

Nutritionally induced skin alterations in weaned piglets – a case report



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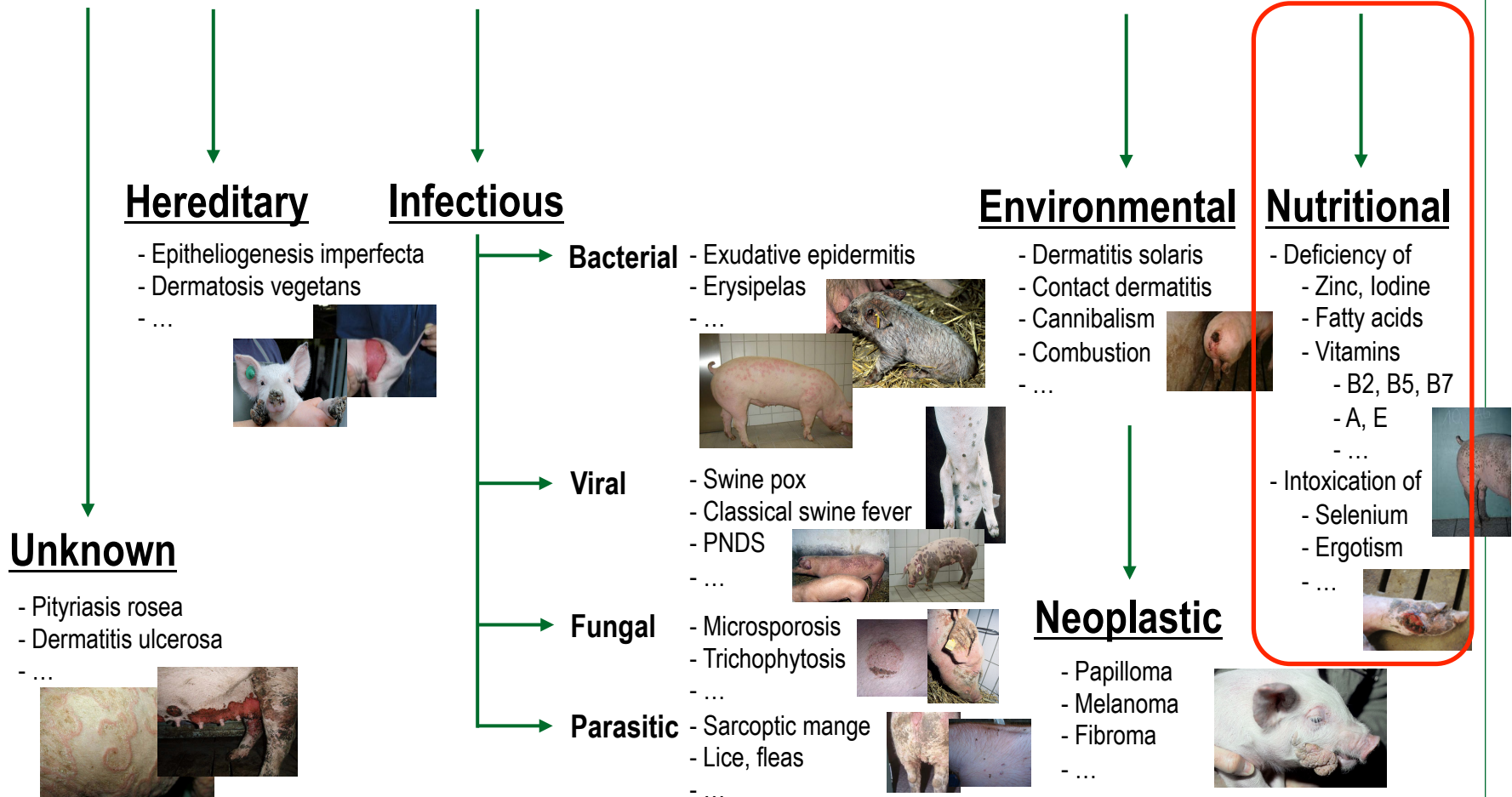


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Aetiology of skin disorders in pigs

Pictures taken from:

BARZ ET AL., 2009; VON ALTRÖCK AND HÖTIG, 2013



Farm characteristics

- **Pig breeding farm**
 - Location: Mecklenburg-Western Pomerania, Germany
 - Permanent livestock: 800 breeding sows in 2 barns
 - Temporary livestock: Weaned piglets in 6 barns with flat decks
- **Standard protocol for piglet rearing:**



| Age | Body weight | Feeding |
|---------------------------------------|--|--|
| Birth to weaning (day 28) | Birth: 1.2 to 1.6 kg Weaning: 6 to 8 kg | Colostrum Milk/ milk replacer Pre-starter (day 14 to 28) |
| Post-weaning (day 28 to day 63/70) | Day 63 to 70: 25 to 30 kg | Pellet rearing feed (complete feed) |

Farm characteristics

- Performance data of the pig breeding farm

| Production parameter | Farm | Recommendation ¹ |
|--|-------|-----------------------------|
| Totally born piglets per litter | 13.11 | 12.50 – 14.50 |
| Live born piglets per litter | 12.64 | 12.00 – 14.00 |
| Mortality of suckling piglets, % | 12.05 | < 13.00 |
| Weaned piglets per litter | 11.03 | 10.50 – 12.20 |
| Litters per sow and year | 2.35 | ≥ 2.40* |
| Weaned piglets per sow and year | 25.92 | ≥ 25.00 |
| Average weight gain from day 28 to 70, g per day | 465 | > 400 |
| Mortality of weaned piglets, % | 1.63 | < 2.00 |

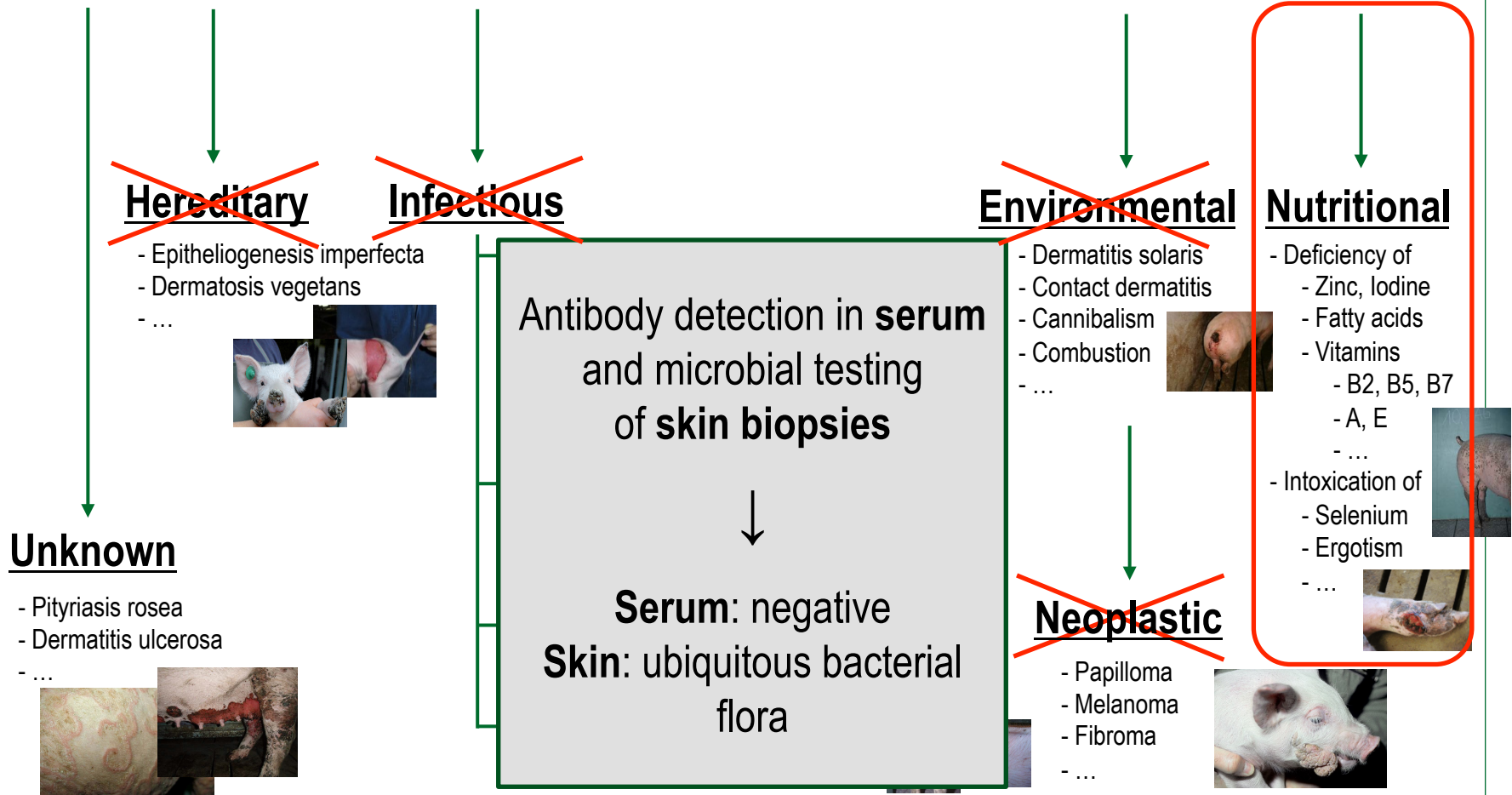
¹ According to GROSSE BEILAGE, 2013

Clinical examination

- 3 to 4 weeks after weaning all piglets of one barn showed
 - **Exudative crusting dermatitis without pruritus**
 - Bilateral symmetrical alterations at ear ridges, muzzle, lips, ventral abdomen, medial thighs, perineum and tail
 - **General condition slightly to moderately disturbed**
 - Marked **decrease in feed intake (-20%)** and **weight gain (-50%)**
 - No indications for a systemic infection (e.g. no fever and diarrhoea)
 - Mortality rate not affected



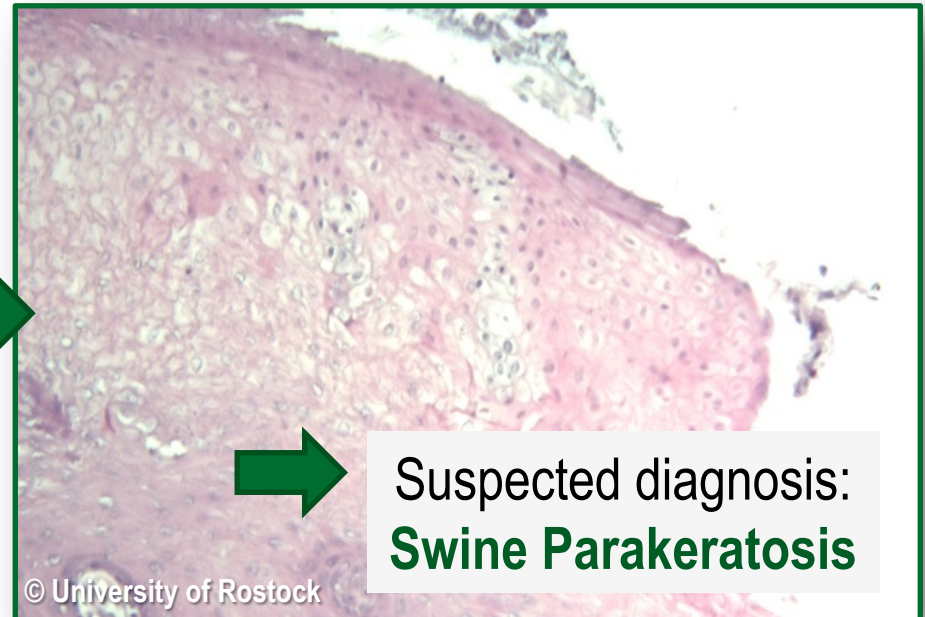
Differential diagnoses for observed skin alterations



Histopathology



Skin biopsy



Suspected diagnosis:
Swine Parakeratosis

Epidermal hyperplasia with diffuse parakeratotic hyperkeratosis

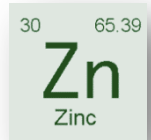
- **Epidermis:** insufficiently keratinized *stratum corneum* with nucleated cells; acanthosis
- **Dermis:** slight vasodilation and perivascular lymphocyte infiltrations

Swine Parakeratosis (Parakeratosis diaetetica)

- Nutrition-related metabolic disorder of growing pigs
 - Complex interaction of various nutrients causing **absolute (primary) or relative (secondary) Zn deficiency** (SCOTT, 1988)
- Great economic importance in 1950s (today quite rare)
- Characterized by **generalized nonpruritic, crusting dermatosis** (ears, perineum, abdomen, medial thighs, distal legs; VON ALTRÖCK AND HÖLTIG, 2013)
 - Severe cases: Affection of **oral and oesophageal mucosa**
- Major clinical **differential diagnoses**:
 - Chronic sarcoptic mange
 - Exudative epidermitis
 - Deficiency of B vitamins



Swine Parakeratosis - Pathomechanism



- Nutrition-related metabolic disorder of growing pigs
 - Complex interaction of various nutrients causing absolute or relative Zn deficiency (SCOTT, 1988) → **Recommendation for weaned piglets (GFE, 2006): 100 mg Zn/kg DM**
- Factors influencing **intestinal Zn absorption** (MILLER AND KORNEGAY, 1983):
 - **High dietary concentrations of**
 - Calcium
 - Phytate
 - Other chelating agents (e.g. Cu, Fe, Co, Mn)
 - **Gastrointestinal diseases**

Parakeratogenic diet:
(PLONAIT AND BICKHARDT, 2004)

**> 10.0 g Ca/kg DM and
< 34 mg Zn/kg DM**



Diagnosis

Clinical picture ✓

Histopathology ✓

Feed analysis

Serum zinc concentration (< 6 µmol/L)

Feeding of weaned piglets on the farm

- Farm purchases a new batch rearing feed for weaned piglets in the affected barn from a commercial feed producer
- **Composition of used rearing feed:**
- **Premix (excerpt):**

| Ingredients | in g/kg diet |
|--|--------------|
| Wheat | 300.0 |
| Barley | 267.7 |
| Soybean meal (44% CP) | 210.0 |
| Barley flakes | 120.0 |
| Premix (AA, minerals, vitamins) ¹ | 74.0 |
| Monocalcium phosphate | 14.0 |
| Limestone | 8.3 |
| Soybean oil | 6.0 |

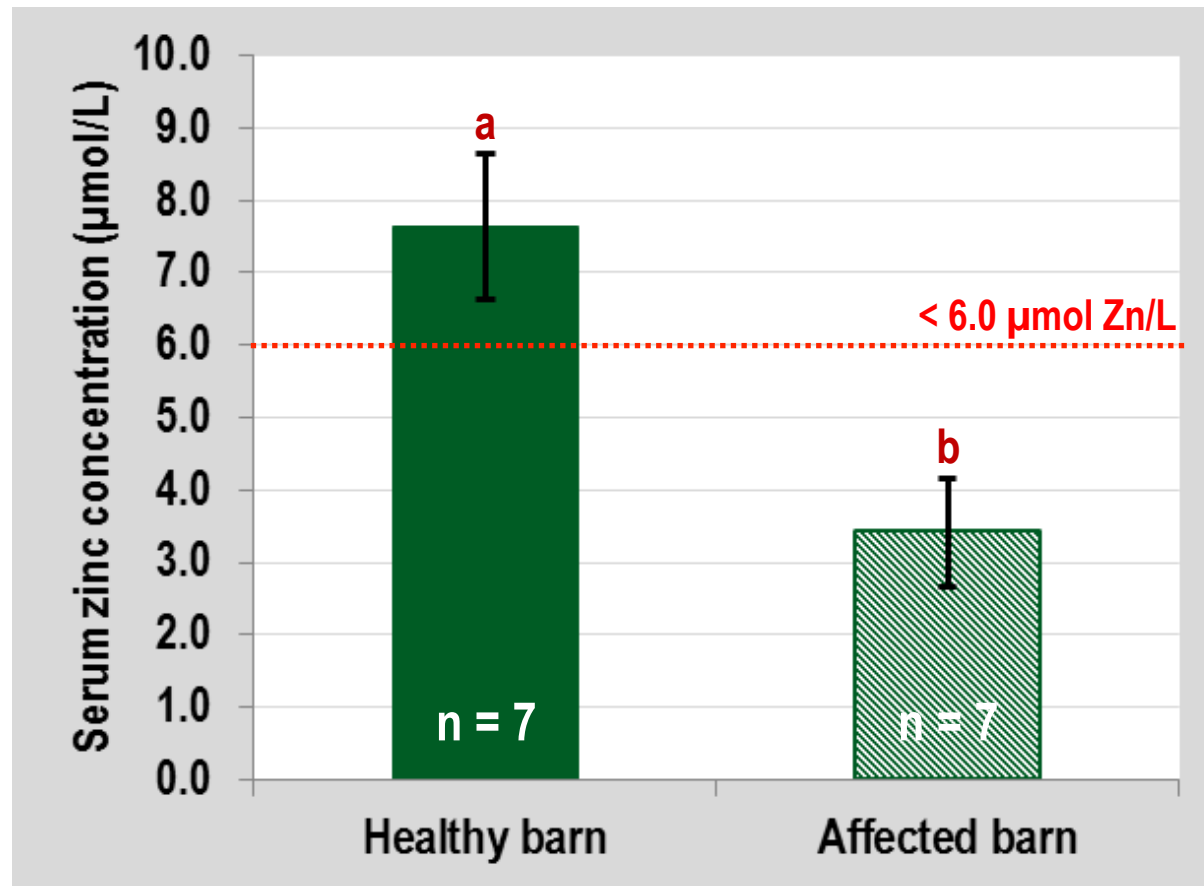
| Ingredients | mg/kg diet |
|-------------|------------|
| Calcium | 3970 |
| Iron | 240 |
| Copper | 6.00 |
| Zinc | 82.5 |
| Manganese | 55.0 |
| Iodine | 1.24 |
| Selenium | 0.40 |
| Phytase | - |

Analysis of feed samples taken from the affected barn

| Chemical composition | Unit per kg DM | Calculation by feed producer | Affected barn |
|----------------------|----------------|------------------------------|---------------|
| Crude ash | g | 78.9 | 71.5 |
| Crude protein | g | 208 | 190 |
| Crude fat | g | 26.2 | 31.7 |
| Crude fibre | g | 38.9 | 49.7 |
| Starch | g | 456 | 384 |
| Sucrose | g | 71.7 | 69.8 |
| ME | MJ | 14.8 | 14.3 |
| Calcium | g | 12.1 | 16.9 |
| Phosphorous | g | 7.83 | 10.2 |
| Ca : P ratio | | 1.54 : 1.00 | 1.66 : 1.00 |
| Zinc | mg | 92.3 | 39.1 |

High
parakeratogenic
potential!

Serum zinc concentration ($\mu\text{mol/L}$)



a,b indicate significant differences between the groups ($p < 0.05$)

Interpretation of results

- Clinical picture: **Exudative crusting dermatitis** without pruritus
- Histopathology: Epidermal hyperplasia with **diffuse parakeratotic hyperkeratosis**
- Feed analysis:
 - High Ca and P concentrations
 - Phytase not supplemented
 - Low Zn concentration (<< 1 mg Zn : 100 mg Ca)
- Serum analysis: **Low Zn concentrations**

Dosage error of
monocalcium phosphate

Lack of **Zn in premix**
(only native Zn in diet)

Final diagnosis: **Swine Parakeratosis** due to **absolute and relative Zn deficiency**

Therapy: Change to diet with **120 mg Zn** and **12.1 g Ca per kg DM**

Improvement of clinical picture **within 7 days** and entire **recovery** within 6 weeks

Thank you
for your attention.

