

# Canine Leishmaniasis

## Nutritional Management



# Canine Leishmaniasis

## Where can we find it?

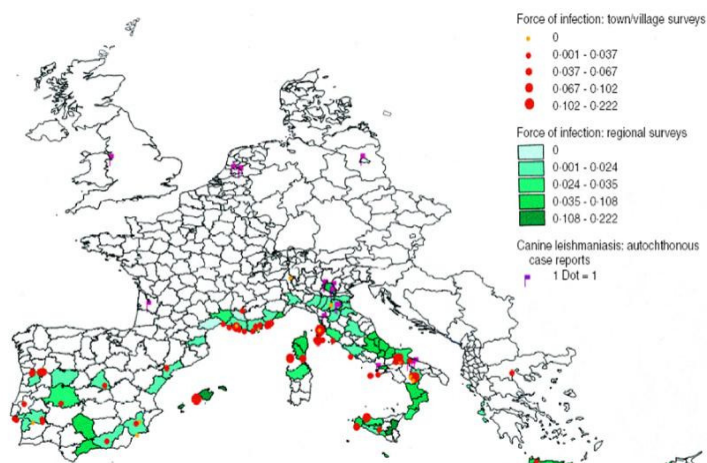
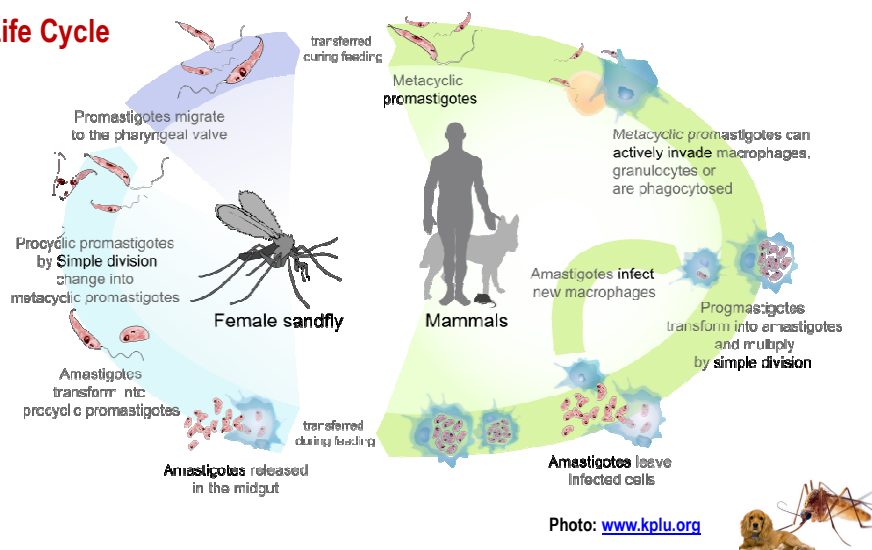


Photo: [www.liv.ac.uk](http://www.liv.ac.uk)



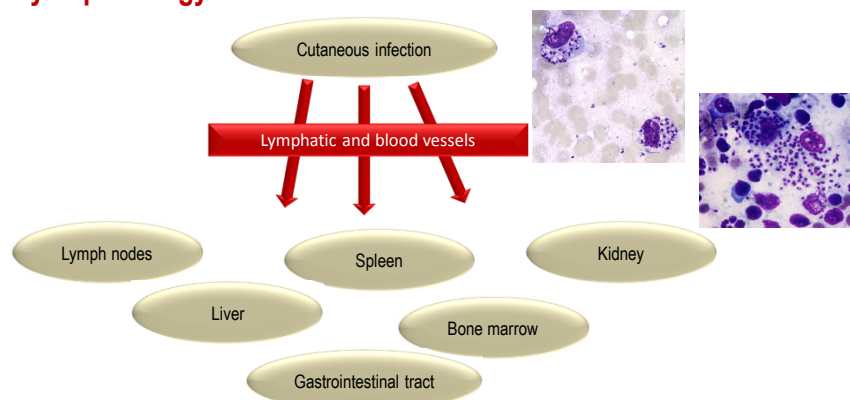
## Canine Leishmaniasis

### Life Cycle



## Canine Leishmaniasis

### Physiopathology



Reis et al. (2007). Research in Veterinary Science 81:68–75.

## Canine Leishmaniasis

### Major clinical signs:

- Inappetence
- Apathy
- Periorbital and nasal dermatitis
- Opaque bristles
- Scaling and/or ulcerative cutaneous lesions
- Keratoconjunctivitis
- Uveitis
- Onychogriphosis
- Lameness

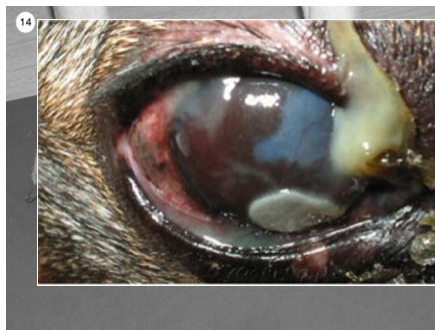


Photo: [www.mascotas.org](http://www.mascotas.org)  
 Photo: [www.mascotas.org](http://www.mascotas.org) (2004). *Advances in Parasitology* 57: 1-88

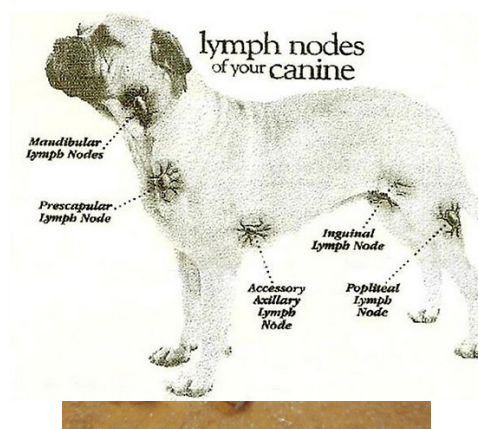
Reis et al. (2007). *Research in Veterinary Science* 81:68-75.  
 Sykes et al. (2014). Chap 74 In: *Canine and Feline Infectious Diseases*



## Canine Leishmaniasis

### Major clinical signs:

- Lymphadenopathy
- Fever
- Hepatosplenomegaly
- Severe weight loss
- Renal failure



Reis et al. (2007). *Research in Veterinary Science* 81:68-75.  
 Sykes et al. (2014). Chap 74 In: *Canine and Feline Infectious Diseases*



## Canine Leishmaniasis

### Therapy

➤ **Pentavalent antimonial compounds:**

Meglumine antimoniate (Glucantime) in Europe

Sodium stibogluconate (Pentostam) in U.S.

➤ **Allopurinol** (10 mg/kg BW PO BID)

Goals:

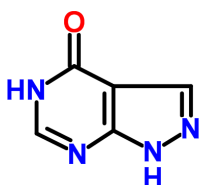
- decreases parasitemia
- maintains infected dogs in an asymptomatic state
- decreases the likelihood of direct or vector transmission

Koutinas et al. (2001) Vet Parasitol 98: 247-61  
Monzote (2009) The Open Antimicrobial Agents Journal 1:9-19

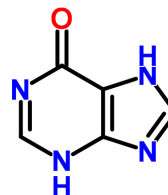


## Canine Leishmaniasis

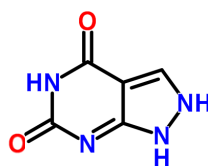
### Allopurinol



### Hypoxanthine



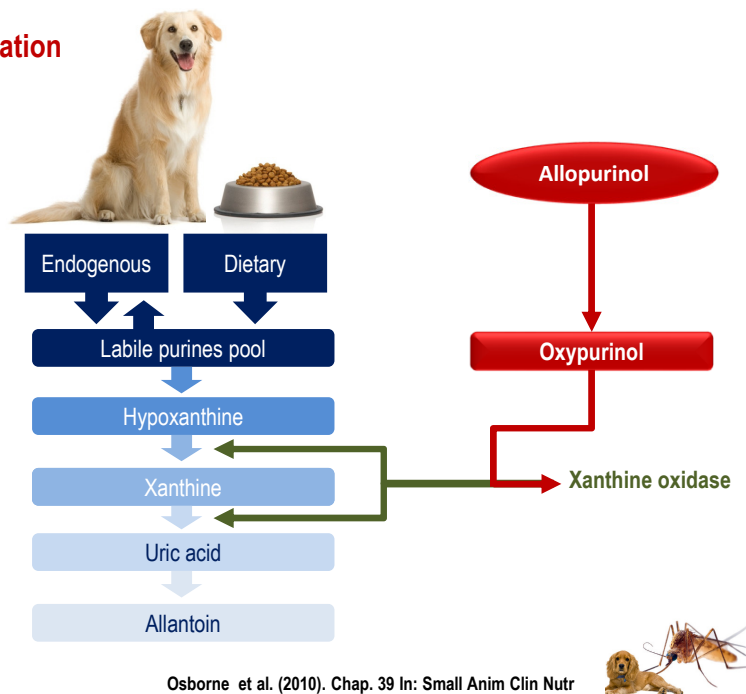
### Oxypurinol



Aldehyde oxidase



## Purine degradation



## Canine Leishmaniasis

### Xanthine uroliths

Minnesota urolith Center (1998-2007)

82.3% Allopurinol

#### Urine pH

Acidic	↑↑↑↑
Neutral	↑↑
Alkaline	↑

Osborne et al. (2010). Chap. 38 & 39 In: Small Anim Clin Nutr

## Canine Leishmaniasis

### Perdido:

- Intact male
- Mixed breed
- 7-9 years old
- Ideal BW = 30.5 kg

Mar 2013

### Sx

- Letargic
- Fever
- Hyporexia (3d)



### Dx

- Bone Marrow aspiration: Leishmania positive

### Tx

- Glucantime 75 mg, SC, SID, 30 d
- Allopurinol 10 mg /kg BW, BID, PO



## Canine Leishmaniasis

### Perdido:

Mar 2013

Hematocrit (37-55%)	31.9	↓
Hemoglobin (12-18 g/dL)	10.9	↓
Lymphocytes (0.5-4.9 x10 <sup>9</sup> /L)	0.24	↓
Thrombocytes (175-500 x10 <sup>9</sup> /μL)	35	↓
Urea (12.6-58.2 mg/dL)	~	
Creatinine (0.62-1.64 mg/dL)	~	
ALT (0-130U/L)	~	
ALP (0-200U/L)	~	
Total protein (5-7.5 g/dL)	9.61	↑
Albumin (2.2-3.5 g/dL)	1.95	↓
Globulins (2.2-4.5 mg/dL)	7.66	↑



## Canine Leishmaniasis

### Sept 2013 - Control

BW= 34 kg

BCS = 6/9

MCS = No muscle wasting

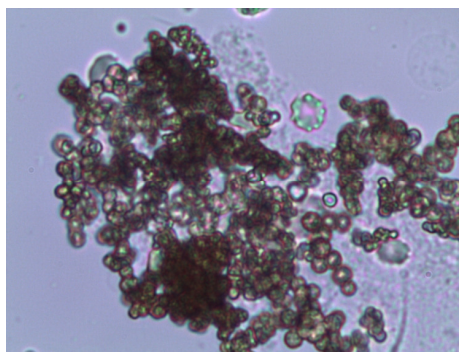
Symptoms remission

Crystalluria: Xanthine Crystals

Rx: no visible uroliths

### Perdido:

- Intact male
- Mixed breed
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## Canine Leishmaniasis

### Perdido:

	Mar 2013	Sep 2013
Hematocrit (37-55%)	31.9 ↓	44
Hemoglobin (12-18 g/dL)	10.9 ↓	15
Lymphocytes (0.5-4.9 x10 <sup>9</sup> /L)	0.24 ↓	0.56
Thrombocytes (175-500 x10 <sup>9</sup> /μL)	35 ↓	200
Urea (12.6-58.2 mg/dL)	~	44.4
Creatinine (0.62-1.64 mg/dL)	~	1.35
ALT (0-130U/L)	~	34
ALP (0-200U/L)	~	37
Total protein (5-7.5 g/dL)	9.61 ↑	7.35
Albumin (2.2-3.5 g/dL)	1.95 ↓	2.49
Globulins (2.2-4.5 mg/dL)	7.66 ↑	3.0



## Canine Leishmaniasis

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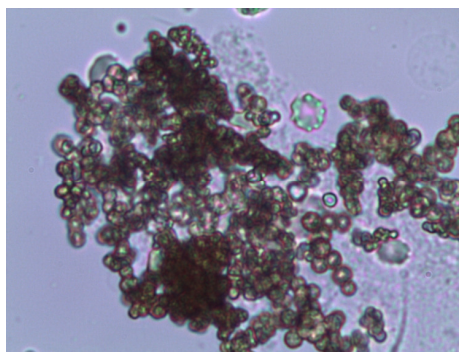
- Diet: Dry commercial food (Supermarket)
- Fed from the package

Pasta + Liver (for the medication)

- Eats with appetite
- Kept indoors
- No other pets

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## Canine Leishmaniasis

### Perdido:

Problem list	Diet
Crystalluria: Xanthine Crystals	↓ Purines ⇒ ↓ Protein
Allopurinol treatment	↑ Urine pH
	↑ Urine volume
	↓ Phosphorus
Overweight	↓ Energy
	↑ Protein
	↓ Fat
	↑ Fibre

Fulfill the animal requirements in essential nutrients!!





### Purine content of selected foods

High	Moderate	Low
<b>Fish &amp; Sea food</b>	<b>Vegetables</b>	<b>Milk &amp; Milk products</b>
Anchovies	Asparagus	Butter and fats
Mackerel	Cauliflower	Cheese
Salmon	Beans	Milk
Sardines	Peas	<b>Fruits &amp; Vegetables &amp; Grains</b>
Tuna	Lentils	Fruits
Clams	Spinach	Other vegetables
Mussels	<b>Other</b>	Nuts
Oysters	Other fishes	Grains
Scallops	Meats	Refined cereals
Shrimp	Mushrooms	Sugars
<b>Meat &amp; Viscera</b>		Potatoes
Brain		<b>Other</b>
Heart		Gelatin
Kidney		Eggs
Liver		Water
Goose		
Meat extracts		
<b>Other</b>		
Sweetbreads		
Yeast		

Osborne et al. (2010). Chap 39 In: Small Animal Clinical Nutrition

## Canine Leishmaniasis

### Ingredient evaluation

#### Current diet (Polgar - Supermarket)

Cereals, **meat and meat by-products (min 12% calf)**, **vegetable by-products**, oils and fats, **bakery products**, **yeasts**, minerals

#### New commercial diet (RC Urinary U/C Low Purine)

Rice, maize flour, wheat flour, egg powder, animal fats, wheat gluten\*, minerals, maize gluten, vegetable fibres, fish oil, soya oil, fructo-oligo-saccharides, borage oil, marigold extract (source of lutein).

Urine alkalinising substances: calcium carbonate, potassium citrate.



## Canine Leishmaniasis

### Nutritional evaluation

Current diet (Polgar - Supermarket)

Analysis:	
Energy	410 kcal per 100 g
Crude Protein	
Crude Fat	
Fibre	
Moisture	
Additives:	
Vitamins, pro-vitamins and substances with analogous effect and chemically well defined:	
Vit A (E672):	
Vit D (E671):	
Vit E ( $\alpha$ -tocopherol):	60 mg/kg
Iron	250 mg/kg
Iodine	0.4 mg/kg
Copper	15 mg/kg
Zinc	150 mg/kg
Selenium	0.3 mg/kg

4kg – 4.29 euros???



## Canine Leishmaniasis

### Nutritional evaluation

	Unit	Requirements	New commercial
Amount	g		250
Energy	kcal	908	977
Energy	RER	1	1.1



## Canine Leishmaniasis

### Nutritional evaluation

	Unit	Requirements	New commercial
Amount	g		250
Energy	kcal	908	977
Energy	RER	1	1.1
<b>Per kg BW<sup>0.75</sup></b>		<b>NRC(2006)</b>	
Protein		3.28	3.47✓
Fibre	g	-	0.39✓
Fat	g	1.8	2.9✓
Calcium	g	0.13	0.15✓
Phosphorus	g	0.10	0.11✓
Sodium	mg	26.2	57.8✓
Potassium	g	0.14	0.17✓
Vit A	IU	167	482✓



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Osborne et al. (2010). Chap 39 In: Small Animal Clinical Nutrition

## Canine Leishmaniasis

### Home Made Diet

Ingredient	Amount	Unit
Cottage cheese	500	g
Barley meal	80	g
Safflower oil	5	mL
Fish oil, menhaden	5	mL
Courgette with peel, raw	200	g
Balance It, Canine-K	10	g
Potassium citrate, 99 mg K	7.0	cap
<b>Total</b>	<b>807</b>	<b>g</b>



## Canine Leishmaniasis

### Nutritional Evaluation (total intake)

Nutrient	Unit	New Commercial	HMD	Evaluation
		1.1 RER	1 RER	
Moisture	g	93	672	↑
Protein	g	48	75	↑
Fat	g	40	34	↓ 23 Req
NFE	g	133	85	↓
Fiber	g	5.6	10	↑
Ash	g	15	9.1	↓
Calcium	g	2.1	1.9	↓ 1.7 Req
Phosphorus	g	1.6	1.2	↓ 1.3 Req
Sodium	g	0.78	2.2	↑ >3.7 max
Potassium	g	2.4	2.5	↑



## Canine Leishmaniasis

### Perdido:

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### Advices to the owners:

- Clean water always available, preferably multiple options
- Add water to the dry food
- Divide the daily amount in 4 meals per day
- The treat for dry food medication: 20 g of cottage cheese (↑2% of energy intake)

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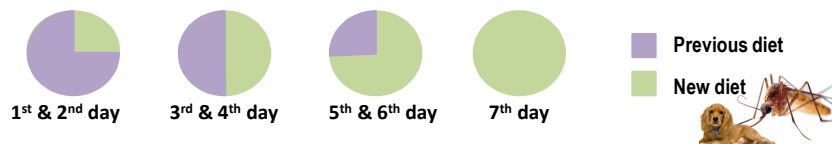
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- Weight the dog once per week (same hour, scale and week day)
- Transition of the diet over a week



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### Follow up:

Control in 1 month:

- Nutritional evaluation including BW; BCS, MCS and adjustments to the diet if necessary
- Urine collection and exam of the sediment
- If crystals are found ⇒ Ultrasonography or double-contrast cystography to screen for uroliths
- Blood and urine analysis if abnormalities are found (if not, check in 3 months for leishmania effects)





**Thanks!!**