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A Study of the Nutritional Effect of Grains in the Diet of a Dog

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A STUDY OF THE NUTRITIONAL EFFECT OF GRAINS IN
THE DIET OF A DOG

by

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A Thesis Submitted in Partial Fulfillment
of the Requirements for a Degree with Honors
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ABSTRACT

The present study was designed to address the prevalence of the lack of knowledge for what owners are feeding their dogs, and to determine if grain should be within the diet. It was hypothesized that a bag of feed containing protein at no specific level, with a low level of grain will be more beneficial for the animal, and that a diet needs to contain grains. The crude protein, crude fat, and first five ingredients listed were compared for four bags chosen, and to the nutritional requirements for a dog. “Holistic Blend Grain Free”, contained an extremely high amount of protein, too much for a maintaining dog, thus would cause damage to the dog’s kidneys if consumed for prolong time. “Nature’s Variety Instinct Grain Free” contained too much protein for a dog to use, and had a high fat content. “Natural Balance” contained protein and fat within the nutritional requirements, and was the best choice out of the four bags chosen. “Purina Dog Chow” was within the nutritional requirements of a maintaining dog but was composed mainly of corn, which is not as nutritious. Owners should not feed high protein diets that are grain free because the kidneys could be over worked and cannot remove urea as efficiently, therefore, grains need to be in feed. Owners need to read labels before buying a feed for their dog, and accommodate the pet’s needs. Otherwise, more dogs will be fed too high protein diets or lower quality ingredients, and more dogs will develop kidney disease, or become obese from high fat content.

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INTRODUCTION

The commercial dog food industry has been in existence for almost one hundred and fifty years (Dog Food Advisor, 2014). The food companies offer convenience to pet owners whereby they need only to scoop out dry kibble into a bowl or open a can of pet food, without any additional food or supplement. However, pet owners do not know what ingredients are being used in the commercial food. Owners rely on the dog food industry to use quality products; however, to their surprise, and in some cases at the demise of pets, the owners have learned that this has not been the case.

Since 1995 and more recently in March 2007, Menu Foods recalled more than 100 brands including Iams, Eukanuba, Hills Science Diet, Purina Mighty Dog and many store brands including Wal-Mart's (Blue Buffalo Company, 2014). Menu Foods, a Canadian company, was one of the largest companies that were in contract with pet food companies under different private labels. They did not produce products under their own name; instead the contracts were to produce large amounts of feed for "75% of the private-label pet foods from Canada, and 40% of all products in the United States" (Nestle, 2008, pg. 42).

Over the past five decades, diseases in dogs have increased by 80%, and studies have found processed food may be responsible for that increase (Blue Buffalo Company, 2014). Due to this increase in dog illnesses, pet owners have been trying to feed their dogs a healthier diet (Heffernan, 2011). However, owners focus too much on the presentation and labeling of commercial companies; such as 'grain-free' and 'gluten-free'. There has been much controversy about whether it is best to feed your dog food

containing any kind of grain. Some people do not believe it is healthy to feed dogs grains, while others believe it to be a necessity within the diet of a dog.

DOG FOOD RECALLS

Dog food recalls occur when there is something within the feed that will cause harm to the animal's health or when there is a flaw within the feed. When a company requests for their product to be recalled, they ask that all of the production run of that feed be returned to the manufacturer (Nestle, 2008, pg. 15). Owners should immediately stop feeding those products to their pets and return them to the purchasing store and the store will ship the product back to the manufacturing location. Recalls can happen for many different reasons, but a few common reasons have been possible contamination through Salmonella, antibiotic residues, mold contamination, and even remnant pieces of plastic (Nestle, 2008, pg.175). In 2007, when Menu Foods had its record-breaking food recall of nearly one hundred different brands, the recall was due to wheat flour within the food that was laced with melamine and a by-product of melamine, which causes damage to the kidneys (Nestle, 2008, pg. 1). Melamine is an organic base that contains 67% nitrogen and is used industrially in adhesives and plastics, and is even used in dishware (Nestle, 2008, pg 105). The by-product found was cyanuric acid, which is "used industrially to stabilize solutions for chlorinating swimming pools and hot tubs" (Nestle, 2008, pg. 83). It was found that "through three kinds of scientific studies—laboratory, tissue sample, and animal—that combination of melamine and cyanuric acid quickly forms kidney crystals" (Nestle, 2008, pg. 83). Owners should be wary of feeding their dog a brand that has been recalled multiple times, such as Purina, because multiple recalls

raise doubts as to whether that these brands are made safely and precisely. Although many pets are negatively impacted by the poor quality of certain feedings, understanding the diet of the dog reveals the complexity of catering to each individual animal's particular needs.

BACKGROUND OF A DOG

The dog is a subspecies of the grey wolf as *Canis lupus familiaris*, and classified in the order as *Carnivora* (Dictionary.com, 2014). Despite public belief, the dog is in fact not a true carnivore; the dog is an indifferent omnivore. Unlike cats, which are obligate carnivores, dogs can digest grains. This means that dogs have carnivorous traits with sharp teeth and meat drive, but also have the omnivore digestive traits with an ability to break down carbohydrate feeds (Mobley et al., 2013). Dogs can also modify the feed given or synthesize from scratch the nutrient; taurine, and vitamin A. A cat cannot synthesize the nutrients from plant precursors, so these nutrients have to be added to their feed and the essential fatty acid arachidonic acid (Stokes, 2011).

GRAIN

Grains in any form are a source of energy. "Grain refers to cereal grains, which are the seeds [or kernels] of grass feeds. Forms of grains can include wheat, barley, corn, and rice" (McNamara, 2006, pg. 128). The seeds, also known as kernels, contain a high amount of starch, which is relatively low in protein. Grains are also low in calcium and vary in other minerals and vitamins. However, some grains contain greater amounts of protein that can enhance the overall maintenance of an adult dog (McNamara, 2014). Amylase is an enzyme produced in the pancreas to digest starch in the small intestine

(Mobley et al., 2013). Dogs can digest starch that has been previously cooked because this enzyme is present in the small intestine (Schlotthauer, 1941).

EFFECTS OF GRAIN

There have been few experiments conducted to test the effects of grain on the overall health of a dog, but there have been some investigations of specific diseases and the effects of grain on them. A major concern is with the kidney, which can be affected by high protein with a low or a grain-free diet, which can cause azotemia or uremia in a dog. “Azotemia is due to elevation of nitrogen containing compounds in the blood, such as urea, creatinine, and various body waste compounds” (Polzin, 2013). Uremia is the inability of the kidneys to remove wastes from blood (McNamara, 2014). “Azotemia and uremia are caused by the continuous addition of protein metabolites derived from too much dietary protein and the decline of the body to produce its own internal proteins” (Polzin, 2013). Both azotemia and uremia cause stress on the kidney due to an overload of protein or amino acids, and excessive nitrogen in the diet causing the kidneys to work harder to excrete all the urea in the system. This can possibly lead to permanent kidney damage (Polzin, 2013).

Many dogs have been seen to have allergies to the feed they eat, and in some cases grains are often associated with the allergy responses or sensitivities seen in the dog (Stokes, 2011). Most dogs that have been allergic to grains in the feed have exhibited some skin issues. Signs of an allergic reaction have resulted in “pruritus (itchiness), eczema (dry skin), and skin appearing red and tender” (McNamara, 2006, pg. 203). When having an allergic reaction, dogs scratch and bite at the sensitive spots on the body, inflaming the area being bitten or scratched (McNamara, 2006, pg. 203).

Nevertheless, grain has been shown to have many beneficial effects on the gastrointestinal system, especially improving the gastrointestinal health of dogs that have kidney disease (Hill, 2012). “Fermentable fiber encourages colonic bacterial multiplication; however, a source of ammonium nitrogen is [needed] for bacteria to grow” (Hill, 2012). The nitrogen sources come from dietary proteins that escape from the small intestinal digestion, endogenous proteins, shed intestinal mucosal cells, and the blood urea that moves across the intestines with water movement (Hill, 2012). Some studies have shown that adding grain into the diet will cause more successful utilization of blood urea as a source of nitrogen for microbial growth in the colon (Hill, 2012).

OBJECTIVES

Consumers are limited in their knowledge of what their pet requires to fulfill its nutrition needs. Dog owners should be educated in the nutritional requirements of their dogs, and should read a food label, and understand what they are feeding their dog. Grains have been used as an energy source in feed, but can sometimes, act as an allergen. Pet owners should know whether a diet containing grain or a grain free diet is more helpful to the overall health of their dog. This can be a step in making sure the dog is being nutritionally fulfilled. The purpose of this research was to see which of the commercial feeds chosen had the greatest nutritional benefit for the health systems of the dog: looking at different levels of food quality, grain, and meat content in the diet. It was hypothesized that a bag of feed containing some level of protein, with a low level of grain would be more beneficial for the animal, hence that a dog’s diet needs to contain grains.

PROCEDURE

Four bags of dog feed were obtained with certain protein and grain levels. They were chosen as food that would maintain a mature adult dog at the approximate age of three or four years old, with low energy needs. The breed and sex of the dog did not matter in this literature review due to no testing being done on any animal during this literature review. The quality of each feed was assessed by using the Dog Food Advisor rating system that gives each feed a rating from one star (low quality) to five stars (high quality). The feed used for high quality that was high in meat and grain-free was “Holistic Blend” (WellPet LLC, Tewksbury, MA). The food contained 42% crude protein, with 20% crude fat (see Appendix Table 1). The second bag used was a high quality brand that was lower in meat content and grain free, “Nature’s Variety Instinct” (Nature’s Variety, Lincoln, NE). This food contained 37% crude protein and 20% crude fat. The third bag used was a high quality brand that contained meat and a low level of grain, “Natural Balance” (Natural Balance Pet Foods Inc., Pacoima, CA). “Natural Balance” contained 24% crude protein and 11% crude fat. The fourth bag used was a low quality brand that contains meat and grain, “Purina Dog Chow” (Nestle-Purina, St. Louis, MO). “Purina Dog Chow” contained 21% crude protein and 10% crude fat (see Appendix Table 1).

The first five ingredients of each bag were compared to one another by looking at what the first main ingredient of each bag was and if any of the four bags had similar ingredients, and what the ingredient was composed of. The National Research Council adequacy charts were used to compare the nutritional adequacy of the different foods from the first five ingredients of each feed. The crude proteins of the bags were

compared to one another to see if they exceeded or met the nutritional requirements for a dog. Next, the crude fat was looked at to see how the ratio of protein to fat was for each bag. Then each individual nutritional value was compared to the most recent standard nutritional requirements for dogs presented by the National Research Council (National Research Council, 1985). The differences between the nutritional percentages, requirements and ingredients were then recorded for later review.

Literature was reviewed on how grain in the diet of a dog can affect the health systems of the dog. Then brands were chosen which were considered the best to give a dog to help its overall health. When looking over the literature and previous research to see the effects of grain in a diet, it was decided which one of the four bags would cause the most harm on the health systems of the dog. At the end of the experiment, it was determined whether a diet containing grain or a grain-free diet is more beneficial for the overall health of the dog.

DOG FOOD QUALITY ASSESSMENT

To choose the four bags of feed used for this experiment, the bags needed to vary in quality between all four, and The Dog Food Advisor was used to aid in determining the quality of feed. The company, The Dog Food Advisor, evaluates every dog feed produced in the United States and Canada. The Dog Food Advisor rates dog food on ingredients and nutritional value, as ingredients are described and evaluated, with comments added regarding their appropriateness and overall value as part of the food (Dog Food Advisor, 2014). They give dog food a star rating between one and five, with one being low quality and five being high quality.

DOG FOOD LABELS

Looking at the dog food labels of each of the four bags, the ingredients, crude protein, and crude fiber were reviewed and recorded. The list of ingredients on a dog food label is too large, so only the first five ingredients of each dog food label were looked at during this experiment. Just like human food labels, “the ingredients in the list are in descending order from [the main ingredient in the diet] to the least” (McNamara, 2006, pg. 162). However, the percentage of each ingredient was unknown, but it was assumed the first five ingredients would cover the vast majority of the ingredients in the feed (McNamara, 2006, pg. 162). The energy and calorie content of each bag was looked at as well at the bottom of the feed labels. The energy level cannot be too high for a dog doing nothing for activity, and the owner must be careful with portion control. The average energy for a dog doing absolutely nothing for activity is approximately 1.6 kcal/kg (Stokes, 2011).

ADEQUACY STATEMENT

All four of the bags had an adequacy statement claiming to be completely balanced for all life stages of the dog, which means that we would assume that all the essential amino acids are present within each dog food bag (McNamara, 2006, pg. 163). The first and second bag had high meat content, so we assumed these high protein bags contained all essential amino acids required for dogs. For the high protein bags they should contain all the amino acids needed for a dog, even though the potato and pea may be short in certain amino acids (McNamara, 2006, pg. 163). What is interesting is that bags of high protein content did not contain just protein; they had legume proteins as well, even though the first and second bag were grain free. So owners may believe they

are feeding their dog all the amino acids they need to maintain their health, where in some cases like the first bag, “Holistic Blend,” they could be possibly missing or in short supply of some.

NATIONAL RESEARCH COUNCIL

The National Research Council (NRC) sets the nutrient requirements for dogs, cats, and livestock for varying maintenance requirements and at different life stages. The National Research Council states that an adult dog needs its protein levels between 15-28% and a fat level between 5-20%. However, they do state that an owner needs to be careful, when feeding a dog with a low activity level, as having higher than 15% fat within the diet may lead to obesity (National Research Council, 1985). For a growing puppy, a lactating dog, or a pregnant dog, the crude protein level needs to be between 28-35%, and crude fat needs to be at 30% to keep up with high demands of the animal (National Research Council, 1985). An elderly dog (eight years or older) needs to have protein between 15-20% and fat content around 5-15% since the animal is not doing a lot of activity anymore and to avoid it laying on fat (National Research Council, 1985).

RESULTS

The first bag, “Holistic Blend,” is not healthy for a dog to be on long-term because it surpasses the recommended 15-28% crude protein with its 42% crude protein (see Appendix Table 1). The first bag contained a lot of protein in the top five ingredients that included two meat sources, peas, potato and sunflower oil, which is used to increase palatability and is a fat source. The “Holistic Blend” is grain free and should not be used for a prolonged amount of time as its high crude protein level with no grain could damage the kidneys. The second bag, “Nature’s Variety Instinct,” did not contain

as much crude protein as the first bag, but it still exceeds the recommended amount at 37% (see Appendix Table 1). Its first three ingredients were meat protein sources; tapioca, which is a starch source; and beef fat for palatability. The third bag, “Natural Balance,” had a crude protein level within the recommended nutrient requirements for a mature dog, and the bag did contain venison, which is a very lean meat and is very healthy for a dog to consume, but it also has canola oil as a top five ingredient, which increases the fat content. The fourth bag, “Purina Dog Chow,” also met the nutritional requirements of the National Research Council because the crude protein was at 21% and crude fat at 10%. The ingredients were not the best choices due to the main ingredient being whole grain corn, with meat and bone meal, corn gluten meal, and soybean meal as the main sources of protein. Animal fat was included for energy and to intensify palatability.

INGREDIENT COMPOSITION

When assessing the ingredients, it was found that in “Holistic Blend,” the top five ingredients were deboned turkey meat, turkey meal, potato, sunflower oil and peas. Deboned turkey meat is turkey taken right off of the bone and is a great protein source (Martin, 2008, pg. 10). The second ingredient, turkey meal, actually contains more protein than the turkey meat because turkey meal can include bones, blood, heads, and organs (Martin, 2008, 10). Potatoes are considered a “gluten free” source of digestible carbohydrates but are of only modest nutritional value to a dog, containing vitamins, minerals, and some protein (Subcommittee on Feed Composition et al. 1982). The potatoes are digestible for a dog because during processing the potatoes are cooked, which gelatinizes the starch and allows it to be digested (Martin, 2008, pg. 14).

Sunflower oil is used specifically to increase palatability while adding fat to the diet, and peas are used as a protein and fiber source, as well (Subcommittee on Feed Composition et al. 1982). Fiber is not well digested by dogs but can be partially fermented in the large intestine and will improve colon health.

In “Nature’s Variety Instinct,” of the five ingredients listed, beef meal, lamb meal, turkey meal are all high in protein because they are composed of meat, bone, blood, organs, and whatever other parts could have been mixed together during processing of each ingredient (Martin, 2008, pg. 10). Tapioca, as said before, is a source of starch extracted from the cassava plant root, so it also contains some protein. Tapioca is what manufacturers use as a substitute for grains (Macgregor, 2000). Beef fat is a major fat source that is sprayed onto the feed near the end of processing to add palatability (Martin, 2008, pg. 12).

“Natural Balance” ingredients were analyzed and venison was found to be a good meat source that actually contains pure meat and is low in fat (Martin, 2008, pg. 10). Sweet potatoes, when cooked during processing of the food, become a good source of carbohydrates that add protein, vitamins, and minerals (Macgregor, 2000). Potato protein and pea protein is the dry residue remaining after removing the starchy part of a potato and supplies protein (Macgregor, 2000). Canola oil is a fat source but does add some favorable omega-3 content (Subcommittee on Feed Composition et al. 1982).

It was seen that “Purina Dog Chow” contained the most corn ingredients, and corn products are low in the essential amino acid lysine, which may be supplied by the soy and meat ingredients (Macgregor, 2000). Animal fat increases fat content in the diet and increases palatability (Martin, 2008, pg. 12). Meat and bone meal is a protein source

of dry rendered product from mammal tissues, including blood, bone, hair, hoof, hide, manure, trimmings, stomach, and even rumen contents (Martin, 2008, pg. 12). The problem with this ingredient is that the meat is not from a specific animal; it can come from anywhere. Corn gluten meal is the dried residue from corn after the removal of the larger part of the starch and germ (Macgregor, 2000). Soybean meal adds protein to the diet and is obtained by grinding the flakes that remain after using a solvent extract to remove most of the oil from soybeans (Macgregor, 2000).

DISCUSSION

It was determined that the first bag of feed, “Holistic Blend,” is not healthy for a dog if given for an extended period of time. Its protein percentage surpassed not only the maintaining adult dog requirements, but also the requirements for a lactating, pregnant, or growing dog. A lactating or pregnant dog needs a lot of protein and fat, not only to supply the food to the young, but also to keep up demands for its own maintenance. This feed could cause major harm to the dog’s kidneys, especially when a low to non-active dog is being used as an example. If this feed were consumed for an excessive amount of time, the dog would develop kidney damage before becoming an elderly dog and die at an early age. This feed was rated a 5-stars, high quality feed, but since this bag is grain-free and contains a very large amount of protein (42%), it can be extremely harmful when a dog is on this feed for too long. The quality rating just rates on the quality of ingredients. It does not take into consideration if the protein or fat level is too high in the diet. The Dog Food Advisor that analyses the feed to determine its quality should be aware of the nutritional requirements that are set by the National Research Council,

because those have been created to help prolong the health and lives of dogs and other animals.

The second bag, “Nature’s Variety Instinct,” did not contain as high an amount of protein as the first bag, but still surpassed the protein requirements of an adult dog and a lactating bitch. With its high protein content, this feed, too, would cause distress on the kidneys, which would be over-worked and over time, fail. When looking at the ingredients list on each bag of food chosen, it was observed that the large ingredients list contained more meat by-products and meat meals lower in the list, which contain a higher meat content than a meat source. This can explain why the first two bags of feed are so excessive in crude protein. Since we did not know the percentage of each of these meat meals and meat by-products, they could be adding more protein to the diet than we expect. The crude fat within the first two bags of feed are within the structured requirements of an adult dog. Unfortunately, the National Research Council does state that a dog doing low to no activity should stay below 15% crude fat to avoid laying on excessive fat. The crude protein and crude fat have been seen in all four bags of dog food to have a direct relationship: with increased protein comes increased fat content.

The data taken from each dog food bag (see Appendix Table 1) reveals that the third bag, “Natural Balance,” is more beneficial to the overall health systems of the dog. Since it contained grains and a lower protein level within the recommended values, dogs would be able to process the protein more efficiently, and not over work the kidneys and cause long-term harm. The crude fat does not exceed 15%, so if fed the right portion, the dog should not lay on fat as heavily when consuming this feed for extended amounts

of time. This one is not grain free, but still contains ingredients that have quality nutritive value and is rated a 4-star quality feed that allows the feed to be utilized more efficiently.

After analyzing “Purina Dog Chow,” it is interesting to see that it is not nearly as harmful to the health systems as the first and second bags of feed looked at during this experiment, but “Purina Dog Chow” is still not the optimal choice of the four bags. “Purina Dog Chow” met and did not exceed the nutrient requirement for crude protein and crude fat set by the National Research Council. Assessment of the ingredients shows that whole grain corn was the main ingredient, and corn does not offer many nutrients but is used because it is inexpensive. “Purina Dog Chow” does contain grain and a good level of protein that a dog needs, but the primary ingredient of corn, has little nutritional value (Macgregor, 2000). Corn products are low in the essential amino acids lysine, which can be supplied by the soy and meat ingredients within the “Purina Dog Chow.” Even though this bag contains ingredients that do not contain a lot of nutritional value, this bag would not be harmful on the kidneys with prolonged consumption.

TESTING DOG FEED

This literature review was done just by literature review and analyzing the labels of each dog feed. No analyses were performed on any of the four feeds to send them out to be tested to find out what exactly was in each feed. There were no funds to conduct analyses, and it is expensive and time consuming to test each different feed. This experiment was lacking crucial data to determine the nutrients within the ingredients such as amino acids, vitamins, minerals, etc. Definitive speculation cannot be made if there is an amino acid deficiency or not within each feed, which then makes us limited in drawing conclusions on what the protein and fat content truly is. However, we can go by how

much protein and fat in the diet is needed for varying maintenance requirements given by the National Research Council. In fact, one way to avoid amino acid deficiencies is to overfeed protein and “Holistic Blend” at 42% is certainly overfeeding protein, but nevertheless not the best to be feeding.

PORTION CONTROL

A major concern for dogs that are not exercising and just trying to maintain their body weight is feeding too much of a high calorie food. Owners need to be careful regarding portion control, because what was noticed on each of the four bags of food was a high calorie content. Owners overfeed most maintaining dogs. They need to be fed less than a sled dog, pregnant or nursing dog, because they have no way of utilizing the excess energy. Instead of using the calories and energy, they would layer on fat in a faster fashion if fed the same amount as a sled dog, etc. Since the four bags of feed chosen stated that they were a “complete and balanced diet for all life stages,” on the back of each bag was a list of how much feed a dog should be given by weight and life stage (McNamara, 2006, pg. 163). It is critical that owners follow the correct amounts listed for what their animal should be consuming.

OBESITY

“Obesity is defined as the excessive accumulation of fat in the adipose storage areas of the body. A body weight that is more than 15% to 20% above normal is generally considered to be indicative of obesity” (Case, 2000, pg. 303). Obesity in dogs is increasing every year due to owners not knowing how much calorie content or energy their dog needs (Nestle 2008, pg 180). In fact, “obesity is currently the most common nutritional disorder that occurs in companion animals in the United States. Surveys have

reported incidence rates of between 24% and 34% in adult dogs” (Case, 2000, pg. 303). There needs to be a stronger emphasis on what a dog needs to keep up with its own maintenance. The cause of obesity is when the energy taken in and the energy demand are not synchronized, which results in an energy surplus within the dog (Case, 2000, pg. 305). The unnecessary amount of energy in the dog’s body would be stored as fat, which would increase weight gain, and if the dog goes beyond 15% of its average body weight the dog would become obese (Case, 2000, pg. 305). With obesity would come other health problems stemming from it such as glucose intolerance and diabetes (Case, 2000, pg. 304). Unfortunately, many owners do not realize that as the protein level in food goes up, so does fat content due to fat within the meat sources themselves. A dog doing nothing for activity should not surpass a 15% crude fat content, to make sure they can utilize the energy given to them and not just gain a layering of fat on their body.

CONCLUSION

Feeding a dog a high protein diet that is high in fat causes long term effects, such as harm to the kidneys due to being over worked and not being able to flush out enough urea in the system. Grain is a necessary dietary ingredient for a dog, but in low amounts, and protein should be within the limits given by the National Research Council. Labels that read ‘grain-free’ are more harmful to the dog and should not be given unless required for other specific needs. Further research must be done, examining high-marketed commercial feeds brands, comparing them to one another to assess grain content as well as nutritional quality within the feed. The owner must be aware of how much they should be feeding their dog to avoid the risk of obesity that can lead to other diseases.

FORESEEN PROBLEMS

Owners tend to feed their pet one feed, especially if it is meant for all life stages, for their pet's entire life. Most dogs do not seem to mind being fed one product especially if they enjoy it, but food labels still need to be read and must accommodate what the dog needs. If owners do not read these labels and understand what they are feeding their dogs, more dogs can develop kidney failure due to having too much protein in their diet. With grain as a controversial topic at this time, some diets (as seen in this study) containing an extreme high protein content, and little or no grain, can cause harmful long-term effects on the health systems of the dog through prolonged consumption. Most dogs when consuming the high calorie and energy content would gain weight at an alarming rate, especially if owners do not understand that if their dog is laying on the couch all day it does not need as many calories as an active dog. Similarly, someone who does moderate exercise does not need as high calorie intake as an Olympian training all day. However, obesity has already increased, and is the commonly seen nutritional disorder, and will continue to increase if owners are not careful. The owner is responsible for portion control, by choosing the correct feed and feeding it in the correct manner.

Dogs have some influence on what their owner buys for food, but that does not have to do with the nutrient content. This influence is whether the animal will eat it. Other factors, such as its unpleasant smell, do not depend on the dog but on the owner. The owner determines whether to buy the feed, and the largest influence on them is how products are marketed. Many manufacturers market their feed to the owner, not to the dog based on what the dog needs in their diet. There has recently been a commercial on

the brand “Blue Wilderness Grain-Free,” and they grab the consumers’ attention by saying they should be feeding their dogs like the dogs’ ancestors, the wolf because “wolves and dogs share many traits like their primitive desire for meat” (Wright, 2014). In the television commercial they show a dog running along side a pack of wolves to show how much alike they are. They also stated, “Feed your dogs wolf spirit with Blue Wilderness, because he’s wild inside” (Wright, 2014). Yet, in The Dog Food Advisory, this feed contained 39% crude protein and 20% crude fat (Dog Food Advisor, 2014). There is more protein in the diet than a dog can manage and it contains no grain at all. The protein level would need to be lowered to be acceptable for a dog and have grains within the feed for successful utilization. “Blue Buffalo” company wants consumers to think that how they are feeding their dog right now is not right unless it is their brand because an owner needs to fulfill the ‘wild instincts’ inside the dog. Marketers play off of what they know will influence the consumers to buy their product, instead of making a food within the required nutrient levels.

Another commercial was aired in November of 2013, from “Blue Buffalo” again, and this too was an ad that showed dogs and then wolves running and jumping through the air. They stated in the commercial that an owner needs to “satisfy a dog’s wolf spirit” because they are just like their ancestors (Wright, 2013). When researching what that feed contains, it was found that it contained 40% crude protein and 21% crude fat (Dog Food Advisor, 2014). The protein contained in the feed is too high for an adult dog of any energy level, and is too high in fat content, which is interesting because the company states in the commercial to “feed a high protein diet like the ancestors once had” (Wright, 2013). They are trying to tell owners that this high amount of protein is

better for a dog to have, when it is found that this is not the right way to feed your dog. This company has an adequacy statement on the commercial saying they are a “complete balanced diet for all life stages” (Wright, 2013). The marketing makes people believe they are doing the right thing by allowing their dog to be mainly eating meats, when in fact if the animal consumed this diet from puppy to adulthood, the animal would die prematurely due to permanent kidney damage (Hill, 2012).

Commercials are intriguing but misrepresentative, I do not trust the producers that are marketing their food, because they are doing all they can to make a sale, not trying to improve the dog’s well being. This is why every label should be looked at with caution by the owner and evaluated for what the animal truly needs, whether it is for lactation, pregnancy, growth, weight loss, sled dog activity, or maintaining body weight. Do not just trust what is in big letters on the front of the bag, such as ‘grain-free’ or ‘gluten-free’, or what is said on television. The label on the back of the feed will tell you the important facts you need to know to make an educated choice about the feed. When will pet food companies present themselves for what they are truly selling? My answer is never, and if manufacturers persist in mis-advertisement, diseases in dogs will continue to grow, and many owners will lose their loving family members earlier than desired.

REFERENCES

- Blue Buffalo Company. (2014). *Pet cancer awareness*. Retrieved from <http://bluebuffalo.com/health/pet-cancer-awareness>.
- Case, L. (2000). *Canine and feline nutrition*. (2nd ed., pp. 303-305). St. Louis, Missouri: Mosby, Inc.
- Dog. (n.d.). *Dictionary.com*. Retrieved March 27, 2014, from <http://dictionary.reference.com/browse/dog?s=t>.
- Dog Food Advisor. (2014) *Dry dog food*. Retrieved from <http://www.dogfoodadvisor.com/dog-food-reviews/dry>.
- Heffernan, M. (2011) *Keeping our pets safe: What to feed fido*. Retrieved from <http://www.wellness-interactive.com/foodlife/keepingpetsafe.htm>
- Hill R.C. (2012) *Applied veterinary clinical nutrition: Volume 1* (Delaney S.J., & Fascetti A.J., eds), pp. 253-291. Wiley & Blackwell, Ames, IA.
- Holistic Blend Grain Free (WellPet LLC, Tewksbury, MA). Retrieved from <http://holisticblend.com/en/food-formulas/dog-formulas/grain-free/>.
- Macgregor, C. (2000). *Directory of feeds & feed ingredients*. (3rd ed., pp. 25-38). Fort Atkinson, Wisconsin: W.D. Hoard & Sons Company.
- Martin, A. (2008). *Food pets die for: Shocking facts about pet food*. (3rd ed., pp. 10-14). Troutdale, Oregon: NewSage Press.
- McNamara, J. (2006). *Principles of companion animal nutrition*. (1st ed., Vol. 1, pp. 162-203). Upper Saddle River, New Jersey: Pearson Education, Inc.
- McNamara J.P. (2014) *Principles of Companion Animal Nutrition: Volume 2* (Anthony V.C., ed), pp. 20-23. Pearson, Boston, MA.
- Mobley A.R., Slavin J.L., and Hornick B.A. (2013) The future of recommendations on grain foods in dietary guidance. *J. Nut.* 182:9-13.
- National Research Council (U.S.). (1985) *Nutrient requirements of dogs and cats*. Washington, D.C. National Academies Press.
- Natural Balance (Natural Balance Pet Foods Inc., Pacoima, CA). Retrieved from <http://www.naturalbalanceinc.com/product-category.aspx?ProductCategoryID=12&category=LID+Limited+Ingredient+Diets+Dry+Dog+Formulas>.

Natures Variety Instinct Grain Free (Nature's Variety, Lincoln, NE). Retrieved from <http://www.instinctpetfood.com/product/instinct-raw-boost-grain-free-kibble-dog-food-venison-lamb>.

Nestle, M. (2008). *Pet food politics: The chihuahua in the coal mine*. (pp. 1-175). London, England: University of California Press.

Polzin D.J. (2013) Evidence-based stepwise approach to managing chronic kidney disease in dogs and cats. *J. Emerg. Crit. Care*. 220:205-215.

Purina Dog Chow (Nestle-Purina, St. Louis, MO). Retrieved from <http://www.purina.com/products/purina-dog-chow>.

Schlotthauer C.F. (1941) The Diet of the Dog. *Can. J. Comp. Med. Vet. Sci.* 5:36-42.

Stokes, M. (2011) *Animal nutrition*. Unpublished manuscript, University of Maine, University of Maine , Orono, ME.

Subcommittee on Feed Composition. Committee on Animal Nutrition, Board on Agriculture and Renewable Resources, Commission on Natural Resources, & National Research Council, (1982). *United states-Canadian tables of feed composition*. (3rd ed., pp. 41-80). Fort Atkinson, Wisconsin: W.D. Hoard & Sons Company.

Wright, M. (Producer) (2013). Blue wilderness [Television series episode]. Retrieved from <http://www.youtube.com/watch?v=Cxniyck1Vmc>.

Wright, M. (Producer) (2014). Blue buffalo wilderness [Television series episode]. Retrieved from <http://www.youtube.com/watch?v=Y2oqz8j678>.

APPENDIX

Table 1.

Data results of dog feed.

	1st Bag: Grain-Free 5 Star	2nd Bag: Grain-Free 5 Star	3rd Bag: Contains Grain 4 Star	4th Bag: Contains Grain 1 Star
Name Brand	Holistic Blend	Natures Variety Instinct	Natural Balance	Purina Dog Chow
Crude Protein %	42%	37%	24%	21%
Crude Fat %	20%	20%	11%	10%
1st Five Ingredients	1)Deboned Turkey Meat 2) Turkey Meal 3) Potato 4) Sunflower Oil 5) Pea	1) Beef Meal 2) Lamb Meal 3) Turkey Meal 4) Tapioca 5) Beef Fat	1)Sweet Potatoes 2) Venison 3) Potato Protein 4) Pea Protein 5) Canola Oil	1)Whole Grain Corn 2)Meat & Bone Meal 3)Corn Gluten Meal 4)Animal Fat 5)Soybean Meal

AUTHOR'S BIOGRAPHY

Kristyn M. Souliere was born in Portland, Maine, on June 3, 1992. She was raised in Saco, Maine, and graduated from Thornton Academy in 2010. Majoring in animal science, Kristyn concentrated in pre-veterinary science. She is a member of Alpha Lambda Delta, Phi Sigma Pi Honors Fraternity, and the UMaine pre-vet club. She is also the president of the National Society of Collegiate Scholars organization. Kristyn has received the Southern Maine Executive Club of University of Maine Scholarship and has made the Dean's List.

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