

**Canine fiber responsive
diarrhea:
resolution of clinical
signs after dietary
change and
administration of a
symbiotic mixture**

Resident: Alessia Candellone

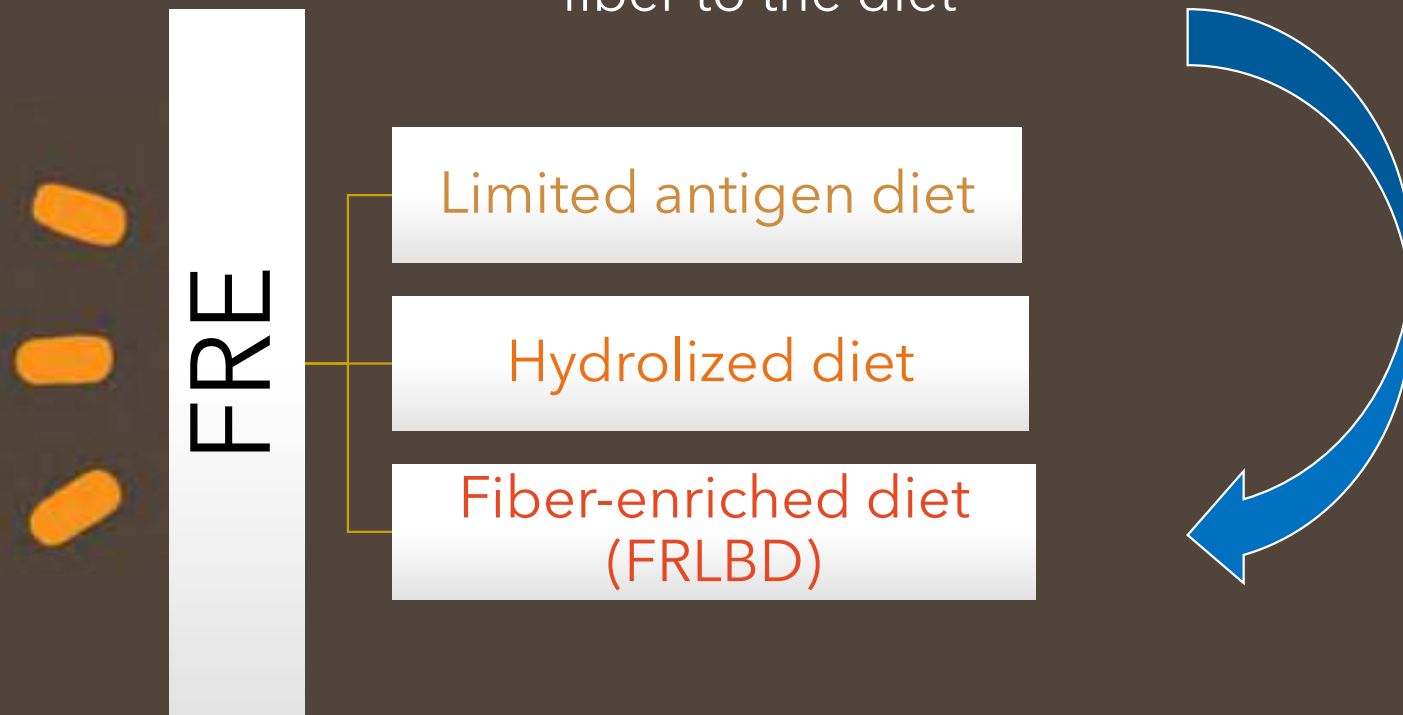
Supervisor: Prof. Domenico Bergero



Residency Class 2020

Fiber responsive large-bowel diarrhea (FRLBD):

chronic condition, +++ affecting the colon, which improves by adding fiber to the diet



Diagnosis and

No specific markers...

but

...fecal calprotectin (fCP)
and serum oxidative
stress/antioxidant status markers
(i.e. CUPRAC, TEAC, ROS, PON-1,
etc...) could be useful!

(Otoni et al., 2017; Rubio et al., 2017)

Exclusion of non-GI tract
diseases
(i.e. Addison)

Fecal examination

Hemato-biochemical
analysis

(Abdominal US/X-Rays/GI tract
endoscopy)

Dietary trial
(+++ fiber)

FRLBD

if resolution of clinical signs w/o other abnormalities

Oxidative stress (OS) is one of the major fundamental tissue-destructive mechanisms, through excessive release of reactive oxygen metabolites (ROM)

Mucosal damage caused by ROM play a key role in the pathogenesis of acute and chronic enteropathies in dogs.

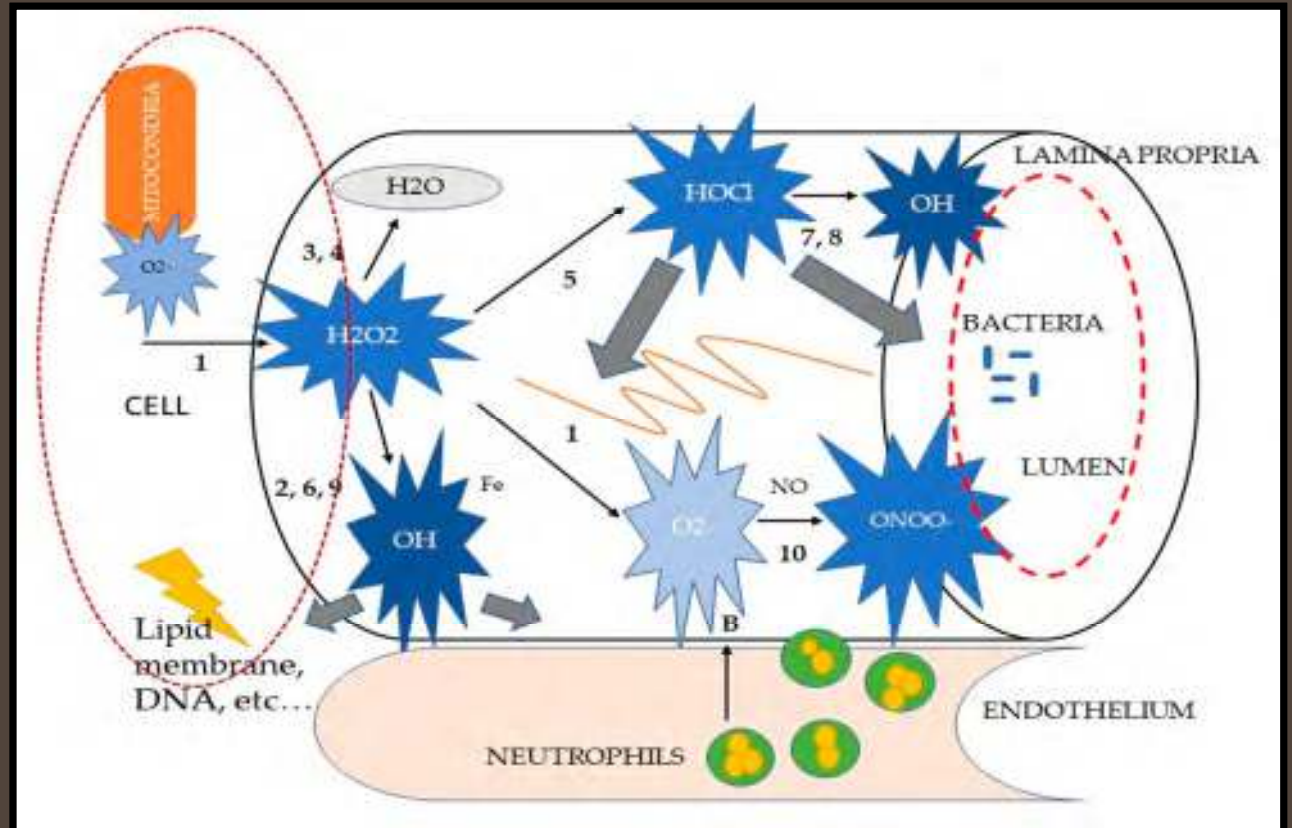
(Candellone et al., 2020)



Probiotics and antioxidant supplementation to counteract OS and inflammation

(Rossi et al., 2019)

+++ polyphenols



SIGNALMENT:

#1: Bouledogue fr., NF, 5 yrs,
11.9 Kg, BCS 5/9, MMI wnl

#2: Bouledogue fr., F, 1 yr,
10.2 Kg, BCS 4/9, MMI wnl

#3: Bouledogue fr., F, 9 mo,
10.0 Kg, BCS 4/9, MMI wnl



#1 Birba

#2 Chloe

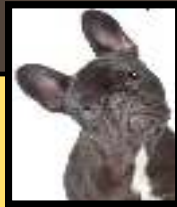
#3 Ribolla



HISTORY:

CHRONIC SIGNS OF LARGE BOWEL
DIARRHEA (3 WKS- 2 MS)

#1



#2



#3



MUCUS

+/-

++

+++

HEMATOCHEZIA

+

+++

+

**TENESMUS/ABDOMINAL
PAIN**

+

+++

+

WEIGHT LOSS

+/-

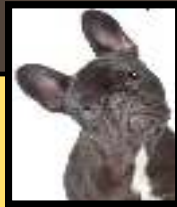
+

+



NUTRITIONAL HISTORY:

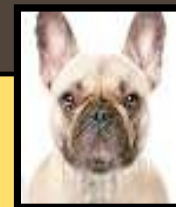
#1



#2



#3



COMMERCIAL DIET, DRY

+
(CHICKEN AND RICE)

+
(HORSE AND POTATOES)

+
(CHICKEN/TURKEY/
LAMB RICE/WHEAT/CORN)

**COMMERCIAL DIET,
CANNED**

-

-

+

**HOME-MADE
INGREDIENTS**

-

+
(HORSE MEAT)

-

TREATS

+/-

+

-

**CCECAI AND
FECAL SCORE:**

CCECAI: 6



9



7



DIFFERENTIALS FOR CASE #1-#2-#3:



?

DIAGNOSTIC WORK-UP:

	#1	#2	#3
FECAL EXAMINATION, including <i>Giardia</i> spp.	NEG	NEG	NEG
MDB	Wnl	Wnl	Wnl
FECAL CALPROTECTIN (RI: 3.2-65.4 µg/g)	71	64	91
PON-1 (RI: 3.64-7.94 IU/L)	1.5	0.7	1.1
ABDOMINAL US	Thickened colonic wall, dilation	Not performed	Thickened colonic wall Lymph nodes enlargement
COLONOSCOPY	Np	Hyperemia and edema, no signs of HUC. HPA: moderate mucosal lpc inflammation	Hyperemia and edema, no signs of HUC. HPA: moderate to severe mucosal lpc inflammation. -
DIETARY TRIAL + SYMBIOTICS	Highly digestible, novel single protein, home- made diet + soluble fiber	Commercial hydrolyzed diet, fiber enriched	Highly digestible, novel single protein, home- made diet + soluble fiber

Table 62-1. Key nutritional factors for dogs and cats with colitis.*

Factors	Recommended levels
Protein	Adult dogs: 15 to 30% Growing puppies: 22 to 32% Adult cats: 30 to 45% Growing kittens: 35 to 50% Option: consider elimination foods or protein hydrolysates (Table 31-5 for dogs and Table 31-6 for cats)
Fat	Dogs: 8 to 15% Cats: 9 to 25%
Digestibility	Highly digestible foods: $\geq 87\%$ for protein and $\geq 90\%$ for fat and digestible carbohydrate Fiber-enhanced foods: $\geq 80\%$ for protein and fat and $\geq 90\%$ for digestible carbohydrate
Fiber	Highly digestible foods: $\leq 5\%$ Fiber-enhanced foods: $\geq 7\%$
Electrolytes	Sodium: 0.3 to 0.5% Chloride: 0.5 to 1.3% Potassium: 0.8 to 1.1%

*All values expressed on a dry matter basis.



Mean Nutritional composition, DMB:
CP 28.5 %, EE 14%, **Raw Fiber 6 %**, Soluble fiber 5%,
Ash 6.5 %, Ca 1.0%, P 0.9%,
Na 0.4%, K 0.9%, Cl 1%

Nutritional composition:
Humidity 9%, CP 24%,
EE 13%, **Raw Fiber 7.8%**, **Dietary fiber 21%**,
Ash 7%, Ca 1.0%,
P 0.9%, Na 0.5%, K 0.9%.

SYMBIOTIC MIXTURE

(MICROBIOTAL® – NBF LANES)

1/2 TABLET/10 KG OS, SID, FOR 30 DAYS



IN EACH TABLET:




- FOS: 250 mg
- Microencapsulated tributyrates: 200 mg (glyceryl tributyrates: 60 mg)
- Inulin: 180 mg
- Citrus sinensis L. Osbeck, solid extract: 120 mg
- Lactobacillus reuteri NBF1: 100 mg



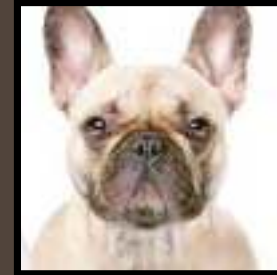
Mean Nutritional composition:

Humidity: 1.84%, CP 1.16%,
EE 14.65%, **Raw Fiber 21.23**
%, Ash 6.61 %



	#1	(Before)	#2	#3
				
BODY WEIGHT (KG)	12.1	(11.9)	10.8	(10)
BCS (9-POINT SCALE)	5	(5)	5	(4)
FECAL CALPROTECTIN (RI: 3.2-65.4 µg/g)	7	(71)	49.3	(64)
PON-1 (RI: 3.64-7.94 IU/L)	5.45	(1.5)	6.89	(0.7)
FECAL SCORE (7-POINT SCALE)	3	(7)	2	(5.5)
CCECAI	1	(6)	1	(9)

AFTER 30 DAYS...



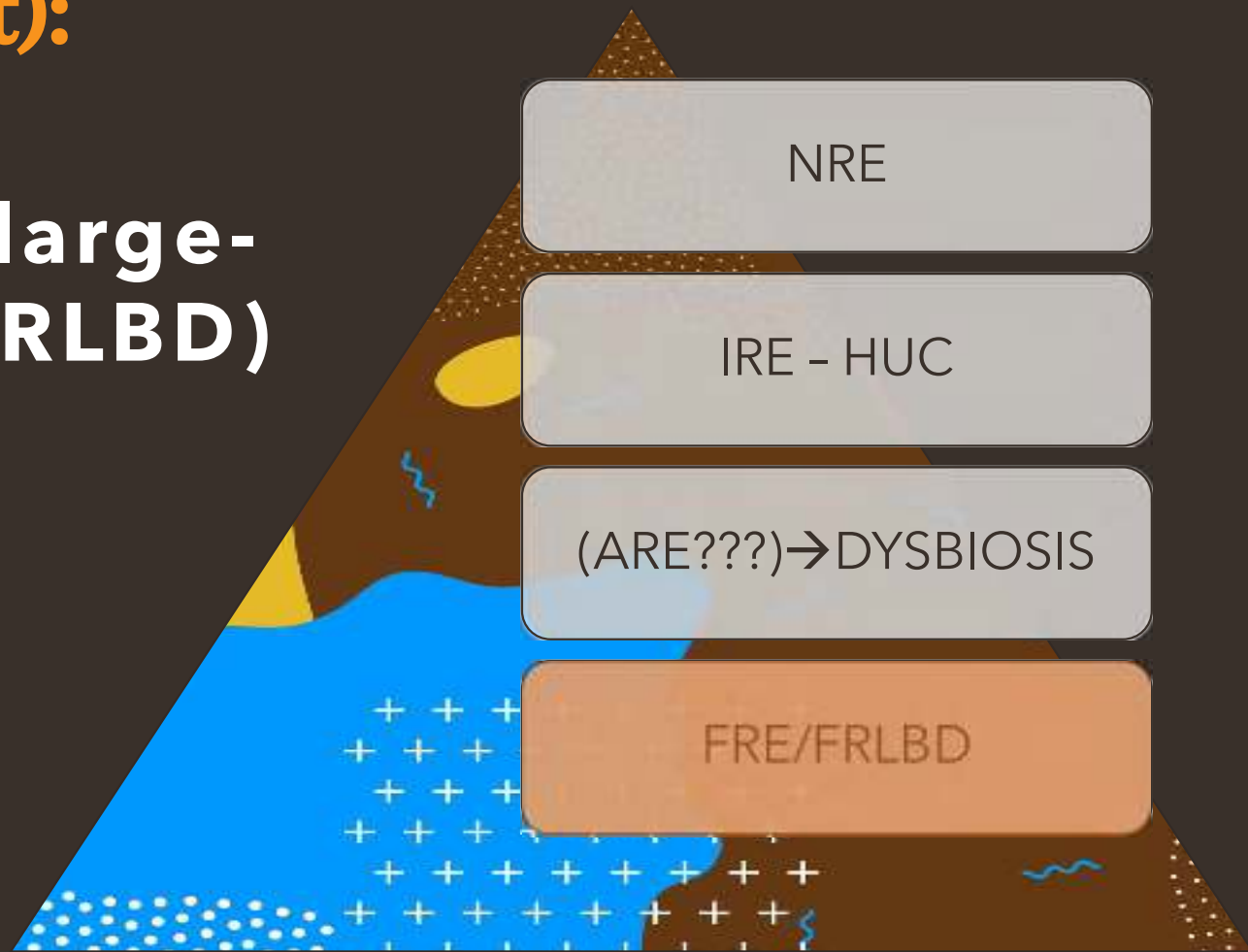
FECAL SCORE AFTER 30 DAYS...

DIAGNOSIS (and treatment):

Fiber responsive large-bowel diarrhea (FRLBD)

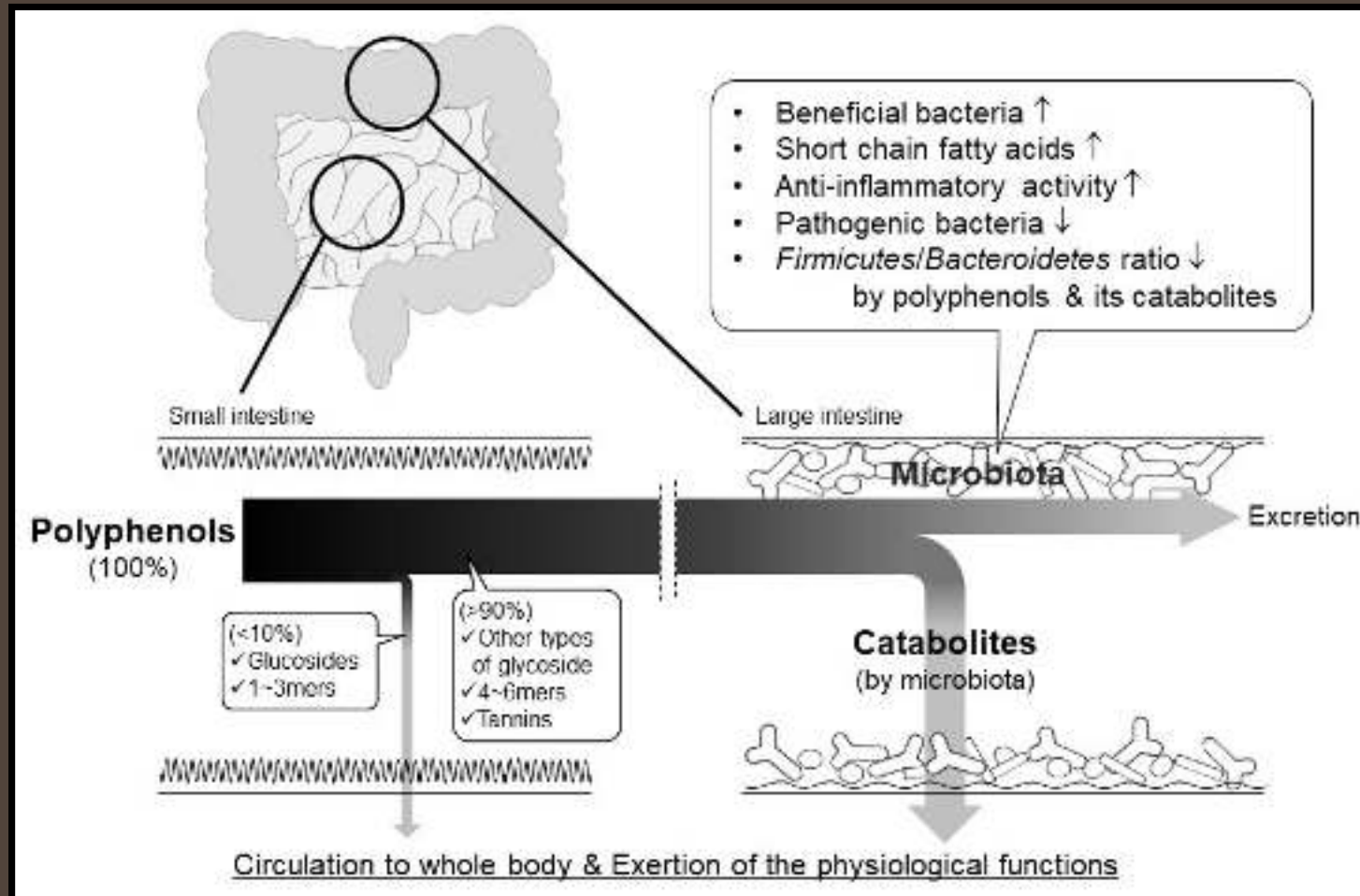


- Dysbiosis
- Mucosal inflammation
- Redox unbalance with depletion of plasmatic antioxidant defences





Role of Polyphenols in FRLBD



(Kawabata et al., 2019)



References:

- Candellone, A.; Cerquetella, M.; Girolami, F. Acute Diarrhea in Dogs: Current Management and Potential Role of Dietary Polyphenols Supplementation. *Antioxidants* **2020**, 9(8), 725
- Davenport, D.J.; Remillard, R.L.; Carrol, M. Large Bowel Diarrhea:colitis. In *Small Animal Clinical Nutrition*, 5th ed., Hand, M.S.; Thatcher, C.D.; Remillard, R.L., Mark Morris Inst, Topeka, US, 2010, pp.1101-1109.
- Hall, E.J.; German, A.E. Diseases of the small intestine. In *Textbook of Veterinary Internal Medicine*, 7th ed., Ettinger, S.J.; Feldman, E.C. eds.; Elsevier Saunders, St Louis, US, 2010, pp. 1544-1546.
- Kawabata, K.; Yoshioka, Y.; Terao, J. Role of Intestinal Microbiota in the Bioavailability and Physiological Functions of Dietary Polyphenols. *Molecules* **2019**, 24(2), 370.
- Khan, I.; Samson, S.E.; Kumar Grover, A. Antioxidant Supplements and Gastrointestinal diseases: A Critical Appraisal. *Med Princ Pract* **2017**, 26, 201-217.
- Otoni, C.C.; Heilmann, R.M.; Garcia-Sancho, M. Serologic and fecal markers to predict response to induction therapy in dogs with idiopathic inflammatory bowel disease. *J Vet Intern Med* **2018**, 32 (999), 1008.
- Ozdal, T.; Sela, D.A.; Xiao, J.; et al. The Reciprocal Interactions between Polyphenols and Gut Microbiota and Effects on Bioaccessibility. *Nutrients* **2016**, 6(8), 78.
- Romier, B.; Schneider, Y.J.; Larondelle, Y.; et al. Dietary polyphenols can modulate the intestinal inflammatory response. *Nutr Reviews* **2009**, 67(7), 363-378
- Rossi, G.; Cerquetella, M.; Gavazza, A. Rapid Resolution of Large Bowel Diarrhea after the Administration of a Combination of a High-Fiber Diet and a Probiotic Mixture in 30 Dogs. *Vet Sci* **2020**, 7, 21.

References:

- Rousdari, N.M.; Lashgari, N.A.; Momtaz, S.; et al. Natural polyphenols for the prevention of irritable bowel syndrome: molecular mechanisms and targets; a comprehensive review. *Daru* **2019**, 27(2), 755-780.
- Rubio, C.P.; Martínez-Subiela, S.; Hernández-Ruiz, J. Serum biomarkers of oxidative stress in dogs with idiopathic inflammatory bowel disease. *Vet J* **2017**, 221(3), 56-61.
- Tomasello, G.; Mazzola, M.; Leone, A.; et al. Nutrition, oxidative stress and intestinal dysbiosis: Influence of diet on gut microbiota in inflammatory bowel diseases. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* **2016**, 160(4), 461-466.
- Vargas-Robles, H.; Castro-Ochoa, K.F.; Citalán-Madrid, A.F. et al. Beneficial effects of nutritional supplements on intestinal epithelial barrier functions in experimental colitis models *in vivo*. *World J Gastroenterol* **2019**, 25(30), 4181-4198.



Thank you for your attention!

alessia.candellone@unito.it