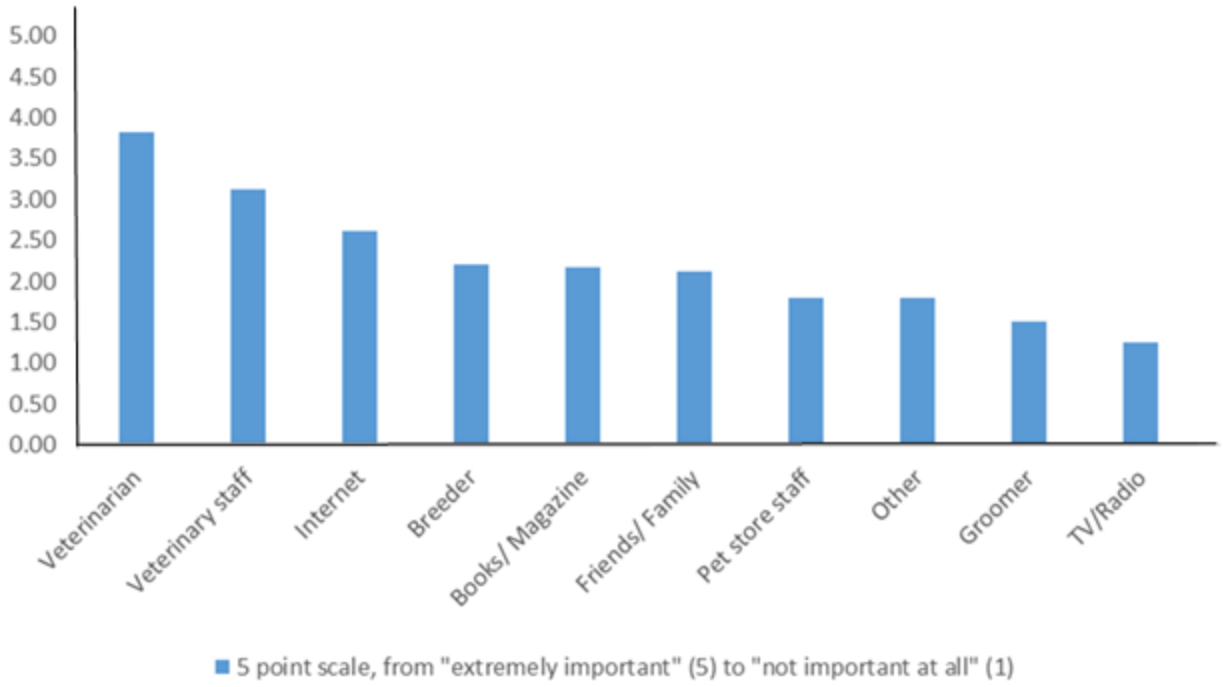

Figure 2. Mean importance rating from surveyed pet owners on pet food information source. Adapted from Schleicher et al. (2019).

Chapter 2. Proposed structure of the web-based nutrition information center

A mind map of the information center was created using the Mind Mapping tool of Miro and presented in Figure 3. The map allowed to generate ideas, organize the website structure, and allowed for visualization of the bigger picture and the interconnection between the various topics.

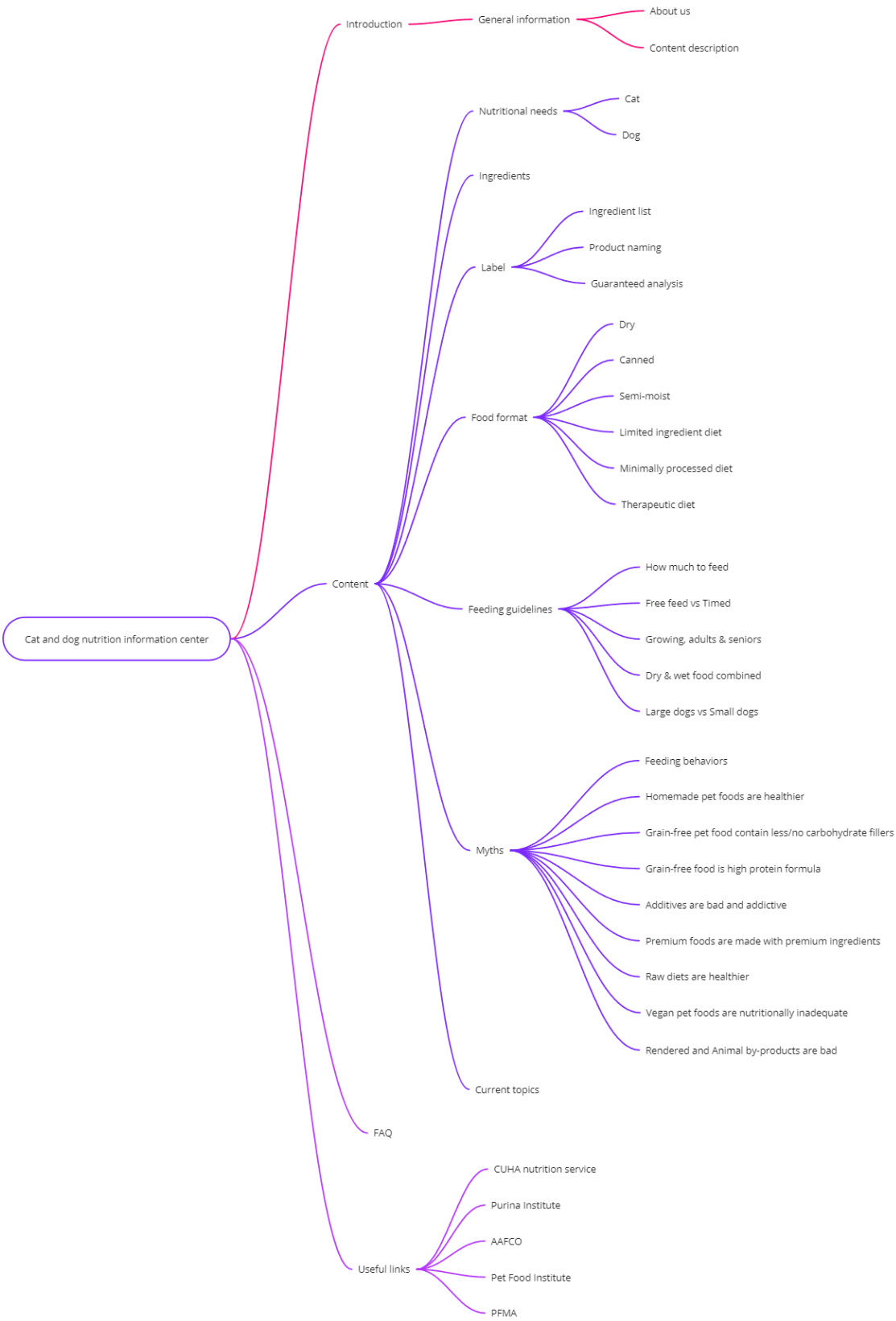

Figure 3. Mind map of the proposed website.

There will be a section in the introduction (Figure 3.1) that includes “About us” and “Content description”. Under “About us”, visitors will see information about the Department of Animal Science at Cornell University, the mission, and goal of the website, and the contact information. The “Content description” provides an overview of the webpage content.

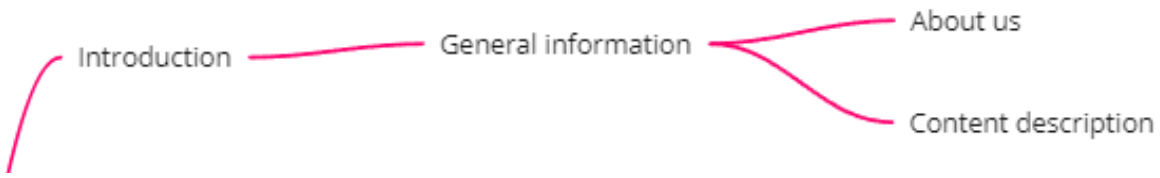

Figure 3.1. Introduction

The “content” section (Figure 3.2) is the main part of the website and will cover the science behind pet nutrition. Preliminary web content is provided in Chapter 4.

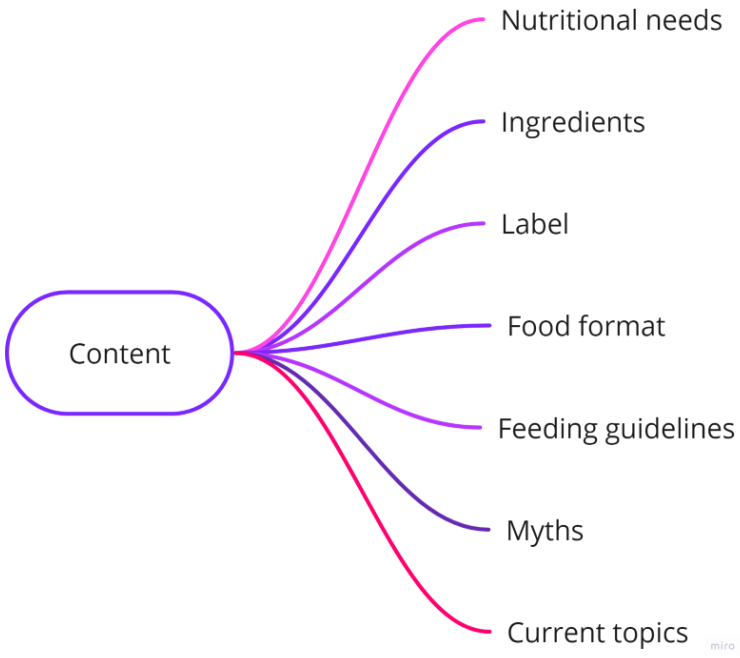

Figure 3.2. Content

The “Nutritional needs” section (Figure 3.3) will cover the specific nutrient requirements of cats and dogs to function optimally and maintain good health for the different life stages such as growth, pregnancy and lactation, and maintenance according to the Association of American Feed Control Officials (AAFCO).

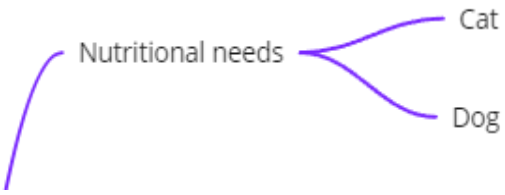

Figure 3.3. Nutritional needs

The “Ingredients” section (Figure 3.4) includes definitions and function of ingredients commonly used in commercial pet food. Pet owners with no pet food knowledge may have difficulty in understanding ingredients such as “beef meal” or “riboflavin”. It is expected that readers will gain a clear understanding of ingredients commonly found in commercial pet foods. The definition of ingredients will follow that of the Association of American Feed Control Officials (AAFCO). The “Label” section includes how to interpret the ingredient list, the product naming and guaranteed analysis.

Figure 3.4. Ingredients and Label

Different pet food formats serve different purposes and may differ in their nutritional profiles due to the water content (i.e., dry, canned, or semi-moist). The “Food format” section (Figure 3.5) will describe the forms of commercial food products and discuss their manufacturing process and application.

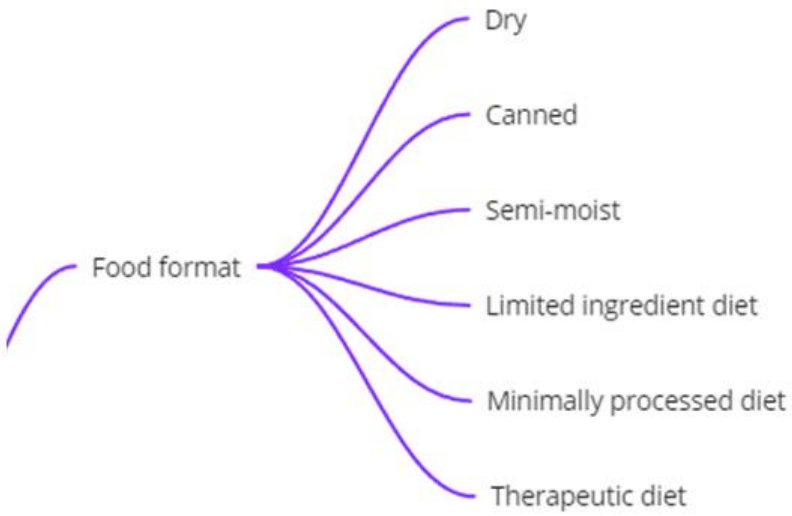

Figure 3.5. Food format

The information center will provide feeding guidelines for pet owners who look for specific guidance.

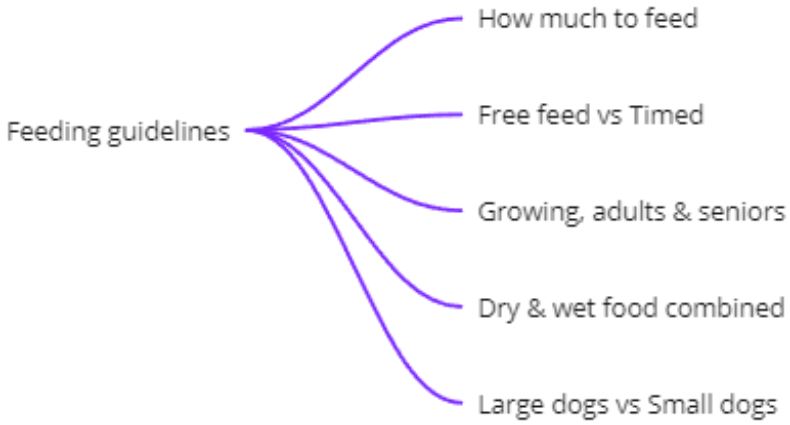

Figure 3.6. Feeding guidelines

The “Myths” section (Figure 3.7) is a collection of topics related to pet nutrition and pet food products that have been circulating through the internet and spread misinformation. In several cases, these myths are meant to disinform pet owners. Believing in myths may lead to feeding inappropriate diets to pets or spending too much money on purchasing certain food products. The pet food market is also filled with marketing claims, hype, and rumors that are misleading. Presenting facts based on reliable information and research to dispute myths and misleading claims will help pet owners to make educated decisions.

As an example, unconventional diets such as homemade diets have become more popular in recent years (Dodd et al., 2020). Homemade diet recipes are commonly obtained online and may not be nutritionally adequate. Most recipes contain excess protein because of the belief that cat and dog food should be mostly fed meat (Remillard, 2008). Excess lean meat also results in low fat and energy, and excess meat leads to imbalanced dietary calcium to phosphorus ratio. There are many non-peer reviewed articles purporting on the benefits of raw diets for pets dealing with food allergies (Stogdale, 2019), and there is no scientific evidence behind these claims. About 30% of pet owners feed raw diets to their pets to allegedly prevent allergies and improve immune functions (Thomas & Feng, 2020).

The section “Current topics” will contain a list of articles on pet nutrition trends or fads that are demystified and presented in layman’s terms.

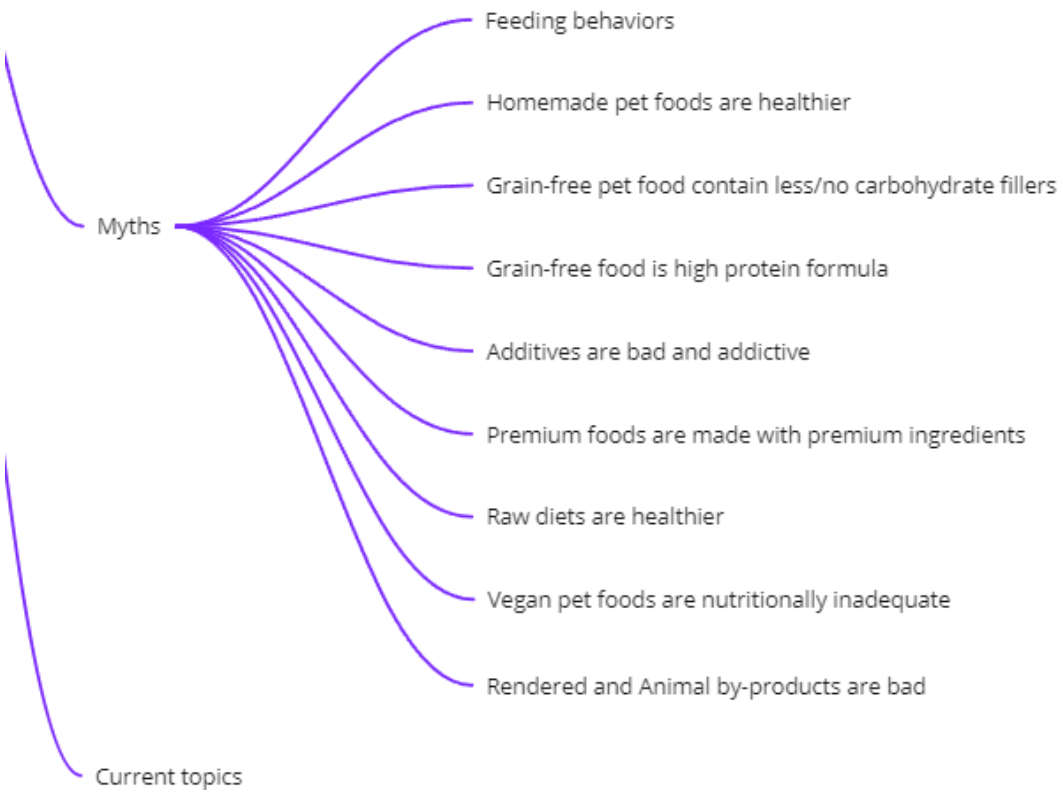

Figure 3.7. Myths and Current topics

The website will provide a section with a list of frequently asked questions (FAQ) and answers, and access to useful links (Figure 3.8) that may complement the nutrition information center, such as the Cornell University Hospital for Animals (CUHA), The Association of American Feed Control Officials (AAFCO), Purina institute, Pet Food Institute, and Pet Food Manufacturers Association (PFMA).

Figure 3.8. FAQ and Useful links

Chapter 3. A survey on knowledge and opinions of pet owners about commercial pet foods

An anonymous survey titled "A survey on knowledge and opinions of pet owners about commercial pet foods" was designed to gather data on the sources of nutrition information sought from cat and dog owners. The survey will be tested in the fall of 2023. Participants will be cat and dog owners in the Cornell University community including students, faculty, and staff. The final survey will be administered across the wider population in spring 2024 and the data will be used to guide future content development of the of the cat and dog nutrition information center. The survey will collect information from participants about pet ownership, their basic knowledge on pet food product labels, level of interest about nutrition, opinions about different commercial pet food products and formats, resources sought on cat and dog nutrition information, level of understanding on cat and dog food ingredients and sourcing, and misconceptions about pet food products.

The survey includes 31 questions in total and estimated to take 10 to15 minutes to complete. The first part contains demographic questions including the participants' gender, level of education, occupations, and pet ownership. The second part includes questions about sources of pet nutrition information, factors affecting pet food purchasing decision, and food format. The third part survey the participants' understanding of the terminology on pet food products.

Chapter 4. Content description of the cat and dog nutrition information center website

The initial content of the website has been created and described herein.

4.1. Ingredients

4.1.1. Animal ingredients

Meat. The flesh limited to the muscles of mammals. Common meat ingredients include beef and lamb.

Meat by-product. Non-rendered animal part other than meat. These parts include liver, kidney, lung, brain, intestine that are not commonly used as human food. Hair, horns, teeth and hoofs are not included.

Poultry. Flesh and skin of poultry. Feathers, head, feet and entrails are not included. Common poultry ingredients include chicken, duck and turkey.

Poultry by-products. Non-rendered heads, feet, viscera and internal organs of poultry.

Meat meal. Dry rendered mammal products, exclusive of any added blood, hair, hoof, horn, hide trimmings, manure, stomach, and rumen.

Poultry meal. Dry rendered poultry, exclusive of feathers, heads, feet and entrails

4.1.2. Additives

Additives play a significant role in the formulation of commercial pet food, serving a range of purposes to enhance its nutritional value, improve palatability, ensure safety, and maintain product quality (Craig et al., 2021). These additives can be natural or synthetic compounds carefully selected and regulated to meet specific standards (Craig et al., 2021).

In United States, FDA regulates the manufacturing, labeling, and distribution of pet food under the Federal Food, Drug, and Cosmetic Act (FFDCA). They oversee the safety of pet food additives and establish guidelines for their use. The FDA conducts inspections, investigates complaints, and can issue recalls or take legal action if necessary to ensure compliance with regulations (U.S. Food and Drug Administration, n.d.). Additives function as preservatives that

extend the shelf life and prevent nutrient degradation, and as flavor enhancers to improve the food palatability. Additives contribute to the overall quality and appeal of pet food.

Preservatives:

Function: Prevent spoilage and extend shelf life by inhibiting bacterial and fungal growth.

Ingredient: Ethoxyquin, BHA (butylated hydroxyanisole), BHT (butylated hydroxytoluene)

Antioxidants:

Function: Protect fats and oils from oxidation, preventing rancidity and maintaining nutritional quality.

Ingredient: Vitamin E (tocopherols), Vitamin C (ascorbic acid).

Flavor Enhancers:

Function: Improve the taste and palatability of pet food to encourage consumption.

Ingredient examples: Beef broth, Chicken broth

Emulsifiers and Stabilizers:

Function: Improve the texture and consistency of pet food, preventing separation or settling of ingredients in wet pet foods.

Ingredient examples: Polysorbate, Carboxymethylcellulose, Polyglycerols, Modified starch, Soya lecithin, Carrageenan, Gums

Vitamins and Minerals:

Function: Supplement essential nutrients that may be lacking in the primary ingredients, ensuring the pet food meets the nutritional requirements of the animal.

Vitamins are sometimes written in their ingredient names to provide clear and consistent information about the specific supplement form. Table 4.1 show the common names, scientific names, and ingredients names of vitamins.

Table 4.1. Common names, scientific names and ingredient names of vitamins

Common name	Scientific name	Ingredient name
Vitamin A	Retinol	Retinyl Palmitate, Retinyl Acetate, Retinyl Linoleate, Retinol
Vitamin B1	Thiamine	Thiamine
Vitamin B2	Riboflavin	Riboflavin
Vitamin B3	Niacin	Niacin, Niacinamide, Nicotinic Acid
Vitamin B5	Pantothenic Acid	Pantothenic Acid
Vitamin B6	Pyridoxine	Pyridoxine, Pyridoxal, Pyridoxamine
Vitamin B7	Biotin	Biotin
Vitamin B9	Folic Acid	Folate, Folic Acid
Vitamin B12	Cobalamin	Cobalamin, Cyanocobalamin
Vitamin C	Ascorbic Acid	Ascorbic acid
Vitamin D	Calciferol	Cholecalciferol, 1,25-Dihydroxycholecalciferol, Ergocalciferol
Vitamin E	Tocopherol	Tocopherol, alpha-tocopherol
Vitamin K	Phytonadione	Phylloquinone

4.2. Label

4.2.1. Ingredient list

The ingredients are printed in the ingredient list in letters of the same font type, size, and color. The name of each ingredient has an official definition established by AAFCO. No brand names can be used in the ingredient list. For example, an ingredient named as “zinc sulfate” must be presented as “zinc sulfate” rather than a brand name of the mineral ingredient. The ingredient list cannot include any reference to the quality or grade of an ingredient, as such, words such as “Prime, select, utility, etc.…” should not be part of the ingredient list. The ingredients are arranged in order of largest inclusion level to lowest inclusion level (by weight). In other word, the first ingredient is present in the largest amount and the last is the ingredient in the smaller amount.

4.2.2. Guaranteed Analysis

Table 1 below presents an example of a typical guaranteed analysis on a pet food label.

Table 4.2. Sample guaranteed analysis

Guaranteed Analysis	
Crude Protein	24.0% min
Crude Fat	14.0% min
Crude Fiber	5.0% max
Moisture	10.0% max
Ash	3.5% max
Calcium	1.0% max
Phosphorus	0.7% max

The guaranteed analysis must include the crude protein, crude fat, crude fiber, and the moisture content. Additional nutrients can be presented if the pet food company desires to do so. The nutrition facts are provided “as fed” which refers to the feed in its current state containing water. Dry kibbles contain anywhere between 10 to 12% water labeled as “moisture”.

What are “Crude” protein, fat, and fiber?

In crude protein, “crude” refers to a method of measuring the protein content in food by analyzing the total nitrogen content. The term "crude" is used to distinguish it from a more precise and specific methods of measuring protein. Crude protein is an estimation of protein content based on the amount of nitrogen present in the food product or feed ingredients and a value very close to that of true protein.

“Crude fat" and "fat" are not the same thing and can differ in their composition and nutritional value. Crude fat is an estimation of the total fat content in the food product or feed ingredient, based on the amount of ether extractable material present in the sample. The crude fat content value is only slightly higher than the fat value.

Crude fiber is a measure of the indigestible carbohydrate components, such as cellulose and lignin. It is determined by subjecting the sample to a series of chemical treatments that remove soluble and digestible components, leaving behind the "crude fiber" residue.

Ash

Ash is a general term that includes the inorganic component of food, such as minerals calcium, zinc, iron etc.

4.2.3. Product name

Commercial pet food companies must name their products following rules established by AAFCO.

The 100% rule. The requirement for “All” statement, such as "All-beef jerky dog treats" is that the product should primarily consist of beef meat, excluding any added water used during processing, decharacterizing agents to differentiate them from human food, and small amounts of preservatives and condiments. In most cases, “all” appears in treat product.

The 95% rule. If a product's name includes a specific ingredient, such as "beef" or "chicken," that ingredient must account for at least 70% of the total product weight, and at least 95% of the total dry weight of the product. The remaining 5% should be ingredients required for additional nutritional purposes, such as vitamins and minerals.

The 25% rule. Product with “dinner,” “entrée,” “platter” in name should follow the 25% rule. The named ingredient(s) must comprise at least 10% of the total product by weight and at least 25% of the product by weight not including the added water.

The “With” Rule. Simply put, including the words “with” or “similar” allows an ingredient to be included in the product name or anywhere else on the label at an inclusion rate of at least 3% of each named ingredient.

The Flavor Rule. Referring to AAFCO, “flavor” designation in a product name (or elsewhere on a label) may be used if a listed ingredient provides the flavor, and the flavor descriptor is printed in the same font and as clearly as the name of the designated flavor. For example, on a bag of “chicken-flavored dog food,” one should find chicken fat or some other ingredient providing chicken flavor in the ingredient list, and both words “chicken” and “flavored” are printed in the same font-type and size in the product name.

4.3. Pet food format

Pet food format refers to the various types or forms in which pet food is available. The format of pet food can differ based on several factors.

Dry Kibble. Dry kibble is one of the most popular and widely available formats for both dogs and cats. It is made by combining ingredients, forming a dough, and then cooking it at high temperatures. The resulting kibble is crunchy and helps promote dental health by reducing tartar buildup.

Wet/Canned Food. Wet or canned pet food typically contains higher moisture content and is often more palatable to pets than dry kibbles. It is made by blending ingredients and then sealing them in cans or pouches. Wet food can be more appealing for picky eaters and provides hydration along with nutrition.

Semi-Moist Food. Semi-moist pet food falls between dry kibble and wet food in terms of moisture content. It is soft and chewy, making it easier to eat for some pets.

Dehydrated/Freeze-Dried Food. Dehydrated or freeze-dried pet food is made by removing moisture from fresh ingredients while retaining their nutrients. The food is typically rehydrated with water before feeding. This format offers convenience, longer shelf life, and nutritional benefits.

Treats and Snacks. Pet treats and snacks are available in various formats, including biscuits, chewy treats, jerky, dental chews, and more. Treats and Snacks are not nutritionally balanced, so they are often used as rewards during training or simply as a way to pamper pets.

Therapeutic diets. Also known as veterinary diets, are specialized pet foods that are formulated to address specific medical conditions or nutritional needs of animals. These diets are typically recommended by veterinarians as part of a comprehensive treatment plan for pets with various health issues.

4.4. Feeding guidelines

4.4.1. Free feed vs timed feed

Free Feeding involves leaving food available for your pet at all times, allowing them to eat whenever they want. This method is commonly used for dry kibble since it doesn't spoil quickly. It is convenient if you have a busy schedule or if your pet is self-regulating and doesn't overeat. However, free feeding may not be suitable for all pets, especially those prone to obesity or weight-related health issues.

Timed Feeding involves offering meals to your pet at specific times of the day and removing any uneaten food after a certain period. This method is often recommended for both cats and dogs, as it helps with portion control and maintaining a healthy weight. It is also the preferred method for raw diet and homemade diet since they spoil quicker under room temperature. For puppies and kittens, they usually require more frequent meals, gradually transitioning to fewer meals as they mature. Adult dogs can be fed once or twice a day, while adult cats typically do well with two or more smaller meals throughout the day. The portion size should be appropriate for their size and activity level. Commercial pet food provides daily feeding guidelines by weight on their packages.

4.4.2. Large breed dog diet vs small breed dog diet

Caloric Needs

Large breeds generally have higher total energy needs due to their larger body size and higher activity levels. They require more calories to maintain their weight and support their muscle mass.

Small breeds typically have faster metabolisms and higher energy levels by weight compared to larger breeds. Diets for small breeds is somewhat more calorie rich than large breed diets.

Nutritional Considerations

Large breeds are more prone to certain health issues like joint problems, such as hip dysplasia (Krontveit et al., 2010). Providing a diet formulated with balanced levels of calcium, phosphorus, and appropriate protein content can support their bone and joint health. Large breed dogs generally require lower levels of calcium and phosphorus in their diet compared to small breed dogs.

Small breeds may have specific dental concerns, such as dental overcrowding or tartar buildup (Perry, 2017). Feeding smaller kibble or providing dental treats designed to promote oral health can be beneficial. Additionally, small breed formulas may have higher nutrient density to provide the necessary nutrition in smaller portions.

Feeding Frequency

Large breeds often benefit from two or three meals per day, rather than free feeding or having just one large meal.

Small breeds may be more prone to hypoglycemia or low blood sugar levels (Selk Ghaffari & Najafiyan, 2009). To help maintain stable blood sugar, they may benefit from more frequent meals throughout the day.

4.5. Myths

4.5.1. Grain-free diet

A grain-free diet is a type of pet food that excludes cereal grains such as wheat, corn, rice, barley, and oats from its ingredient list and formulation. It has become a popular choice for both dogs and cats in recent years, often marketed as a more natural and healthier option. Grain-free diets were initially developed with the idea of providing an alternative for pets with food allergies or sensitivities to grains. The belief was that by removing grains, the risk of triggering allergic reactions would decrease.

While grain-free diets do not contain traditional (i.e., cereal grains), the absence of grains does not automatically make a diet low in carbohydrates. Grains are just one source of carbohydrates commonly found in pet foods. In grain-free diets, carbohydrates come from alternative ingredients like legume grains (e.g., peas, lentils), potatoes, sweet potatoes, or tapioca. These ingredients contribute to the carbohydrate content of the food. Be aware, grain-free diets are not higher protein diets than products containing cereal grains. For detailed nutrition facts, you can read the guaranteed analysis on pet food packages.

The carbohydrate levels in grain-free diets can vary depending on the specific formulation of the pet food. Some grain-free diets may indeed have lower carbohydrate levels compared to traditional grain-containing diets, especially if they prioritize using animal-based protein sources and fewer carbohydrate-rich ingredients. However, others might have similar or even higher carbohydrate content, depending on the ingredients used.

Is grain-free necessary?

The majority of dogs and cats do not have any grain sensitivities (fewer than 1%). While some pets may benefit from a grain-free diet, it is not inherently necessary or appropriate for all dogs and cats.

Is carbohydrate bad for your pet?

No, in fact, carbohydrates can serve as a valuable energy source and contribute to a balanced diet when provided in appropriate amounts and from high-quality sources. The starch

plays a crucial role in forming pet food dry kibbles structures. Starch is a natural binder that holds the other ingredients together during the extrusion process. It helps maintain the shape and structure of the kibble, preventing it from crumbling or falling apart.

4.5.2. Natural diet

What is "natural" and "natural diet"?

According to AAFCO, "Natural" means a feed or ingredient derived solely from plant, animal or mined sources should not have been produced by or subject to a chemically synthetic process and not containing any additives. The term "natural diet" generally refers to a diet that closely mimics the foods that animals would consume in their natural habitat or environment. For domestic pets like dogs and cats, a natural diet is one that emulates the type of diet their wild ancestors would have consumed. Therefore, natural diets include instinctual and ancestral diets that are formulated based on animals' innate preference or similarity of their evolutionary ancestor. Natural diet contains higher protein and lower carbohydrate concentration than commercial pet food products. Diets high in protein (>30% ME from protein) or fat (>50% ME from fat) are beneficial for active pets but feeding a natural diet to inactive indoor pets leads to undesirable weight gain.

4.5.3. Animal by-products and rendered animal products

An animal by-product refers to any part or substance derived from animals that is not intended for direct human consumption. These by-products come from the processing of animals for human food, such as livestock or poultry. They include parts of the animal that are not typically used as human food, such as bones, internal organs, fat, blood, feathers, and other tissues.

Rendered animal products refers to any material derived from animals that has undergone the rendering process. The rendering process involved cooking the material at high pressure to remove fats and pathogens, followed by drying to remove moisture and grinding into a meal. Removal of fat and moisture extent the shelf life. Rendering is a common industrial process used to convert animal by-products, such as fat, bones, and internal organs, into usable materials for various purposes, including pet food and livestock feed.

The use of animal by-products and rendered animal products is regulated to ensure safety, environmental protection, and compliance with health standards. Proper rendering processes are necessary to produce safe and high-quality products for their intended purposes, whether it be for animal feed or industrial applications.

4.6. FAQ

Are animal by-products and rendered animal products safe?

In the United States, processing standard and quality is regulated by the Food and Drug Administration (FDA). People may have the misconception that animal by-products and rendered animal products are not safe. However, they are high quality and more affordable protein sources.

I heard that euthanized pets are rendered, is that true?

The Food and Drug Administration (FDA) prohibits the use of euthanized animals in pet food or animal feed intended for consumption by other animals.

I heard that the ingredients of by-products come from animal parts that slaughterhouses throw away, is that true?

Though by-products come from animal parts that are not intended for direct human consumption, they are refrigerated or frozen until processed by rendering facilities or used by pet food manufacturing plants.

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