
Purina® PRO PLAN® Symposium 2026
Navigating Microbiota Dynamics
Applicable to Pet Nutrition



**Rebalancing the Gut: Microbiota-
Targeted Strategies for Managing
Chronic Enteropathies**



Dr. Aarti Kathrani

**BVetMed (Hons), PhD, DACVIM (SAIM & Nutrition),
FHEA, FRCVS**



The speaker has the following disclosures related to their presentation:

- **Current/past employment:** Academic post at the Royal Veterinary College
- **Investments/commercial interests:** None
- **Patents:** None
- **Speaking engagements (last 5y):** ISFM, ACVIM, ECVIM, BSAVA, Vet Science Week, Hellenic Companion Animal Vet Society, Greece
- **Consultancies (last 5y):** Royal Canin, Lintbells, Carus
- **Grants/research (last 5y):** Royal Canin, PetPlan Charitable Trust, PetSavers, American Academy of Veterinary Nutrition, Waltham & Nestle Purina
- **Gifts, hospitality, travel support (last 5y):** Purina, Royal Canin
- **Memberships:** ACVIM, RCVS, AAVN, CGS, ESCG

OVERVIEW



Nutrition as a causative factor



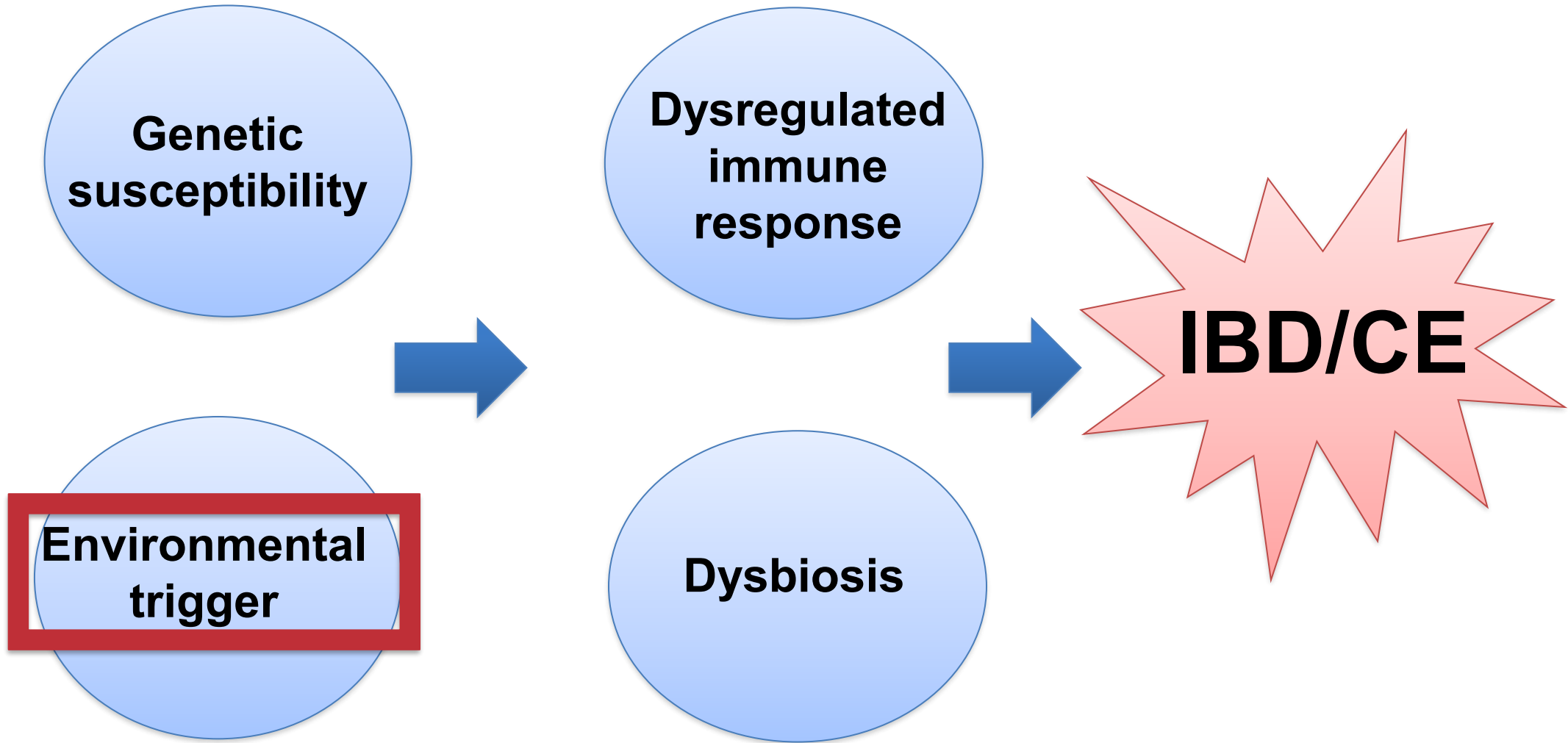
Nutrition as a therapeutic strategy

Digestibility
Protein source & type
Optimal fibre
Fat modulation



Stress management

Nutrition as a Causative Factor



**Genetic
susceptibility**

**Dysregulated
immune
response**

IBD/CE

**Environmental
trigger**

Dysbiosis

Role of Environmental Factors in Human IBD

Migrant studies^{1,2}

Systematic review³ – pre-IBD diagnosis:

- Increased dietary fat & animal protein
- Decreased dietary fibre & fruit

Most dietary studies have reported inconsistent findings:

- Omega 3 FAs

Role of diet in canine CE

Journal of Veterinary Internal Medicine

STANDARD ARTICLE |  Open Access |  

Pre-illness dietary risk factors in dogs with chronic enteropathy

[Isla Trewin](#), [Aarti Kathrani](#) 

- > 95 dogs; 48 with CE & 47 without GI disease
- > Retrospective case-control questionnaire-based study
- > Frequency of the main diet containing no CHO greater for controls (5/47 dogs, 11%) vs CE dogs (0/48 dogs, 0%; $P = .05$).
- > Fewer dogs with confirmed CE were fed a main diet containing red meat as the primary protein source (2/23 dogs, 9%) vs controls (15/47 dogs, 32%; $P = .03$).
- > A main diet moisture percentage of $\leq 14\%$ as fed was significantly associated with confirmed CE in logistic regression analysis (OR 5.71 [95% CI: 1.18-27.69]; $P = .03$).

“It's been a few weeks now, and I've eliminated all chews and treats, so she's only been eating XXX. Thankfully, she's completely back to normal now with a soft stomach, no gas, normal eating habits, and regular energy levels.”

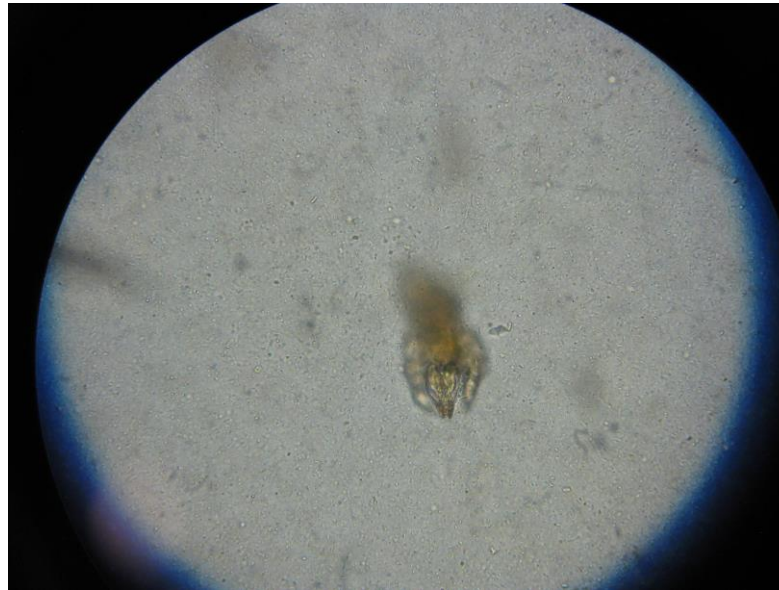
Commercial diets and commercial treats (please include each on a separate line)								
Manufacturer and brand (e.g., Chappie, Pedigree)	Flavour (e.g., chicken)	Formulation (dry/canned if latter specify size)	Amount & frequency fed per day	Date started - date stopped	Fed exclusively or combined with XX (please specify)	Transitioned onto over XX no. of days (please specify) or added abruptly	Effects on gastrointestinal signs if any (including during transition period, if relevant)	Additional comments
1. Pets love Fresh	chicken	wet/frozen		8 wks old	+treats	transitioned	was sick after.	
2. Butternut box	all meats	"		1 yr old	+treats	"		
3. Pets love fresh	venison	"	300g	1.5 yrs old	+treats	"		
4.				- until now.				
5.								

Home-prepared ingredients including table foods and non-commercial treats (please include each on a separate line)							
Cut of meat (e.g., chicken thigh, skinless, boneless) or fruits/vegetable	Preparation (e.g., roasted)	Amount & frequency fed per day	Date started - date stopped	Fed exclusively or combined with XX (please specify)	Transitioned onto over XX no. of days (please specify) or added abruptly	Effects on gastrointestinal signs if any (including during transition period, if relevant)	Additional comments
occasionally gave her							
1. roast beef		50g	occasionally				
2. Sweet potato							
3.							
4.							
5.							

Other (e.g., supplements, dental products, rawhides, foods used as treats or to administer medications (please include each on a separate line)				
Supplement name or other	Amount & frequency per day	Date started - date stopped	Effects on gastrointestinal signs if any	Additional comments

Assess every source of oral intake!

- 6yr male neutered Border Terrier
- Intermittent vomiting & mixed bowel diarrhoea
- During routine faecal analysis documented presence of mites & eggs in faeces on 2 occasions.
 - Identified as non-parasitic *Tyrophagus putrescentiae* forage mites



Assess every source of oral intake!

- **Prof. Mark Fox:**
- “Encountered a **number of cases in dogs similar to this one, which were associated with stored feedstuffs.**
- Short Communication in ***Veterinary Record***
- Can be confused with '**strongyle eggs**'
- If parasitic - the **numbers of mites ingested would tend to be much lower and the number seen in faecal samples correspondingly low.**
- Anything in the case history that would support the hypothesis of free-living mites, such as **dried biscuits or other dog feed kept in large bins, that might not be cleaned out between batches?**
- In this case, **are there any other dogs in the household, are they given the same feed and are they showing similar clinical signs?”**

Diet History Form

Supplementary form S10–Dietary History Form for Chronic Inflammatory Enteropathy

Veterinarian to complete:	
Pet's name:	Patient ID:
Date:	Body weight:
Body condition score:	Muscle condition:



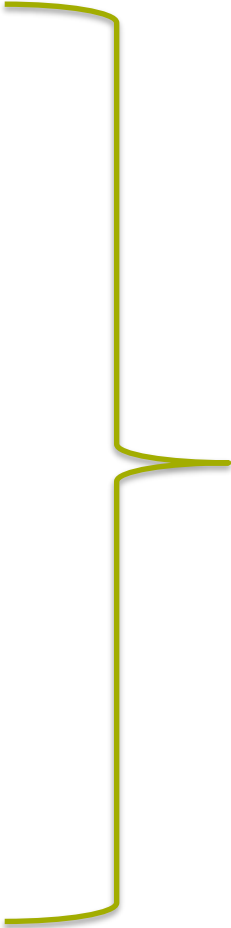
Section A: General information regarding your pet and preferences for diet:

Please describe your pet's activity level:	Low	Moderate	High		
Who feeds your pet?					
Please describe how the food is stored:					
How many times per day do you feed your pet:	Once	Twice	Three	>3	Food is out all the time
How do you measure the food:	Scale	Cup	Can	None	
Do you currently give any dietary supplements to your pet?	Yes	No			

Nutrition as a Therapeutic Factor

Dietary Strategies – canine & feline CE

- High digestibility, low residue
- Hydrolysed protein
- Novel protein
- Elemental protein
- Fibre-enriched
- Fat modulation
-



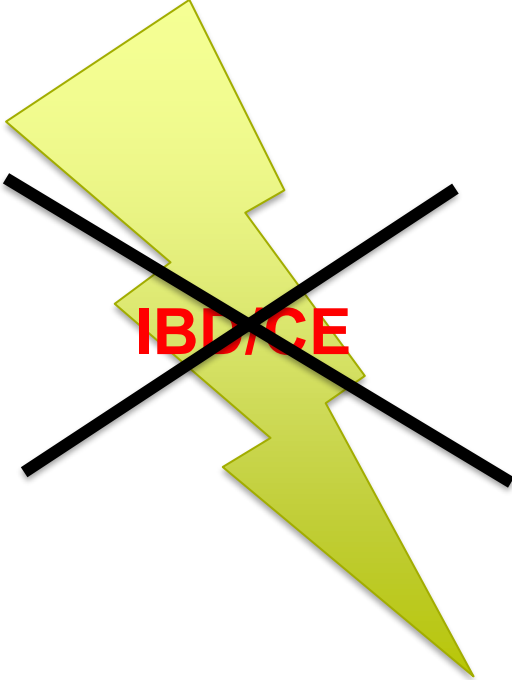
Gene expression

Epigenetics

Microbiota

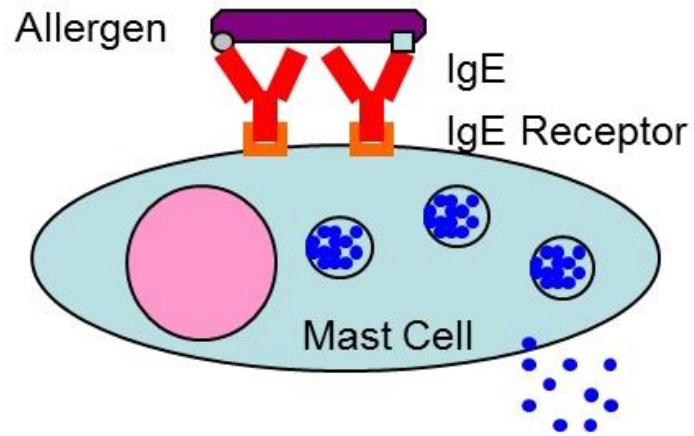
GI permeability

Mucosal immune system



Hydrolysed protein

Hydrolysed Protein

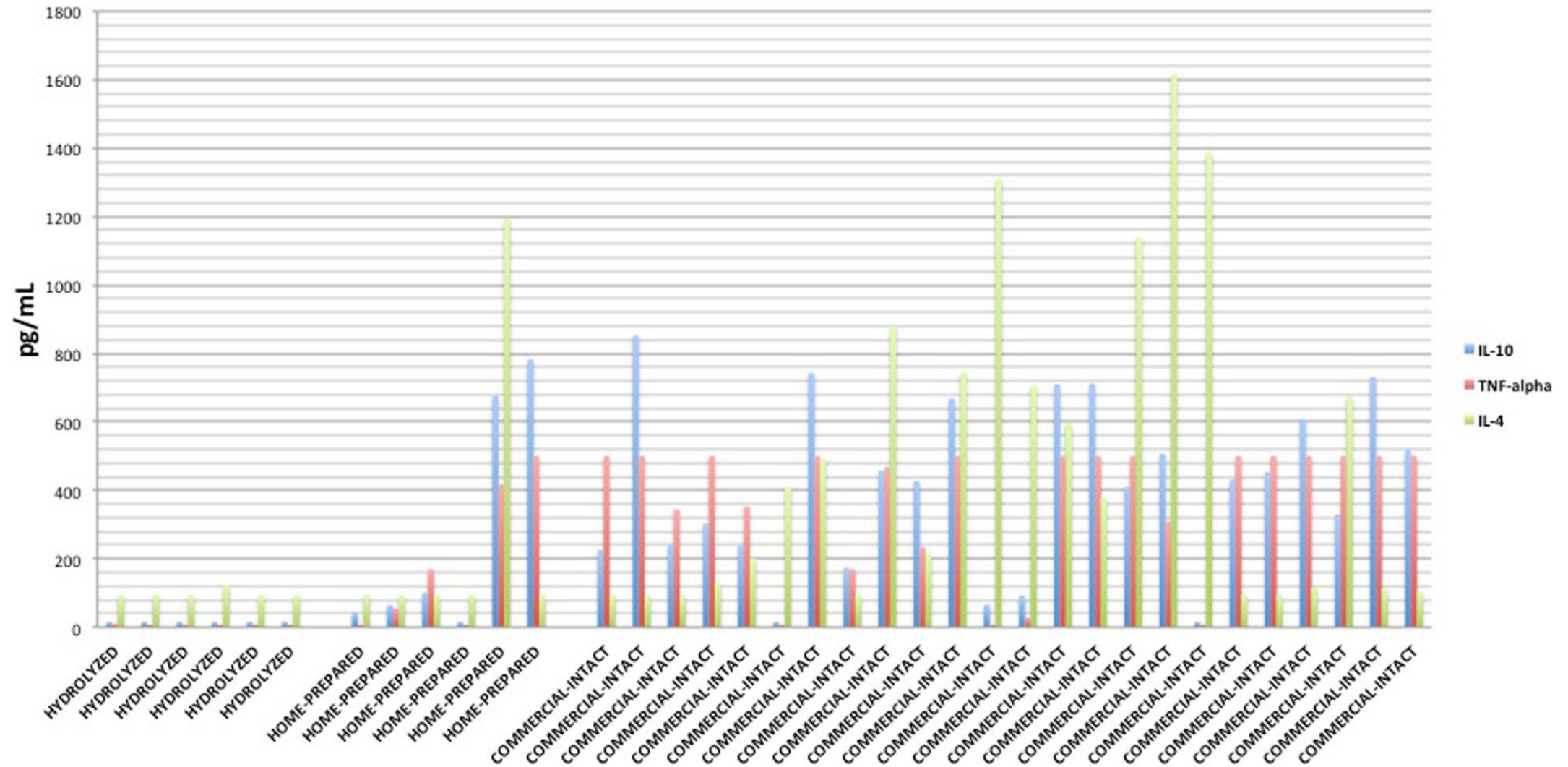


IgE mediated type I hypersensitivity:
Protein < 10 kDa (3-5 kDa^{1,2})

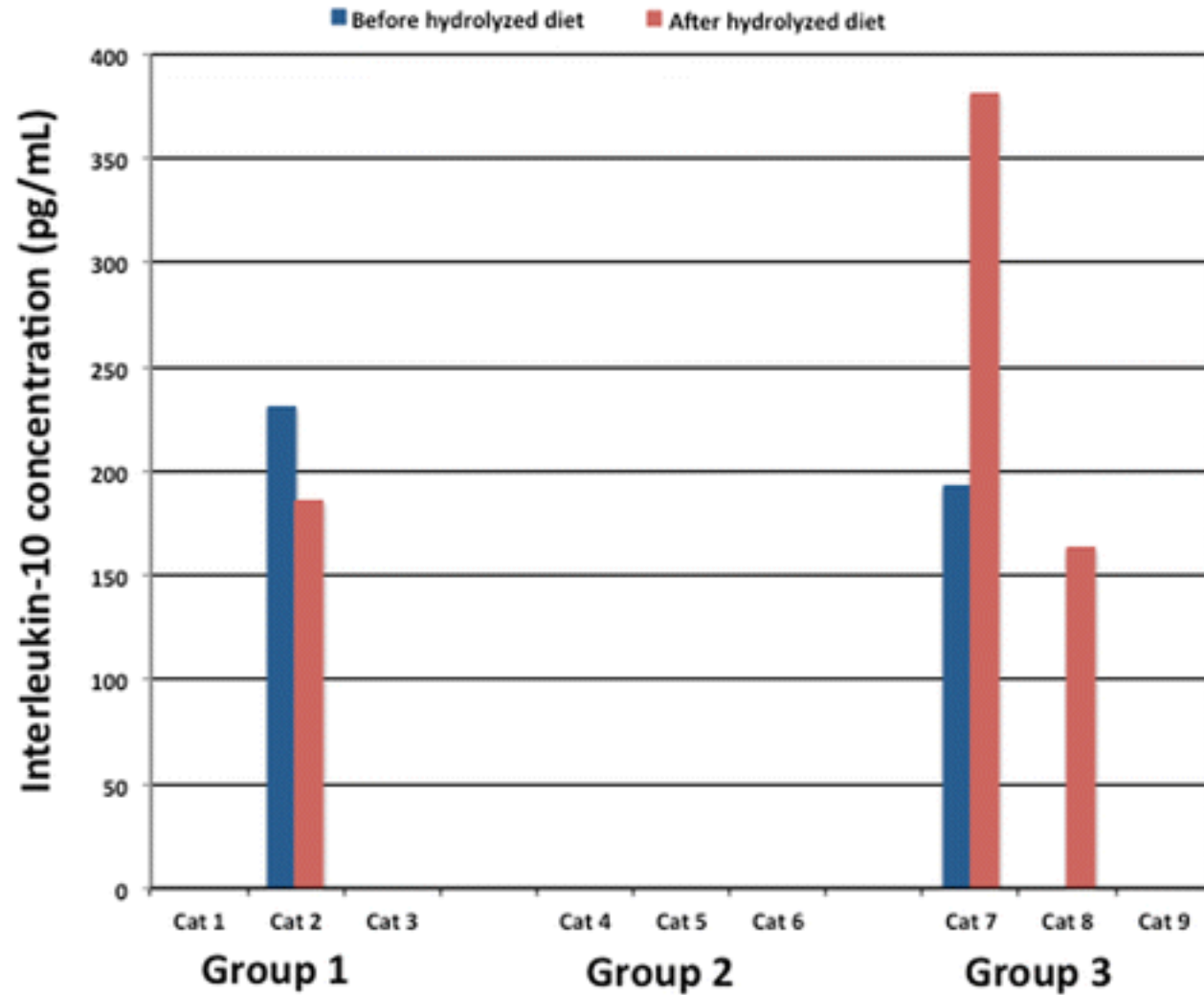
Non-IgE mediated hypersensitivity :
Size?

¹Van Beresteign, E.C., J Aller Clin Immunol. 1995, ²Van Hoeyveld E.M., Clin Wxp. Allergy, 1998

Hydrolysed Protein



Hydrolysed Protein



Kathrani A et al. BMC
Vet. Res. 2017

Hydrolysed Protein

> [Microbiome](#). 2019 Aug 31;7(1):126. doi: 10.1186/s40168-019-0740-4.

Diet-induced remission in chronic enteropathy is associated with altered microbial community structure and synthesis of secondary bile acids

Shuai Wang¹, Rene Martins², Megan C Sullivan¹, Elliot S Friedman³, Ana M Masic¹, Ayah El-Fahmawi¹, Elaine Cristina Pereira De Martinis⁴, Kevin O'Brien¹, Ying Chen¹, Charles Bradley¹, Grace Zhang¹, Alexander S F Berry^{1 5}, Christopher A Hunter¹, Robert N Baldassano⁵, Mark P Rondeau², Daniel P Beiting⁶

- > “Remission induced by a hydrolyzed protein diet is accompanied by alterations in microbial community structure marked by decreased abundance of pathobionts (e.g., *Escherichia coli* and *Clostridium perfringens*), reduced severity of dysbiosis, and increased levels of the secondary bile acids, lithocholic and deoxycholic acid.”
- > “Physiologic levels of these bile acids inhibited the growth of *E. coli* and *C. perfringens* isolates, *in vitro*.”
- > “Metagenomic analysis and whole genome sequencing identified the bile acid producer *Clostridium hiranonis* as elevated after dietary therapy and a likely source of secondary bile acids during remission.”

Hydrolysed Protein

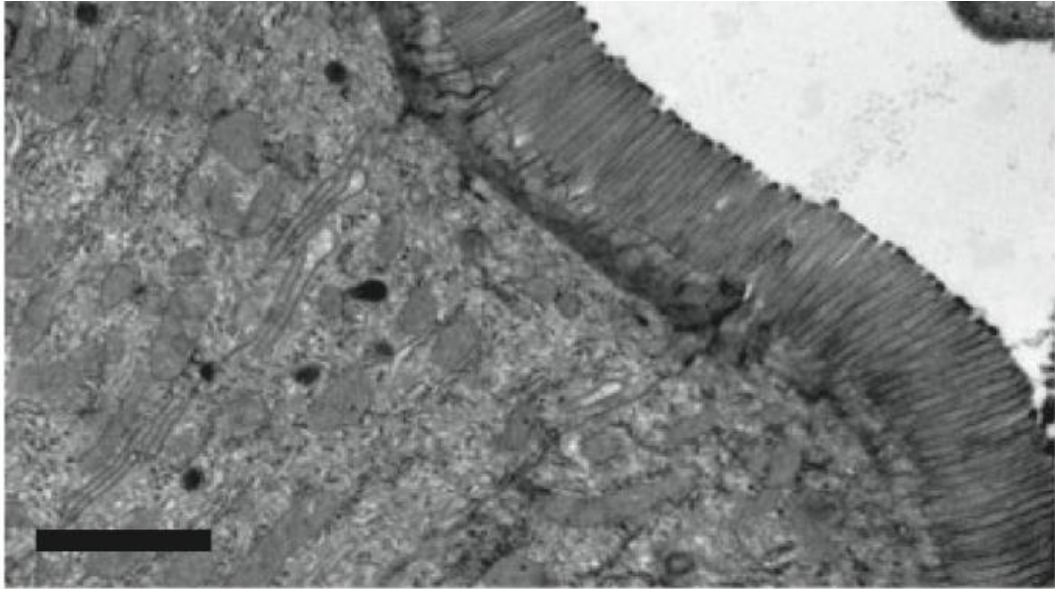
> [Sci Rep. 2022 Feb 17;12\(1\):2746. doi: 10.1038/s41598-022-06576-y.](#)

The effect of a hydrolyzed protein diet on the fecal microbiota in cats with chronic enteropathy

Aarti Kathrani ¹, Sandi Yen ², Jonathan R Swann ^{3 4}, Edward J Hall ⁵

- > After 6-weeks of feeding the diet, 15 cats were classified as responders and 18 as non-responders, based on clinical signs.
- > At the genus level, α -diversity was increased in non-responders versus responders at diagnosis but decreased after dietary intervention in both groups ($P < 0.05$).
- > At the family level, non-responders became increasingly dissimilar after dietary intervention ($P = 0.012$).
- > In general, the abundance of bacteria decreased with feeding a hydrolyzed diet, with the genera most significantly affected being more frequently observed in non-responders.
- > Bifidobacterium was the only genus that increased significantly in abundance post-diet and this effect was observed in both responders and non-responders.
- > Both Oscillibacter and Desulfovibrionaceae_unclassified were most abundant in non-responders at diagnosis but were rarely observed post diet in neither responders nor non-responders.

Study on FRE by Walker et al 2013, JVIM



- Dietary therapy (hydrolysed soy diet) improved ultrastructural lesions of mitochondria and brush border



Hydrolysed diets

My first choice

- Animal inappetent/won't eat HA diet
- Most will transition:
 - 39/42 cats with CE transitioned to HA diet
 - 93/120 dogs with CE transitioned to HA diet
 - Communication is KEY!
- Warm water
- Probiotic with animal digest
- No more than 10% topper (e.g., low-fat cottage cheese)

Which hydrolysed diet?

- How much should we worry regarding 1st diet change...

Randomized controlled trial of hydrolyzed fish diets in dogs with chronic enteropathy

Kenneth W Simpson¹, Meredith L Miller¹, John P Loftus¹, Mark Rishniw¹, Carol E Frederick¹, Joseph J Wakshlag¹

Objectives: To compare the ability of diets composed of hydrolyzed fish, rice starch, and fish oil without (HF) or with prebiotics, turmeric, and high cobalamin (HF+) against a limited ingredient diet containing mixed nonhydrolyzed antigens and oils (control) to resolve clinical signs and maintain serum cobalamin and folate concentrations in dogs with nonprotein losing CE (non-PLE). To determine the ability of hydrolyzed fish diets to support recovery and remission in dogs with PLE.

Results: Nineteen of 23 (83%; 95% confidence interval [CI], 60%-94%) non-PLE CE responded clinically to their initial diet, with no difference between diets ($P > .05$). Four nonresponders responded to another diet, with sustained remission of 18/18 (100%; 95%CI, 78%-100%) at 26 weeks. Serum cobalamin concentration was increased ($P < .05$) and maintained by diet. Serum folate concentration decreased posttreatment ($P < .05$) but was restored by dietary supplementation. Hydrolyzed fish diets supported weight gain, serum albumin concentration, and recovery ($P < .05$) in dogs with PLE.

Conclusions and clinical importance: Changing diet, independent of antigen restriction or supplemental ingredients, induced long-term remission in dogs with non-PLE CE. Serum cobalamin and folate concentrations were maintained by diet. Hydrolyzed fish diets supported clinical recovery and remission in PLE.

Response to first and subsequent diet trials in dogs with CE

Open Access Article

A Descriptive Study on the Extent of Dietary Information Obtained during Consultations at a Veterinary Teaching Hospital

by Andreina Schramm  and Peter Hendrik Kook*  

- A positive response to diet was noted in 50/86 (58%) GE and 26/88 (30%) IM dogs.
- A further 23/35 (66%) GE dogs and 12/21 (57%) IM dogs responded positively to a second diet trial
- 4/9 GE dogs (44%) and 6/7 (86%) IM dogs responded positively to a third diet trial.

Responds to 1st diet

- Environmental risk factor?
- Aetiology responsive to many dietary strategies

Needs more than 1 > diet trial

- TLC
- Aetiology only responds to limited dietary strategy

Intervention beyond diet

- FMT, glucocorticoids etc. with diet
- Aetiology that needs diet as well as other non-dietary strategies



FRE

Second diet choice

Second choice – different hydrolysed diet

- Not all hydrolysed diets the same
- Different protein source & type
- Different fat content

Cases of both dogs and cats, failed one hydrolysed diet but responded to a second hydrolysed diet

How much improvement did I get?

Is there evidence to trial another strategy?

Novel protein

Novel Protein Diets



contain a single protein source, which is used less in maintenance diets

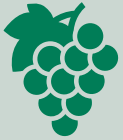


produced on dedicated equipment to reduce the chances of cross contact of ingredients.



Likely effective due to their limited number of ingredients, increased palatability & possible differences in moisture, fat, protein, soluble carbohydrate & fibre content.

Novel Protein Diets



Salmon & rice-based diet fed to dogs with CE 19/29 responded favorably, despite there being no change in the mean histological grade of intestinal biopsy specimens following dietary treatment (Allenspach et al., 2006).



Salmon and rice-based diet assessed at 10-day point in 2 separate studies showed a positive response in 10/26 (38%) dogs and 39/65 (60%) dogs with CE (Luckschander et al., 2006 & Luckschander et al., 2010).



The first of these studies also showed that in dogs that responded to the diet, the number of macrophages & epithelial cells staining positive for activated NF- κ B decreased significantly 4 weeks after treatment (Luckschander et al., 2010).

Novel protein diets

- Third choice
- “Just checking in to give you an update on XX - we have been nearly 4 weeks on the Purina Dermatitis diet, and we have what appears to be normal stools! This was the case from quite early during the transition period when the volume of hypoallergenic food we were giving him decreased. Image attached!”



Novel protein diets

> Food intolerance/allergy

- May react to hydrolysed protein
- Some peptides may retain antigenic potential, as one study demonstrated a significant proportion (21%) of dogs sensitized to the intact protein developed cutaneous signs with the hydrolysed protein (Jackson et al., 2003).

Fibre-enriched

Benefits of Fibre

Soluble fibre – SCFAs:

- Energy source
- Maintain epithelial integrity¹
- Decrease proinflammatory cytokines²
- Decrease intestinal inflammation³
- Alter microbiota⁴

Insoluble fibre

- Bulk
- Transit time

¹Wrozonek L, BMC Biol 2013. Burger-van Passen N, Biochem J 2009, ²Elinav E, Cell 2011, ³ Koleva PT Br J Nut, 2012, ⁴Joo E, Nutrition 2013

Fibre-enriched



Therapeutic fibre- enriched diets are specifically formulated to contain higher fibre, using a mix of soluble, insoluble and pre-biotic fibres.

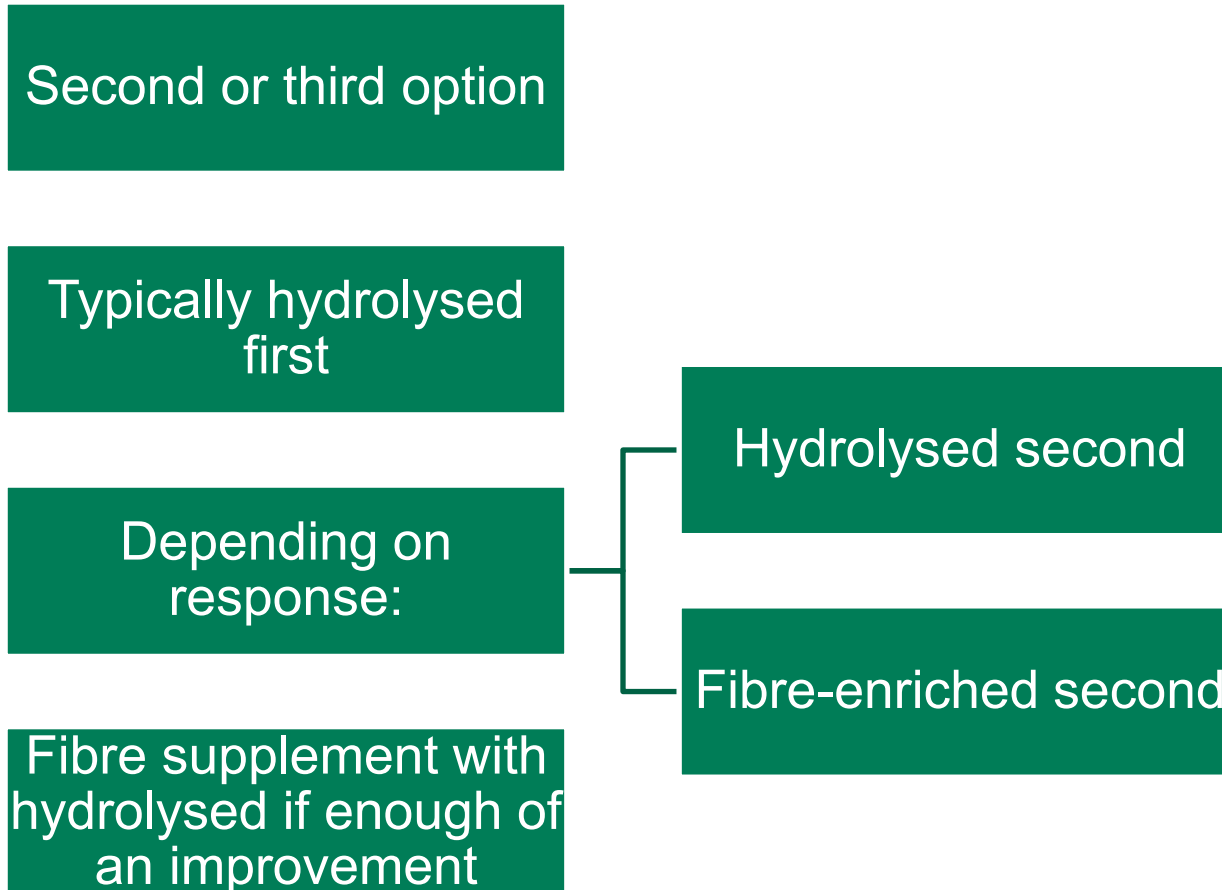


Typically, these diets provide ~4.5 to 6.5 g of TDF per 100 kcal, which is relatively lower in TDF, and insoluble fibre compared to therapeutic weight loss diets.



Assessed the effects of chondroitin sulfate & several prebiotics in 27 dogs with CE and showed that the histological score of dogs that received the supplement together with a hydrolysed diet decreased by 1.53-fold, whereas the unsupplemented group showed no difference in histological score. (Segarra et al., 2016).

Fibre-enriched









Low-fat

Benefits of Low-Fat Diets

Studies in human IBD – high fat exacerbates signs¹

Mouse model – high fat diet – exacerbate colitis & enrichment of pro-inflammatory microbiota². Also increases barrier dysfunction³

Mouse model⁴

Increase taurocholic acid production

Dysbiosis – Th-1 profile – colitis

¹Hou JK. Am J Gastroenterol 2011. ²Ghosh S. PLoS ONE 2013. ³ Ma X. Clin Exp Immunol 2008. ⁴ Devkota S. Nature 2012

Benefits of Low-Fat Diets

➤ High fat diet:

- Induced TLR expression (NOD 2 and TLR5 mRNA) in mouse model of CD¹
- TLR4 dimerization is facilitated by saturated FAs²
- Increase GI permeability – dramatic decrease in occludin expression³

¹Martinex-Medina M. Gut 2014. ²Lee JY. J Lipid Res 2003. ³Gruber, L. PloS ONE, 2013

Benefits of Low-Fat Diets

> [J Vet Intern Med.](#) 2025 Mar-Apr;39(2):e70035. doi: 10.1111/jvim.70035.

Effects of a Western Diet on Colonic Dysbiosis, Bile Acid Dysmetabolism and Intestinal Inflammation in Clinically Healthy Dogs

Brandon Mason ¹, Dipak Kumar Sahoo ¹, Chelsea A Iennarella-Servantez ², Aarti Kathrani ³, Shannon M Morgan ¹, Agnes Bourgois-Mochel ⁴, Alex M Bray ¹, Vojtech Gabriel ², Christopher Zdyski ², Jennifer M Groeltz ², Eric Cassmann ⁵, Mark R Ackermann ⁵, Jan S Suchodolski ⁶, Jonathan P Mochel ⁴, Karin Allenspach ⁴, Albert E Jergens ¹

- To determine the effects of WD on inflammatory indices, microbiome, and fecal bile acids (BAs) in dogs
- Ten adult clinically healthy dogs.
- WD fed to clinically healthy dogs promotes colonic dysbiosis, altered fecal BA, and low-grade inflammation independent of obesity.
- **TRIAL & ERROR** if low fat approach is beneficial as likely depends on genetic susceptibility of underlying pathophysiology

Low-Fat Diets

Canine PLE/IL

- Good scientific evidence
- First choice with hydrolysed approach

CE

- Abstract at ECVIM
- Gain more experience as more options available
- First with hydrolysed:
 - Nauseous
 - Regurgitation
 - Vomiting
 - Osmotic/secretory diarrhoea

PLE



Highly digestible GI

Highly digestible GI diets

Higher digestibility results in more rapid dietary protein digestion & absorption in the proximal small intestine & less intact protein being present in the GI tract.

Diet with higher digestibility may help to counteract impaired nutrient absorption.

Better absorption of macronutrients in the upper small intestine means less undigested fat & protein entering the colon - prevent dysbiosis, as well as limit production of gut derived uremic toxins, & worsening of diarrhoea.

As dogs & cats with CE can have hypokalemia & hyponatremia, feeding diets higher in these minerals may help to replenish these levels & reduce any associated deleterious effects.

Highly digestible GI diet

- One study showed a therapeutic GI diet induced remission, but these dogs were less likely to remain asymptomatic at subsequent rechecks when compared to dogs fed a hydrolysed protein diet
- Should be considered for those dogs and cats that will not consume a hydrolysed diet & novel protein diet not an option (e.g., due to availability or higher fat content).
- If the dog or (cat) attains remission with a therapeutic GI diet, then consideration should be given to transitioning to a hydrolysed diet to maintain remission long-term.
- **MONITOR** as may not need to be transitioned.



Stress management

The impact of acute and chronic stress on gastrointestinal physiology and function: a microbiota–gut–brain axis perspective

[Sarah-Jane Leigh](#), [Friederike Uhlig](#), [Lars Wilmes](#), [Paula Sanchez-Diaz](#), [Cassandra E. Gheorghe](#), [Michael S. Goodson](#), [Nancy Kelley-Loughnane](#), [Niall P. Hyland](#), [John F. Cryan](#), [Gerard Clarke](#) ✉

Stressed to the Core: Inflammation and Intestinal Permeability Link Stress-Related Gut Microbiota Shifts to Mental Health Outcomes

[Annelise A Madison](#)^{1,2}, [Michael T Bailey](#)^{1,3,4}

Article | [Open access](#) | Published: 08 July 2025

Gut microbiota composition is related to anxiety and aggression scores in companion dogs

[Sarita D. Pellowe](#) ✉, [Allan Zhang](#), [Dawn R. D. Bignell](#), [Lourdes Peña-Castillo](#) & [Carolyn J. Walsh](#)

The Relationship between Canine Behavioral Disorders and Gut Microbiome and Future Therapeutic Perspectives

[Paula Kiełbik](#)^{1,*}, [Olga Witkowska-Pitaszewicz](#)¹

Stressful triggers!

Section A: General information regarding your pet and preferences for diet:

Please describe your pet's activity level: Low Moderate High

Who feeds your pet? Me / family

How many times per day do you feed your pet: Once Twice - Three >3 Food is out all the time

How do you measure the food: Scale Cup Tin None

Do you currently give any dietary supplements to your pet? Yes No

If so, please list which ones and the doses:

Does your pet have any of the following currently (if so, please provide specific details in the last column):

Involuntary Weight Loss	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Changes in Appetite	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Changes in Activity	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Nausea	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Vomiting	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Diarrhea	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Changes in urination	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Allergies	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>
Other (e.g., flatulence, lip-licking, tummy pain)	Yes <input checked="" type="radio"/>	No <input checked="" type="radio"/>

Does your pet have any problems with specific foods? (e.g., intolerance, aversion, etc.): Yes No

If so, what are they? I think chicken, maybe beef, suspect grains / dairy

Do you or your pet prefer canned, dry or both types of food: Dry Tinned Both Wet Food only

Does your pet prefer a specific flavor or consistency of food: Yes No

If so, please provide further details: Wet, venison

Are there any other dietary restrictions for you or your pet we should know about: Yes No

If so, please provide further details: I suspect she has allergies but unsure what exactly.

Very picky eater.

Food aversion since feeling nauseous.

More picky w/ Owner
 Eats better w/ Aunt/family members

Stress reduction

Diet history

- Who feeds the dog/cat?
- How is the dog/cat fed?
- How does the dog eat with other family members/friends/dog sitter?
- Any stressful triggers during meal-times?

Interventions

- Individual basis
- Some may improve



Take home message with dietary management of CE

DIET HISTORY FORM

Trial & error – usually start with a hydrolysed diet

Warn owner may get it wrong – data point!

- May take up to 3 different diets or more until response is seen
- Response likely to be seen within 2 weeks

Accurate monitoring important

Methodical about next strategy/diet

Stress management!



PURINA
PRO PLAN
symposium



Thank you!

