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Factors influencing the use of BARF feeding in dogs

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1. Abstract

In this thesis, the main goal was to figure out the advantages and disadvantages of feeding dogs a BARF (Biologically Appropriate Raw Food) diet and to understand what leads their owners to choose this feeding method. The findings are based on scientific literature.

The most commonly claimed advantages of BARF feeding for dogs are that it resembles the wolf's diet, offers health benefits such as improved dental hygiene, and allows precise control over the ingredients. However, potential disadvantages include nutritional deficiencies and the risk of pathogens from raw meat.

It became evident that the lifestyle and demographics of the owners, as well as the characteristics of the dogs themselves, influence the dietary choices of the dogs. Owners who feed their dogs a BARF diet often have more than one dog, with the dogs being of medium to large size. They typically live in one- or two-person households without children and prefer living in rural areas.

Összefoglalás

A dolgozatomban a BARF (Biologically Appropriate Raw Food) kutyákkal történő etetésének előnyeit és hátrányait elemeztem. Kitértem azokra a tényezőkre is, amelyek szerepet játszhatnak az ilyen étrend alkalmazásában. Az eredmények a tudományos szakirodalom áttekintésén alapulnak.

A leggyakrabban hangoztatott érvek, hogy a BARF hasonlít a farkas táplálékához, egészségügyi előnyökkel jár (pl. a szájüreg és a fogak higiéniája), továbbá lehetővé teszi az összetevők pontos ellenőrzését. Ugyanakkor hátrányként említhetőek az esetleges táplálóanyag-hiányok, valamint a nyers húsból származó fertőzések kockázata.

Az egyértelmű, hogy a tulajdonos életmódja, valamint a kutya tulajdonságai egyaránt befolyásolják az állat táplálék iránti preferenciáját. A BARF-ot etető tulajdonosoknak gyakran van több kutyájuk, amelyek közepes vagy nagytestűek. Tipikusan olyan emberek, akik egyedül vagy legfeljebb társukkal élnek, és kedvelik a falusi életvitelt.

2. Introduction

In the past few years, our dogs have undergone a transformation from being simple guardians of our homes to becoming important members of our families. This shift in our perception of dogs has increased the interest of dog owners in feeding their canine companions as naturally and species-appropriate as possible, ensuring their overall well-being and longevity. For this reason, the so-called “BARF” (Biologically Appropriate Raw Food) concept developed. BARF is intended to mimic the feeding behavior of the wolf by using only raw ingredients and as many natural and organic components as possible in the dog’s diet. While this approach has gained increasing popularity in recent years, the reasons for choosing it depend on various factors, ranging from health considerations to environmental concerns and personal beliefs. Many pet owners choose it as a way to harmonize their pet’s diets with their own understanding of a more natural and less processed way of feeding. However, the BARF concept isn’t universally suitable for all dogs and owners, and dog owners choose to feed BARF for a variety of reasons, including their own lifestyle and demographic characteristics, as well as the characteristics of the dog. While some of them use BARF feeding due to a desire for a more natural diet or to minimize their ecological footprint, others view it as their last option against food allergies. With homemade rations from raw ingredients, one has complete control over every component, ensuring that nothing is included that isn’t specified on the label. Owners who have already tried BARF often report positive health effects, such as improved digestion and gastrointestinal health, dental health due to the inclusion of bones in the diet, healthier and shinier coats, and an overall impression of better health, increased energy, and vitality.

2.1 Background

The term “BARF” stands for “Biologically Appropriate Raw Food” or “Bones and Raw Food” and is a diet developed primarily for dogs but used for cats as well (although less frequently), with the goal to imitate the feeding behavior of their wild ancestors, especially wolves. This expression was used first by the Canadian Debbie Tripp, who used it to describe both a dog owner who feeds their dogs in this way but also the food itself. Over the years, the term BARF underwent a shift in its meaning. While initially standing for “bones and raw food”, Ian Billinghurst introduced the term “Biologically Appropriate Raw Food” in 1993 with his book “Give Your Dog a Bone” [1].

However, the BARF concept isn’t the only raw feeding method out there. There are other raw feeding methods like the “Prey Model Raw” and the “Ultimate Diet”, but they are not

as widely used. Therefore, in general understanding, the term BARF is often used synonymously with raw feeding [2].

2.2 Composition

The theory of assembling BARF rations is that not each individual meal has to be balanced, but rather the overall diet should be balanced when considering all meals over a period of a few days or weeks together. According to Billinghamurst, a BARF diet should be made of “60% raw, meaty bones”, and the rest should be a variety of foods similar to what a wild dog eats in terms of type and amount [1, 3].

This includes mainly other animal products, such as skeletal muscle and offal like kidneys and liver, but also feeding rumen including its contents is quite popular. It is understandable that most owners don't necessarily want to buy expensive fillet meat, which is intended for human consumption. Therefore, for BARF meals, by-products from slaughter animals are often used, but this by no means implies that these are of lower quality. It simply means that they are not suitable for human consumption due to their appearance or shape. These could be meats (such as tongue or diaphragm) and organs that are less commonly consumed by humans but should be vital components of a BARF diet for dogs. Reinerth emphasizes that feeding organs is essential because wild canids wouldn't only consume the muscle meat of their prey but also the organs, because they contain essential nutrients, especially vitamins. Other animal-based products like eggs and yogurt can be added as well [4].

The smaller portion that remains should be completed with plant-based components as a source of fiber like green vegetables or fruit, intended to replicate the stomach contents of prey animals [1, 4].

To make sure dogs get all the right nutrients, many owners add things like oils and supplements such as eggshells, seaweed, and herbs to their BARF diets [5]. In contrast, according to the official definition of the BARF concept, “artificial ingredients” such as mineral or vitamin preparations are not allowed. Nevertheless, there is a wide variety of these products available on the market to supplement homemade BARF rations [2].

Large amounts of carbohydrates are considered undesirable, as they may have negative effects on dogs, who are regarded as obligatory carnivores. According to Reinerth, their entire digestive system is not adapted to the intake of larger quantities of grains. This becomes evident in their teeth, which lack grinding surfaces, and their saliva, which, unlike herbivores, lacks enzymes to already initiate digestion in the oral cavity [4]. Therefore, most

sources advise to avoid grains, while other carbohydrates such as potatoes and legumes can be integrated into the diet in small amounts [2, 6].

Regarding the form of the fed meat, it would most closely resemble the wolf's diet to feed whole prey animals to the dog. However, in practice, this is rarely possible. Therefore, the pieces are either left as large as possible, cut smaller or even ground to prevent the swallowing of large pieces without chewing [4].

Raw food can be categorized into three main groups. The first category includes "chews", which consist of items like porcine or rabbit ears with fur, chicken hearts, or tendons. Another category involves homemade diets focused on raw meat, commonly known as homemade BARF. The final category and also the most popular one amongst pet owners includes commercial BARF preparations that are readily available, usually frozen, in both stores and online shops. These commercial products are considered to be perfectly balanced without requiring any additional ingredients or supplements, and are made of a variety of components such as muscle tissue; bones, which are frequently included in ground form in the rations; organs, and various other animal-derived ingredients [7].

3. Motivations for using BARF feeding

Some dog owners place a high priority on their dog's nutrition, sometimes even caring more about their diet than their own. While themselves, they eat ready-made meals from the supermarket freezer, only the most expensive and high-quality ingredients make their way into the dog's bowl. In the search for the healthiest diet for dogs, a concept parallel to the human food market, where the "raw food" trend also exists, eventually arose – the idea of raw feeding. The motivations for this feeding method can be diverse, but overall there is a lack of good-quality studies especially about the long-term effects of BARF feeding, regarding both negative and positive impacts. This is why motivations and effects are often either highly subjective and not supported by evidence, or only rely on food science and nutritional physiology rather than on research investigations [2].

3.1 Health and nutrition considerations

3.1.1 Claims of nutritional superiority

In the last few years, a rising number of food trends has emerged on the human food market, such as paleo or vegan as well as raw food diets and the wish for natural and organic products is increasing, both for ourselves and for our dogs. As dogs are considered family members and play important roles in our lives nowadays, the desire to vary and prepare their meals is increasing. The choice is also driven by the wish of a certain level of control. People believe that preparing the food at home gives them full power over the dog's health [8]. In her article, Handl mentions supporters of the BARF feeding method who believe that commercial pet food contains "waste materials" and therefore can lead to numerous health issues [2].

The main motivation for most owners is that they simply view raw food as healthier and more natural, and they do not trust commercial food due to the lack of transparency of ingredients. Some of these owners' dogs have developed health issues after consuming commercial food [9–11].

According to Billinghamurst the basic philosophy of BARF is "to reach genetic potential in terms of health, longevity, physical activity and reproduction" [6]. Billinghamurst believes that a lot of health problems are associated with our modern, grain-based dog food, which differs remarkably from what their canine ancestors used to eat in the wild. He argues that the bigger the gap between their original, natural food and what they're fed today, the more problems they can face. He claims that we should "provide food their bodies were designed for" [6]. When it comes to grains, there is a common misconception that gluten and cereals are harmful to dogs and cats in general, and some dog owners even choose a BARF diet to avoid carbohydrates [11]. Although this myth is believed by many pet owners, it lacks any scientific basis, and should be seen more as a rumor than a fact. It is true that gluten can cause problems for some dogs, especially those with gluten intolerances or allergies. However, it is by no means a concern for all of them. In fact, it is worth mentioning that dogs, during their evolution alongside humans, adapted to diets that include large amount of carbohydrates commonly found in human food [2]. This allows them to absorb and digest nutrients from starch-based food much better, distinguishing them from their wild ancestors. Commercial pet food is often made from by-products of human food production. While these by-products are actually nutritious and safe for pets, people would usually not eat them themselves. Therefore, they also avoid giving them to their pets, even though they pose absolutely no risk when feeding dogs [8].

Additives in pet food have also earned a negative reputation and are meant to be avoided with homemade raw feeding, as they are viewed as “unnecessary chemicals”. The belief is that the food manufacturers use flavorings to make pets addicted to their low-quality food, leading to increased sales. However, it is important to keep in mind that these additives require strict approval processes and that additives don’t just include cheap flavorings but also other components which make pet food nutritionally complete, such as essential vitamins [2].

The absence of heat treatment in dog food can be both an advantage and disadvantage. This chapter will focus on the advantages, while later, potential consequences such as bacterial contamination resulting from the absence of heating will be addressed.

In theory, an advantage would be that heat-sensitive components such as A and B vitamins – especially thiamine is highly sensitive to heat treatment – as well as minerals and some amino acids, are not destroyed due to the absence of heat treatment. In practice, the loss of vitamins due to heat treatment does not play a significant role, as additional amounts are simply added to compensate for the loss during heat treatment. The situation is similar for heat-sensitive amino acids, especially lysine. If the feed contains high quality protein from animal origin in a sufficient amount, this concern is of no relevance [2].

3.1.2 BARF against diseases

With homemade BARF rations, the owner has the opportunity to influence specific health conditions of their dog. For instance, if the dog is allergic to a particular protein source, they can simply omit that protein. If the dog has cancer, they can add more energy by choosing richer, fatty meat, while for an overweight dog, a lean protein source like chicken can be selected [4].

a) Allergies and food sensitives

Some dog owners consider raw feeding as a lifestyle because they believe it provides their dogs with the best possible nutrition to provide them with a healthy life. On the other hand, there are dog owners who turn to raw feeding as a last resort, especially when their dog suffers from food allergies or intolerances. In such cases, raw feeding can be seen as a way to avoid allergic reactions to specific ingredients in commercial dog food. In many cases, it

is not in particular about raw food itself but more about preparing the food at home, as it allows for precise control over which ingredients are included in the diet and which are not. Not only can allergies be avoided through a BARF diet, but Reinerth even claims that allergies are actually triggered by commercial processed food and the “artificial substances” contained in them, as well as the poor quality of ingredients [4].

The solution for food allergies is exclusion diets. In this approach, the dog is fed a protein and carbohydrate source they have never had before. Often, unusual proteins like kangaroo, crocodile, or horse are used for this purpose; and novel carbohydrates like sweet potato or parsnip. Alternatively, protein can be provided in a hydrolyzed form, which means it is broken down into such small fragments that the dog’s digestive system no longer recognizes it as an allergen. After a period of at least 6 weeks during which exclusively this food is fed, the suspected allergens are reintroduced to potentially trigger an allergic reaction [12].

An elimination diet can be performed either by using commercial hypoallergenic food or by preparing the food at home. Many pet food manufacturers do offer hypoallergenic diets, but a common problem is that they may not use separate production lines for different types of pet food, which can lead to cross-contaminations [13, 14].

While many dogs respond well to this commercial food, there are also some for whom it shows little to no improvement due to the reasons mentioned above. That is because in dogs with food allergies, even a trace of the allergen can trigger an allergic reaction. Owners of such dogs often choose to prepare the food themselves, and BARF is a good option for this purpose.

b) gastrointestinal and infectious diseases

Diet significantly affects the dog’s immune function through the gut-associated lymphatic tissue (GALT), which makes up an important part of the immune system [1, 2]. Studies have shown that BARF can lead to better immune function by altering both the amount and composition of the microbiota, leading to enhanced disease resistance. Therefore, during mentioned studies less extraintestinal infectious diseases occurred [15, 16]. On the other hand, BARF feeding didn’t play any significant role in reducing non-infectious diseases [17].

While there is no scientific evidence to support that BARF can help with gastrointestinal diseases, however, there are many opinions and experiences from pet owners and other BARF advocates who recommend BARF as a helpful method. Nonetheless, studies

examining a small group of dogs revealed no correlation between BARF and a reduced occurrence of diarrhea episodes [17].

When considering digestion in the context of BARF, it is also worth noting that as a pleasant side effect, there may be a potential decrease in fecal volume, which many owners find preferable. This reduction in volume is due to the better digestibility of BARF diets resulting from higher percentage of meat and lower levels of carbohydrates compared to most commercial diets. Additionally, the consistency of feces can change, resulting in firmer stools [2].

c) Obesity

With BARF, the owner has both the opportunity to prevent and fight against obesity. Especially with homemade BARF meals, the amount of fat and therefore the calories can be controlled and reduced. In addition, veterinarian Lea Stogdale reports that dogs fed a BARF diet usually have a good body condition and are rarely overweight [15]. There could be several reasons for this. Firstly, owners frequently choose BARF to provide their pets with the best possible nutrition and therefore tend to be more health-conscious about their dogs. They are usually careful not to feed cheap treats aside from the twice-daily meals, but rather a limited number of high-quality treats, such as dehydrated meat snacks. Secondly, it might be due to the composition of BARF, as it contains fewer carbohydrates and more protein than commercial dog food. Another reason mentioned by Stogdale is that BARF is often too expensive for owners to feed excessive amounts [15].

3.2 Perceived benefits

3.2.1 Dental health

According to Billingham's definition, since BARF consists of a high percentage of bones [6], it is not surprising that BARF can have a positive effect on dental hygiene. The high bone content means that dogs need to chew more compared to commercial dry or wet food, which results in a stronger periodontium. This, in turn, leads to better tooth support and stability, reducing the risk of dental problems and tooth loss [2]. Therefore, to avoid dental problems, this aspect can also be a contributing factor to why owners choose BARF feeding. However, it is important not to forget that the higher bone content also brings a greater risk of injuries, which will be addressed in a later chapter.

3.2.2 Other effects / subjective effects

While there are benefits of BARF feeding that are understandable and provable, such as improved dental health, there are also some other positive effects claimed by owners that lack evidence-based support. These include an improved and healthier overall condition with livelier and more active behavior, as well as positive effects on skin and fur, especially shinier coats [2, 7, 11, 15]. To prove these claims, proponents often argue that BARF can offer a more diverse diet than some commercial pet foods, containing a wider range of nutrients that are important for skin and coat health, including protein, vitamins, and minerals. Furthermore, BARF is free of any additives, which is believed to ensure that animals receive their optimal nutrition and therefore helps to improve their overall condition. Other sources claim that a BARF diet can potentially help with various health issues, including skin problems, arthritis, eye and ear infections, as well as reproductive problems. Additionally, it is suggested that BARF may be a preventive measure against urinary tract diseases such as urinary stones or FLUTD (Feline Lower Urinary Tract Disease), and other diseases [18].

However, these claims are often based on individual cases or personal experiences rather than scientific studies including a large group of BARF-fed dogs and should therefore be handled with caution. These individual experiences of diseases apparently disappearing after feeding a raw diet may not necessarily be linked to the diet and could have occurred by coincidence [2, 3, 19].

3.3 Ethical reasons

The ecological footprint of commercial dog food can vary significantly depending on various factors such as the origin of ingredients, transportation, packaging, etc. However, it is unfortunately rarely the case that commercial dog food comes from sustainable production. If owners care about their impact on the environment, this might be another reason for choosing homemade BARF food for their dogs. This is because it allows them to choose the origin of the meat themselves, using exclusively regional organic meat to support animal welfare and reduce transportation distances. Meat from appropriately raised animals may be more expensive, but it does offer higher quality and ethical responsibility [4].

4. Demographic and lifestyle factors

In the following chapter, the demographic and social factors will be evaluated in more detail, which play a role when pet owners decide to choose feeding their dogs with BARF. This analysis will take into consideration several factors such as age, gender, family status, income, and educational level.

These factors all play significant roles in shaping a pet owner's decision when it comes to feeding their dog a BARF diet. They can impact their knowledge about different feeding methods, their openness to new dietary methods, and their access to information and resources. Understanding these influences is crucial for gaining insights into the preferences and behaviors of pet owners who choose BARF feeding.

4.1 Demographics

4.1.1 Age and gender

It is easily noticeable that the predominant BARF supporters are female, with a proportion of 80% or higher [9–11, 20]. Various reasons may contribute to this fact:

Women may show higher interest in animal health than men, making them more open to trying alternative feeding methods. They tend to seek for information in books or on social media more likely than men, which may finally lead them to the concept of BARF feeding. Furthermore, women are more often interested in natural, organic nutrition than men and frequently transfer this desire to their pets.

Although the age range of pet owners who feed their dogs BARF is quite broad, it is noticeably that the majority of them are middle-aged adults, approximately between the ages of 21 and 50 years, aligning with their years of employment [10, 11, 20]. People in this age group often begin to prioritize both their own health and the health of their pets. On the other hand, younger individuals are also less likely to own a dog at this stage of life, which is why the percentage of BARF-feeding owners under the age of 20 is quite low.

Elderly people are rarely, if ever, part of the BARF-feeding community [11, 20], which is potentially due to the fact that they own dogs less frequently than middle-aged individuals; or because of the preparation of BARF meals often requiring more time and effort, which could be difficult for them due to their health or limited mobility.

4.1.2 Education

As a result of several surveys, it became apparent that BARF feeders tend to have a higher level of education than the average. The majority of them either hold a high school- or a university degree with a bachelor's or master's degree. Poocharoen's study revealed that a remarkable 4% of all respondents own a doctoral degree, exceeding the average number of people in the general population with such a high academic achievement [9, 10, 20].

Multiple factors could be responsible for this. People with a higher level of education often:

a) have better access to information, which could lead them to discover BARF nutrition in the context of animal health.

b) have a greater interest in gaining knowledge about animal nutrition.

In addition, people having higher academic achievements tend to have more financial resources to afford the potentially more expensive raw food.

Most people have come across the concept of BARF feeding through the internet, and it is also the most common source from which they get their knowledge [2, 9, 11, 21].

The internet has the advantage that information is readily and quickly available without the need to go into a bookstore and purchase a book. People can easily and quickly educate themselves about BARF through online articles, social media, or forums; and connect with people who share similar interests.

The fact that the internet is the primary source of knowledge for most BARF-feeding owners also reflects in their internet consumption behavior. The majority spend at least one hour online per day, and more than half even spend 2 hours or more [9].

4.1.3 Income

Regardless of income, it can be observed that nowadays, more and more pet owners tend to spend larger amounts on their pets. While they commonly choose cheaper alternatives for themselves, they are less price-sensitive when it comes to their chosen pet food [20]. The costs of a BARF diet can vary depending on many factors, such as the quality of the chosen ingredients or the size of the dog. Nonetheless, it is plausible that a BARF diet can be more expensive than commercial dog food, as it requires fresh, high-quality ingredients and has a higher meat content than most commercial dog foods, which can be costly – especially if the owner decides to purchase organic ingredients. In addition, some pet owners, most likely regardless of their income, are willing to invest more money from their income into their

pets than others. Consequently, for pet owners who strongly support the BARF concept, income may not be a determining factor in their decision to feed BARF or not.

However, when looking at the income of BARF feeders, it can be observed that most of them earn a moderate income, which, however, is slightly higher than the average [10, 20]. Regarding their employment status, most of the respondents in Poocharoen's study were corporate employees [20].

4.1.4 Family status

Most of the owners feeding their dogs BARF are either single or living in 1-2 person households without children [9–11, 20, 22]. Certainly, this could be a result of the fact that in recent years there are more childless couples due to a decreased birth rate, and these couples have also been keeping dogs more often [20]. However, even in a detailed comparison with owners who feed commercial diets, it can be observed that BARF-feeding owners, on average, have fewer children [22].

It is interesting to note that BARF feeding households tend to be smaller, meaning they have fewer people per household compared to those who feed their dogs commercially.

A factor that could contribute to BARF feeding being in relation with household size and the number of children might be the time management aspect of a BARF diet. Singles or childless couples often have fewer obligations, which allows them to spend the necessary time for preparing BARF meals, as this obviously takes more time than feeding ready-made commercial pet food.

In addition, there is a growing tendency to humanize our pets nowadays, and childless pet owners may see their dog as a sort of substitute for children. Being a “good mother” also includes providing the dog with a particularly species-appropriate and natural diet [22].

Most people who feed their pets a BARF diet are well aware of the potential health risks and understand that handling raw meat poses a higher risk of infection for certain individuals, including elderly, pregnant women, children, and immunocompromised individuals [15]. Nevertheless, it appears that some BARF feeders may underestimate this risk, as many of them live together with family members for whom raw meat could be hazardous, particularly children and those with chronic illnesses [11].

4.1.5 Urban vs. rural living

As previously explained in detail, most proponents of BARF associate this type of feeding with a more natural lifestyle. Therefore, it is only logical that they not only focus on “naturalness” in terms of feeding but also in other aspects of dog keeping.

This also includes the fact that these dogs are often kept in more “natural” environments in comparison to commercially fed dogs. The idea behind the BARF diet is to harmonize the nutrition of dogs with the original dietary needs of wolves in the wild. In addition to nutrition, some dog owners also aim to make their dogs’ living environments as “wolf-like” as possible. This may involve providing dogs with access to natural environments where they can walk without leash and exhibit their natural behaviors. This might be easier to achieve in rural areas where there is often more space and natural surroundings available.

Conclusively, it can be observed that dogs fed a BARF diet are more frequently kept in rural locations, meaning outside of bigger cities, while in comparison, commercially fed dogs tend to be more frequently found in metropolitan areas or large cities [22].

Similar observations were made in Morgan’s study: here, more of the respondents who feed their dogs a BARF diet reported living in suburbs or small towns and rural areas than in large cities [9].

5. Dog characteristics influencing the use of BARF feeding

5.1 Individual characteristics

Certainly, the choice of a dog’s diet is influenced not only by the owner’s own circumstances like family status or income, but also by the dog itself. In this section, it will be investigated whether and to what extent the type of dog, breed, size, and other factors, play a role in the dog’s nutrition – specifically, if and how these factors might affect the choice to feed BARF. It can be observed that certain factors such as dog breed, size, and gender may influence the choice of using BARF as a feeding method.

5.1.1 Sex

It can be noticed that there is no considerable difference in the percentage of male and female dogs that are fed a BARF diet. No obvious trends can be observed in the proportion of neutered and unneutered dogs, either [11, 22, 23].

5.1.2 Size

When dividing the dogs into 4 different groups;

- 1) small dogs (under 10 kg)
- 2) medium-sized dogs (10-25 kg)
- 3) large dogs (25-50 kg)
- 4) and maxi dogs (over 50 kg);

it can be seen that dogs belonging to the medium-sized group are most frequently fed a BARF diet, closely followed by the group of large dogs. In contrast, it is evident that the group of maxi dogs by far receive a BARF diet the least frequently but are fed dry food most commonly [10, 11, 23]. This could possibly be due to the fact that very large dogs require large amounts of food, which can be both costly and time-consuming for the owner. Therefore, for financial reasons and reasons of convenience, they may choose commercial dry food instead.

BARF advocates often tend to draw parallels between their dogs and wolves. Hoummady names as a possible reason for larger dogs being more commonly fed with BARF than small dogs that larger dogs resemble wolves more than smaller dogs [22].

5.1.3 Breed

Both mixed-breed dogs and purebred dogs are fed a BARF diet, although it can be observed that the proportion of purebred dogs is slightly higher. Among the mixed-breeds, larger dogs get BARF most frequently, while the group of small dogs get BARF the least frequently. However, it is notable that some breeds are fed a BARF diet significantly more often than others. Breeds commonly fed with a BARF diet include:

- Golden Retriever
- Czechoslovakian Wolfdog
- German Shepherd
- Malinois
- Labrador Retriever
- Australian Shepherd
- and French Bulldog [10, 11, 22].

On the other hand, it was observed in Bielig's survey that the Yorkshire Terrier is the breed that is least frequently fed a BARF diet among the 13 most common dog breeds [23]. The fact that French Bulldogs and Labradors are more frequently fed a BARF diet than a commercial diet compared to other breeds may be due to the higher prevalence of food

allergies observed in these two breeds. This susceptibility might have led their owners to choose a BARF diet, allowing them to have complete control over the ingredients and thereby avoid the specific food allergens that affect their dogs. Additionally, the Australian Shepherd is one of the more active dog breeds often used in agility or obedience. With a BARF diet, the owner has the opportunity to create a customized nutrition plan for their dog, ensuring that the dog receives the necessary energy and protein amount for such activities.

5.1.4 Age

The average age for dogs being fed a BARF diet typically ranges from a middle age of around 3-4 (2-7) years [11, 23], with most dog owners not having their dogs on a BARF diet for longer than 3 years [10].

The reason why owners of puppies and young dogs rarely opt for BARF feeding is likely because the risk of nutritional imbalance, especially minerals, is even greater in puppies than in adult dogs [24]. Some owners who are generally proponents of the BARF diet would still avoid feeding a puppy this way [11].

Most owners have been feeding their dogs a BARF diet for less than 3 years likely because the BARF trend has gained popularity only in recent years, causing an increase in the amount of information about it in the past few years.

5.1.5 Activity and body condition

Many dog owners who feed their dogs a BARF diet report that their dogs are physically active, participating in activities such as hunting or agility. Compared to commercially fed dogs, BARF-feeding owners reported a higher engagement in sports activities with their dogs [22, 25]. For such active dogs, BARF could be helpful in providing the dog with the energy it needs, tailored to its individual requirements. Moreover, owners of active dogs are frequently very health-conscious and want to ensure that their dog's diet contributes to optimal health and performance. This could lead them to the concept of the BARF diet, as it is promoted as highly nutritious and natural.

When it comes to daily activity, BARF-fed dogs also excel. Most of them get a daily walk, while significantly fewer commercially-fed dogs have the opportunity to walk every day. In addition to that, BARF-fed dogs are typically allowed to walk off-leash for longer periods compared to commercially-fed dogs [22]. Certainly, there could be a connection between BARF-fed dogs having more off-leash freedom and the fact that, as mentioned earlier, they

more commonly live in rural areas. In rural areas, it is generally more manageable to allow dogs to walk freely compared to urban environments.

Regardless, this highlights how BARF feeding owners strongly prioritize a natural and species-appropriate way of caring for their dogs, which includes ensuring they get enough daily exercise, and not just focusing on nutrition.

Furthermore, it can be observed that BARF-fed dogs are relatively less likely to be overweight compared to dogs that receive commercial dry or wet food. Most owners who feed their dogs a BARF diet report that their dogs have an ideal weight in relation to their size [11]. This claim is also supported by Bielig's study: in comparison to the group that received commercial food, the BARF group had the highest proportion of lean dogs [23]. This leads to the already mentioned assumption that BARF can be beneficial in fighting and preventing obesity, although BARF owners often simply tend to be more health-conscious as well [15].

5.1.6 Keeping conditions

The majority of BARF-fed dogs are kept indoors [10, 11]. However, it is ordinary nowadays to keep dogs inside the house as they are generally considered part of the family and are regarded as pets in most cultures. Therefore, this observation may not be surprising.

In comparison to commercially fed dogs, BARF-fed dogs often live with other dogs, meaning that owners who feed BARF often have more than one dog [22]. An explanation for why BARF advocates often own multiple dogs could be their orientation towards the natural lifestyle of wolves. Since wolves live in packs, this might motivate these owners to keep more than one dog, aiming for a "more natural" approach to dog ownership.

5.2 Influence of special needs

The diversity of dog breeds brings a wide range of genetic, anatomical, and health characteristics, making it necessary to customize nutrition for each dog individually. Some breeds or individuals may benefit from BARF, while others may benefit better from alternative feeding methods. While many dog owners choose BARF not necessarily to address a health issue but because they strongly believe it is the healthiest and most natural way of feeding, there are indeed owners who want to address a specific problem in their dog,

such as a breed-specific health issues, through this approach. Therefore, the breed and individual needs of a dog can also be a determining factor for BARF feeding.

5.2.1 Heart problems

Small breeds like the Cavalier King Charles Spaniel often suffer from heart problems such as myxomatous mitral valve disease. In this condition, it is essential to ensure an adequate energy and protein intake to prevent cardiac cachexia and associated muscle loss, which can be facilitated through BARF. Additionally, it is important to reduce salt consumption in heart problems [26]. BARF diets can be tailored to match the salt intake for dogs suffering from heart-related issues.

5.2.2 Dental problems

Dogs of older age or small dog breeds like Chihuahuas or Yorkshire terriers are more predisposed to suffer from dental issues than larger breeds [27]. As previously mentioned, BARF can contribute to better dental health. Therefore, BARF could be advantageous for breeds that tend to have dental problems.

5.2.3 Urolithiasis

For dogs that are more prone to urolithiasis than others, a BARF diet might be advantageous. For instance, the Dalmatian commonly suffers from ammonium urate stones, and reducing purine intake is crucial for managing this condition [28]. Feeding a BARF diet may allow for individual adjustment of purine levels.

5.2.4 Diabetes

Due to the option of increasing fiber content in homemade BARF meals, this feeding method could be beneficial for diabetic patients. Predisposed dogs include middle-aged and older dogs, smaller dogs, and certain breeds like Poodles and Dachshund [2].

Of course, these are just a few examples of breed-specific health issues and how they might be managed through BARF diets. In conclusion, it is clear that individualizing a dog's diet to their specific breed characteristics and health needs can have an important impact on their

overall well-being. BARF diets are a good way to meet those requirements by offering personalized nutrition that considers certain dog breed's genetic predispositions.

6. Risks and drawbacks

While BARF diets have gained popularity as a natural approach to pet nutrition, it is important to recognize that they come with certain risks. These risks can sometimes be a significant factor in why some pet owners decide against this type of feeding for their pets.

6.1 Nutritional imbalances and deficiencies

As already explained, most BARF promoters report that they acquire their knowledge about assembling BARF rations from the internet or books. Only a minority of them relied on official feeding recommendations from veterinarians. Some of them even claim that they don't follow any specific rules or guidelines; instead, they put together their BARF meals entirely based on intuition [9, 11, 21, 22]. Even though there are indeed many websites and books that provide BARF meal plans or recipes on how to assemble a complete BARF diet, they seldom meet the animal's requirements and frequently contain errors. Most of them deviate significantly from energy and nutrient recommendations [2, 21]. According to studies, a significant proportion of home-cooked diets were unsatisfactory in terms of amount in at least one nutrient [18]. Unfortunately, blood tests, such as the so-called "BARF profile" offered by some veterinarians and clinics, often show unsatisfactory and inconclusive results. To ensure that the barfed animal is indeed receiving all nutrients in adequate amounts, it is always necessary to assess the diet itself [2]. Clinical symptoms are typically not reported in dogs that are fed with these inadequate rations, as they often either stay unnoticed or do not show until a long period of time has passed [25]. The following nutritional imbalances are commonly observed in BARF diets:

6.1.1 Protein

In fecal samples from BARF-fed dogs, significantly higher levels of protein and fat content and lower levels of NFE (Nitrogen-Free Extract) and dietary fiber were observed compared to dogs fed with commercial processed dog food [29]. This is linked to the generally lower carbohydrate content or even carbohydrate-free nature of BARF diets. However, due to the

high meat content in BARF meals, the protein content often exceeds the recommended intake, as it has also been demonstrated in fecal samples from dogs fed a BARF diet [29].

This could be problematic in liver and kidney diseases, which is why BARF is not recommended for dogs with such conditions. Such a protein-rich diet is not recommended for older animals either, as kidney function tends to decrease with age, and a protein-rich diet can further burden the kidneys. Nevertheless, it is worth noting that a high protein intake does not have adverse or harmful effects on the health of healthy animals [2].

While rare, what can still occur is a lower protein content than recommended, for example, when exclusively feeding fatty meats. This mainly includes lamb meat, as it contains less protein and more fat than other types of meat. Feeding only high-fat, low-protein might lead to muscle and weight loss, weakened immunity, or delayed growth and development in young dogs [2].

6.1.2 Fat

Due to the naturally higher fat content in fresh meat compared to commercial dog food and the frequent addition of oils to BARF diets, these diets often contain more fat than recommended. The recommended amount of 5-7% of dry matter is frequently surpassed, sometimes reaching levels exceeding 30% of dry matter [2]. This was also confirmed by the previously mentioned stool samples [29]. The high fat content increases the risk of pancreatitis and is not suitable for some medical conditions such as liver or gastrointestinal diseases [2].

6.1.3 Minerals

In the practice of feeding dogs a BARF diet, there are several minerals that are particularly critical because they are essential for the health of the animals and must be provided in the right quantity and ratio. Calcium and phosphorus are especially frequently mentioned as significant and therefore critical minerals. Maintaining an optimal calcium-to-phosphorus ratio and appropriate quantities of these minerals is crucial for all dogs, but it becomes particularly important for young, growing individuals of large and giant breeds. However, achieving this balance can be difficult to control with feeding bones [30]. In several samples, significant deviations from the recommended values and therefore the dog's requirements have been observed, both in terms of excess from bones and deficiency [3, 8, 21].

Insufficient calcium or excessive phosphorus intake in some samples frequently resulted in an imbalanced calcium-to-phosphorus ratio of less than 0.6:1 [25]. For comparison: the ideal calcium-to-phosphorus ratio for adult dogs should be around 1.2:1, while growing puppies require even higher calcium levels, with a recommended ratio of 1.5-1.8:1 for healthy bone development [30]. The consequence of this unfavorable ratio can be nutritional secondary hyperparathyroidism [2], which can have a negative impact on bone health. For instance, this was observed in the diet of a group of puppies whose rations consisted of 80% rice and 20% raw meat, resulting in an excessive phosphorus intake [8].

In addition, the risk of both over- and undersupply of other minerals exists when feeding a BARF diet due to the absence of supplements. The affected elements may include potassium, magnesium, and iodine, as well as zinc and copper [2, 3, 8, 19, 21, 25]. Deficiency in the last two can also be induced by an excess of calcium, which interferes with their absorption in the intestine [30].

6.1.4 Vitamins

Vitamin imbalances are also commonly observed in BARF diets since, as explained in the beginning, “artificial ingredients” including vitamin preparations are not permitted in the classical concept of BARF feeding. Fat-soluble vitamins, particularly Vitamins A and D, are often affected and can be either extremely high or extremely low [3, 8, 21, 25]. Both oversupply and undersupply of vitamin D can have negative consequences, with undersupply affecting calcium absorption, potentially leading to weakened bones and muscle weakness, while oversupply can cause hypercalcemia and affect various body functions.

Although many examined diets were deficient in Vitamin A, feeding liver in BARF meals can also lead to hypervitaminosis A [25, 31].

6.2 Food safety concerns

Even though there is a general lack of studies about BARF, and many of the promoted benefits are based more on opinions and subjective experiences than on research, the risk of infections and zoonoses from raw meat is unquestionable. In comparison to processed commercial pet food, BARF is not heat treated, which makes it plausible that the risk of

foodborne pathogens is higher. This risk is also commonly reported as the most significant concern associated with BARF.

In general, bacteria, viruses, and parasites can be present in raw meat and pose a danger to the health of both animals and their owners; especially in young, pregnant, elderly, and immunocompromised individuals, as well as animals with conditions such as gastrointestinal diseases or neoplasms or in immunosuppressed animals [2, 3, 15].

What is common practice for human food is often lacking in commercial BARF meals: instructions on how to store and prepare the product properly [17]. Pathogens are typically not present in living animals but can enter the meat during processing steps under favorable conditions, and can even further multiply with improper storage or preparation (such as thawing at room temperature, storing at inappropriate temperatures, etc.) [18].

6.2.1 Bacteria

While contamination with *Salmonella* is the most common and can pose a threat to the owner due to its zoonotic potential, other bacterial pathogens such as *Campylobacter*, *Yersinia*, *E. coli*, *Brucella*, *Clostridium*, *Staphylococcus* and *Listeria* can also contaminate raw meat [17].

a) Salmonella

Even though *Salmonella* and *Campylobacter* are considered “of absolutely no consequence for a healthy dog” according to Stogdale [15], they can still cause illness in healthy humans when present in high doses. In comparison to processed pet food, especially commercially available BARF diets have shown a significantly higher detection rate of *Salmonella*. Transmission to humans can occur either directly through utensils or direct contact with the dog, or indirectly, as *Salmonella* has been documented to be shed in the dog’s feces [17].

b) E. coli

Contamination with *E. coli* was also more noticeable in raw food compared to processed dry or wet pet food. Even *E. coli* strain O157:H7, which is known for its toxin production and is considered an important human pathogen, has been detected in some rations. Furthermore, in four cases where humans were infected with this strain, a connection to dogs fed raw diets could be made [17].

c) others

With these two being the most important ones, there are still several more bacteria species likely to contaminate raw meat. *Campylobacter* for instance is known to contaminate chicken meat, but it is not as practically relevant as the previously mentioned bacteria because it is sensitive to cold temperatures and dehydration. Other bacterial species like *Listeria monocytogenes* or *Yersinia enterocolitica* are less frequently reported in connection with BARF, but they can cause very severe illnesses in humans in serious cases [17].

d) antimicrobial resistance

Raw meat can also be contaminated with antibiotic-resistant bacteria that are shed into the environment by the animal, potentially contributing to their spread. Besides multidrug-resistant *Salmonella*, ESBL-resistant *E. coli* bacteria, those that are resistant to antibiotics from the beta-lactam group, are indeed widespread in raw pet food. These resistances also pose a potentially significant threat to humans because they are not susceptible to cephalosporins, which belong to the beta-lactam group and are widely used in human medicine [8, 17].

6.2.2 Viruses

In the context of BARF and viruses, the Aujeszky virus, primarily found in raw pork, is of special concern as it can cause pseudorabies in pets, having a potentially fatal outcome. For this reason, raw pork meat, including wild boar, should never be fed to pets. Even though this virus is relatively harmless to humans and can only cause mild symptoms, it can trigger rabies-like symptoms in our dogs and possibly result in death [4].

However, there have also been cases of African Horse Sickness Virus transmitted through raw horse meat. While this disease is typically not zoonotic, it can be transmitted to dogs [2, 17].

6.2.3 Parasites

Even though BARF proponents often claim that BARF helps against parasites, however without any scientific evidence, raw food poses a significant risk for infection with various parasites, including cestodes and protozoa. More specifically, to list the most important ones:

- *Sarcocystis*, a genus of protozoan parasites that can occur in the muscles of animals, frequently occurring pork and beef.

- *Toxoplasma gondii*, which is especially prevalent in raw or undercooked pork, beef, and game meat. It poses a particular danger to pregnant women and immunocompromised individuals.
- Cestodes, especially *Taenia* spp. and *Echinococcus*.
- *Trichinella*, which is primarily found in game meat.
- Others, such as *Giardia*, *Isospora*, or *Cryptosporidium parvum* [17].

Hygiene measures are crucial when it comes to BARF feeding to protect the health of both animals and humans. The most important aspects to consider are:

- **Handwashing:** the hands should be thoroughly washed with soap and warm water after handling raw meat to reduce the risk of bacterial transmission.
- **Separate utensils:** to avoid cross-contamination, knives and cutting boards used for preparing raw meat should not be used for the preparation of any other food.
- **Proper cleaning:** to prevent residues, bowls should be thoroughly cleaned and disinfected after each meal. Unfortunately, this may not always be effective enough to eliminate, for example, *Salmonella*.
- **Storage:** raw meat should be stored separately from other food items, and it is essential to always keep the recommended storage temperatures.
- **Freezing and thawing:** frozen raw meat should never be thawed at room temperature but always in the refrigerator or microwave. Once thawed, it should be consumed immediately.
- **Handling of feces:** feces of BARF-fed dogs should be removed immediately, and hands should be washed afterwards [18].

While these measures may not completely eliminate all pathogens, the number of microbes plays a significant role in causing disease or not. Some pathogens can only cause disease if their microbial load is very high. Simple handwashing and cleaning all utensils with soap can already kill many bacteria, reducing the risk of disease significantly [17, 18].

6.3 Risk from raw bones

Although some BARF promoters argue that feeding raw bones is beneficial for dental health and this benefit can be observed quite often in BARF-fed dogs as mentioned earlier, raw bones can easily splinter and develop sharp edges or fragments. This can lead to injuries in the oral cavity, throat, esophagus, or gastrointestinal tract.

In particular, poultry bones can easily splinter, potentially causing obstruction, ileus or perforation in the gastrointestinal tract. It has also been observed that bone fragments became wedged in the esophagus or oral cavity. Especially older poultry bones should be avoided as they become more brittle over time and can splinter more easily. But even long bones like beef bones can be dangerous when a dog chews on the hard material, potentially leading to tooth fractures [2–4].

6.4 Toxic / harmful components

The BARF diet is gaining popularity among pet owners for its focus on providing pets with a natural and species-appropriate diet. However, it is important for pet owners feeding BARF to know that not all components of a raw diet are safe for pets, and some ingredients can be potentially harmful. Additionally, it is worth noting that certain foods that are considered healthy for humans can even be toxic to dogs.

6.4.1 Thyroid tissue

Feeding throat tissue, which contains thyroid tissue, is popular in BARF feeding and is commonly observed. However, it is important to be aware that this practice can carry certain risks. This is primarily due to the presence of thyroid hormones in the throat tissue, which can have significant health effects on the animal.

Thyroid hormones play a critical role in regulating metabolism and other body functions. When dogs consume large amounts of thyroid tissue as part of a BARF diet, it may cause an excessive intake of these hormones, potentially leading to thyrotoxicosis or hyperthyroidism. The symptoms of hyperthyroidism can be various, including hyperactivity, unintended weight loss, polyuria / polydipsia, or the development of goiter.

Elevated T4 levels can be commonly observed in blood tests of dogs fed thyroid tissue. However, this condition is not exclusive to BARF, as it makes no difference whether the thyroid tissue is raw or heat-treated as the hormones are heat stable.

Fortunately, BARF-related hyperthyroidism is typically reversible by modifying the diet to exclude thyroid tissue. Once the diet is adjusted, the symptoms usually resolve [2, 19, 21].

6.4.2 Antinutritive factors

Antinutritive factors are natural substances found in several foods that can prevent nutrients to be absorbed or utilized; or simply have negative effects on the organism. They are mainly found in plants and can cause health issues when consumed excessively.

- eggs: as mentioned earlier, eggs are a popular ingredient to be added to BARF rations. Regardless, it's generally not recommended to feed eggs raw because, in addition to the significant risk of Salmonella infection, they can also contain antinutrients: avidin is a naturally occurring protein found in raw eggs, particularly in egg whites. It is known for its complex formation with biotin, which means that biotin cannot be absorbed anymore. The resulting deficiency may lead to skin infections, dry and itching skin, alopecia or brittle claws [2, 21].
- Beans: raw beans contain lectins, which are proteins that can adhere to the intestinal mucosa. This leads to increased permeability and, consequently, might cause bloody diarrhea. It is important to note that these lectins are only inactivated through cooking, so including beans into raw diets should be avoided [2, 21].

Cyanogenic glycosides are another antinutritive factor which can not only be found in several bean species, but also in manioc (cassava). These are plant toxins that typically serve as a defense mechanism for those plants and can be inactivated through cooking. The consumption of raw beans and manioc can therefore result in general poisoning symptoms such as vomiting and diarrhea, as well as dyspnea, paralysis, seizures, convulsions, salivation, and in severe cases, loss of consciousness [21].

- Fish: It is also advisable to avoid fish in BARF feeding due to the presence of thiaminase. This is an enzyme that catalyzes the breakdown or destruction of thiamin (Vitamin B1). Vitamin B1, also known as thiamin, is a vitamin which is crucial for brain function. When a deficiency occurs, it can lead to neurological symptoms such as incoordination, seizures, and paralysis [2, 21].

6.4.3 Toxic foods

While all following foods are completely safe for humans, it is essential to remember that dogs have different dietary needs, and some foods that are safe for us can be highly toxic to them. Among these are grapes (including raisins), avocados, onions and garlic. Grapes and raisins can lead to kidney failure in dogs, even in small quantities. Onions and garlic, whether raw or cooked, can lead to hemolysis, finally resulting in anemia. Paradoxically, garlic

(together with salmon oil and flaxseed oil) is one of the most popular ingredients for supplementing BARF meals. For those following a BARF diet for their dogs, it is crucial to avoid including these harmful foods in their meals. However, this applies not only to raw food but to all homemade diets [2, 11].

6.5 Time, cost and effort investment

Preparing BARF meals requires a significant amount of time from pet owners. Unlike simply opening a can or pouring dry food into a bowl, BARF demands careful planning and preparation.

- **Menu Planning:** Creating well-balanced meals requires thorough research and the acquirement of knowledge about the nutritional needs of dogs. While there are numerous BARF recipes available on the internet and in books, it is important to note that many of these can be inaccurate and can't be customized for the individual needs of every dog. Therefore, every dog owner feeding BARF should acquire the necessary knowledge to create a well-balanced diet. Some veterinarians or pet nutritionists do offer the service of customizing BARF diets. However, it is important to keep in mind that this can come with a significant financial cost.
- **Veterinary costs:** Nevertheless, veterinary expenses may not be limited to consultation or meal planning; they can also include the necessary regular check-ups to ensure that the BARF diet fulfills the needs of the animal and does not result in any health consequences.
- **Ingredients:** to ensure a consistent supply of high-quality and fresh meat and other ingredients, regular shopping is necessary. Additionally, high-quality, fresh ingredients and necessary supplements can be expensive, which can result in higher monthly expenses for pet food compared to commercial options.
- **Preparation:** in contrast to commercial pet food, homemade BARF requires cutting, portioning, and mixing the ingredients before feeding, which can be time consuming, especially when more than one animal is being fed a BARF diet.
- **Cleaning:** as previously mentioned, thorough cleaning of all utensils is necessary after food preparation to avoid the risk of foodborne illnesses. If this is done carefully, it may consume a significant amount of time [4, 18].

Additionally, it can be challenging to consistently stick to this diet in all circumstances. For example, during vacations, it is often inconvenient and difficult to find food of the same

quality and quantity as at home. Similarly, when someone else is taking care of the pet temporarily (e.g. dog daycares, family members, etc.), it would require a significant amount of time and effort to make them familiar with the practice of BARF feeding [11].

7. The role of veterinarians and experts

The veterinarian responsible for a customer who practices BARF feeding carries significant responsibility. They should not only educate the customer about the disadvantages and risks but also provide detailed guidance to ensure that the BARF diet is as nutritionally complete as possible for the dog. In addition, regular check-ups are necessary to ensure the dog's health.

Since many dog owners have great trust in their veterinarian and appreciate their opinion, including regarding dog's nutrition, the veterinarian and their recommendations can also be a determining factor for or against the decision to follow a BARF diet.

7.1 Veterinarian's perspectives and opinions

The advice of veterinarians and experts is crucial in the debate about BARF feeding. Their knowledge is essential for assisting pet owners in making the right choices for their pet's nutrition.

In the field of dog nutrition, few topics generate as many strong and divergent opinions as the BARF diet. Veterinarians often show skepticism towards this feeding regimen, primarily due to the disadvantages and risks already discussed in the previous chapter.

The concept of BARF feeding is still relatively new, and as a result, there are only few long-term studies on the subject. For this reason, veterinarians highlight the lack of sufficient scientific evidence, both regarding the advertised benefits and the potential long-term consequences associated with BARF feeding. Because of the insufficient evidence of health advantages, veterinarians often carefully consider whether BARF feeding is reasonable when there is no apparent reason (i.e. exclusion diet due to allergies).

Furthermore, veterinarians argue that the BARF diet is not suitable for all animals, as each one is unique and has individual needs. Some dogs have specific health requirements and conditions that are difficult to handle with this type of feeding. Therefore, veterinarians usually advise against BARF feeding for the following groups:

a) growing large breed dogs

Dogs of large breeds tend to have faster growth rates than their smaller conspecifics of the same age. Therefore, it's important to adjust their energy, nutrient and mineral requirements to prevent excessive bone growth and associated issues, such as skeletal deformities [32]. For instance, an excess of calcium can lead to bone deformities such as curved radius syndrome. Unfortunately, achieving the optimal and precise mineral intake in young dogs with BARF can be challenging. Puppies and young dogs have both higher calcium and phosphorus requirements than adult dogs, and the ratio is different as well, as young dogs need more calcium compared to phosphorous than adult dogs [30, 32].

- When considering protein intake, puppies and young dogs fed with BARF diets often receive an excessive amount of protein due to the high meat content of BARF rations. However, this appears to be less problematic, as dogs that receive an excess amount of protein only experience forced growth when their energy intake is also increased [30].
- Other minerals can possibly be a concern as well. In particular, deficiencies in copper and zinc are quite frequent, with calcium playing a role as well, as an excess of calcium can impact the absorption in the intestine. Moreover, excessive iodine intake in puppies fed a BARF diet is frequently seen as well [30].

b) dogs suffering from gastrointestinal disease

In cases of gastrointestinal diseases, the balance of microorganisms in the GI tract is disrupted, leading to dysbiosis. This results in increased permeability of the intestinal wall to pathogens that may potentially be present in raw meat, significantly elevating the risk of infection. Moreover, the absorption of nutrients can be impaired in such dogs. Since BARF diets are already not known for being perfectly balanced, deficiencies could be even more likely to occur in these cases [2].

c) immunocompromised animals

These include dogs suffering from neoplasia or those receiving immunosuppressants due to other diseases. The immunosuppressed animal is not capable of effectively fighting potential infections from raw meat [2].

Nevertheless, even though being generally skeptical towards raw feeding, veterinarian Lea Stogdale claims that some animals tolerate BARF better than commercial food without any

apparent reason. This decision must always be made on an individual basis for the animal because there is no one-size-fits-all solution [15].

7.2 Veterinarian's responsibilities

It does indeed make sense to get a brief overview of the dog's diet as part of the anamnesis during every veterinarian visit, as possible health problems could be related to the dog's nutrition. However, a discussion about nutrition is not standard practice for all veterinarians [9].

If the owner has not yet made a final decision regarding the dog's food, it is the veterinarian's responsibility to inform them about feeding options and alternatives to raw feeding. These include:

- high-quality commercial processed dry or wet pet food. It is important to ensure that it suits the individual needs of the dog (e.g., puppy food for dogs under the age of 1 year, high-performance food for physically active dogs);
- home-made cooked diets that meet the nutritional needs of the dog and do not include any harmful or toxic substances;
- home-made raw food, being nutritionally complete;
- or commercial raw food, complete and balanced and mostly purchased in frozen form [15].

Certainly, this is not a "non-plus-ultra" guide, and the mentioned feeding methods can also be combined or alternated. For example, Freeman recommends customers who desire fresher food for their pets to use high-quality commercial dry or wet food and supplement it with fresh ingredients such as fruits and vegetables [3]. If the dog requires a specific diet due to breed-specific, individual, or health-related needs, it is the responsibility of the veterinarian to provide recommendations to the owner based on his own knowledge.

In some specific cases, the veterinarian should advise the owner against BARF feeding. This includes situations where the owner does not have sufficient financial and time resources to responsibly carry out a BARF diet or when individuals are living in the household for whom the risk of infection from raw meat is too high, such as pregnant women and children [15].

Even though consulting their veterinarian is considered normal for most other aspects of their dog's health, many suddenly lose trust in them when it comes to the topic of nutrition. Observations from veterinarians show that owners who feed their pets a BARF diet generally have less trust in their veterinarians. They often believe that veterinarians are primarily

motivated by financial gain and that they have great knowledge about medicine but are not genuinely experienced with dog nutrition. Concerns expressed by veterinarians regarding the risk of infections and potential nutritional deficiencies are often ignored by these owners [9, 15]. In direct comparison to owners who feed commercial diets, it is obvious that BARF-feeding owners seek advice about their dog's nutrition from veterinarians less frequently and tend to rely more on sources like the internet [22].

Additionally, many owners tend to withhold the information about their pet's nutrition from their veterinarian, which often leaves the veterinarian unaware that their patient is either being fed a raw diet or raw ingredients such as eggs are being incorporated into their meals. Unfortunately, a nutritional anamnesis or discussing about nutrition in general during the visit is not a standard procedure for many veterinarians [9]. Therefore, taking an extensive nutritional anamnesis and its documentation becomes even more crucial. Based on the gained information, as mentioned, guidelines for safety measures can be provided to the owner and also be implemented within the veterinary practice itself. It is important that all staff members also maintain adequate hygiene to minimize the risk of foodborne illnesses from raw-fed dogs visiting the practice [15].

It is crucial to evaluate whether a homemade BARF diet really provides all the necessary nutrients, minerals, and vitamins. To assess the success and suitability of a BARF diet, the following options are available:

- BARF profile: this is a blood test that assesses critical nutrients and commonly analyzes the following parameters: vitamins A and D; calcium and phosphorus; copper, zinc, and iodine; as well as the thyroid hormone T4. However, the results of this blood test should be interpreted with caution. It often does not provide information about whether the dog is adequately supplied with all nutrients, minerals, and vitamins in the long term. For example, a calcium deficiency would not necessarily show up in the blood since calcium and phosphorus balance is regulated by hormones (particularly parathyroid hormone, calcitriol, and FGF23) [21].
- Diet assessment: because of the BARF profile not being reliable enough, it makes sense to assess not the dog itself but rather its diet directly. For this purpose, veterinarians and nutritionists offer diet assessments or diet calculations. In this assessment, the precise nutrient composition of the diet is analyzed to control its adequacy in providing essential nutrients, such as protein, carbohydrates, fat, vitamins, and minerals for the dog. Additionally, it can be assessed if the diet meets the dog's calorie requirement to ensure an adequate energy supply. Afterwards, any

necessary adjustments to the diet can be discussed with the owner and required additions such as mineral supplements can be added [19, 21].

- T4: if there is any suspicion of diet-associated hyperthyroidism because of the presence of potential symptoms, the concentration of T4 in the blood can also be determined exclusively. If the values are elevated, a modification to food free from thyroid tissue should be carried out [19].
- Fecal examination: as discussed in detail earlier, raw feeding carries a significant risk of infection, both from parasites and bacteria. In addition to deworming, a fecal examination can be carried out to detect parasites such as Echinococcus or Giardia. Bacteria like Salmonella, which are being shed in the feces, can also be examined for presence and quantity. However, due to the intermittent shedding of some bacteria and parasites, it is advisable to collect fecal samples over three consecutive days [19].

In addition, a dog fed a BARF diet should regularly attend veterinary check-ups to monitor the dog's health and detect signs of malnutrition early.

8. Discussion and Conclusion

The aim of the thesis "Factors influencing the use of BARF feeding in dogs" was to consider the advantages and disadvantages of the concept of BARF feeding and to gain an understanding of the factors that can influence its frequency of use.

It has become evident that BARF represents a kind of philosophy for many dog owners, as they believe it gives them the opportunity to provide their dogs with a diet that is as species-appropriate and natural as possible. The owners' desire to mimic the wolf's diet with their dogs stands in an odd contrast to the fact that dogs nowadays sleep in memory foam beds and wear raincoats in bad weather, while wolves withstand the elements outdoors and bravely hunt their own dinner.

Many dog owners have already read about the promoted benefits of the BARF diet, and for some, these advantages serve as a determining factor to choose this feeding practice for their own dogs. On the other side, some may be discouraged by the more present disadvantages or may have personally experienced them, leading them to choose not to feed their dogs with BARF or turn back to commercial food.

Clear trends can be identified among the types of owners who decide for BARF feeding. Demographic and lifestyle factors such as age, health consciousness, income, knowledge and education and available time influence whether pet owners choose to use BARF feeding for their dogs. But there can also be breed-specific and individual differences in the frequency of BARF feeding between dogs themselves. The most important points are:

1. Young to middle-aged, middle-class women who are either single or living in two-person households without children are most likely to choose BARF feeding. They often have a higher level of education than the average and prefer living in rural or suburb areas.
2. Medium- to large sized, younger dogs are the most frequently fed with BARF. Dogs fed a BARF diet more frequently live with other dogs, while commercially fed dogs are more often single dogs, and there is a slightly higher percentage of purebred dogs compared to mixed breeds. There are no clear trends regarding gender.

Among the various risks associated with homemade raw food, most sources primarily highlight the risk of nutritional imbalances, as well as the risk of infections from raw meat, especially with bacteria. Salmonella poses the most significant risk in this context.

Regarding the BARF topic, veterinarians also carry significant responsibility. They should undertake the task of individually guiding pet owners and suggesting alternatives to raw feeding if necessary, educate them about risks and how to minimize them, and perform regular examinations on the BARF-fed dog to monitor its health and well-being.

In the end, the decision to feed your dog a BARF diet or not is personal. Before choosing this type of diet is important to do thorough research, understand the potential risks, consult with a veterinarian, and take into account the dog's individual needs and health condition.

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Thesis progress report for veterinary students

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Department: **Animal Nutrition and Clinical Dietetics**

Thesis title: **Factors influencing the use of BARF feeding in dogs**

Consultation – 1st semester

	Timing			Topic / Remarks of the supervisor	Signature of the supervisor
	year	month	day		
1.	2023.	02.	12.	Review of literature.	<i>[Signature]</i>
2.	2023.	03.	26.	Structure of the thesis.	<i>[Signature]</i>
3.	2023.	04.	20.	Citation of the authors.	<i>[Signature]</i>
4.	2023.	05.	24.	Nutritional imbalances.	<i>[Signature]</i>
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2.	2023.	09.	25.	Veterinarian' responsibilities.	<i>[Signature]</i>
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The thesis meets the requirements of the Study and Examination Rules of the University and the Guide to Thesis Writing.

I accept the thesis and it is found suitable to defence,

[Handwritten signature]

signature of the supervisor

Signature of the student: *A. Háró*

Signature of the secretary of the department: *Balint Hura*

Date of handing the thesis in: 17. 11. 2023

I hereby confirm that I am familiar with the content of the thesis entitled

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..... written by *Alina Häve*

(student name) which I deem suitable for submission and defence.

Date: Budapest, *15* day *11* month *2013* year

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