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## Nutritional management in a dog with severe hyperkeratosis – case report

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Linda Böswald, 19.09.2017 1



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## Outline

- Case history
- Hyperkeratosis / sebaceous adenitis
- Nutritional history
- Adaptation of diet
- Follow up
- summary

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## Case history

Golden Retriever “Buddy”  
 35kg, \*2011, male  
 2013 – 2014:

- Recurrent inflammation of multiple claw beds
- Amputation of one digit - osteolysis
- Paronychia
- sometimes multi-resistant infections
- 2014 up to now: claws okay
- **January 2017: severe follicular castings, sebaceous adenitis, hyperkeratosis**
  - Cytology (yeast/bacterial infection) negative
  - Scraping sample (mites) negative
  - Wood light (fungal infection) negative






Photo: www.etsy.com

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## Sebaceous adenitis


= progressive inflammatory disease of cutaneous sebaceous glands

- Initial defect: keratinisation disorder or disturbed lipid metabolism
- Signs
  - Dull, brittle coat, scales, alopecia
  - Follicular casts around hair shafts = “keratin collaring”
  - Skin lesions, often firstly along dorsal midline + head
  - 2<sup>nd</sup> bacterial infection (pyoderma), pruritus etc.
- Predisposition: Akita, poodle, Samoyed, Magyar Vizsla, GSD – inheritable?!




From Pfeiffer (2015)

Blackwell's Five-minute veterinary consult; Linek et al. (2005); Pfeiffer (2015); White et al. (1995);
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### Nutritional history

- Recurrent claw infections → Allergy suspected
- 2 “elimination diets” were recommended by the vet, but owners add things using “trial and error”

➤ Tuna

➤ Potatoes

➤ Carrots

➤ Apples, banana

➤ Dried parsnip flakes

➤ Vitamin mineral supplement pills

➤ Treats (dried duck meat)


}

main components

➔ since December 2014 on this diet, no claw problems


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### Nutritional history

Ration calculation with Diet Check Munich®

	Amt. (g)	ME (MJ)	Crude protein (g)	Ca (mg)	P (mg)	Cu (mg)	Zn (mg)	Mn (mg)	J (µg)	Vit A (IU)	Vit D (IU)	Vit B <sub>12</sub> (µg)	Biotin (µg)
tuna	400	4.1	90	94	988	0.5	1.4	0	398	2646	320	12	4
Cooked potatoes	380	1.2	8	38	228	0.8	1.1	1.1	10	11	0	0	2
Carrots	380	0.4	4	141	133	0.4	1.1	0.8	8	retinol	0	0	19
Apples	35	0.1	0	2	4	0	0	0	0	7	0	0	2
Banana	35	0.1	0	2	8	0	0.1	0.1	1	10	0	0	2
Dry parsnip	40	0.2	4	156	224	0.2	2.6	1.2	10	*	*	0	*
supplement	4.5	0.1	1	243	189	0.3	9	0.5	-	315	45	2	56
Treats*	20	0.2	10	*	*	*	*	*	*	*	*	*	*
sum		6.4	117	676	1774	2.2	15.3	2.2	427	2365	365	13	85
RDA**		5.8	79	1873	1405	2.8	28.1	3.7	412	2989	255	16	4

Ca/P ratio

CP g/MJ ME

CF % DM

0.4 / 1

18.3

20.5

\*Analysed data lacking

\*\*factorial calculation (Diet Check Munich) / NRC 2006

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## Nutritional history

- ME supply above mean requirement
  - ideal body weight
  - individual, higher ME requirement
- Inadequate supplementation
  - **Ca, Cu, Zn, Mn below RDA**
  - Inverse Ca/P ratio (0.4/1)
  - **Vit A < RDA**
  - **Vit B<sub>12</sub> < RDA**
- Supply with essential fatty acids ??



NRC (2006)

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## Nutrients associated with skin disease (I/V)

Primary deficiency vs. malassimilation of nutrients

Nutrient deficiency

Nutrient deficiencies definitely among DDs!

- immune system ↓ (parasite infestation, risk of secondary infection)
- cutaneous barrier not intact

- Seborrhea / sebaceous adenitis
- scales (seborrhea sicca)
- Alopecia
- Erythema
- greasy skin
- Dull, brittle coat
- Loss of hair colour ...and many other clinical findings

Watson (1998); Hand et al. (2010, 5<sup>th</sup> edition)

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## Nutrients associated with skin disease (II/V)

- **Protein:** Keratinisation, hair colour, wound healing...
- **fatty acids**
  - **n6 FA:** essential e.g. linoleic acid → Cell membranes, cutaneous barrier, mediator substances
  - **n3 FA:** potential anti-inflammatory effect, possibly circumstantially essential

Hand et al. (2010, 5<sup>th</sup> edition); Kienzle (1992); Lloyd (1989); Logas & Kunkle (1994); Rees et al. (2001); Watson (1998)

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## Nutrients associated with skin disease (III/V)

- **P:** deficiency associated with dry skin, brittle coat
- **Cu:** hair colour, density of coat
- **Zn:** enzymes of cell turnover (epidermis!), FA metabolism. Involved in hyperkeratosis, nail disease, footpad disease, Zn-responsive dermatitis...
  - Primary deficiency < secondary deficiency (e.g. via Ca excess)
  - Zn absorption disorder in Huskies and other breeds

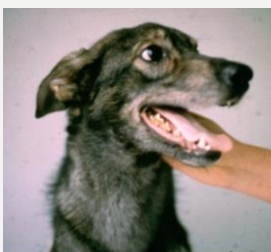
Watson (1998); Hand et al. (2010, 5<sup>th</sup> edition)

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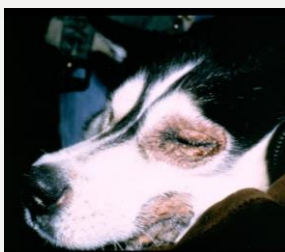
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## Nutrients associated with skin disease (IV/V)

Zn deficiency



Zn responsive dermatitis



parakeratosis



Photos from the database of the Chair of Animal Nutrition and Dietetics, LMU

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## Nutrients associated with skin disease (V/V)





- **Vitamin A:** keratinisation, epithelial integrity
  - Deficiency + excess can cause similar cutaneous signs, e.g. seborrhea/sebaceous adenitis, keratinisation disorders, ichthyosis,...
  - Retrospective study by Lam et al. (2011) – oral supplementation possibly beneficial in sebaceous adenitis
- **Vitamin E:** antioxidant, cell membranes – linked to FA intake
  - Pansteatitis, peroxide production
- **B-vitamins:**
  - Biotin

Hand et al. (2010, 5<sup>th</sup> edition); Lam et al. (2011); Watson (1998)

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### Adaptation of diet

- Ingredients tolerated → stay basically the same 
- ME supply above mean requirement
  - ideal body weight according to owner → individual, higher ME requirement 
- **Individual supplementation**
  - Meeting requirements of all nutrients
  - **High Cu + Zn content – abundant supply > RDA!** 
  - **Vit A meeting RDA**
  - Ca/P ratio 1.2/1
- Addition of fatty acids to be on the safe side
  - Sunflower oil → essential **n6-FA**
  - Linseed oil → anti-inflammatory **n3-FA** 

Elmiger et al. (2017); Lam et al. (2011); Rees et al. (2001)

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### Follow up

5 months on adapted diet

- Owners are satisfied with the adapted diet
- Dog tolerated the individual supplement well
- No further problems with skin and coat

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