Commercial and home cooked diets: pros and contras

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Abstract

Home cooked elimination diets (HCED) are the most secure way to diagnose a food induced atopic dermatitis (FIAD). By using HCEDs the patients have only contact to new proteins and carbohydrates and the diet does not contain any supplementations or additives that could also elicit allergic reactions. As HCEDs are time-consuming, many owners prefer commercial diets. However, they have some drawbacks making it sometimes impossible finding a suitable one. Most contain essential fatty acids
leading to clinical improvement also in patients not suffering from FIAD. Hydrolized diets hold also many pitfalls and should be cautiously used as elimination diets.
Introduction

Canine atopic dermatitis (CAD) is currently defined as a genetically predisposed inflammatory and pruritic allergic skin disease with characteristic clinical features associated with IgE antibodies most commonly directed against environmental allergens and the recent position of the International task Force on atopic dermatitis states that food allergens might in some individuals trigger flares of CAD\(^1,2\). The incidence of food induced atopic dermatitis (FIAD) in dogs ranges from 14% to 33%\(^3-5\). In another study from Switzerland it could be demonstrated that from 259 allergic dogs 25.1% suffered from pure FIAD and additional 4.2% were diagnosed with FIAD and concurrent CAD\(^6\). During the diagnostic work up of a non seasonal allergic patient, it is therefore important to rule out or confirm FIAD, before starting with intradermal testing and/or allergen specific immunotherapy (ASIT). In fact, beginning with elimination diet presents several advantages: On one hand, offending food allergens, in contrast to house dust and forage mites, molds, epithelia or pollens, can be completely avoided, which means that some cases of FIAD can be managed by a simple change in the patient’s diet\(^7\). In dogs with both food allergy and environmental sensitization, avoidance of offending food allergens contributes to improve the clinical status of the patient, even though pruritus is usually not fully controlled. On the other hand, efficacy of the diet change can be confirmed within 2 months, whereas by using ASIT one has frequently to wait for several months\(^8\).

In order to test for FIAD, an elimination diet (ED) with subsequent challenge of the former food is the goldstandard in cats and dogs\(^3,9,10\). The duration of such an ED is a controversial issue in the veterinary literature, some regarding 3 weeks as enough, whereas others consider that the diet should be continued for up to 3 months\(^7,11\). Most authors however regard 6 to 8 weeks as sufficient\(^12-17\). During this time no other food, treats etc. are permitted. In order to assure this, cats have to stay indoors...
during this period and dogs have to be supervised during the walks. If medications are necessary, they should be nonflavoured.

As this procedure is difficult to carry out for most owners and stressful for some dogs, owners are usually reluctant to repeat an ED. It is therefore crucial for the veterinarian to choose the appropriate diet in order to prevent frustration of all parties. So far, several options are available and the clinician should take several parameters into account before choosing a diet (table 1).

**Home cooked diets**

Home-cooked ED (HCED) consists on ingredients not previously encountered by the patients. As FIAD usually develops rather slowly, feeding the patient with a protein it has never received before ensures that no food-related hypersensitivity reaction will occur during the trial. Any improvement during this period suggests that food components play a role in the hypersensitivity reaction, which has to be confirmed by the subsequent challenge. To be easily interpretable, the HCED should however consist of one protein and one carbohydrates source and should not include any supplements or vitamins. There are a wide range of recommended food components but none of them can be regarded as non allergenic. It is consequently important to compose the diet based on the individual nutritional history. The enhanced complexity and the desire of many owners to provide a large variety of different diets to their animals make it nowadays difficult to choose a suitable ED. In Europe horsemeat and potatoes are often elected, as they are rarely encountered in commercial over the counter diets.

Cross reactions between proteins from related species such as turkey and chicken, salmon and whitefish etc., should also be taken into account, although very little is
known about these reactions in veterinary medicine. In this regard, giving protein
from exotic animals (kangaroo, ostrich…) could also be a good solution.
The last advantage of HCED is that they are lacking preservatives. Although rarely
described, preservative have sometimes been associated with FIAD\textsuperscript{7,25,26}.
Though HCED are most often used to diagnose FIAD, there have however several
drawbacks that should be addressed\textsuperscript{19}: The preparation of HCED is, especially for
large dogs, time consuming, expensive and sometimes impractical (e.g. during
holidays)\textsuperscript{20,21}. If treats are needed, they have to be prepared extra (e.g. dried
horsemeat). Palatability is especially in cats a problem and is a frequent cause of diet
discontinuation. Initial digestive upsets are often mentioned and may be controlled by
gradually introducing the novel diet\textsuperscript{18}. The HCED is usually not a well balanced diet,
which is not a major problem in adult animals for a short test period\textsuperscript{18,22}. For young
patients however, this is an important drawback. The excessive amount of proteins
and lack in calcium and other elements can already after 3 weeks lead to nutritional
disease\textsuperscript{18}. Whereas for adult animals the HCED should only be supplemented after
the diagnosis has been established, it can not be neglected in young cats and
dogs\textsuperscript{18}.
Despite the mentioned problems, HCED is generally recommended to test for FIAD\textsuperscript{7,10,23}. As many owners are not willing to perform this trial and HCED is difficult to
maintain, they have to be carefully educated about the importance of this diagnostic
step. In a study of Tapp et al 10 of 28 owners quit the phase of homecooking. In
other words, the chance of NOT making a diagnosis with HCED was 37% solely
because of owner compliance\textsuperscript{22}!

Commercial diets
Most owners elect to use commercial diets, as it is less time consuming and can be easily used as treats. As they are nutritionally adequate and balanced they are also recommended as long term maintenance diet\textsuperscript{18}. In general one has to select either a commercial novel protein diet (NPD) or a hydrolized diet (HD).

\emph{Commercial NPD}

A wide variety of different commercial NPDs for cats and dogs exist. However an accurate and extensive dietary history is mandatory to choose the adequate NPD. It is though sometimes impossible to find a suitable NPD for some dogs. In fact, numerous NPD contains rice and/or eggs and/or fish, which many animals have already been fed before. Especially in Japan and California fish is frequently inappropriate, as fish allergy is quite common\textsuperscript{22, 24}. Rabbit, lamb and even venison are probably only suitable in individual cases, as they are often ingredients of normal over the counter (OTC) diets. But if carefully chosen, they can be used for ED and subsequent maintenance of food allergic animals, especially in large dogs\textsuperscript{27}. On the other hand the presence of additives and the alteration of antigenic properties during food processing, can sometimes explain the lack of efficacy when a commercial NPD is used as ED\textsuperscript{18, 21}. A special attention should also be paid at the high levels of essential fatty acids (EFAs) in these foods, which can contribute to improve pruritus but makes it difficult to asses if the pet is responding to the diet itself or to the increased levels of EFA\textsuperscript{7}.

Several OTC diets are advertised as containing limited amount of antigens. Owners sometimes elect these diets for food elimination trials, as they are generally cheaper and more convenient to purchase than the veterinary therapeutic diets. Raditic and coworkers however analyzed 4 OTC diets and compared them to a veterinary therapeutic diet. By using ELISA, they were able to demonstrate the presence of
common food proteins in all of the 4 OTC diets although these proteins were not enlisted in the product ingredient list. On the other hand, the veterinary therapeutic diet was devoid of any of these proteins. Although only 4 OTC diets were tested in this study, one should consider OTC diets not be suitable for EDs.

Hydrolized diets (HDs)

In order to facilitate the process of choosing an appropriate ED, the so called HDs seem to be promising. In man food allergens are almost always glycoproteins with a molecular weight of 10-70kDa. In dogs, very little is known on the molecular weight of food allergens but some have been described and were all larger than 20kDa. The rationale for using hydrolyzed proteins is the following: by enzymatically breaking the protein down into small peptide fragments (smaller than 10-12kDa), one impairs IgE crosslinking on the surface of mast cells and avoid development of any allergic reaction. Although convincing at a first glance, using hydrolyzed proteins cannot be regarded as a panacea and attention should be paid to several questions. First it is not really clear, how small the fragments must be, as it has been clearly demonstrated that children with cow milk allergy can still develop hypersensitivity reactions to allergens as small as 1500D. It could consequently be tempting to go a step further and to use free amino acids (AA). Free AA, serving as building blocks for proteins in the body, are clearly not allergenic, but, unfortunately, they have a bitter taste and are way too expensive to be used in commercial diets. One should mention here that the palatability and the cost of commercial HDs is frequently criticized by pet owners. Furthermore free AA are also hyperosmolar, which would attract a large amount of water, resulting in severe diarrhoea. Although most epitopes are probably destroyed during the hydrolyization, it is also likely that some others are exposed, which could, in turn, increase the allergenicity of the HD.
Worsening of clinical symptoms was sometimes observed, when sensitized dogs were fed the hydrolized counterpart of the offending food\textsuperscript{37, 38}. Whether this phenomenon is due to the exposure of new epitopes remains speculative. A hapten/carerrier effect could also explain this adverse reaction\textsuperscript{38}. Furthermore it is possible that not all the proteins in the diet are sufficiently hydrolized, therefore causing an allergic flare. Last but not least, one should keep in mind that FIAD in certain individuals may not based on IgE's at all\textsuperscript{18, 37}. Despite these potential drawbacks, double blinded and controlled studies using sensitized dogs, which were subsequently challenged with HD showed a successful management of food allergic dogs using HDs\textsuperscript{38, 39}.

Another drawback is the lack of canned HDs. To the author's knowledge so far only Hill's provides canned HDs for pets. Especially cats usually fed with canned food will probably not easily accept a sudden change to dry food. A careful review on the evidence of reduced allergenicity and clinical benefit of HDs concludes that only a small number of studies showed reduced immunological and clinical allergenicity\textsuperscript{32}. As there is still incertitude on the good molecular weight of HDs and the obvious possibility of adverse reactions against HD it is probably best, to choose an HD, in which the peptides are small and where the pet is not suspected to be hypersensitive against one of the individual components\textsuperscript{32}.

HCED vs. commercial NPDs

As most owners prefer a commercial diet, several studies addressed directly the question of the suitability of commercial food for the diagnosis of FIAD. Jeffers et al for example diagnosed 13 dogs with FIAD, tolerating HCED consisting of lamb and rice. When fed a commercial NPD with lamb and rice, 2 dogs developed adverse reactions. Efficacy of the commercial NPD was therefore 84.6\%\textsuperscript{21}. Other studies had
similar conclusions\textsuperscript{7, 11}. In another study even 47\% of food allergic dogs reacted with a commercial fish diet. However with the use of subsequent challenge it was demonstrated that of these dogs 37.5\% had adverse reactions against fish\textsuperscript{22}.

**HCED vs. HD or commercial NPD**

Due to the feeding habits of many owners, commercial NPDs are sometimes difficult to choose. Could then HDs be a suitable option to be substituted to HCEDs? A retrospective study comparing the amount of dogs diagnosed suffering from FIAD either by using HCED or HD showed similar frequencies. Furthermore there was no statistically significant difference between the drop out rates\textsuperscript{40}. On the other hand, as mentioned above adverse reactions against HD are possible\textsuperscript{37, 38}. One new and extremely well conducted study included 26 dogs allergic to chicken. Twenty-five dogs were well controlled using a HD. The clinical assessment demonstrated that even though they improved by 80\% (when compared to feeding whole chicken) they were however completely controlled when fed the commercial NPD\textsuperscript{37}.

**Conclusion**

Although HCED is a time consuming, sometimes expensive and impractical method to assess FIAD, it is still the only way to safely control all risk factors that could cause allergic flare ups in animals. In cases of large animals, cases of not tolerating the diet or when owners are unwilling to cook for their pet, it is sometimes necessary to switch to a commercial source. However finding an adequate commercial NPD is not always easy and also a hydrolized diet should be carefully picked regarding the patients dietary history. Neither a commercial NPD nor a HD can fully replace a HCED.
References


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Table 1:

**Advantages and drawbacks of home cooked and commercial diets**

<table>
<thead>
<tr>
<th>Home Cooked Elimination Diet</th>
<th>Novel Protein Diet</th>
<th>Commercial Diet</th>
<th>Hydrolized Diet</th>
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</thead>
<tbody>
<tr>
<td><strong>Advantages</strong></td>
<td></td>
<td></td>
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<tr>
<td>Novel Protein</td>
<td>Practical</td>
<td>Practical</td>
<td>Practical</td>
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<tr>
<td>No additives</td>
<td>Good palatability</td>
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<tr>
<td>No preservatives</td>
<td>Dry and canned food available</td>
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<tr>
<td>No essential fatty acids</td>
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<td></td>
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<tr>
<td><strong>Drawbacks</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Palatability (especially cats)</td>
<td>Contains additives</td>
<td></td>
<td>Effective molecular weight still unknown</td>
</tr>
<tr>
<td>Not balanced</td>
<td>Contains preservatives</td>
<td>Possible hapten/carrier effect</td>
<td></td>
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<tr>
<td>Time consuming</td>
<td>Contains essential fatty acids</td>
<td>Possible new epitopes</td>
<td></td>
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<tr>
<td>Sometimes impractical</td>
<td>Exotic sources not often available</td>
<td>Palatability</td>
<td></td>
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<tr>
<td>Expensive (large animals)</td>
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<td>Exotic sources often not available</td>
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<td>Expensive</td>
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<td></td>
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<td>Mostly dry food</td>
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