

## A photograph of a white dog, possibly a Weimaraner, standing on a grassy area. The dog is facing left, looking slightly towards the camera. It has a sleek white coat and a dark nose. The background is a mix of green and brown grass.

## Nutrition and Endocrinology Unit

ONIRIS - National College of Veterinary Medicine, Food Science and Engineering, Nantes (France)

# History and physical examination

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❖ 7-year-old





❖ Spayed female

❖ Labrador

❖ Diarrhea of 2 months' duration and flatulences.

# History

## *Referring veterinarian analysis*

Albumin	17 g/l	(27 - 40 g/l)	
Total protein	36 g/l	(60 - 80 g/l)	
Globulins	19 g/l	(25 - 45 g/l)	
Cholesterol	0,40 g/l	(1,1 - 3,2 g/l)	

## *Traitement:*

- ✓ intestinal adsorbent
- ✓ nutritional supplement ( enzymes and vitamins)

## Assesement after 2 weeks:

 Persistence of symptoms 



		VALUE	RANGE
TLI		12,7 u/l	( 8,5 – 35 u/l )
FOLATES	★	18,8 ng/l	( 7 - 17 ng/l )
COBALAMIN	★	211 pg /ml	( 225 – 860 pg/l )
cPLI		normal	

★ small intestinal bacterial overgrowth

*Veterinarian referring treatment:*

- ✓ B12 supplementation
- ✓ amoxicillin and clavulanic acid
- ✓ Hypoallergenic diet

# History and physical examination

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- ❖ Normal vital signs
- ❖ BW 27 kg
- ❖ BCS 5/9
- ❖ MCS normal
- ❖ Moderate intensity activity
- ❖ No other animals in the household
- ❖ Fecal score 5-6/7

# Fecal Scoring System



Score 1 – Very hard and dry; requires much effort to expel from body; no residue left on ground when picked up. Often expelled as individual pellets.



Score 2 – Firm, but not hard; should be pliable; segmented appearance; little or no residue left on ground when picked up.



Score 3 – Log-like; little or no segmentation visible; moist surface; leaves residue, but holds form when picked up.



Score 4 – Very moist (soggy); distinct log shape visible; leaves residue and loses form when picked up.




Score 5 – Very moist but has distinct shape; present in piles rather than as distinct logs; leaves residue and loses form when picked up.



Score 6 – Has texture, but no defined shape; occurs as piles or as spots; leaves residue when picked up.



Score 7 – Watery, no texture, flat; occurs as puddles.

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❑ **Urinalysis and bile acid measure to rule out other causes of hypoalbuminemia:**

**normal (RPCU 0,2)**

❑ **Abdominal ultrasonography:**

**Ascites and thickening of overall bowel walls**



**Suspicion of PLE**

**Biopsy by endoscopy of gastric duodenal and colonic mucosa:**

**Histological report: follicular gastritis lymphoplasmacytic enteritis associated to intestinal crypt lesions probably secondary to inflammation.**

- **Hospitalization in IC**
- **Treatment :**
  - **Salicylic acid**
  - **Fenbendazole**
  - **Hypoallergenic diet**

# Nutritional assesement

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**Inflammation bowel disease associated to a protein-losing enteropathy → lynphangiectasia.**

*To summarize...*

- 7-year-old , female spayed dog presenting diarrhea of 2 months' duration and flatulences.
- The FS was 5/7 or 6/7 and defecation frequency increased.
- BCS was 5/9 and MCS was normal.

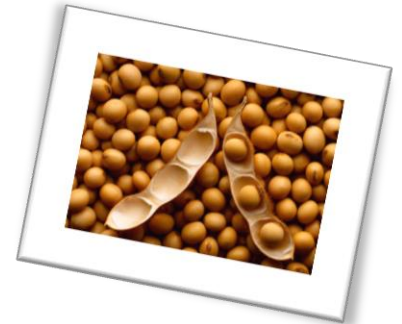
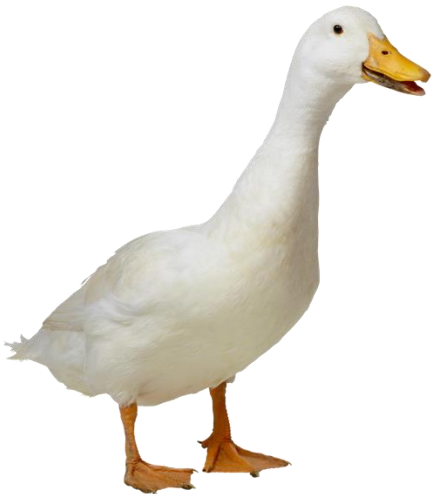
*Dietary history ...*

- Hypoallergenic diet for ten days
- 350 g/day, divided in two meals (no treats)
- Daily energy intake: 1540 kcal ME/day



# Nutritional approach for IBD treatment

- Highly digestible diet
- Novel ingredient diet
- Hydrolyzed diet
- Home-prepared diet



# What Is IBD ?

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- ✱ **Common cause** of chronic vomiting and diarrhea
- ✱ **Idiopathic**
- ✱ Etiology ? Hypothesis: **dysregulation** of mucosal **immunological responses** to intestinal microflora or dietary antigens
- ✱ Clinical response to **novel or hydrolyzed protein** diets and to **antibiotic** treatments supports this hypothesis
- ✱ Hydrolyzed or novel protein **reduces immunogenic stimuli** to the mucosal immune system when dysregulation is present

*Zoran D., 2003, Nutritional management of gastrointestinal diseases*

*Cave N., 2012, Applied veterinary clinical nutrition, Chapter 12*

*Davenport D.J. et al., 2010, Small animals clinical nutrition, chapter 58*

# Nutritional assesement



ALLERGY MANAGEMENT PLUS	Contents per 100 g
Energy kcal	392
Protein g (crude)	22.8
Fat g (crude)	15.3
Carbohydrate g (NFE)	40.8
Fibre g (crude)	6.1
Omega-3 fatty acids g	2.37
Ratio n-3:n-6	01:01
EPA g	0.73
DHA g	0.96

## Key nutritional factors for protein-losing enteropathy and lymphangiectasia

Factors	Recomended livels for dogs on dry matter	Allergy menagement plus
Energy density	>3.5 kcal/g	3.9 kcal/g
Fat	<15%	16%
Protein	≥25%	25%
Crude fiber	≤5%	6%
Digestibility	87% PT 90% FAT	Highly digestible



# Nutritional assesement

ALLERGY MENAGEMENT PLUS Contents per 100 g		
Energy kcal	392	●
Protein g (crude)	22.8	
Fat g (crude)	15.3	●
Carbohydrate g (NFE)	40.8	
Fibre g (crude)	6.1	●
Omega-3 fatty acids g	2.37	●
Ratio n-3:n-6	01:01	
EPA g	0.73	
DHA g	0.96	

ALLERGY MENAGEMENT Contents per 100 g		
Energy kcal	384	●
Protein g (crude)	22.8	
Fat g (crude)	10.6	●
Carbohydrate g (NFE)	49.4	
Fibre g (crude)	2.3	●
Omega-3 fatty acids g	0.13	●
Ratio n-3:n-6	0,049	



# Key nutritional factors for protein-losing enteropathy and lymphangiectasia

Factors	Recomended livels for dogs on dry matter	Allergy menagement plus	Allergy menagement
Energy density	>3.5 kcal/g	3.9 kcal/g	3.8 kcal/g
Fat	<15%	16%	12% 
Protein	≥25%	25%	25%
Crude fiber	≤5%	6%	2.5% 
Digestibility	87% PT 90% FAT	Highly digestible	Highly digestible

# Nutritional strategies

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## ❖ Controlled dietary fat:

- **Fat restricted diet** → better tolerated
- assimilation of dietary fat is **a complex process**
- undigested fatty acids fermented by bacteria → formation of proinflammatory and prosecretory **hydroxy fatty acids**
- These can be **injurious to the mucosa** or can be a cause of **osmotic diarrhea**
- Fat restriction is particularly important in patient with **lymphoangiectasia** → reduce lymphatic pressure, reduce lacteal dilatation, and subsequently **reduce lymph leakage** into the intestinal lumen.

# Nutritional strategies

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## ❖ Controlled dietary fiber:

- Food containing increased levels of fiber (>7% DM) → not recommended
- Lower insoluble fiber → recommended **to support higher density and improve digestibility** of food

## ❖ Prebiotics (fermentable fibres such as inulin, fructooligosaccharides...)

- Fiber that determine a shift in microbiota with positive effects in the host
- **benefit effect by increasing short chain fatty acids**, improving health-promoting intestinal bacteria and immune response to the pathogenic bacteria

*Zoran D., 2003, Nutritional management of gastrointestinal diseases*

*Davenport D.J. et al., 2010, Small animals clinical nutrition, chapter 58.*



# Nutritional strategies

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## ❖ Polyunsaturated n-3 fatty acids:

- There are **no reports demonstrating efficacy** in IBD
- several pet food manufacturers add omega 3 FA → **ant inflammatory factors** to their highly digestible or hydrolyzed diets
- **Optimal ratio 1.3:1**

## ❖ Glutamine:

- The availability of glutamine → probably **beneficial** in of acute and chronic enteritis
- **No evidence** that **supplementation** beyond that present in adequate amounts of intact protein **provides benefit**

# Treatment

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- ***Prednisolone*** → 1 mg/kg BID until normalisation of laboratory values of albumine and total protein.
- ***Metronidazole*** → 10 mg/kg BID for 3weeks
- ***Vitamin B<sub>12</sub>*** → 25 µg/kg one a week for 1 month then once a month
- ***Acetylsalicylic acid*** → 0,5 mg/kg BID until normalisation of laboratory values of albumine and total protein.
- ***Omega-3 PUFA supplement*** → for 1 month

# Follow up

	2 weeks	4 weeks	6 weeks	10 weeks	14 weeks
<b><u>Weight</u></b>	27 kg	25 kg	26.8 kg	27.2 kg	28 kg
<b><u>BCS</u></b>	5/9	4/9	5/9	6/9	6/9
<b><u>Fecal score</u></b>	2/7 (normal)	2/7 (normal)	2/7 (normal)	2/7 (normal)	2/7 (normal)
<b><u>Albumin (27-40 g/l)</u></b>	17 g/l	30 g/l	30 g/l	30 g/l	30 g/l
<b><u>Total protein (60-80 g/l)</u></b>	38 g/l	49 g/l	49 g/l	61 g/l	64 g/l
<b><u>Adjustment</u></b>		<ul style="list-style-type: none"> <li>•WL 1.8 % 10% DEI increased.</li> <li>•Acetyl salicylic stopped</li> <li>•Progressive reduction of corticoids</li> </ul>	<ul style="list-style-type: none"> <li>•Progressive reduction of corticoids</li> </ul>	<ul style="list-style-type: none"> <li>•Progressive reduction of corticoids</li> </ul>	<ul style="list-style-type: none"> <li>•Progressive reduction of corticoids</li> </ul>

# Conclusion

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- ❖ The optimal nutritional approach to IBD and PLE has to be established. The strategies suggested par several authors include: highly digestible or novel or hydrolyzed protein food, controlled content of fat and fiber and supplementation of omega-3 Fa.
- ❖ To accommodate owner economic needs, we have compared two hypoallergenic foods and we evaluated the cheapest food, not supplemented in the omega 3 FA and less in fat and fiber content, appropriate for Eddy case.
- ❖ By combining drug and diet therapy we have managed to normalise symptomatology and biochemical values (albumin and total protein) in 14 weeks.

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**Thank you for your attention**