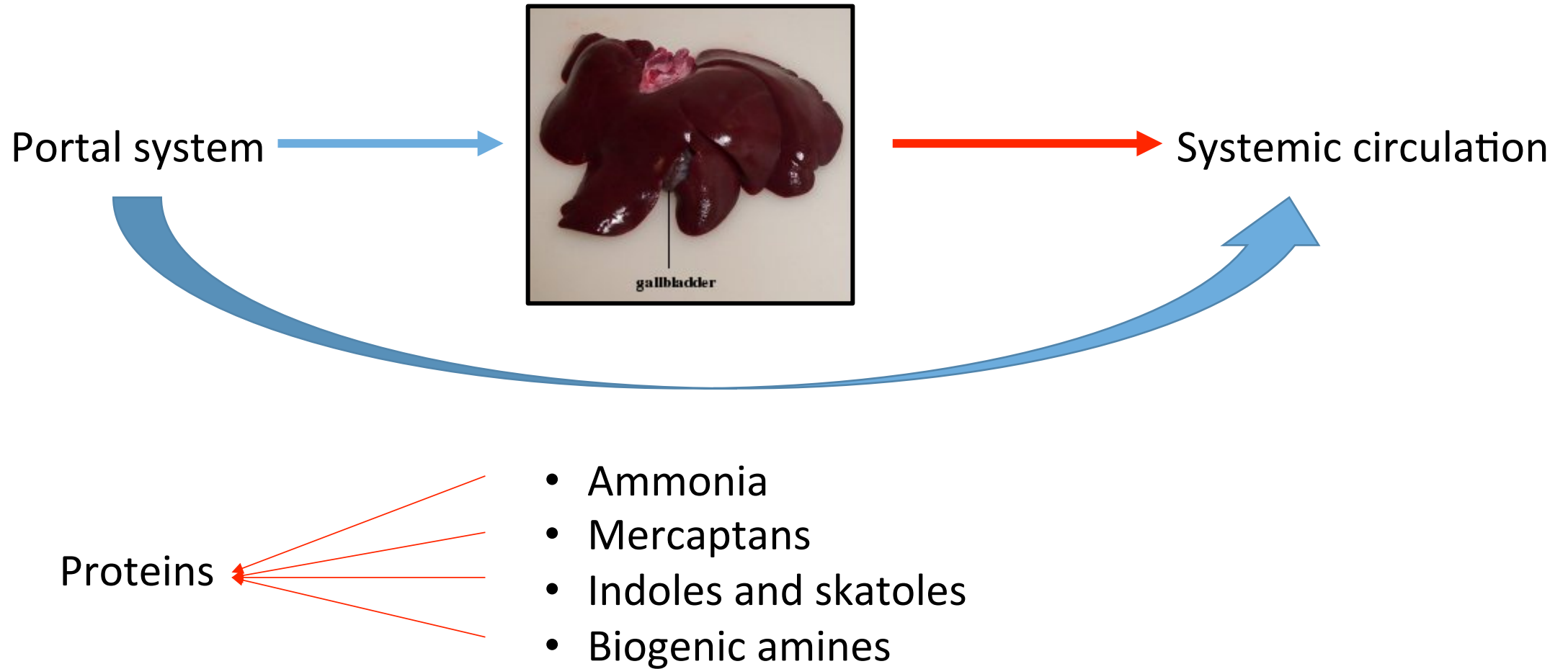


# Management of porto-systemic shunt in a puppy



## Portosystemic shunt



## Portosystemic shunt

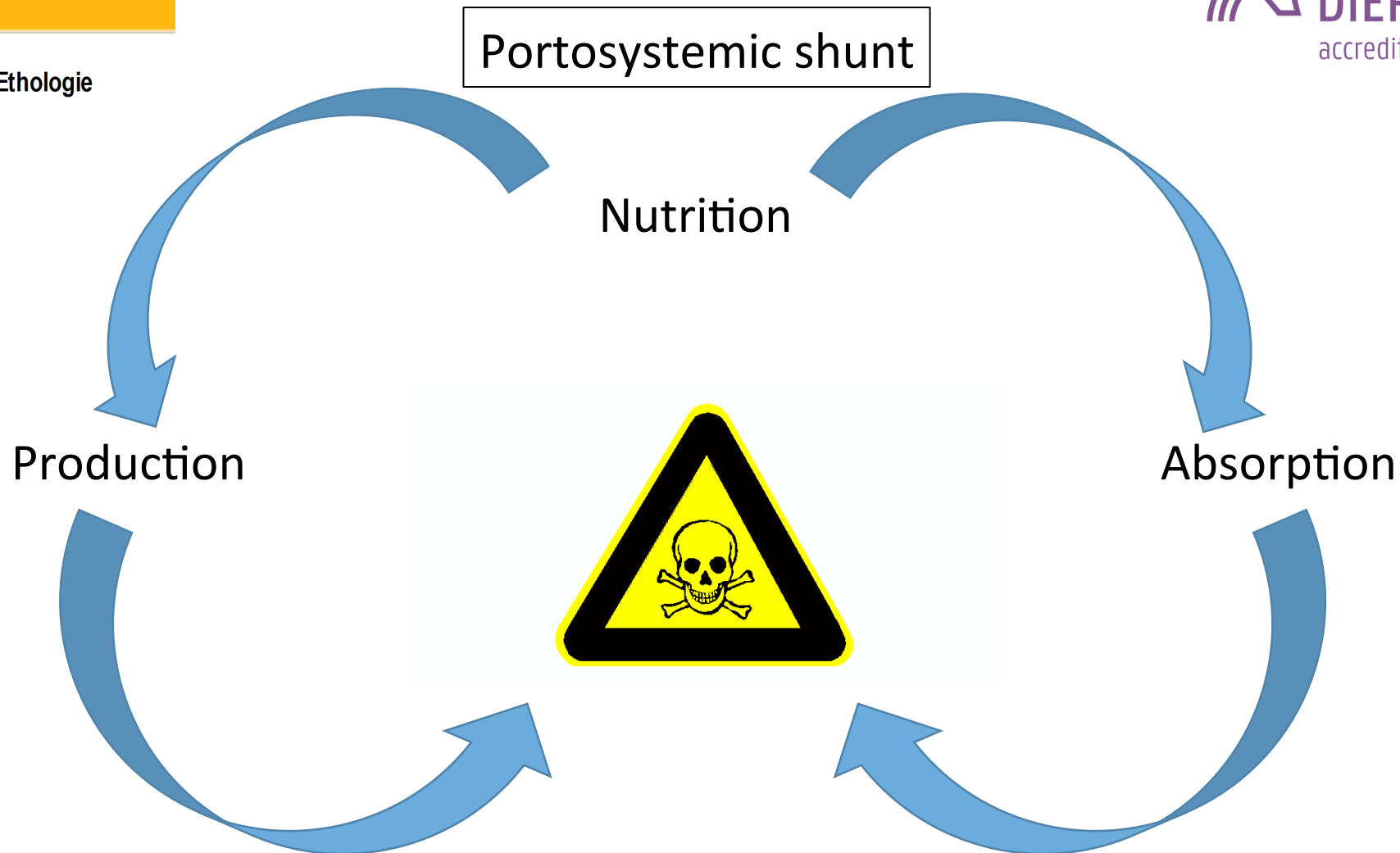
- Ammonia
- Mercaptans
- Indoles and skatoles
- Biogenic amines

→ Systemic circulation



Hepatic encephalopathy





## Nutrition

- Decreasing or modifying dietary protein
- Altering intestinal flora
- Decreasing intestinal transit time



Youp

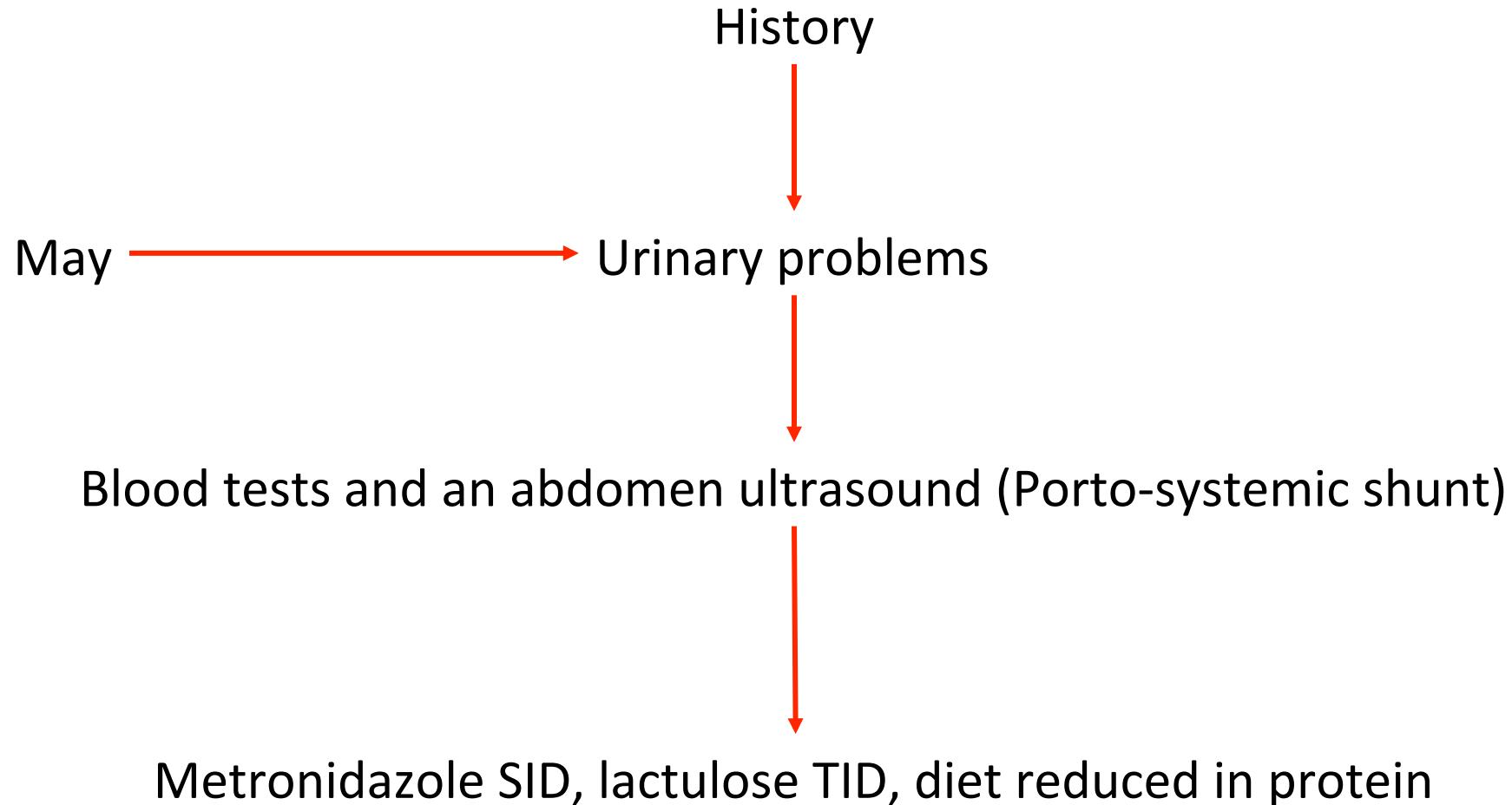
Miniature wire-haired dachshund

3 months 16 days

Veterinary hospital of Ghent University  29/05/2017



But previously...





## Veterinary hospital of Ghent University



29/05/2017



Complaints



Drowsiness and neurological complaints



- Standing against the wall
- Run against objects
- Circle walk, even backwards





Consult

- Current body weight was 2.4 kg
- BCS: 3/9

Nutritional anamnesis → Eukanuba puppy and Prince puppy

Specific heart and kidney support dry and wet (Hill's I/d wet)



# Questionnaire



- They were mixing all diets
- They do not want to see the clinical signs
- They were moving to a new house



They decided to hospitalize the dog

## Hospitalization

## Energy requirements

RER → Puppy → DER

- Age: 3m17d
- CBW: 2.4 kg
- ABW: 4.5 kg
- BCS: 3/9
- IBW: 3.15 kg
- MW: 2.36

→ DER

## Table VII-8.

## Average energy requirements during growth and reproduction in dogs

Puppies	Age	Energy requirement	
	Newborn puppies	25kcal/100g BW	105kJ/100g BW
	Up to 50 % of adult weight	210kcal/kg <sup>0.75</sup>	880kJ/kg <sup>0.75</sup>
	50 to 80 % of adult weight	175kcal/kg <sup>0.75</sup>	730kJ/kg <sup>0.75</sup>
	80 to 100 % of adult weight	140kcal/kg <sup>0.75</sup>	585kJ/kg <sup>0.75</sup>

DER

- Age: 3m17d
- CBW: 2.4 kg
- ABW: 4.5 kg
- BCS: 3/9
- IBW: 3.15 kg

→ 53% of the adult body weight

1726 kJ/day

1035.6 kJ/day  
(-40%)

50 to 80 % of adult weight

175kcal/kg<sup>0.75</sup>

730kJ/kg<sup>0.75</sup>

# Protein

3 months

 $8.5 \text{ g/kg}^{0.75}$ 

4 months

 $8 \text{ g/kg}^{0.75}$ 

Digestible protein (average)

**Digestibility 85%**

3 months

 $9.77 \text{ g/kg}^{0.75}$ 

4 months

 $9.2 \text{ g/kg}^{0.75}$



# Protein

Specific CDD	1659 KJ/100 grams	pro 16 %
Specific CPD-S	1690 KJ/100 grams	pro 25.6 %

**1035.6 kJ/day**

Specific CDD	0 grams
Specific CPD-S	62 grams

Energy	1047.8 kJ/day
Protein	15.872 gr/day
Protein	6.71 Gr/MW

Minimum protein requirements  $\longrightarrow$  9.77 g/kg<sup>0.75</sup>



# Protein

Specific CDD	1659 KJ/100 grams	pro 16 %
Specific CPD-S	1690 KJ/100 grams	pro 25.6 %

1537.9 kJ/day



DER 1726 kJ/day

Specific CDD	0 grams
Specific CPD-S	91 grams

Energy	1537.9 kJ/day
Protein	23.296 gr/day
Protein	9.85 Gr/MW

Protein

Specific CDD	1659 KJ/100 grams	pro 16 %
Specific CPD-S	1690 KJ/100 grams	pro 25.6 %

Specific CDD	33 grams	32.0%
Specific CPD-S	70 grams	68.0%
Total	103 grams	

DER 1726 kJ/day

Energy	1730.47 kJ/day
Protein	23.2 gr/day
Protein	9.81 Gr/MW



7 meals	01 / 06 / 2017		02 / 06 / 2017	03 / 06 / 2017	04 / 06 / 2017
Energy:		1 DER	1 DER	1 DER	1 DER
Protein/ day:	9.8gr/MW		9.8gr/MW	9.8gr/MW	9.8gr/MW
Diet 1:	Specific CPD-S Dry				69
gr/day	69		69	69	10
gr/meal	10		10	10	
Diet 2:	Specific CDD Dry				33
gr/day	33		33	33	5
gr/meal	5		5	5	

Weekend

<b>7 meals</b>	<b>05 / 06 / 2017</b>		<b>06 / 06 / 2017</b>	<b>07 / 06 / 2017</b>
Energy:		<b>1</b> DER	<b>1</b> DER	<b>1</b> DER
Protein/day:	10.4gr/MW		10.4gr/MW	10.4gr/MW
<b>Diet 1:</b>	<b>Specific CPD-S Dry</b>			
gr/day	84		84	84
gr/meal	<b>12</b>		<b>12</b>	<b>12</b>
<b>Diet 2:</b>	<b>Specific CDD Dry</b>			
gr/day	18		18	18
gr/meal	<b>3</b>		<b>3</b>	<b>3</b>

	08 / 06 / 2017	09 / 06 / 2017	10 / 06 / 2017	11/06/2017
Energy:	1 DER	1 DER	1 DER	1 DER
Protein/day:	11.1gr/MW	11.1gr/MW	11.1gr/MW	11.1gr/MW
Diet 1:	Specific CPD-S Dry			
gr/day	102	102	102	102
gr/meal	15	15	15	15



Laboratorium voor Diervoeding  
Vakgroep Voeding, Genetica en Ethologie

	13 / 06 / 2017	14 / 06 / 2017	15 / 06 / 2017
Energy:	1 / 2 DER	3 / 5 DER	2 / 3 DER
Protein/day:	5.5gr/MW	6.6gr/MW	7.7gr/MW
Diet 1:	Specific CPD-S Dry		
gr/day	51	61	71
gr/meal	7	9	10





Veterinary hospital of Ghent University



29/05/2017



Age: 3m17d



DER

16/06/2017



Age: 4m



DER

DER



- Age: 3m17d
- CBW: 2.4 kg
- ABW: 4.5 kg
- BCS: 3/9
- IBW: 3.15 kg
- MW: 2.36 kg

1726 kJ/day

53% of the adult body weight



- Age: 4m
- CBW: 2.9 kg
- ABW: 5 kg
- BCS: 4/9
- IBW: 3.5 kg
- MW: 2.56 kg

1868 kJ/day

58% of the adult body weight

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Protein intake gr/MW	Feed	16 / 06 / 2017 ( 6 meals )
<b>7,2</b>		Specific CPD-S
	gr/meal	<b>12</b>
	gr/day	<b>72</b>

	Feed	17 / 06 / 2017 ( 5 meals )
<b>7,2</b>		Specific CPD-S
	gr/meal	<b>14</b>
	gr/day	<b>72</b>

<b>8,3</b>	Feed	18 / 06 / 2017 ( 5 meals )
		Specific CPD-S
	gr/meal	<b>17</b>
	gr/day	<b>83</b>

Feed	19 / 06 / 2017 ( 5 meals )	Protein intake gr/MW
	Specific CPD-S	<b>9,4</b>
gr/meal	<b>23</b>	
gr/day	<b>94</b>	

Feed	20 / 06 / 2017 ( 5 meals )	
	Specific CPD-S	<b>10,5</b>
gr/meal	<b>26</b>	
gr/day	<b>105</b>	

Feed	21 / 06 / 2017 ( 5 meals )	<b>11,1</b>
	Specific CPD-S	
gr/meal	<b>28</b>	
gr/day	<b>111</b>	

## Comments

This is the advice for Youp. We are going to start with the same diet that Youp was eating before the surgery.

It is very important to keep always the same hours to feed him. We have to keep at least 5 meals per day.

This is a possible schedule: 1 meal 7:00

2 meal 11:00

3 meal 15:00

4 meal 19:00

5 meal 00:00

This schedule is an effort to have the maximum of hours between the meals. It is not the same to give 5 meals but with only 2 hours in between. We have to give enough time to the liver to process the food.

We are going to give only the puppy diet, but we will provide you with another diet called CDD just in case we need to mix two diets

Please, as soon as you see any clinical sign, contact us.

# Discussion

## SPECIFIC™ CPD-S PUPPY SMALL BREED



- Wheat
- Maize protein
- Fish meal
- Rice
- Eggs
- Hydrolyzed poultry protein
- Fermented whey protein
- Potato protein

## SPECIFIC™ CDD FOOD ALLERGY MANAGEMENT



- Rice
- Eggs



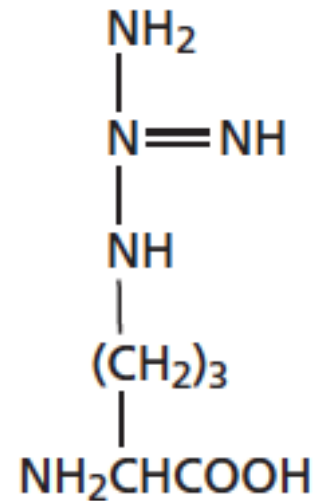
# Discussion

## Animal protein diets



VS

## Alternative protein diets



# Conclusion

15 days



- He increased 500 grams
- BCS 3/9 → 4/9
- Correct management we have been able to avoid clinical signs and give only a puppy diet avoiding supplementation



Thank  
You!



**Table J-20.** Recommendations for daily nutrient intake of growing dogs. (Adapted from Ausschluß für Bedarfsnormen der Gesellschaft für Ernährungsphysiologie, 1989; 20-21, 54. The lower figure refers to large breeds [60 kg]; the higher to toy and small breeds.)

Nutrients	Units	Age (months)				
		2	3	4	5-6	7-12
<b>Protein*</b>						
Digestible protein (average)	g/kg BW	6.5	5.5	4.5	4	3.5
Digestible protein (average)	g/kg <sup>0.75</sup>	9	8.5	8	7.5	6.5
<b>Fat</b>						
Linoleic acid	g/kg <sup>0.75</sup>	0.27				
<b>Minerals</b>						
Calcium	mg/kg BW	390-585	400-525	355-420	240-305	120-145
Phosphorus	mg/kg BW	205-300	190-245	170-195	130-160	80-90
Sodium	mg/kg BW	129	95	76	64	54
Potassium	mg/kg BW	127	91	75	65	57
Magnesium	mg/kg BW	23	29	25	20	16
Iron	mg/kg BW	1.2-3	4.4-4.8	4.4-4.8	4.4-4.8	4.4-4.8
Copper	mg/kg BW	0.24-0.5	0.24-0.5	0.24-0.5	0.24-0.5	0.24-0.5
Zinc	mg/kg BW	1.1-3.7	3.2-4.1	3.2-4.1	3.2-4.0	1.3-1.7
Manganese	mg/kg BW	0.02	0.08-0.11	0.08-0.11	0.07-0.08	0.07-0.08
Iodine	mg/kg BW	0.025	0.025	0.025	0.025	0.025
Selenium	mg/kg BW	0.005	0.005	0.005	0.005	0.005
<b>Vitamins</b>						
Vitamin A	IU/kg BW	200	200	200	200	200
Vitamin D	IU/kg BW	20	20	20	20	20
Vitamin E	IU/kg BW	1.2	1.2	1.2	1.2	1.2
Thiamin	µg/kg BW	55	55	55	55	55
Riboflavin	µg/kg BW	100	100	100	100	100
Pantothenic acid	µg/kg BW	400	400	400	400	400
Niacin	µg/kg BW	450	450	450	450	450
Pyridoxine	µg/kg BW	60	60	60	60	60
Biotin	µg/kg BW	4	4	4	4	4
Folic acid	µg/kg BW	8	8	8	8	8
Vitamin B <sub>12</sub>	µg/kg BW	1	1	1	1	1

Key: BW = body weight.

Table F-6. Approximate daily energy requirements of puppies at five months of age, based on current and mature body weights.\*

Adult BW (kg)	Current BW (kg)	DER (MJ)	DER (kcal)	Adult BW (kg)	Current BW (kg)	DER (MJ)	DER (kcal)
1	0.7	0.56	135	(Continued from below)			
2	1.4	0.89	212	36	20.2	6.97	1,666
3	2.1	1.17	280	37	20.7	7.13	1,704
4	2.8	1.44	344	38	21.1	7.29	1,741
5	3.5	1.69	404	39	21.6	7.44	1,779
6	4.1	1.93	462	40	22.0	7.60	1,815
7	4.7	2.16	517	41	22.5	7.75	1,852
8	5.3	2.38	570	42	22.9	7.90	1,888
9	5.9	2.59	620	43	23.4	8.05	1,924
10	6.5	2.80	668	44	23.8	8.20	1,959
11	7.1	3.00	716	45	24.2	8.34	1,994
12	7.7	3.19	762	46	24.6	8.49	2,029
13	8.3	3.38	807	47	25.1	8.63	2,064
14	8.9	3.56	851	48	25.5	8.78	2,098
15	9.4	3.74	894	49	25.9	8.92	2,132
16	10.0	3.92	936	50	26.3	9.06	2,165
17	10.6	4.09	978	51	26.7	9.20	2,199
18	11.1	4.26	1,018	52	27.1	9.34	2,232
19	11.6	4.43	1,058	53	27.4	9.47	2,264
20	12.2	4.59	1,096	54	27.8	9.61	2,297
21	12.7	4.75	1,136	55	28.2	9.75	2,329
22	13.3	4.91	1,174	56	28.6	9.88	2,361
23	13.8	5.07	1,212	57	28.9	10.01	2,393
24	14.3	5.23	1,249	58	29.3	10.14	2,424
25	14.8	5.38	1,286	59	29.7	10.27	2,455
26	15.4	5.53	1,323	60	30.0	10.40	2,486
27	15.9	5.68	1,358	61	30.3	10.48	2,506
28	16.4	5.83	1,394	62	30.7	10.57	2,525
29	16.9	5.98	1,428	63	31.0	10.65	2,545
30	17.4	6.12	1,463	64	31.4	10.73	2,564
31	17.9	6.26	1,497	65	31.7	10.80	2,582
32	18.3	6.40	1,530	66	32.0	10.88	2,601
33	18.8	6.54	1,563	67	32.3	10.96	2,619
34	19.3	6.68	1,596	68	32.6	11.03	2,637
35	19.7	6.81	1,628	69	32.9	11.11	2,655
(Continued next column)				70	33.3	11.18	2,673



Aminoacid profile														
				CPD-S	CDD	Grams	Grams	Total	NRC Min	NRC Recco	SUL			
						30	44					Data		
		Arginine (g)		1,18	1,36	0,354	0,5984	0,566300428	0,37	0,46		4m23d		
		Histidine (g)		0,48	0,41	0,144	0,1804	0,192889394	0,14	0,17		CW	1,57	
		Isoleucine (g)		0,9	0,75	0,27	0,33	0,356762135	0,28	0,35		IBW	2	
		Methionine (g)		0,6	0,57	0,18	0,2508	0,256155213	0,15	0,18		MW	1,681792831	
		Methionine &				0	0	0				DER	1227,708766kj/day	
		Cystine (g)		1,05	1,21	0,315	0,5324	0,503867055	0,29	0,37				
		Leucine (g)		2,27	1,29	0,681	0,5676	0,742422002	0,45	0,57				
		Lysine		1,09	0,96	0,327	0,4224	0,445595906	0,39	0,49	1,39			
		Phenylalanine (g)		1,11	0,82	0,333	0,3608	0,412535948	0,28	0,35				
		Phenylalanine &				0	0	0						
		Tyrosine (g)		1,98	1,48	0,594	0,6512	0,74040035	0,56	0,7				
		Threonine (g)		0,99	0,74	0,297	0,3256	0,370200175	0,35	0,44				
		Tryptophan (g)		0,32	0,22	0,096	0,0968	0,114639566	0,1	0,13				
		Valine (g)		1,16	0,95	0,348	0,418	0,455466325	0,31	0,39				