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Animal Welfare and Mycotoxins

Michelle L. Thomas, Ph.D.

Professional Animal Auditor Certification Organization (PAACO)

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Agenda

- Background
- Animal Welfare
- Case study and consultation
- Swine Inflammation and Necrosis Syndrome (SINS)

Background

- Ph.D. Animal Scientist focused on Food Animal Wellbeing
- MS Animal Science, Ruminant Nutrition
- Cattle, sheep, goats, poultry, pigs
- PAACO Certified Auditor – Poultry Welfare and Meat Plant
- Preventive healthcare provider – officially humans + animals
- Preventive grazier and manager
- Meat company animal welfare program manager
  - 2nd party auditor – trust, but verify

farmer, scientist, industry

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Professional Animal Auditor Certification Organization

- Poultry Welfare Training Manager
  www.Animalauditor.org
- Teach and certify people to audit for animal welfare, and what an auditor is not
- Snapshot in time
- Evidence and facts
- Not a welfare program; no endorsement or critique of production systems

The standard of **excellence** in animal welfare auditing.

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Animal Welfare/Wellbeing

- A state where an animal is both healthy and has what it wants, to include liking what it has (Dawkins 2008; Gygax 2017)

- 'health and what animals want'
  - Condensed version of current definitions
  - 5 Freedoms "from"
  - 5 Domains

- Measures – animal-based outcomes
  - What evidence is needed
  - Signs of good health or indication that animal has what it wants

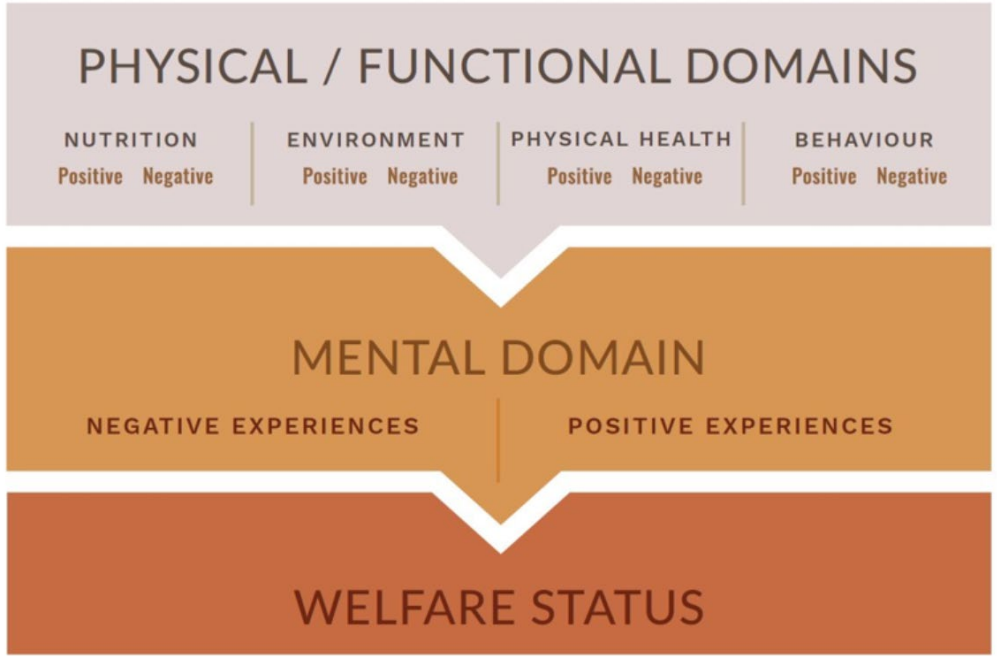

Image modified by WAZA from Mellor and Beausoleil 2015

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Case study

- Mutual trust led to the ask for additional perspective
  - Necrosis, lameness, abscesses, skin
- Literature
- Network
- Outreach—global ask
- Investigation, research, and data gathering
- Virtual meetings
- In-person consultation request
- Slow process

Systemic inflammation - a challenge for pigs

Mirjam Lechner, UEG – Hohenlohe-Franken

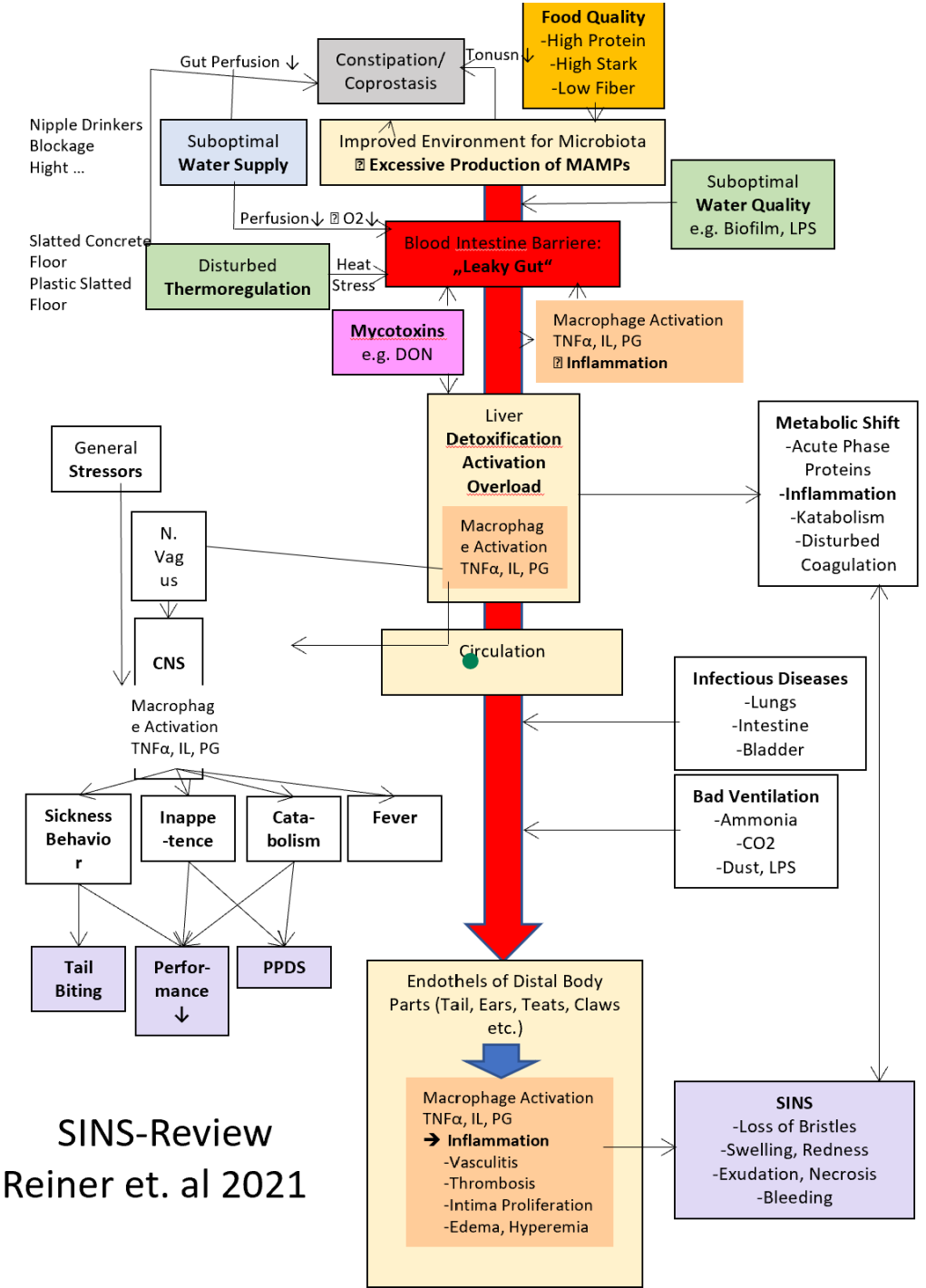
Developement of SINS Inflammation and necrosis syndrome (SINS) in swine.

Team Prof. Dr. Dr. med. vet. habil
Gerald Reiner,
Head of Swine Clinic Gießen

Start of research SINS: 2015
Team with Mirjam Lechner

Research funded by:

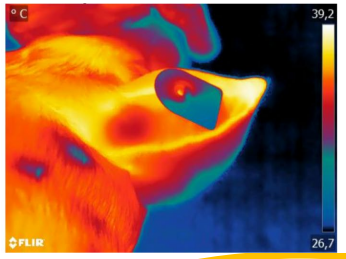
TÖNNIES FORSCHUNG



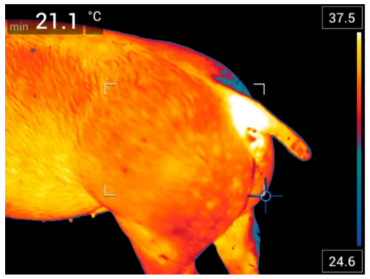
SINS-Review
Reiner et. al 2021

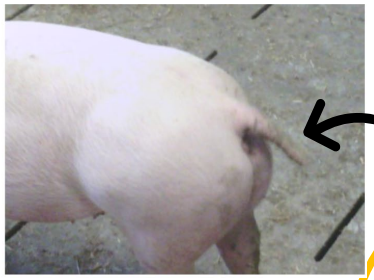
Signs of inflammation in different body parts

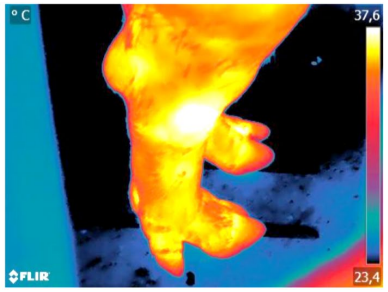
Ear tip inflammation



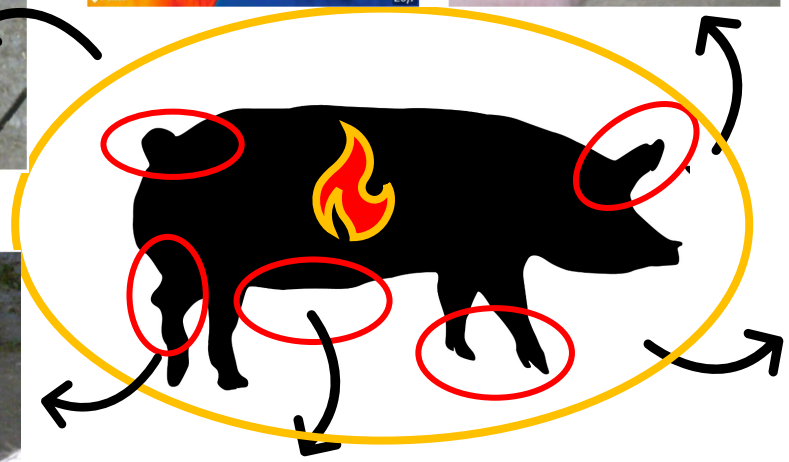
Tail inflammation

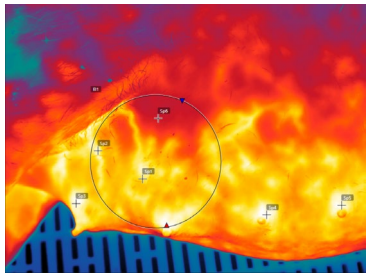






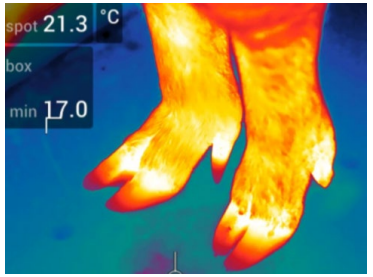
Lying bumps inflammation



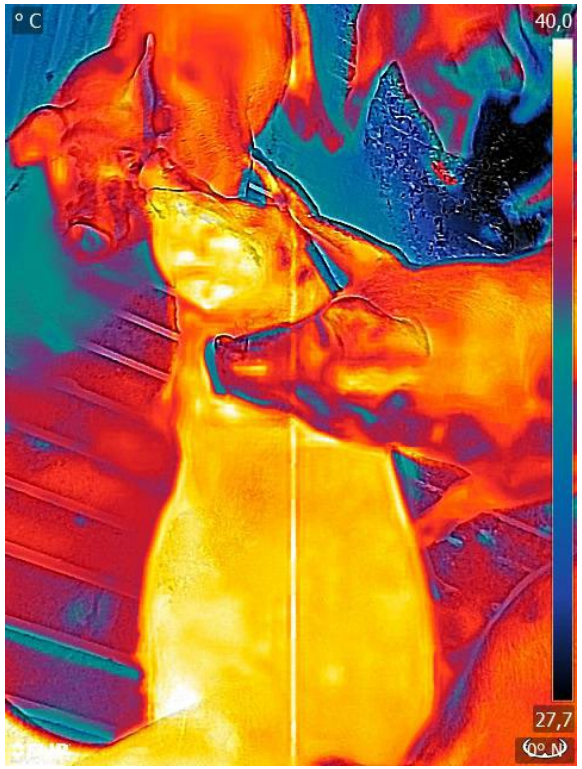


Mastitis

Coronet inflammation



Fever = immune reaction



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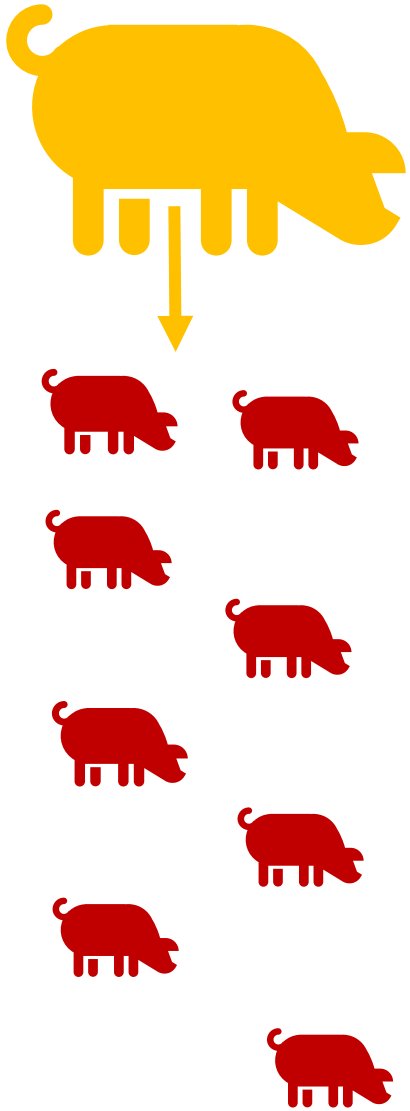
MMA /PHS is a systemic inflammation:
Mastitis, metritis and agalactia
Claws are affected, too: „Laminitis at birth“?!

Wärmebildkamera zeigt zu warme Klauen als Entzündungshinweis!



104.4°F

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SINS-symptoms are found everywhere… screenshots from www

Pig Progress
6.686 Follower:innen
2 Tage •

With the stark increase in energy prices, many of us will have paid attention to where energy can be reduced. Turning down the heating may help a bit, but what about the massive energy costs of keeping pigs at the recommended temperatures? What are the alternatives, and what do they mean to pig health?

Pig welfare expert Dr Irene Camerlink discusses the options in a new expert opinion item on our website.
➡️ https://ow.ly/E9M150QEUgf

#welfare #pigs #climate

Übersetzung anzeigen

Was meinen Sie dazu? @ Posten

Wija Digital marketing
@WijaKoers

Nergens in de wereld wordt #varkensvlees 🐷 zo duurzaam geproduceerd als in #Nederland. Goed #ondernemerschap verdient erkenning en beloning hoe doen we dat?

👉 wija.nl/blog/agri-mark…

#familiebedrijf #agrimarketing #Communicatiemiddelenmix #dierenwelzijn

Tweet übersetzen

POV Varkenshouderij und 9 weitere Personen

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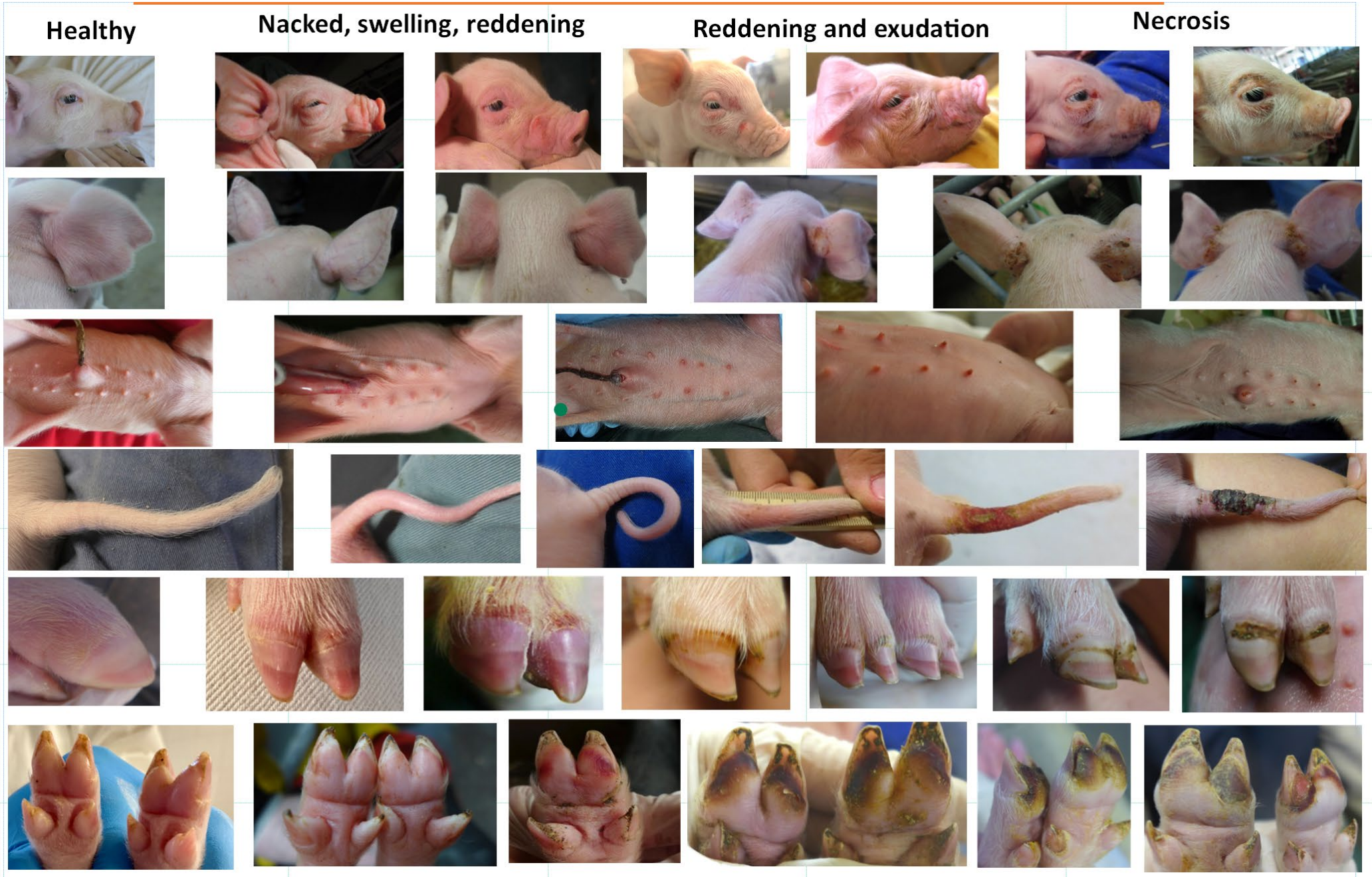
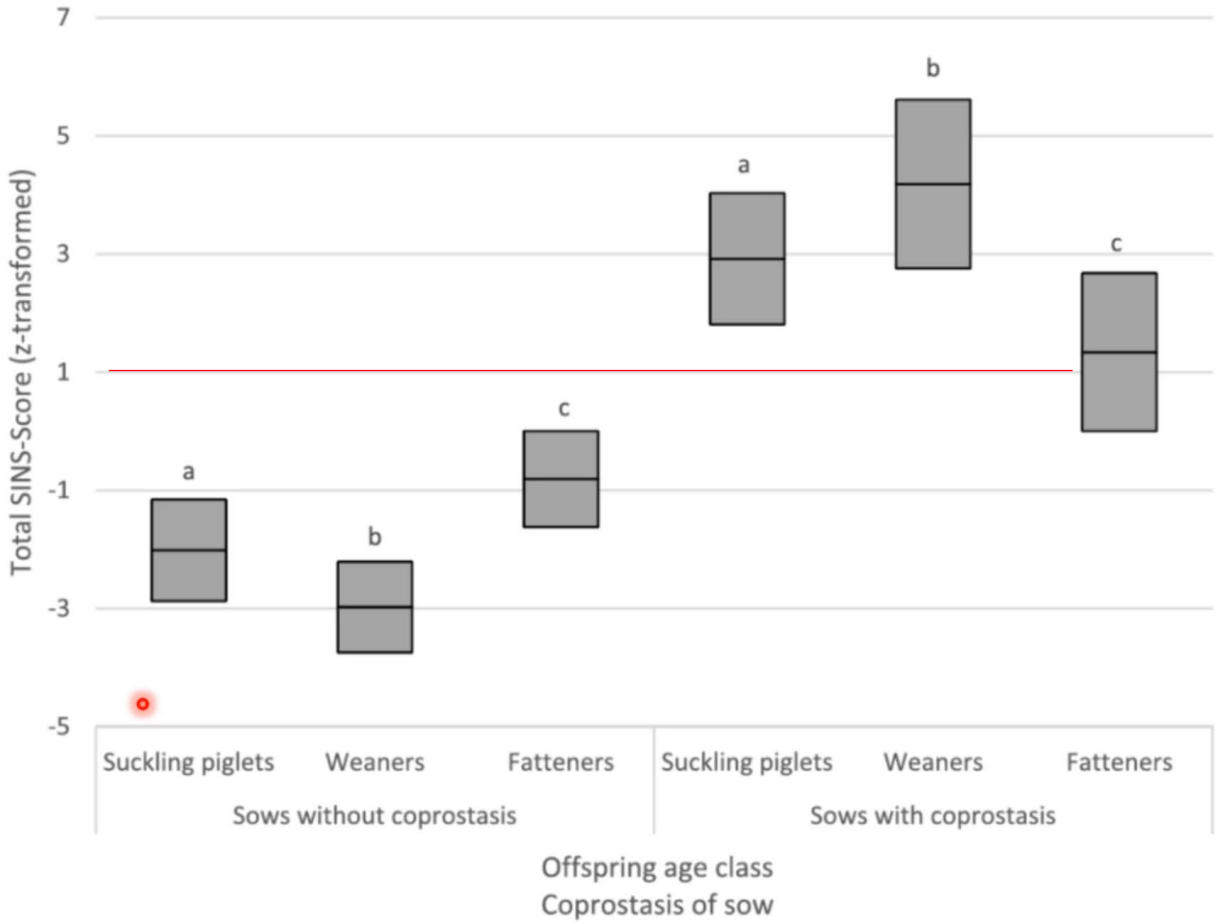
SINS-Scoring suckling piglet – indicator of sow health



Coprostasis of the sow highly associated with SINS in piglets, weaners and fatteners

SINS scores in suckling piglets, weaners and fatteners derived from low-quality sows under standard husbandry conditions were high, but they decreased **significantly when husbandry was improved (water consumption = open bowl and additional fiber).**

Good fecal quality



Sow quality had significant effects on suckling piglets and weaners under standard husbandry conditions. **Coprostasis in sows led to significantly higher SINS scores in their offspring at any age**

Coprostasis while farrowing

Reiner, G., Kühling, J., Lechner, M. *et al.* **Swine inflammation and necrosis syndrome is influenced by husbandry and quality of sow in suckling piglets, weaners and fattening pigs.** *Porc Health Manag* **6,** 32 (2020)

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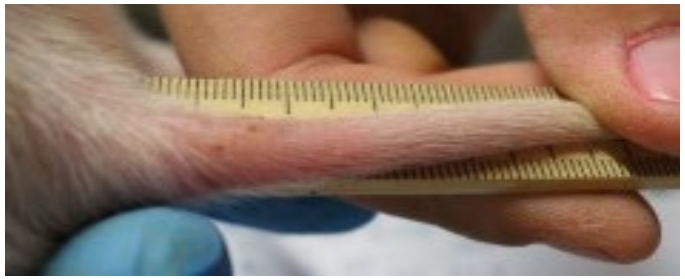
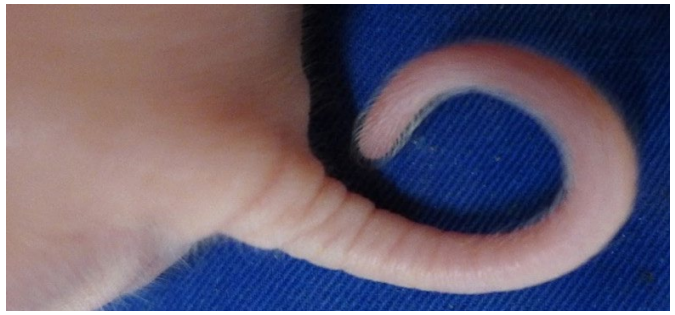
SINS-score tail suckling piglets

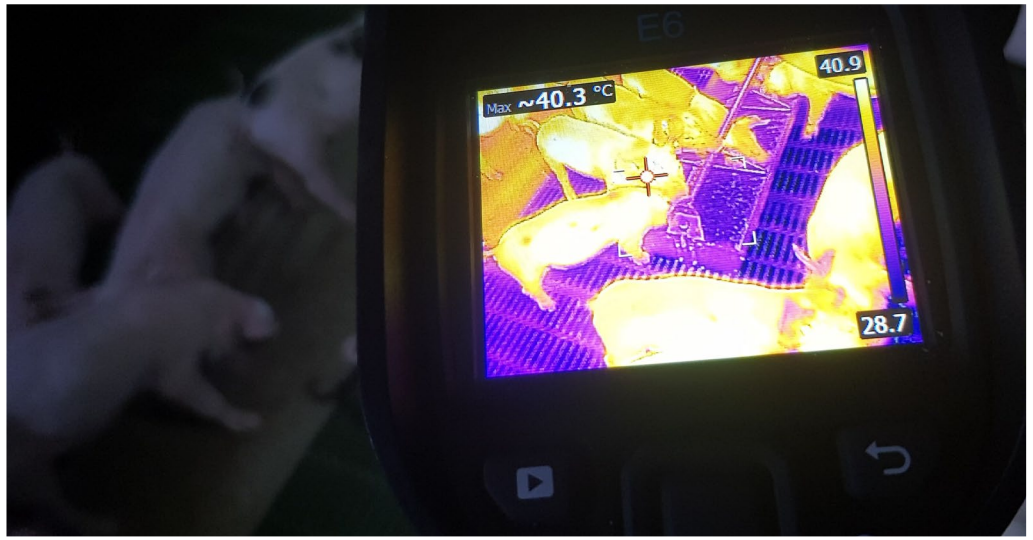
Prevalence in different investigations

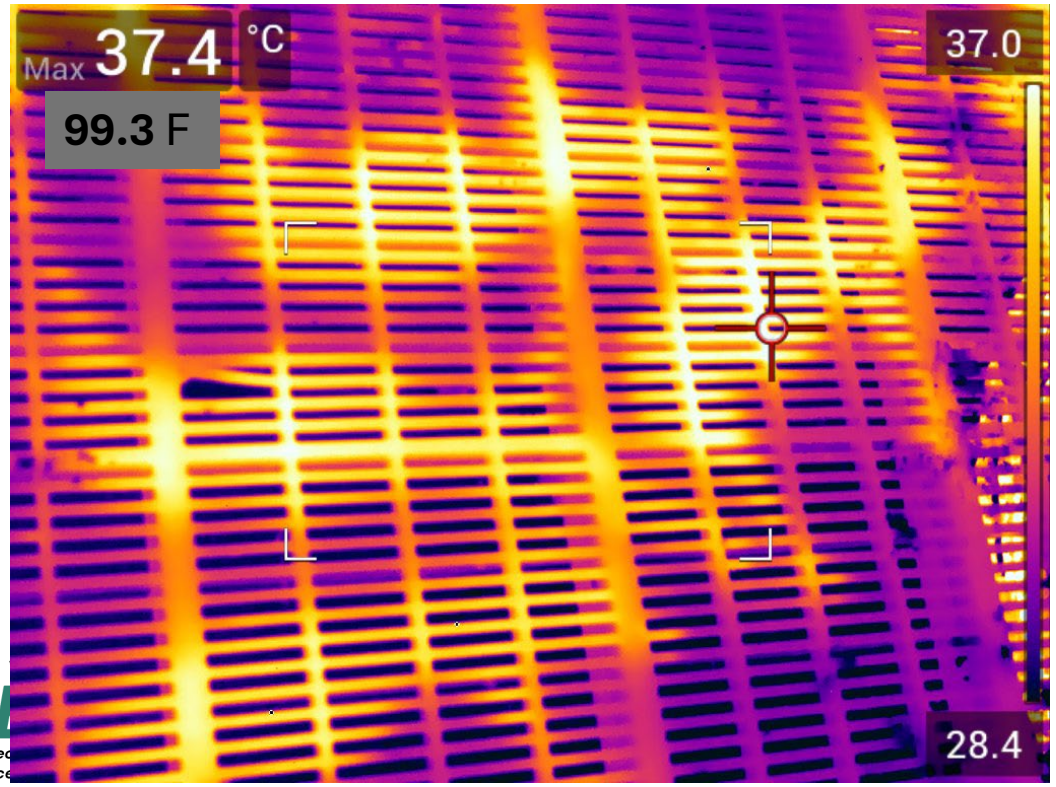



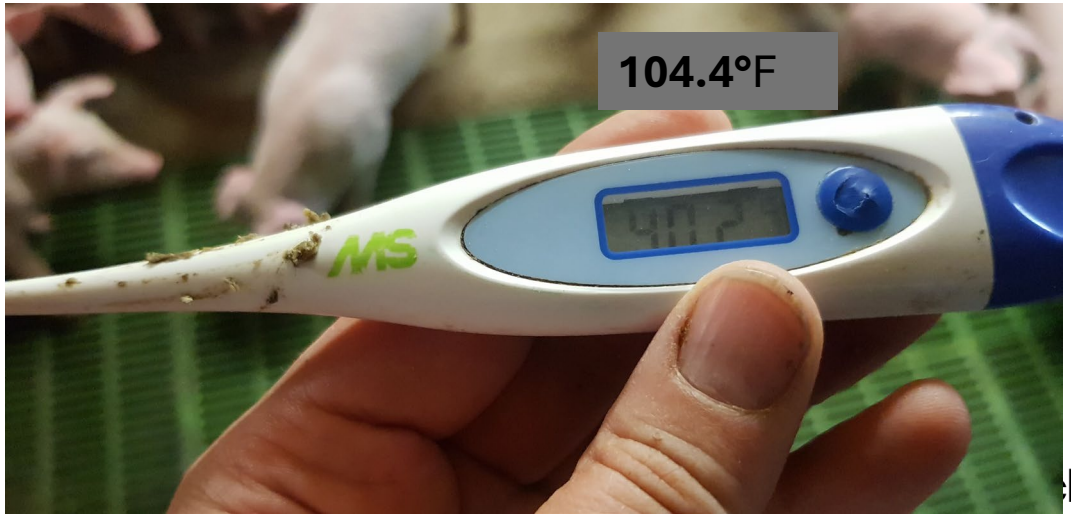




	Number N =	Score 1: healthy: Biddles, no swelling, bristles reddening	Score 2: Hairloss/naked tail base Reddening/swelling No ore mild inflammation, swelling, reddening symptoms: **89,3 %**	Score 3: Blutung, Eksudat Schorf bzw. Nekrose Bleeding, exudate, scab or necrosis
Reiner (2018) Germany/Thuringia	**4725**			**10,7 %**
Kuehling (2020) Germany/Hesse	**146**	**25 – 35 %**	**~ 60 – 70 %**	**4,2 %**
Kuehling (2021) Germany/Hessen	**646**	**28 %**	**70 %**	**2 %**
Friebe (2022) Germany/Saxony	**6756**	**33,5 %**	**63,5 %**	**2,9 %**
Koenders/Andriessen (2023) Netherlands	**7000**	**incoming**	**incoming**	**incoming**
Fortune (2024) France	**2.377**	**23,7 %**		With inflammation and necrosis symptoms: **76,3 %**

Main risk: Weaners & weaning stress – New drinking systems and not enough water intake


Max ~40.3 °C
40.9
28.7

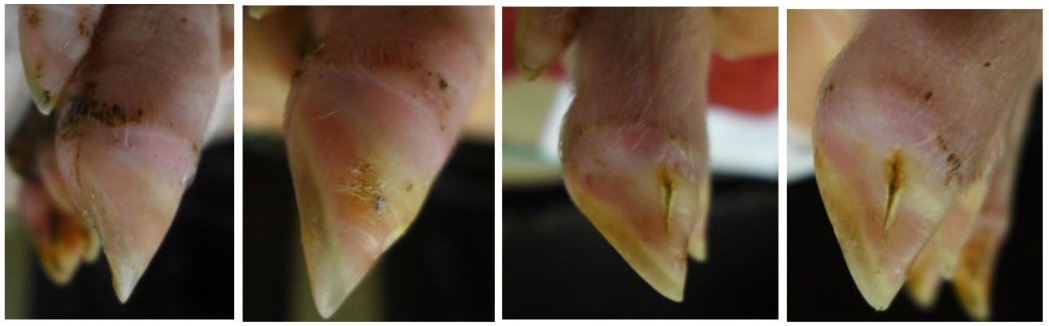

Max 37.4 °C
99.3 F
37.0
28.4


104.4°F
MS

SINS-score weaners. Lechner 2014. N = 44 Aufzuchtferkeln: 12 photos each piglet, syndrome = more body parts affected

Weaner No. 9 | Weaner No. 4 | Weaner No. o18 | Weaner No. 18 | Weaner No. 8

Zonderland, Johan & Schepers, F & Bracke, M.B.M. & Hartog, L.A. & Kemp, Bas & Spoolder, H.A.M.. (2011). **Characteristics of biter and victim piglets apparent before a tail-biting outbreak**.
Animal: an international journal of animal bioscience. 5. 767-75. 10.1017/S1751731110002326.



Null: Klauenwand ohne Befund	Eins:Aufwölbung	Zwei: Sprünge/Rissbildung

Null: Kronsaum ohne Befund	Eins: Schichtung Klauenwand und Rötung Kronsaum (lila)	Zwei: Kronsaumentzündung Kluft

Biters tended (P = 0.08) to spend longer sitting/kneeling (3.1 min/h) than controls (1.7 min/h), but no differences were seen in the time spent lying or standing. Victims tended (P = 0.07) to change posture more often (restlessness) than controls and chased pen mates more (P = 0.04) than biters.

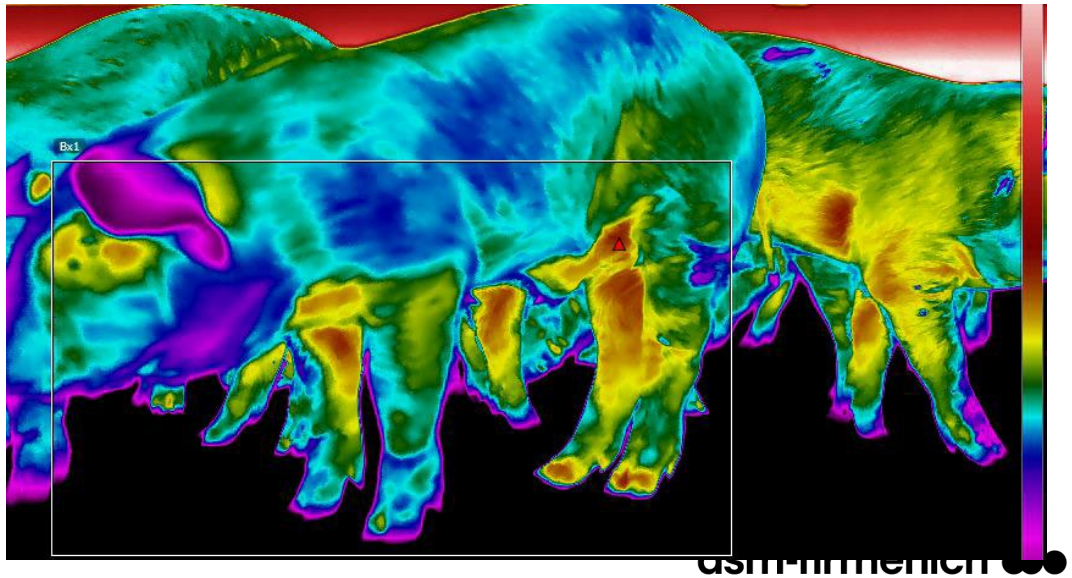


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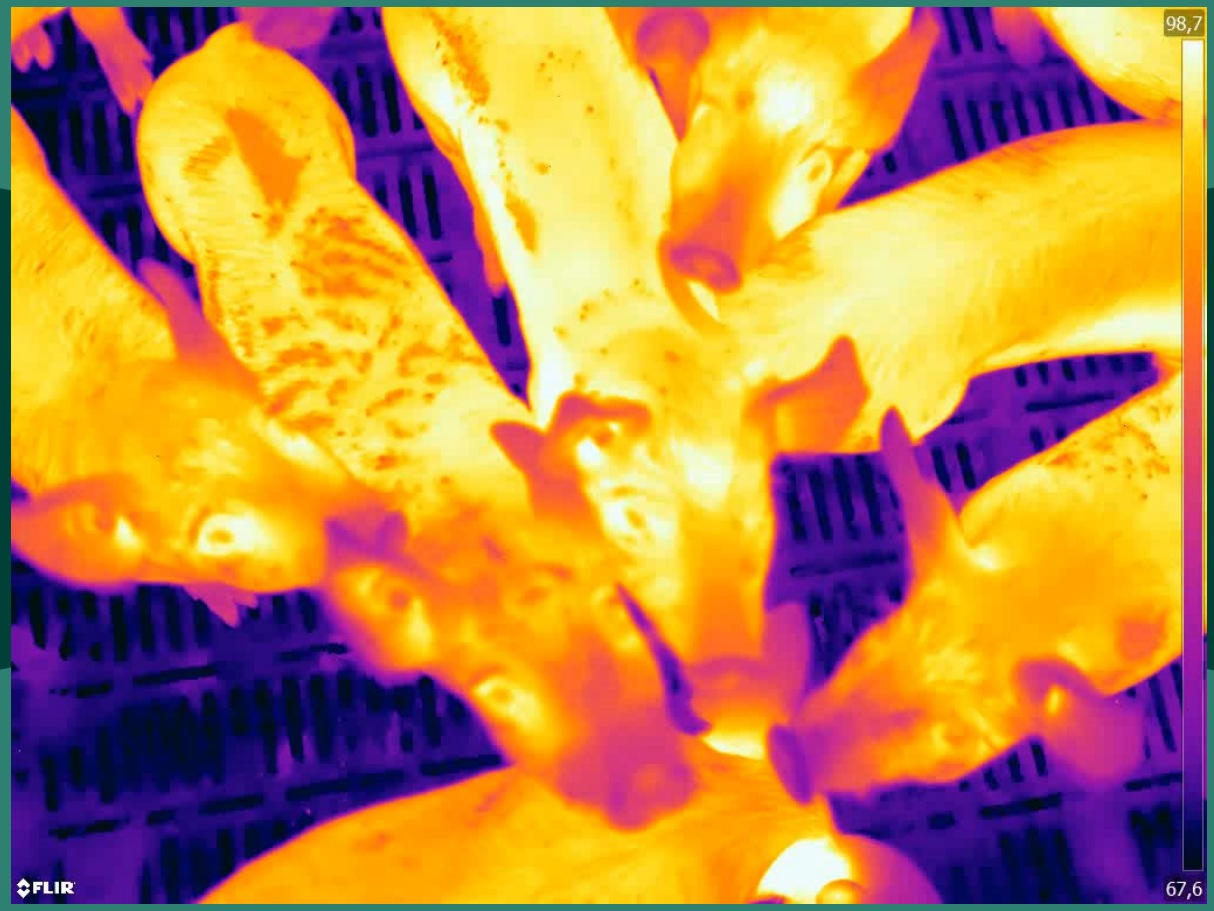
Foto: Mirjam Lechner FitForPigs

Example for healthy piglets – skin temperature below 100 °F



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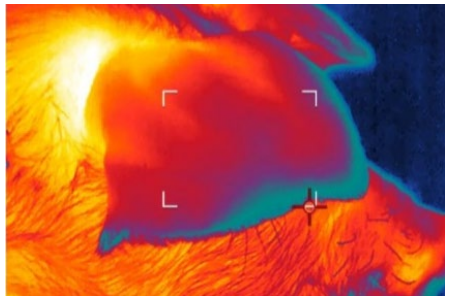
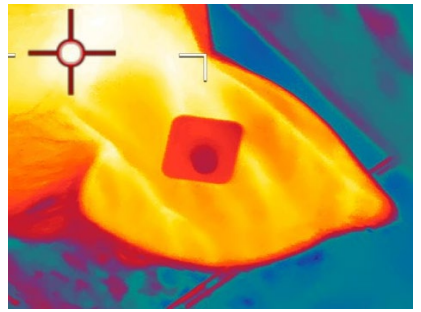
Animal signals: Behaviour Change & Signs:

Time

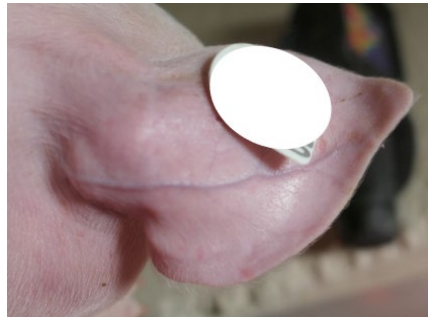


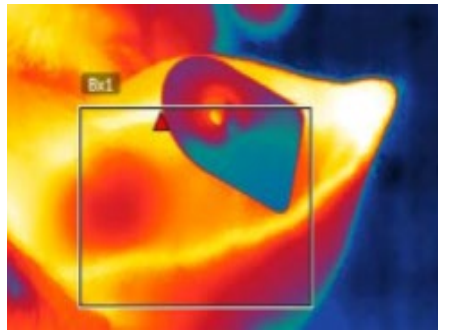
Natural & changed behaviour – try to adapt: Possibility?

Self-protection Sickness Behaviour

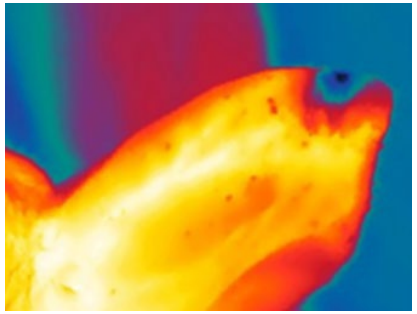


Fever: Active immun response





Inflammation symptoms



Loss of function Necrosis

Welfare

Alert!

Veterinarian needed

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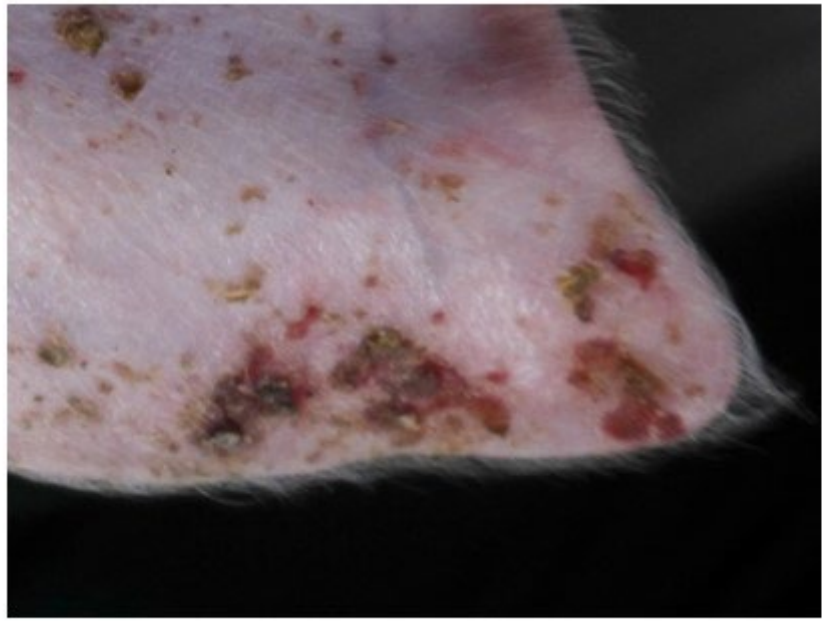
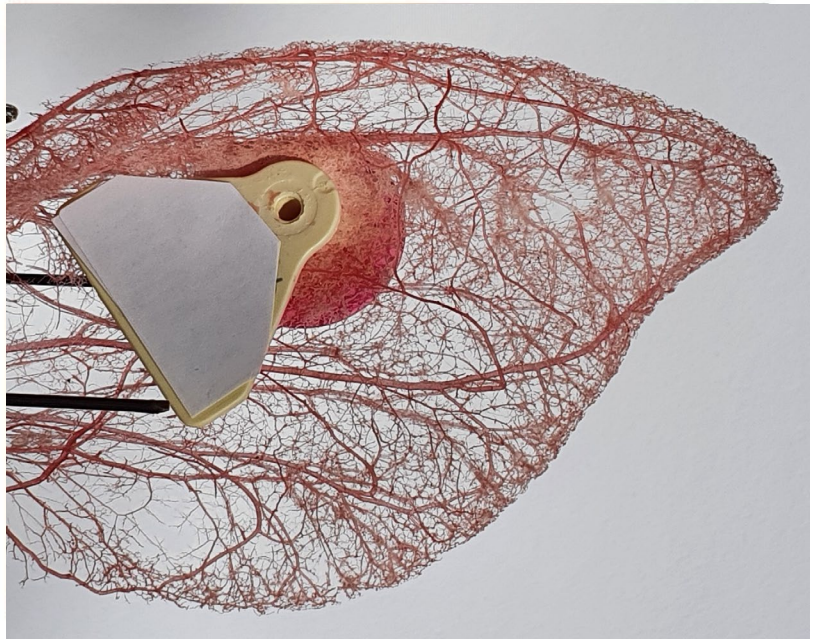




Plastination of the blood vessel of a weaner pig
Dr. Christoph von Horst
www.plastinate.com

Symptom: „punched out lesions“
Quelle:
http://veterinarynews.dvm360.com

Ear edge vasculitis

Photo 5: Smudging of the pinnal vessels in a dog with vasculitis.

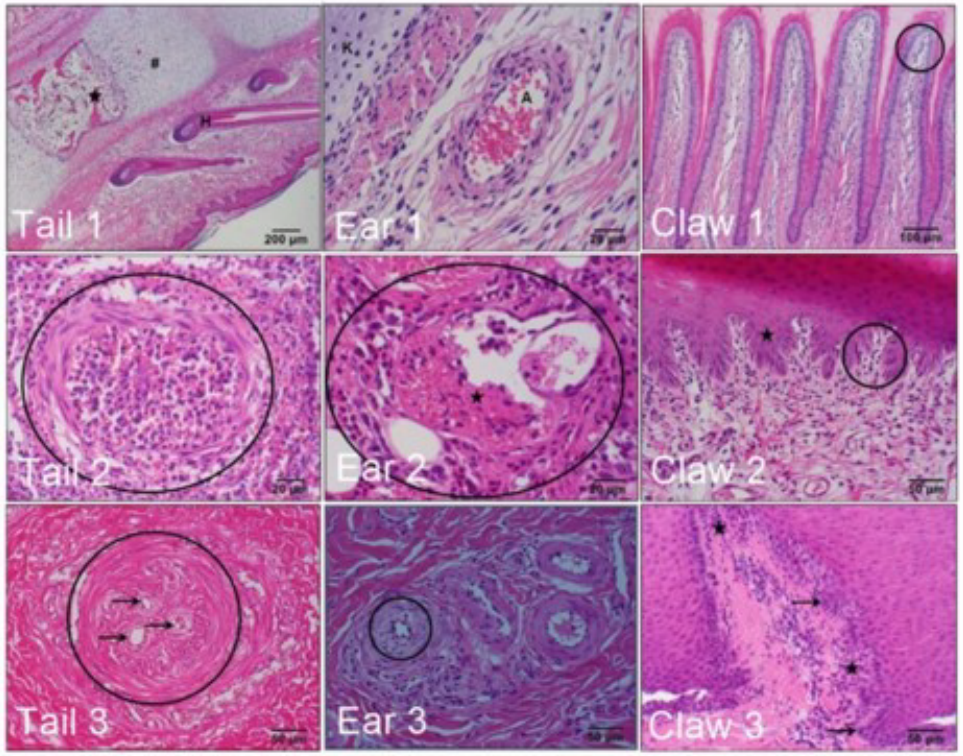
Ear edge vasculitis is common in Chihuahuas and Dachshunds. "Punched out" lesions are usually present in the pinna, which appear clinically as smudging of the pinnal vessels, resulting in alopecia and/or necrosis of the ear edges (Photo 5). Early vascular smudging is evident when the lateral aspect of the pinna is backlit with an otoscope. Make the diagnosis by clinical appearance, breed affected and skin biopsies.

Research | Open Access | Published: 23 November 2020

Swine inflammation and necrosis syndrome is influenced by husbandry and quality of sow in suckling piglets, weaners and fattening pigs

Gerald Reiner, Josef Kühling, Mirjam Lechner, Hansjörg Schrade, Janine Saltzmann, Christoph Muelling, Sven Dänicke & Frederik Loewenstein

Porcine Health Management **6**, Article number: 32 (2020) | Cite this article

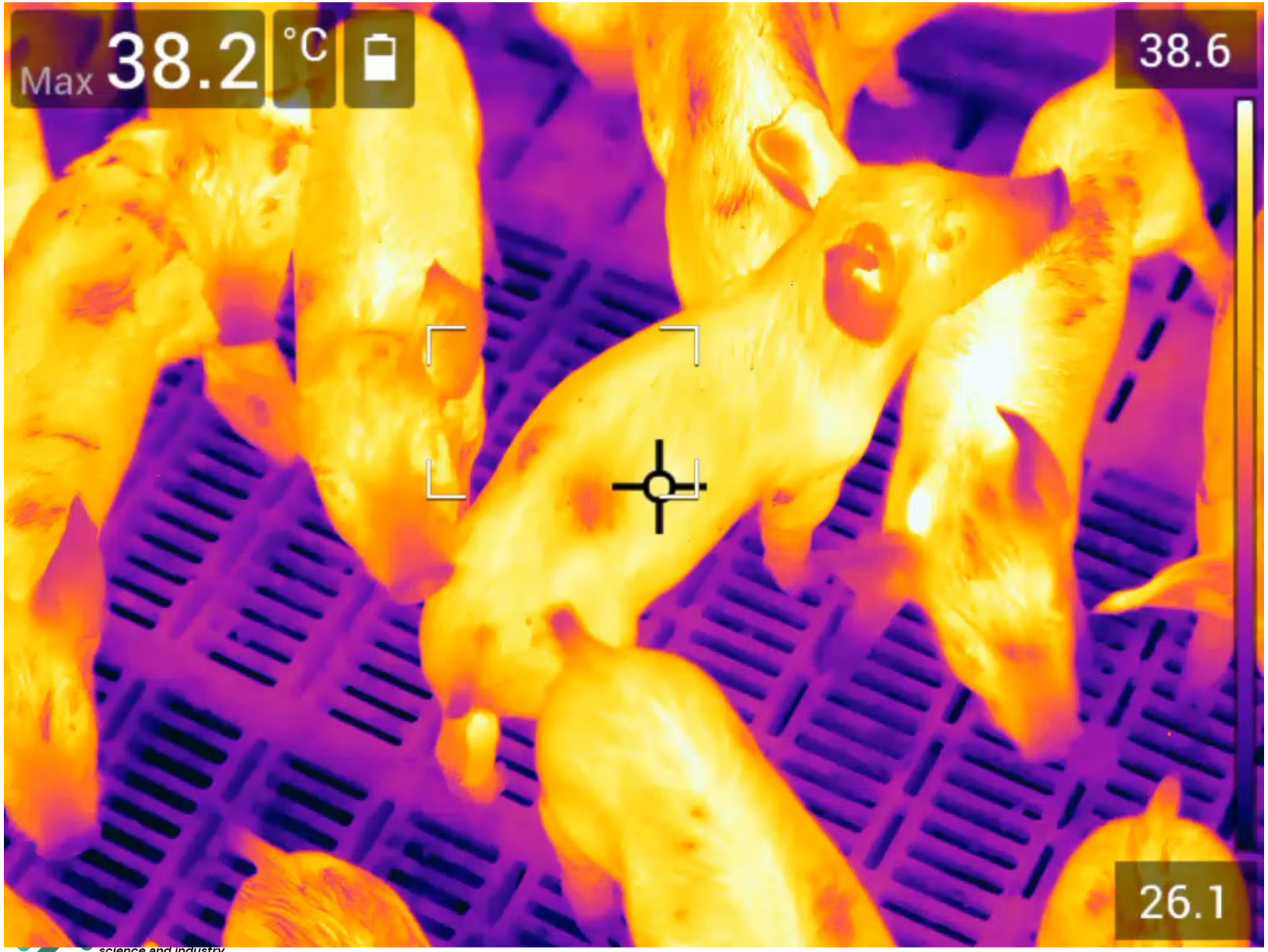


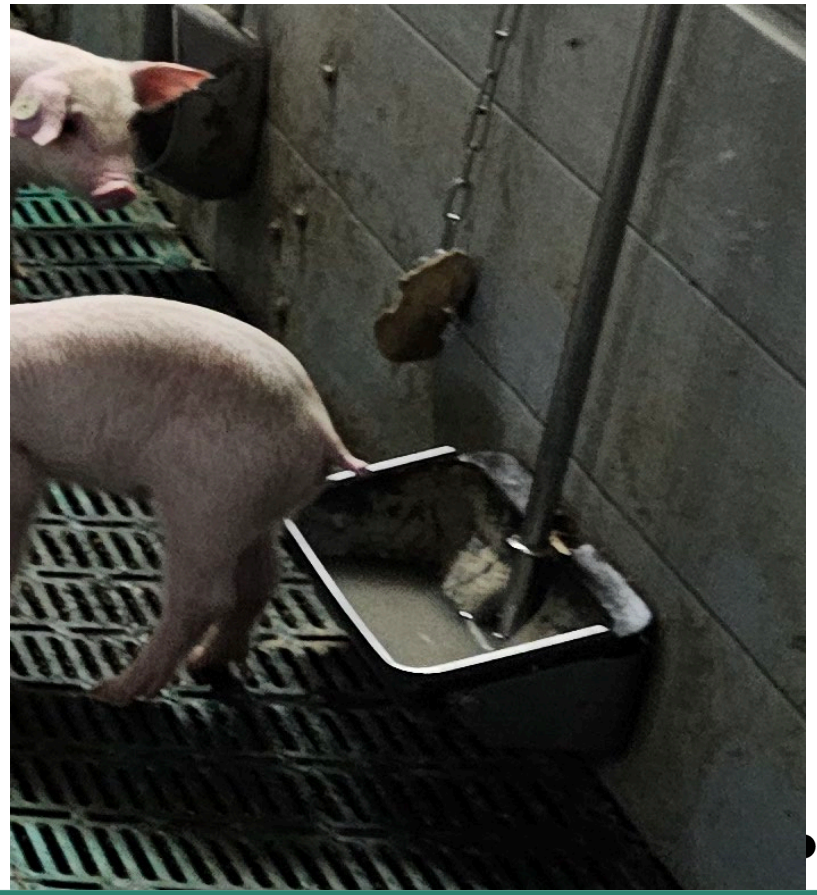
(….) Tissue bleeding occurred in suckling pigs and fattening pigs in a similar manner. Vasculitis was present in all age groups, but especially in suckling piglets and weaners. Thrombolization of the blood vessels also occurred regularly. Arteriosclerotic-like lesions were only observed in weaners and fattening pigs, with the latter group particularly affected. The right-hand side of the table compares the findings of cuts without (0) and with (1) alterations to the epithelium. In weaners and fattening pigs, only individual animals with however, the epithelium was not affected out alterations were found. In suckling piglets, in 93/115 animals. Nevertheless, 57% of the piglets showed intima proliferation, 17% thrombosis and 35.5% vasculitis. Necrosis occurred in 16% of the animals. (…)

38 °C = 100.4 °F

38.6 = 101.5

Pen with bad water quality, biofilms & endotoxins
Causing *E. Coli* & SINS problems in weaners





38 °C = 100.4 °C F

Hot ears… and hot tails: The issue starts in long tails, but the piglets have:

- Fever
- Leg/claw/joint swelling

As a cause of leaky gut and systemic inflammation even without a tail

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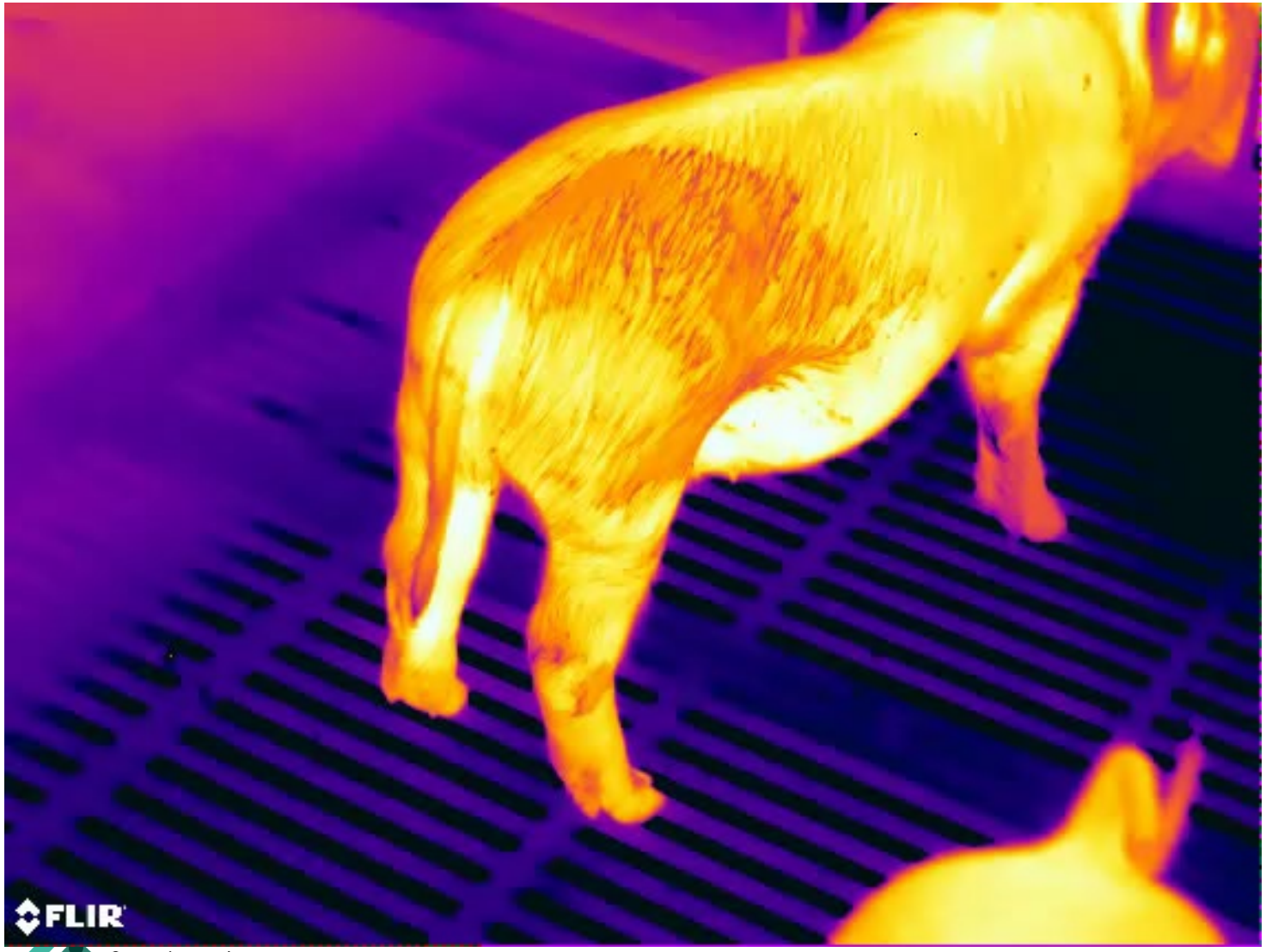
J. Kuehling, F. Loewenstein, S. Wenisch, M. Kressin, C. Herden, M. Lechner, G. Reiner,
An in-depth diagnostic exploration of an inflammation and necrosis syndrome in a population of newborn piglets,
Animal, Volume 15, Issue 2, 2021.



Inside out development

(…) The clinical signs of inflammation were confirmed by histo-pathological examinations. All histo-pathologically examined piglets showed alterations at the tail base, histologically accompanied by pathological edema in the areas of the hair follicles and blood vessels as an indication of increased permeability of the blood vessels. (…)

„if… then“: Inflammation in tail base, then in tail tip

(…) When the base of the tail was affected, the remaining part was also affected in 48% of the animals.

When the tip of the tail was affected, the tail base was always affected. In piglets with no inflammation of the tail base, the remaining part was always intact. (…)

Why is tail docking so effective (3 x less risk for biting). Is tail tip necrosis attracting other pigs to bite?

efsa
European Food Safety Authority

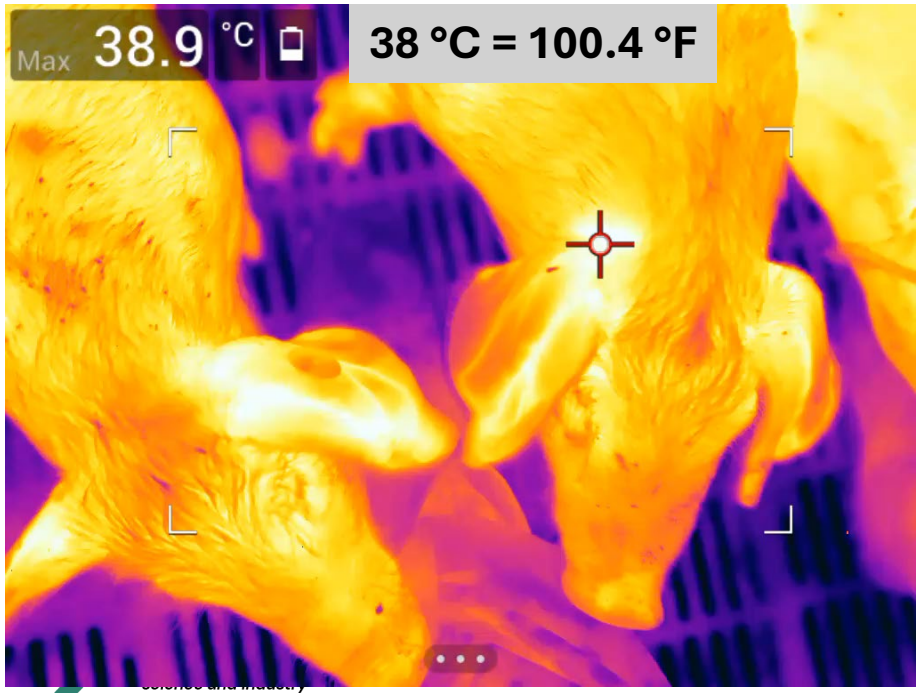
Multifactorial approach to assess pig welfare

Hazard /Risk Factors	Likelihood of tail-biting (expressed as %)		Resource /management-based indicators of hazard	Animal-based indicators of hazard
	Docked population	Undocked population		
Delay of feed supply	1	3		Aggression; Restlessness Poor body condition
Mixing of animals excluding at weaning time	0.5	1.5		
6. **Environment**				
High air speed (draughts)	1	3	Air temperature; Air speed; Light level; level of noxious gases (e.g. CO_2, NH_3)	Increase of the following indicators: Panting, shivering, Poor body condition, poor coat condition; Restlessness; Red eyes; Modified lying behaviour showing thermal discomfort;
Heat stress	0.5	1.5		
Cold stress	0.5	1.5		
Poor air quality	0.2	0.6		
Absence of natural light	0.2	0.6		
1. Diet				
Inadequate dietary sodium	0.5	1.5	Diet composition	Increase of the following indicators: Poor body condition, diarrhoea; Poor coat condition, restlessness, foraging behaviour; Gastric ulcers; Variation in pig size within group
Amino acid deficiency	0.5	1.5		
Abrupt change of feed composition	0.2	0.6		
2. Herd size				
Large herd size	0.1	0.3	Herd size	

*see Section 5.1.3 for further detailed information

(a): SPF: specific pathogen free

(b): The literature clearly shows that being a castrate gives significantly greater risk of being bitten than being a gilt. Being an entire male may give slightly more risk than a gilt, but data are not conclusive. Whilst this therefore suggests castration may increase risk, there is no direct comparison between castrates and entire males. We cannot therefore be certain that castration per se is a risk (EFSA, 2007c)



38 °C = 100.4 °F

Systemic inflammation affects blood vessels… and the whole body. Well-being and behaviour!

Fouhse, et.al., 2016. **The role of gut microbiota in the health and disease of pigs**

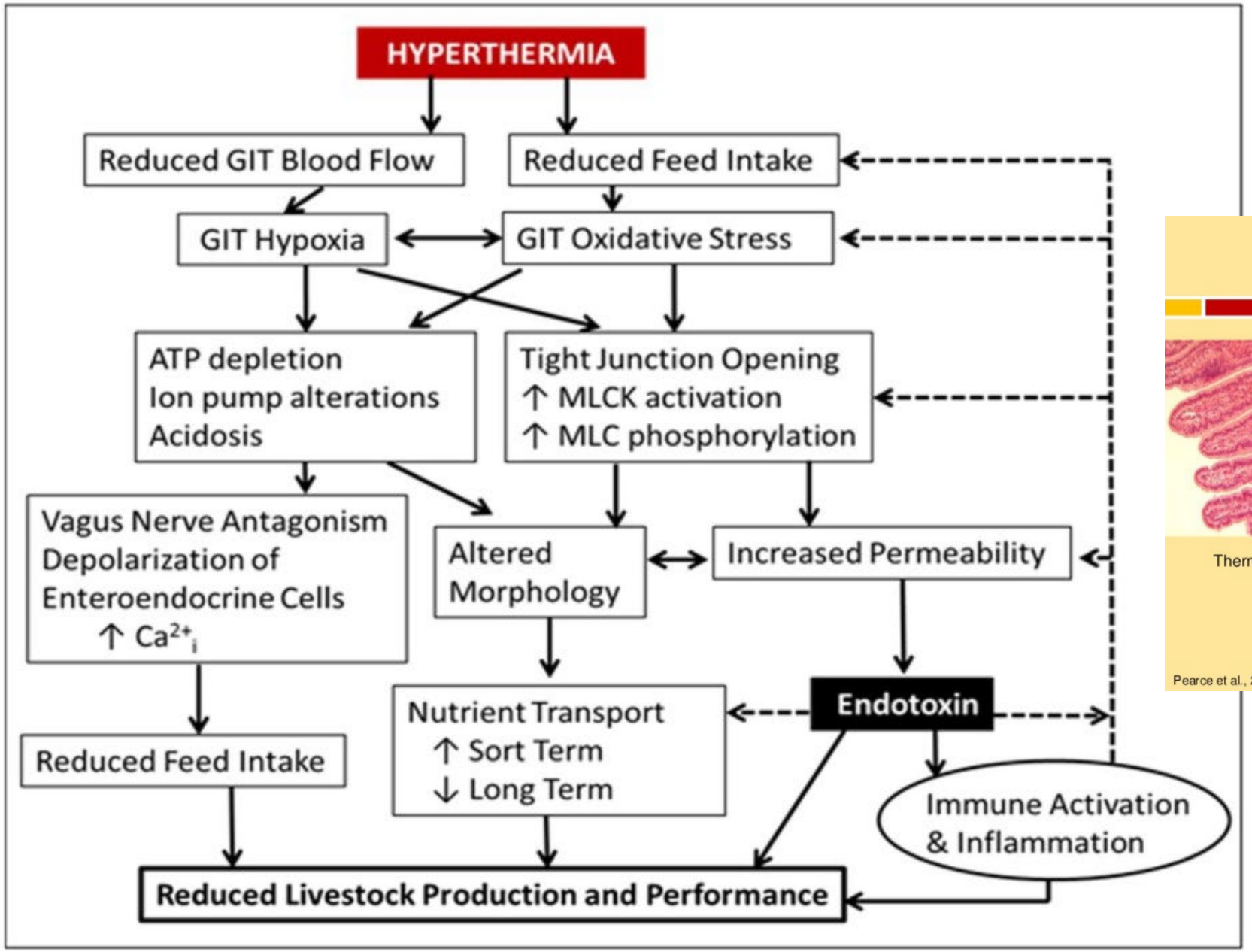
Verbeek, et al., 2021. **The gut microbiota and microbial metabolites are associated with tail biting in pigs.**

Brunberg, et al., 2016. **Omnivores going astray: A review and new synthesis of abnormal behaviour in pigs and laying hens**

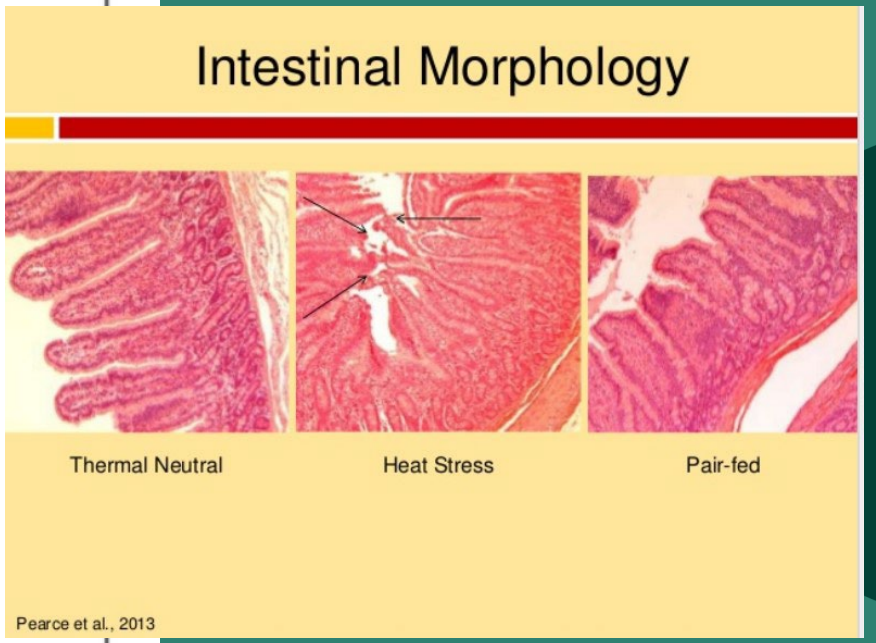
Nordgreen, et al., 2020: **A proposed role for pro-inflammatory cytokines in behavioral disorders in pigs**

Rabhi, et al., 2020: **Association between tail biting and gut microbiota composition in pigs**

Boyle, et al., 2022: **The evidence for a causal link between disease and damaging behavior in pigs**



Baumgard et al., 2011



Environmental heat stress and gut integrity. 2011. Stoakes, et al.

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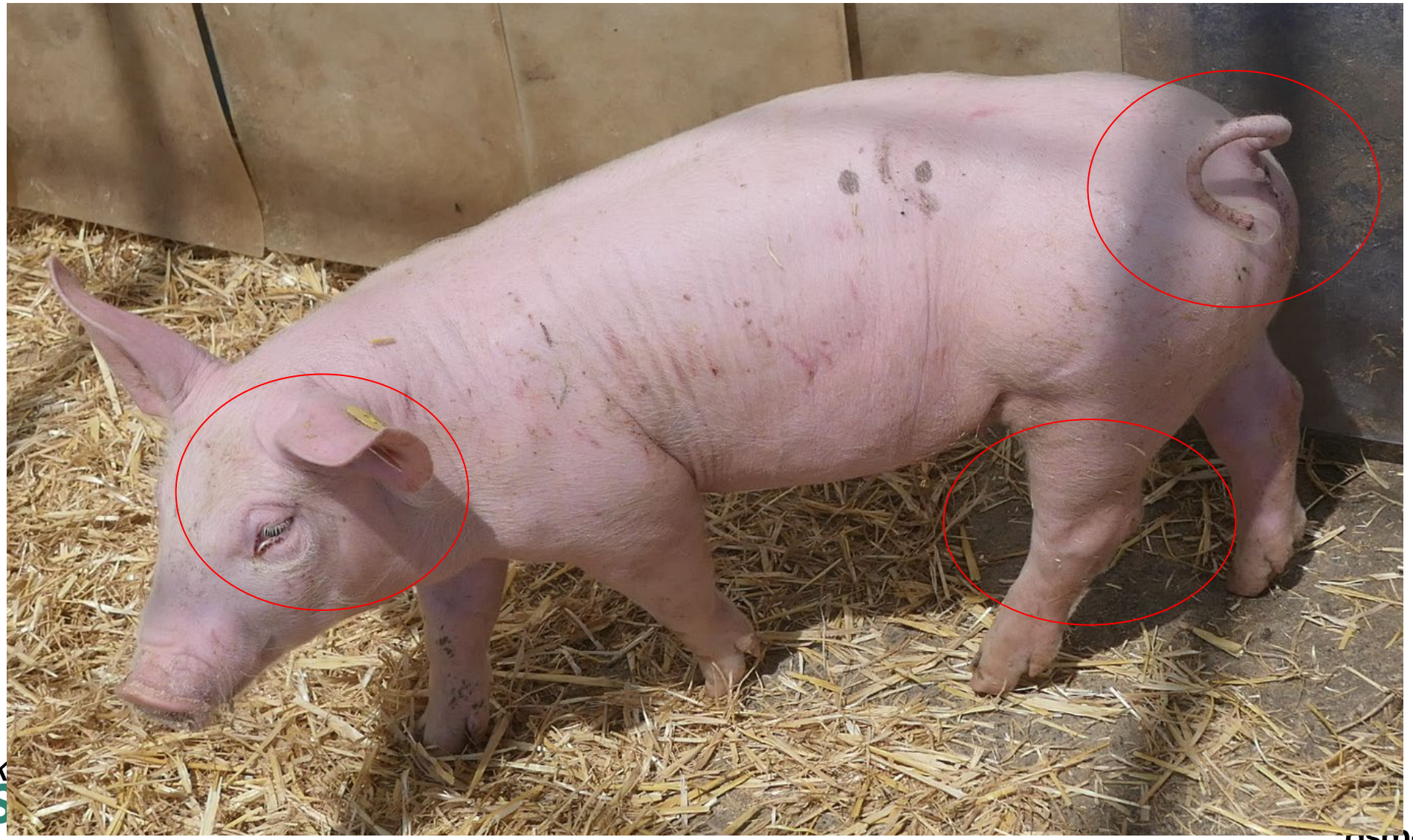
Heat stress is the nexus of systemic inflammation: Isolated floor from straw bedding over plastic floor is affecting the pigs need to cool via contact
Lack of water is a huge problem



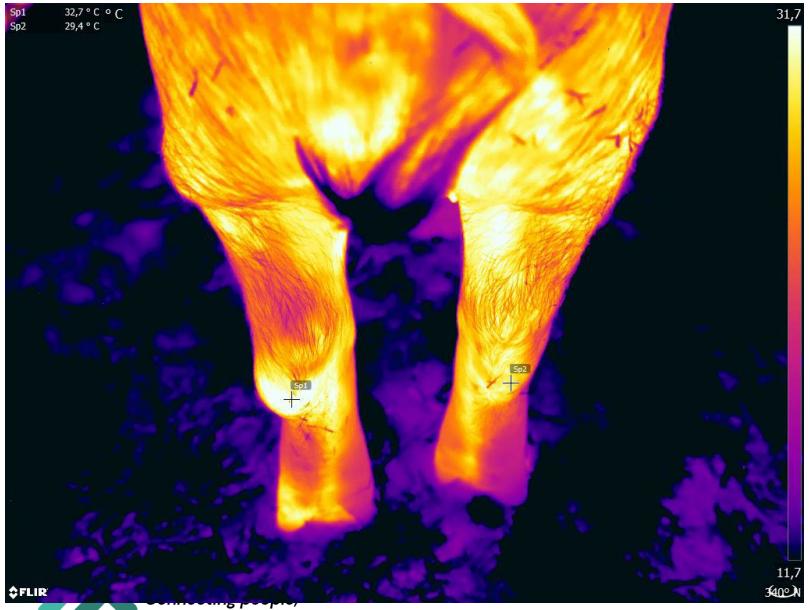
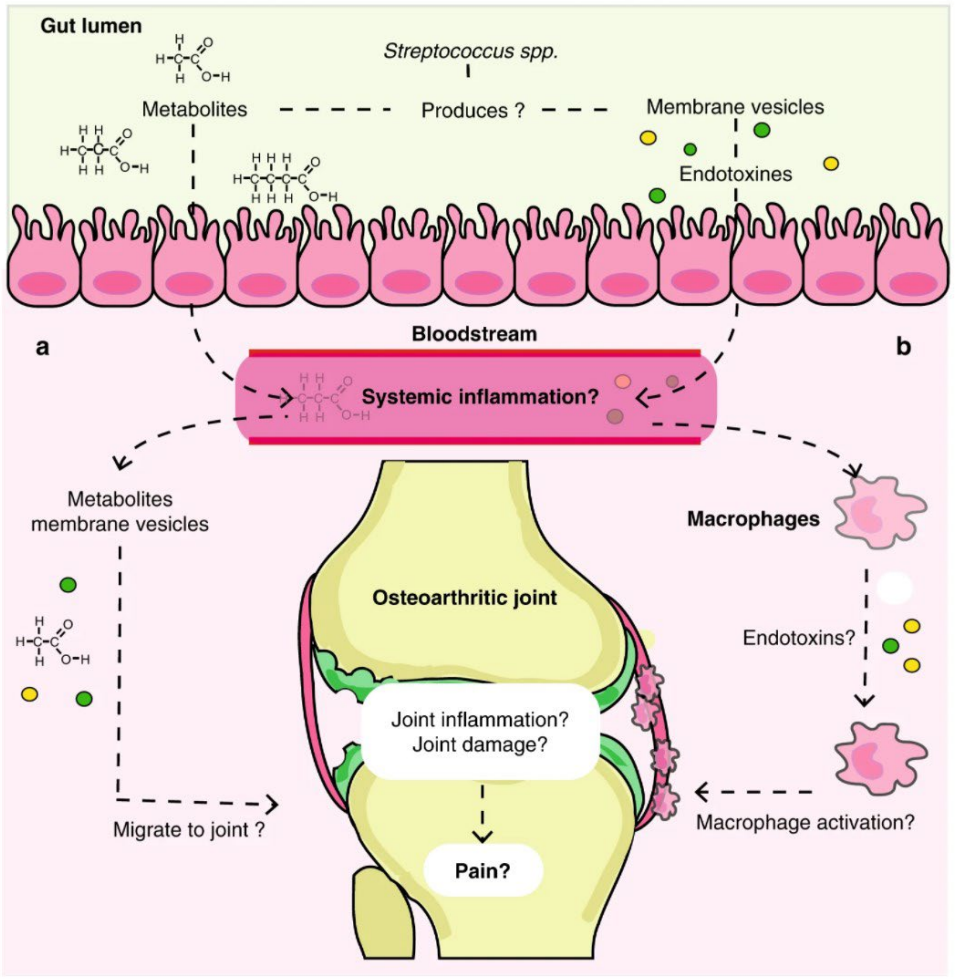


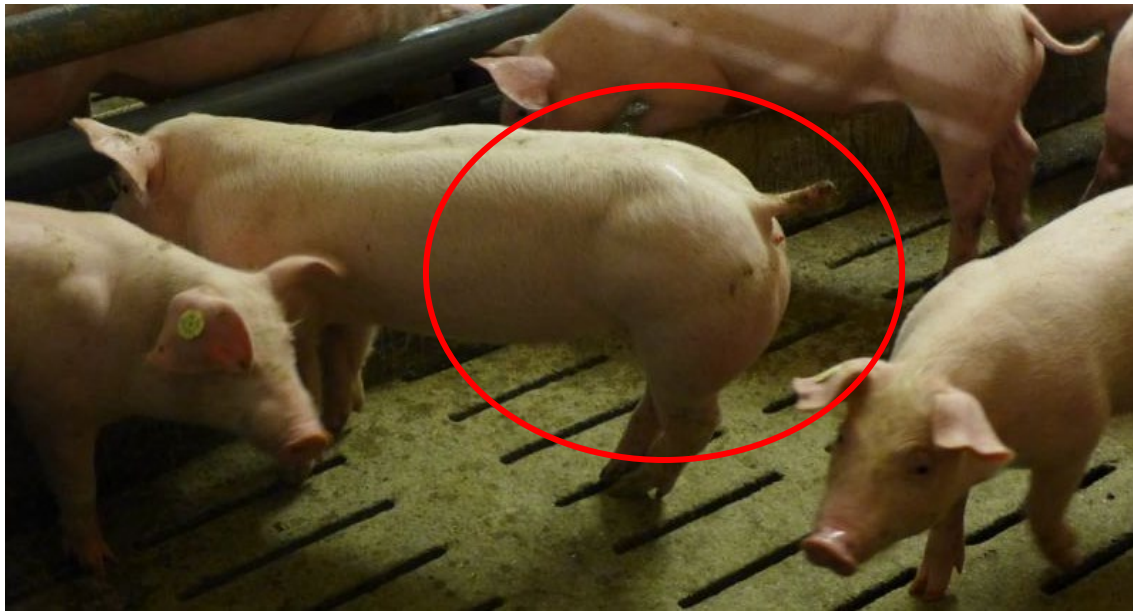
Abb. 2

Aus: Zusammensetzung des Darmmikrobioms und seine Beziehung zu Gelenkschmerzen und Entzündungen

Hypothetical proposed mechanism of *streptococcus spp.* and WOMAC-pain associaiton



Quelle: Boer, C.G., Radjabzadeh, D., Medina-Gomez, C. *et al.*
Intestinal microbiome composition and its relation to joint pain and inflammation.
Nat Commun **10**, 4881 (2019).



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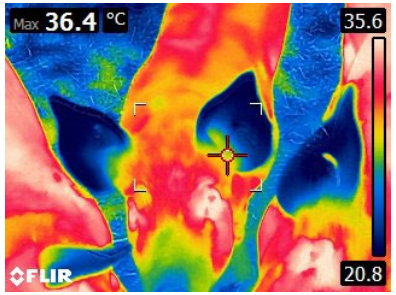
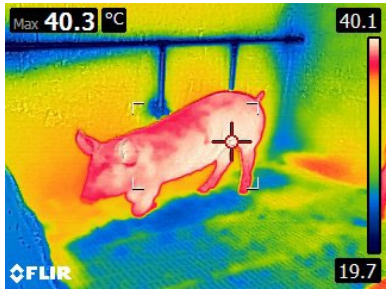
Surrounding temperature and reaction of domestic fattening pigs: Behaviour and metabolism

Source: Kirchgessner Tierernährung ( ), Huynh (2005), Pearce (2011)

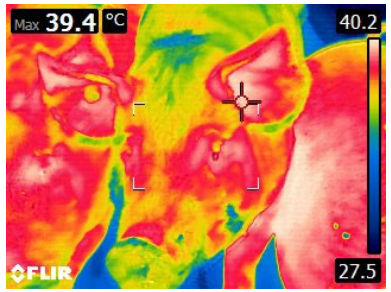
Centralization of body warmth



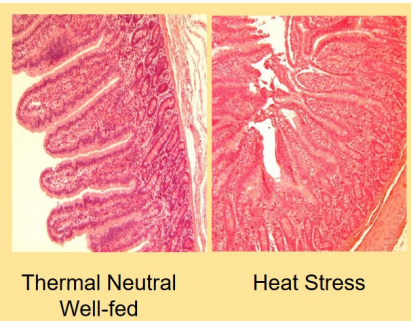
Try cooling on wet-cool floor over drinkers



Increased skin blood circulation



Blood/oxygen missing from the intestine = damage



Shivering

Huddling

Start wallowing

Start lying on slatted floor

Start of urination on concrete floor

Rise of breathing frequency

Reduction of food intake

< 61 °F	61°F	63 °F	64 °F	66 °F	68 °F	70°F	72 °F	73 °F	75 °F	77 °F	79 °F	Over 84 °F

NSHP „non shivering heat production“ = Cost of heat production

Rise of steam production = deep breathing

Reduction Urination

Reduction of body heat production

Rise of rectal temperature

Leaky gut Inflammation

Cost of heat production

Cost of metabolism

Cost of inflammation

* 60 kg fattening pig, humidity ~ 60 %, higher humidity faster response

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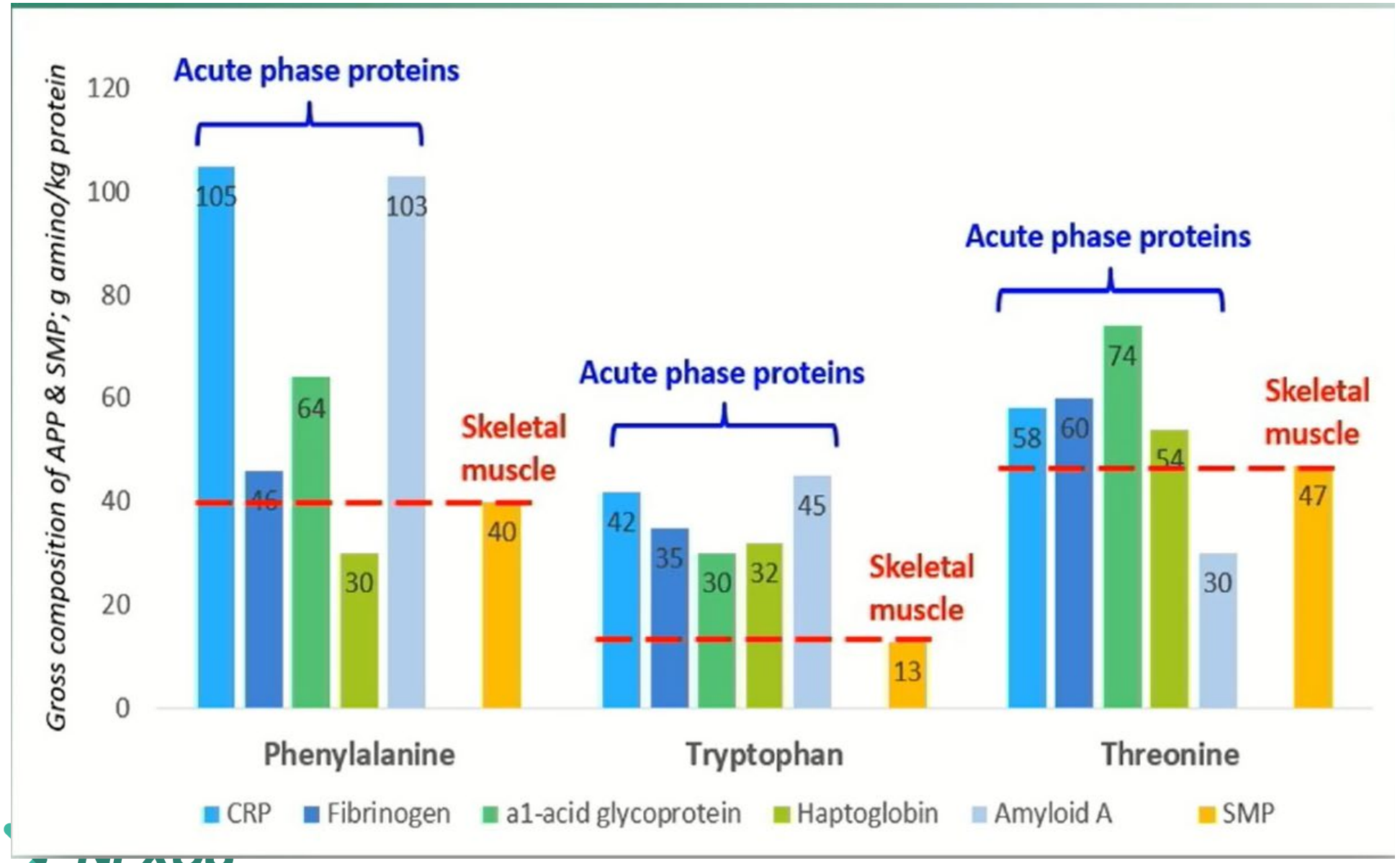
Inflammation = activated immune system : Change in energy & essential demand!

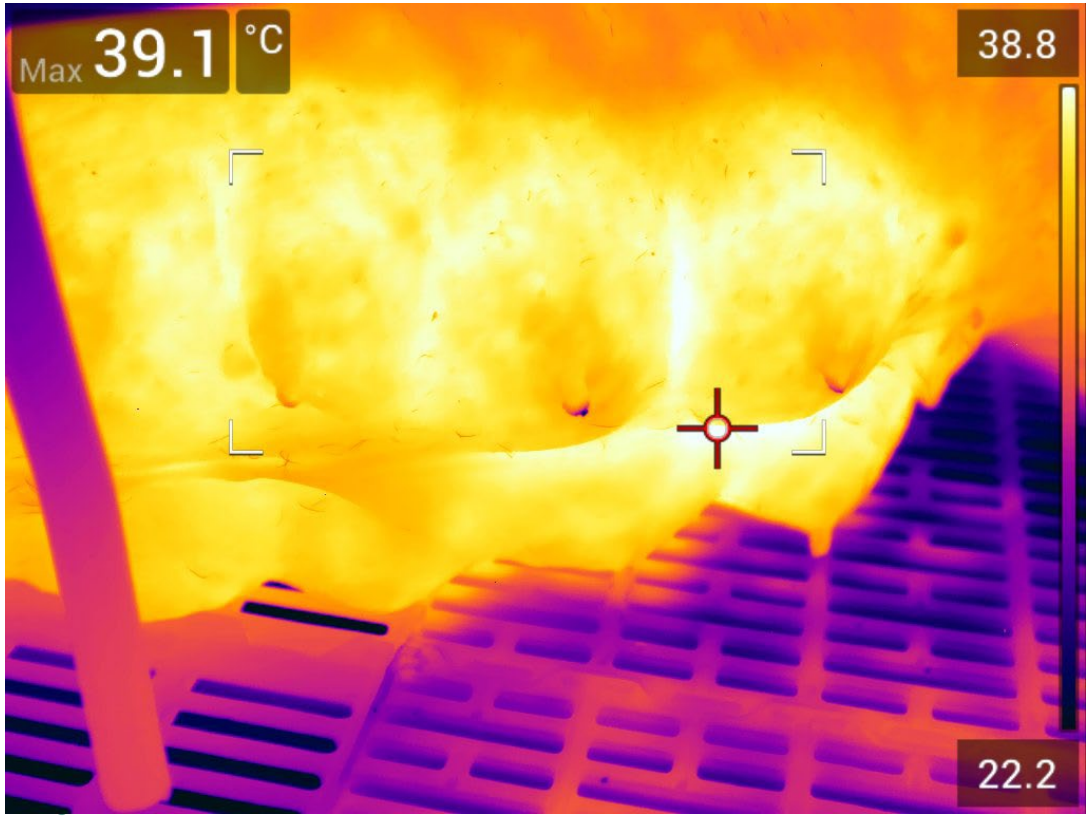


Leakage due to inflammation

Source: Klasing & Iseri 2013, Graphic: DSM Laurent Roger

Temperature	20°C 68°F		29°C 84°F	
Ration Protein in %	17.6	14.2	17.6	14.2
Feed intake in kg/d	6.71	6.51	3.56	4.05
Pigs' weight at weaning	10.5	10.3	10.4	10.3
Milk Production, kg/d.	10.0	9.6	7.4	7.7
Loss weight of sow in kg	16	15	41	29

Source: https://www.biomin.net/en/articles/overcoming-heat-stress-in-pigs-through-nutrition/



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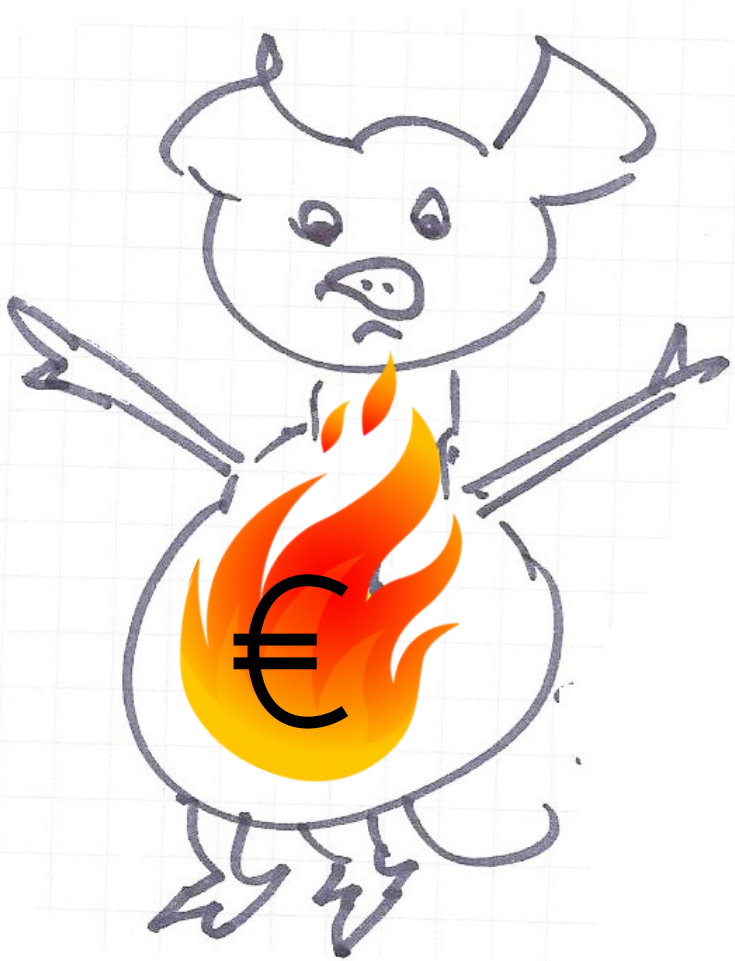
Cost of inflammation – activated immune systems burns health, food, and time!

40 °C = 104 °F



2 kg (4.4 lb) more weight gain in fatteners if they had no SINS symptoms in farrowing

EIP AGRI Project - SINS Saxony 2023
Dipl. Ing. agr. Andrea Friebe,
Prof. Dr. med. vet. Markus Freick

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Take care of the signals – pigs don´t lie!

- Many pigs, pens affected, “waves” of problems
- Lots of symptoms – claws involved
- Antibiotics don´t work properly
- Immunosuppression – infection waves
- Vaccines are not working properly
- Lack of milk, lack of colostrum
- Bad food efficiency, more death losses
- Behaviour disruptions – more aggression

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SINS XXL

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Mykotoxikologischer Befund	(UM)	Einheit	pro 88% TS	Grenz- bzw. Orientierungswert Gesamt-Ration	Futtermittel
Zearalenon-HPLC	(52)	µg/kg 88% TS	21		250
DON-HPLC	(52)	µg/kg 88% TS	291		900
Ochratoxin A-HPLC	(52)	µg/kg 88% TS	< 13		50
T2/HT2 -Toxin-HPLC	(52)	µg/kg 88% TS	< 14		250

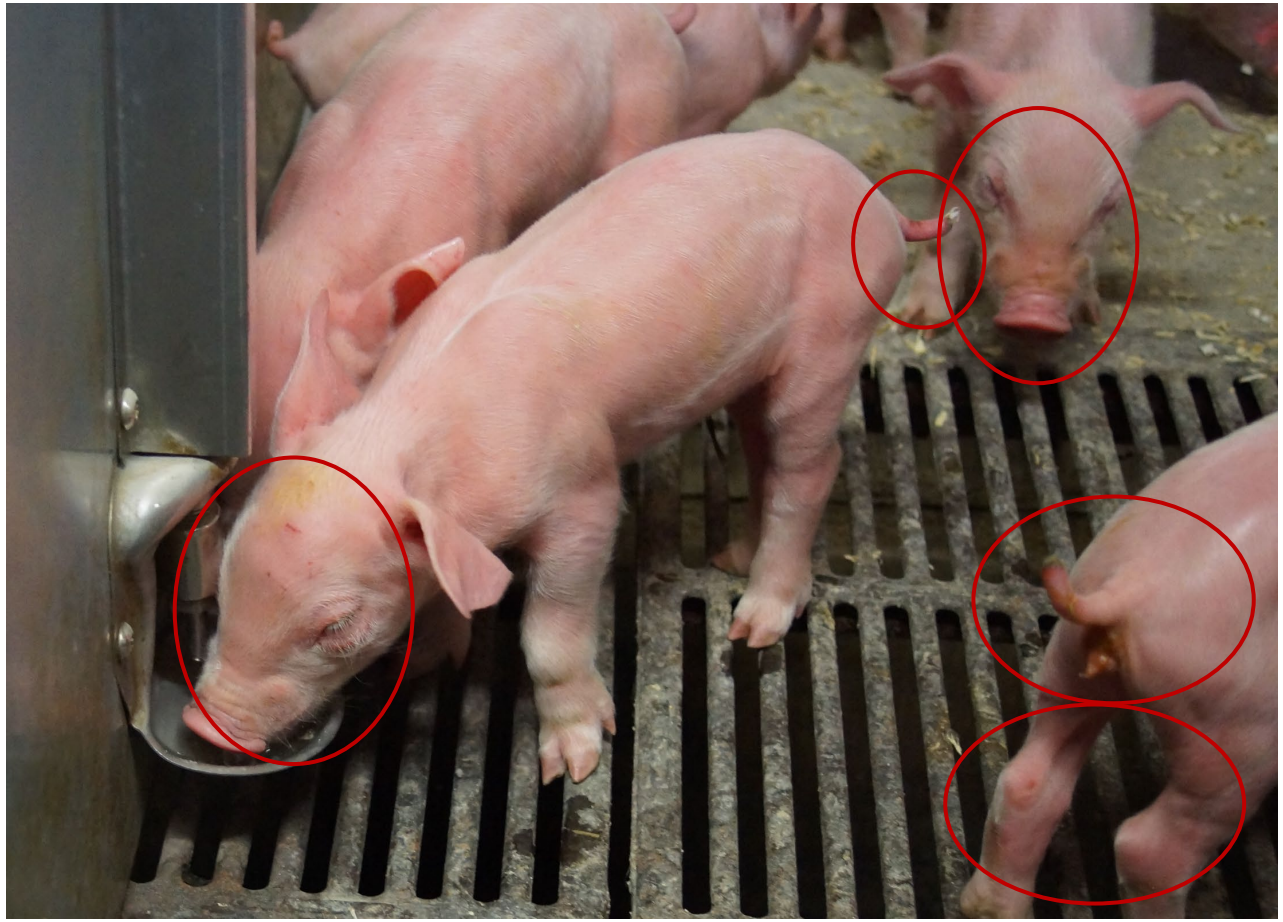
Same feed sample, different results due to better diagnostics in Spectrum Top® 50 at Romer Labs by dsm-fermenich

Hauptmykotoxine:

Toxine	Toxinanzahl pro Gruppe	Konzentration (ppb = µg/kg)	Risiko-Management	Bereich (ppb = µg/kg) Niedrig	Mittel	Hoch
A-Trichothecene	2	3.75	Niedrig	<150	150 - 400	>400
B-Trichothecene	2	623.17	Mittel	<250	250 - 1000	>1000
Ergotalkaloide	12	92.37	Niedrig	<600	600 - 5000	>5000
Zearalenon-metabolite	1	50.09	Niedrig	<100	100 - 250	>250

Healthy piglet

Piglets with mycotoxin signs



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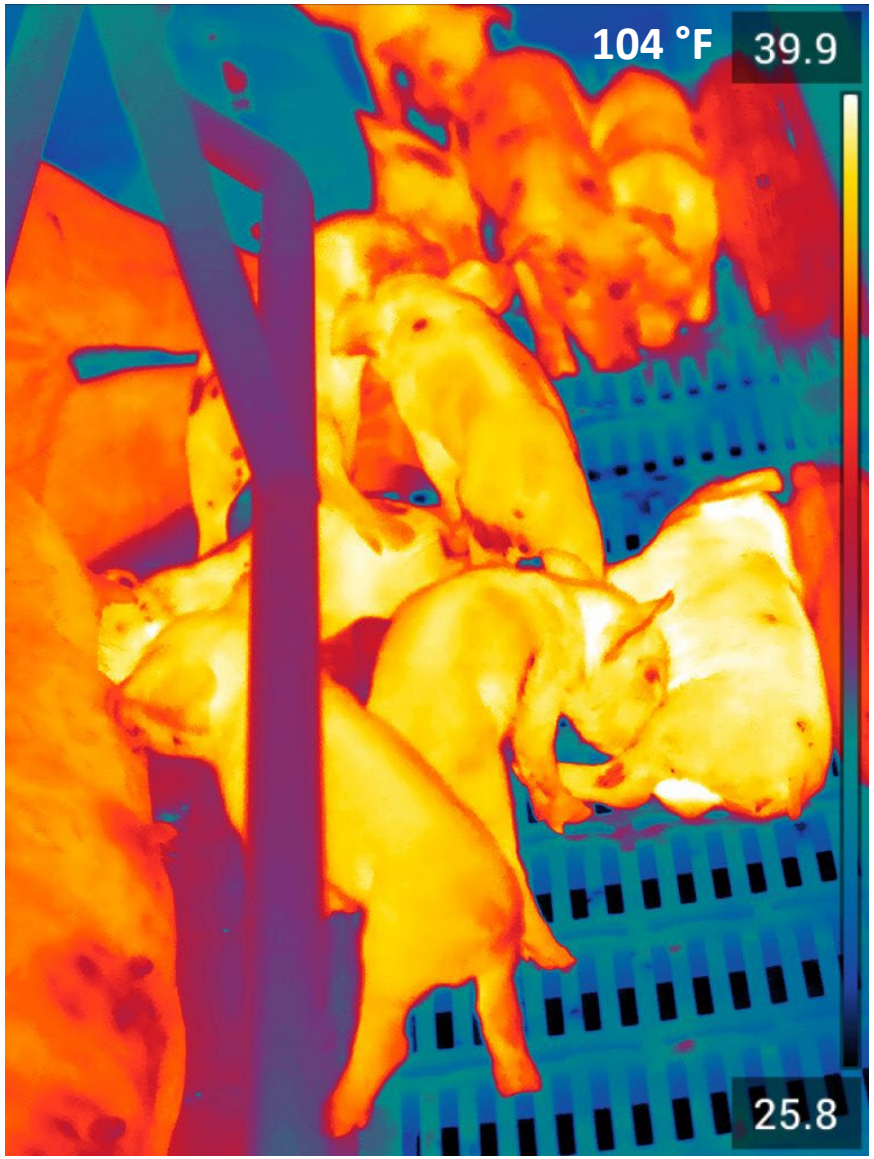

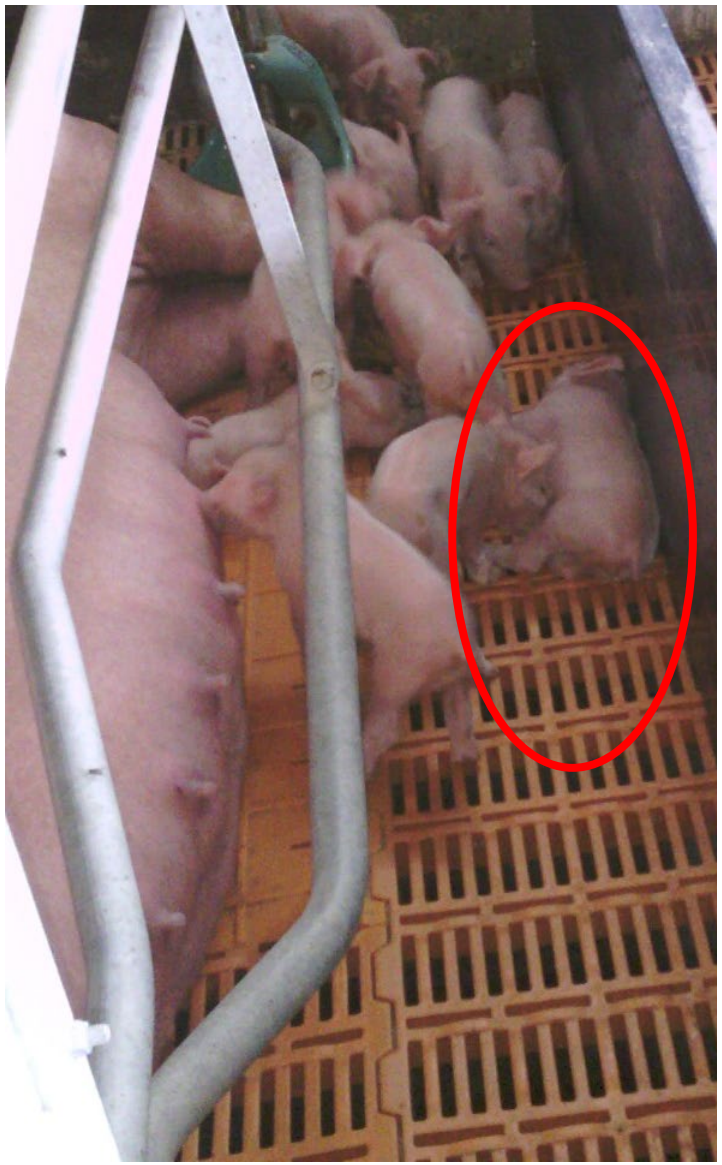

Almeida MC, Steiner AA, Branco LG, Romanovsky AA.
Cold-seeking behavior as a thermoregulatory strategy in systemic inflammation. Eur J Neurosci. 2006

40.1° C =
104.2° F

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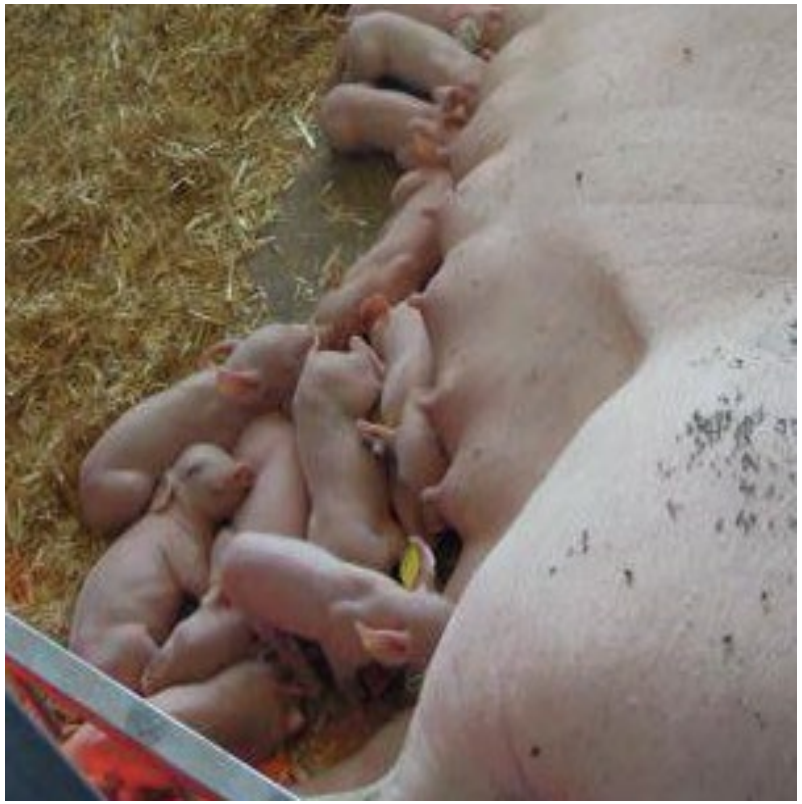

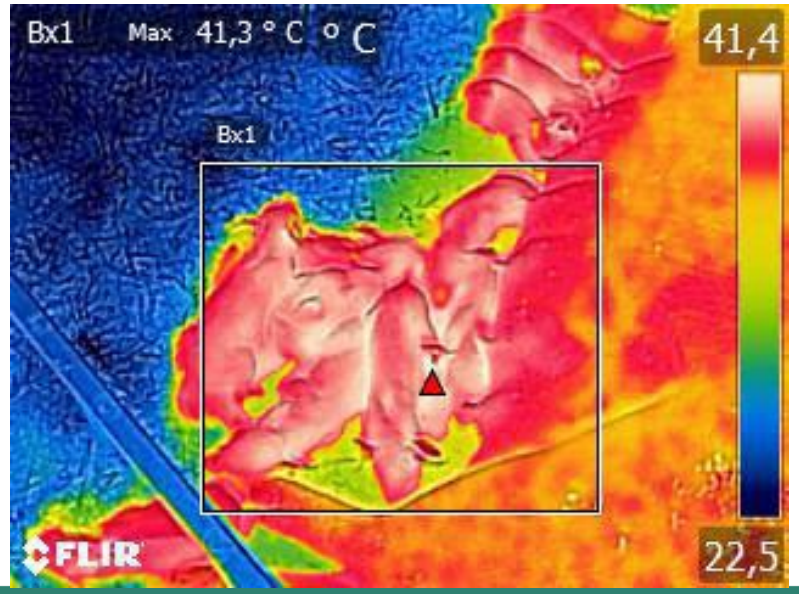
Bx1
Max 41,3 °C °C
41,4
Bx1
FLIR
22,5

https://www.pig333.com/arti...

Clinical case: Abnormal lameness in nursing piglets

6 comments

In March 2021, a high percentage of severe lameness appeared in 12 to 17-day-old piglets, approximately 20% of the piglets present.

S. Damonte

Following

V. Obertino

Following

6 September 2021

Abbildung 3: Klauenverlust bei einem 15 Tage alten Ferkel

Corrective measures

- A broad-spectrum additive based on sequestarnts and enzymes has been introduced in the feed.
- The level of fiber was slightly increased and, above all, its structure was modified by replacing bran for thick bran.
- A peroxide disinfection system was introduced for the drinking water.
- Daily administration of straw (100 g per head per day) was carried out during the gestation phase.

Conclusions

In summary, in light of the compiled elements:

- The presence of clinical lesions and histological picture.
- Mammary lesions and coprostasis observed in sows.

The suspicion of a case of swine inflammatory and necrosis syndrome is confirmed.

Summary of major mycotoxins

Analyte	Value	Unit
Aflatoxin B1	0.40	
Zearalenone	6.57	
Deoxynivalenol	165.00	
T-2 Toxin	3.37	
Fumonisin B1	176.80	
Ochratoxin A	Not detected	
Sum of Ergot alkaloids	79.70	

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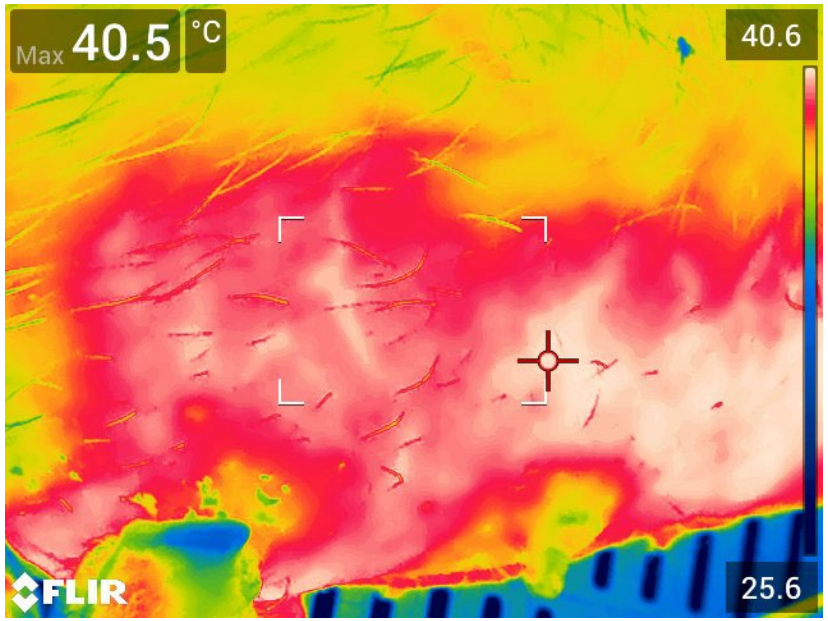
SINS and mycotoxins: The devil meets lucifer...



Role of mycotoxins in herds with and without problems with tail necrosis in neonatal pigs

Tommy Van Limbergen, Mathias Devreese, Siska Croubels, Nathan Broekaert, Annelies Michiels, Sarah De Saeger, Dominiek Maes

FIG 1: First clinical signs of neonatal tail necrosis in a one-day-old piglet

FIG 2: Tail necrosis in a five-week-old piglet

Discussion

The present study showed a high prevalence of tail necrosis in the neonatal pigs from affected herds, namely 47.6 per cent. Different mycotoxins were identified in the feed and plasma of sows and piglets, with DON being the most prevalent one. The former is in accordance with European and global surveys that have investigated the occurrence of mycotoxins in feed and raw materials.[25 26] The concentrations of DON in the sow lactation feed were significantly higher in the case herds than in the control herds.

piglets.[1] Vitality of piglets also improved when sows were artificially inseminated with a boar of a different genetic line. Neonatal tail necrosis remained present, but decreased from 80 per cent to almost 15 per cent when the new piglets were born, suggesting that the occurrence of neonatal tail necrosis is also influenced by multiple non-infectious factors. Mycotoxin analysis of sow gestation feed revealed the presence of deoxynivalenol (DON), T-2 toxin (T-2), HT-2 toxin (HT-2) and enniatin B. All concentrations were below the European maximum guidance

The high prevalence of neonatal tail necrosis in case herds might indicate that a herd factor related, for example, to housing, management, nutrition or water quality is (partly) involved in the occurrence of neonatal tail necrosis. Although no significant differences were found between case herds and control herds, water quality was an important parameter to take along the case-control study as the microbiological and physicochemical characteristics can have a great influence on sow and piglet

Nevertheless, concentrations below the EU maximum guidance value might already have an effect on piglets. A review by Dersjant-Li[36] and others (2003) investigated the impact of low concentrations of DON in diets of growing pigs and concluded that there was already a five per cent reduction in growth rate with a dietary DON concentration of 0.6 mg/kg. The mycotoxin concentration in the feed might be an underestimation of the actual concentration, as sampling is not always easy in mycotoxin

Pig signs comparison: Consultant farm/ case Mirjam Lechner

GERMANY

Tulln, 25. Mrz. 2015

Prüfbericht

Auftragsnummer: 5742

Bestellreferenz:
Auftragseingang: 20.03.2015 Fertigstellungsdatum: 25.03.2015

Probennr.: AT-5742-1

Beschreibung:
Matrix: unbekannt
Zustand: gemahlen, ungekühlt

Gewicht: 1480 g
Verpackung: Kunststoffsack

Prüfverfahren und Ergebnisse

Parameter	Wert	Einheit	NWG	Methode	Artikelnr.
Deoxynivalenol	<250	µg/kg	250	AT-SOP08	RA4000
Zearalenone	<25	µg/kg	25	AT-SOP08	RA5000

Same time, same barn:

Same time, same barn:
Different feed:

Making the World's Food Safer®

ROMER
Romer Labs

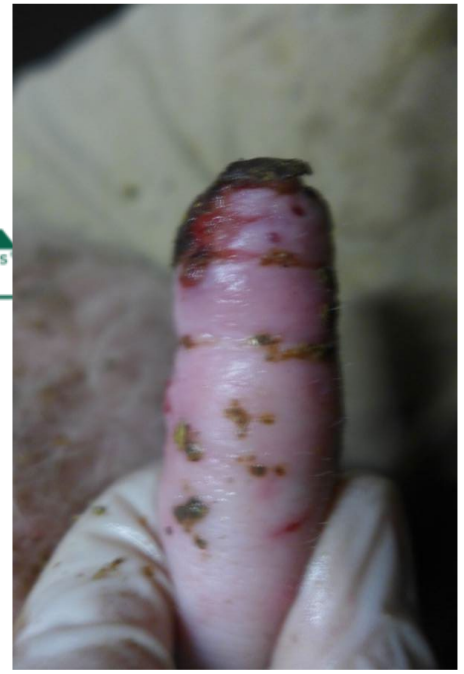
Probennr.: AT-5742-2

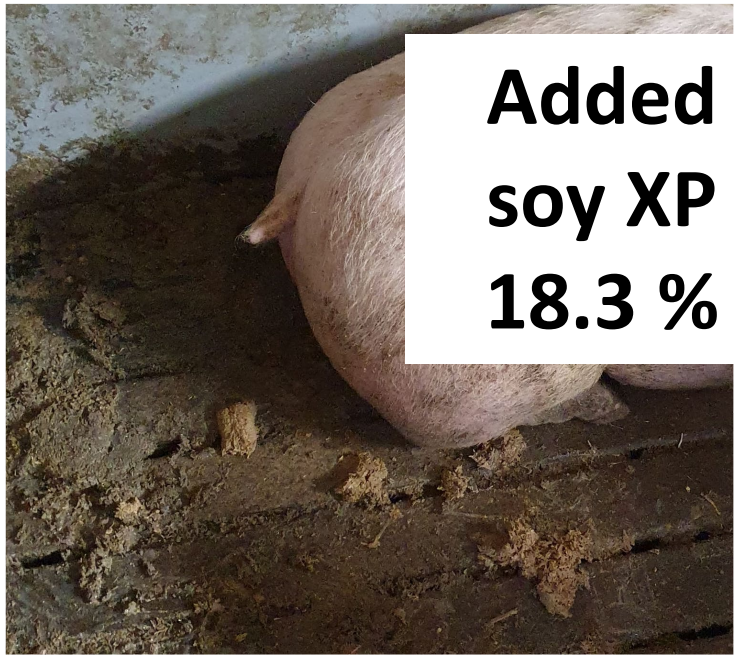
Beschreibung:
Matrix: unbekannt
Zustand: gemahlen, ungekühlt

Gewicht: 1497 g
Verpackung: Kunststoffsack

Prüfverfahren und Ergebnisse

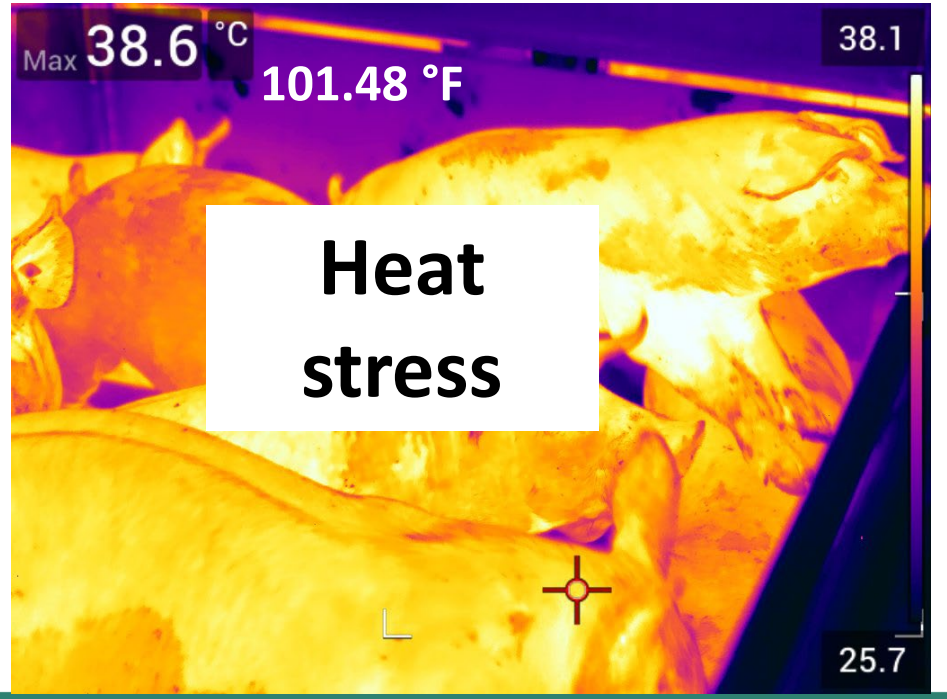
Parameter	Wert	Einheit	NWG	Methode	Artikelnr.
Deoxynivalenol	680	µg/kg	250	AT-SOP08	RA4000
Zearalenone	49	µg/kg	25	AT-SOP08	RA5000





Added soy XP 18.3 %

Mycotoxin load

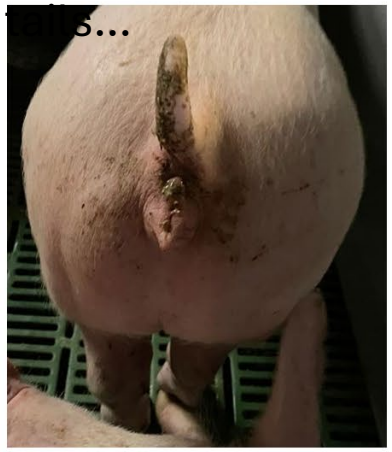


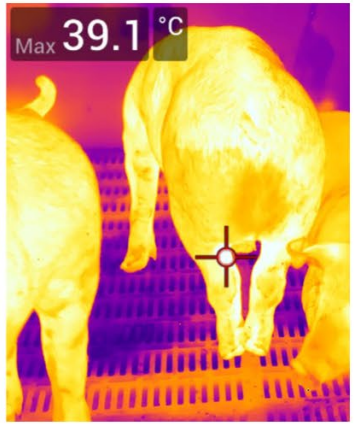
Heat stress

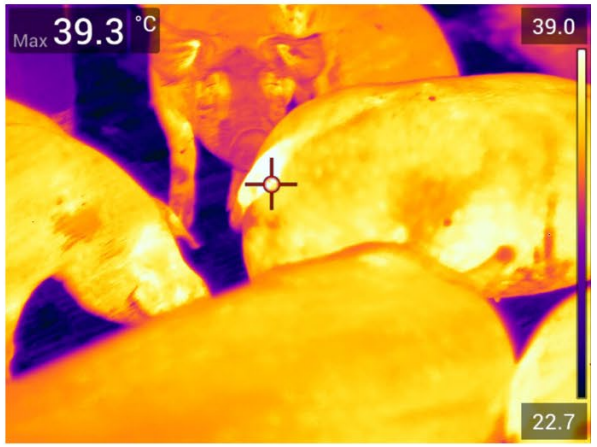
Water lackage

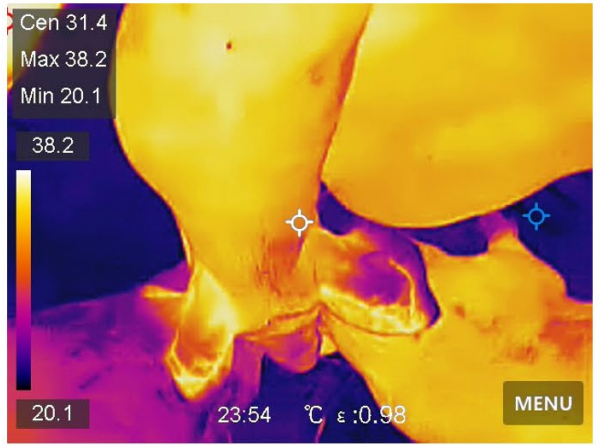
Field case: Austria, BIOMIN Tour 2023

Fattener farm with several & severe problems:
Ear necrosis even in fatteners, fever, lameness, vulva swelling, tail necrosis, even in docked tails…









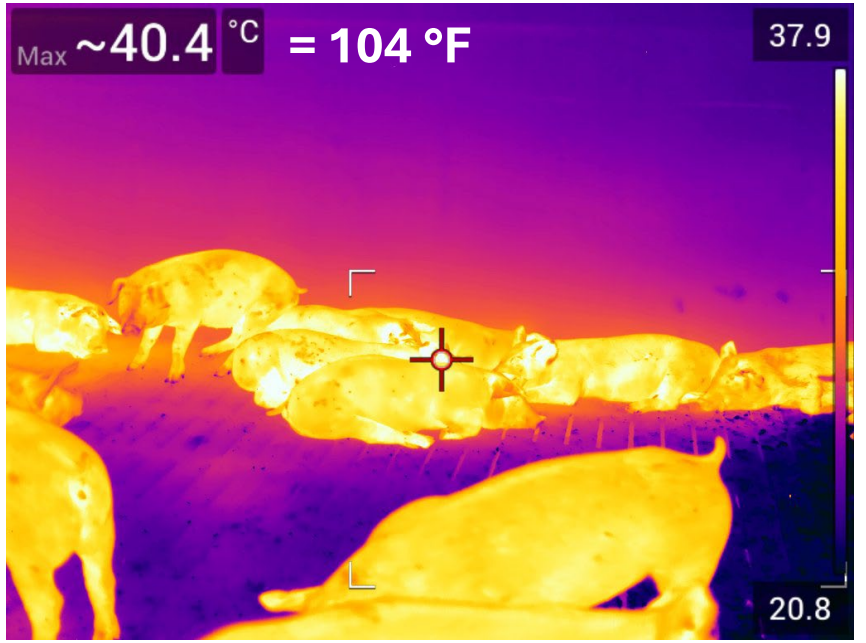
DSM
BRIGHT SCIENCE. BRIGHTER LIVING.
Friday, March 24, 2023

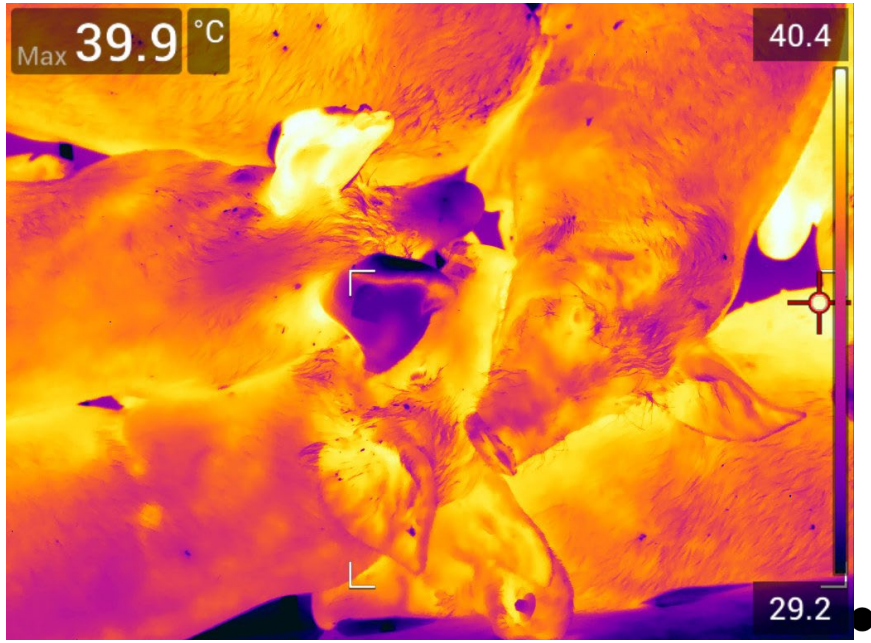
Hauptmykotoxine:

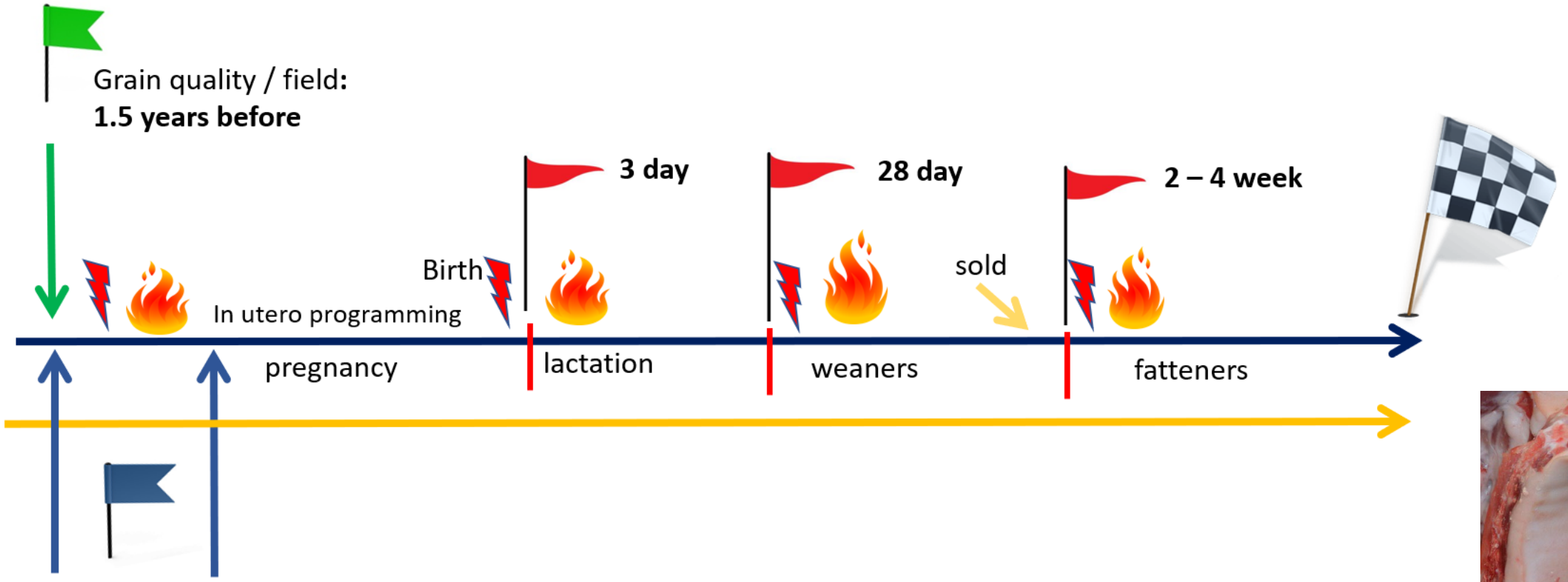
Toxine	Toxinanzahl pro Gruppe	Konzentration (ppb = µg/kg)
A-Trichothecene	2	7.55
B-Trichothecene	4	632.8
Ergotalkaloide	13	457.48
Fumonisine	3	38.21
Zearalenon-metabolite	2	167.87
Aflatoxin B1	-	
Ochratoxin A	-	
Aflatoxine	-	

Ergot alkaloids

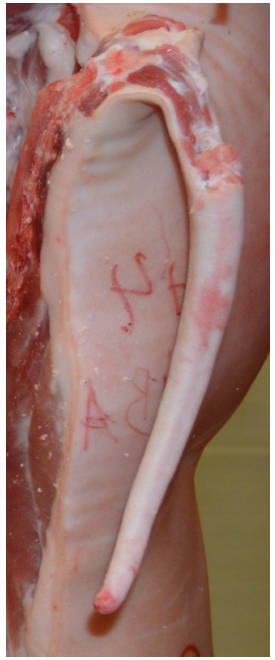
Agroclavine	22.71	µg/kg
Chanoclavin	1.13	µg/kg
Ergocristine	154.53	µg/kg
Ergocristinine	21.68	µg/kg
Ergocryptine	5.03	µg/kg
Ergocryptinine	0.43	µg/kg
Ergometrine	0.03	µg/kg
Ergometrinine	0.07	µg/kg
Ergosin	61.60	µg/kg
Ergosinin	186.15	µg/kg
Ergotamine	0.80	µg/kg
Ergotaminine	3.29	µg/kg
Festuclavine	0.03	µg/kg


Max ~40.4 °C = 104 °F
37.9
20.8


Max 39.9 °C
40.4
29.2



Sow genetic: Boar genetic:
1.5 years insemination
Breeding? **7 - 8 month**



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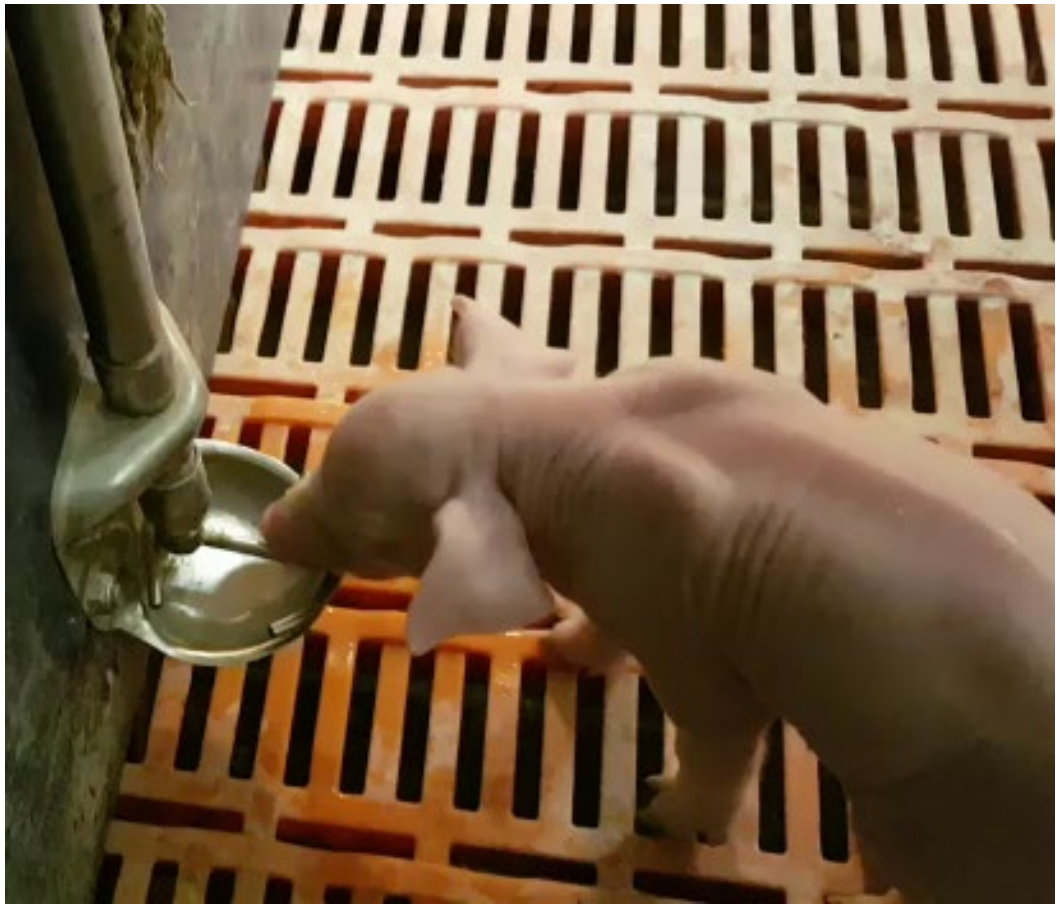
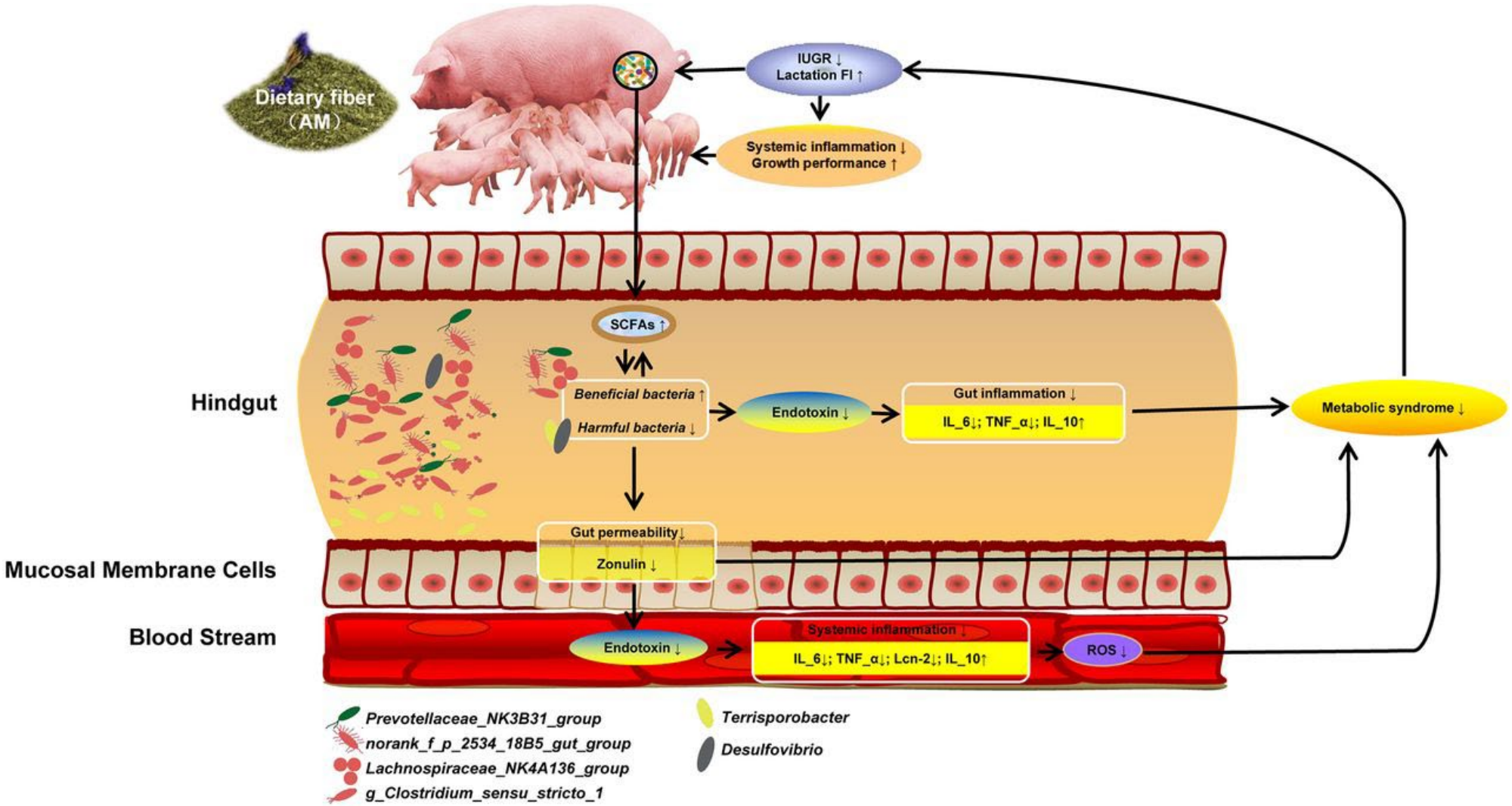
Drinking comfort for sows: How much water is needed?

- Water demand: 3 liters water each kg milk + 15 liter/sow (0.4 gal/lb. milk + 4.0 gal/sow)
- With increasing litter numbers – increasing water demand, up to 58 liters/day each sow (15 gallons/day)
- Fever causes water consumption depression (sickness behaviour)
- A gap of not drinking enough water is no longer being made up
- Problem: Sow needs to stand up to consume water from nipple drinkers: Get clean water down to her!
- Suckling piglets need clean water, too! From day 1 after birth!

Video Mirjam Lechner: Water supply with chlorination AND without biofilms!



Liu, B., ZhuX ,et al., 2021. Consumption of Dietary Fiber from Different Sources during Pregnancy Alters Sow Gut Microbiota and Improves Performance and Reduces Inflammation in Sows and Piglets



- **The addition of 10% alfalfa meal (AM) significantly improved sow and piglet performance and relieved gut and systemic inflammation.**
- **The supplementation with AM significantly increased the relative abundance of anti-inflammatory bacteria and decreased that of proinflammatory bacteria.**

FIG 6 Systematic analysis of the effects of alfalfa meal diet on growth performance, inflammatory indexes, gut microbiota, and SCFAs of sows and piglets.

Solutions

- Look for signs and symptoms
- Feed quality and mycotoxin mitigation
- Water quality, quantity, delivery systems
  - Wells, holding tanks, water lines
- Gut health focus
- Fiber
- Genetic selection
- Medical treatment

Prevention and Management

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The relation between play behaviour and growth rate in piglets across weaning

Mona Lilian Vestbjerg Larsen[1], Lene Juul Pedersen[2], Ida Højgaard Kristoffersen[2], Jeanet Winters[2], Tomas Norton[1] and Margit Bak Jensen[2]

[1]KU Leuven, Department of Biosystems, Kasteelpark Arenberg 30, 3001 Leuven, Belgium, [2]Aarhus University, Department of Animal Science, Blichers Allé 20, 8830 Tjele, Denmark; monalilianvestbjerg.larsen@kuleuven.be

Schweinshaxe which is the German Roast Pork with Crackling skin.

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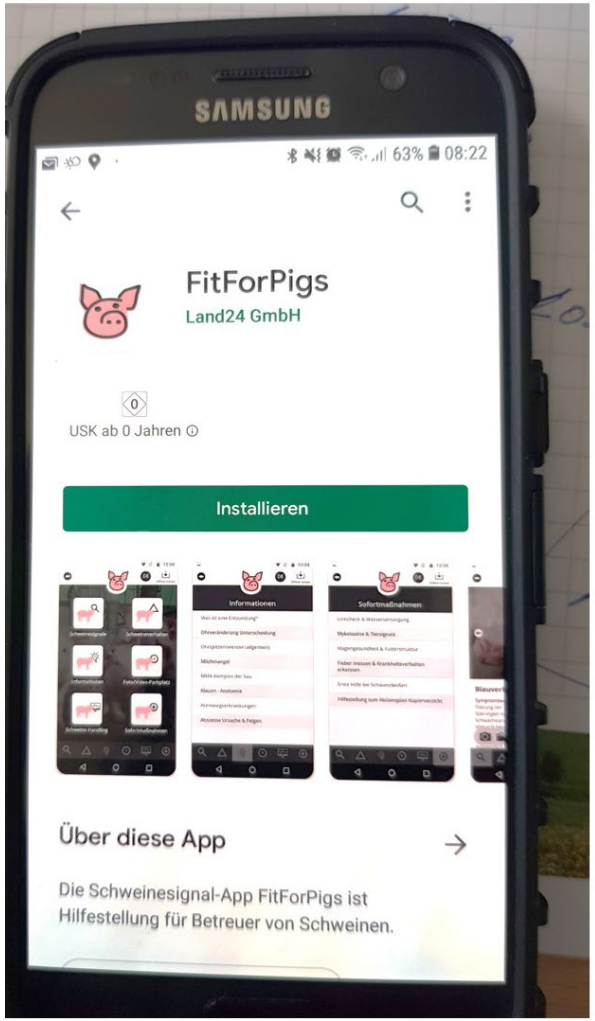

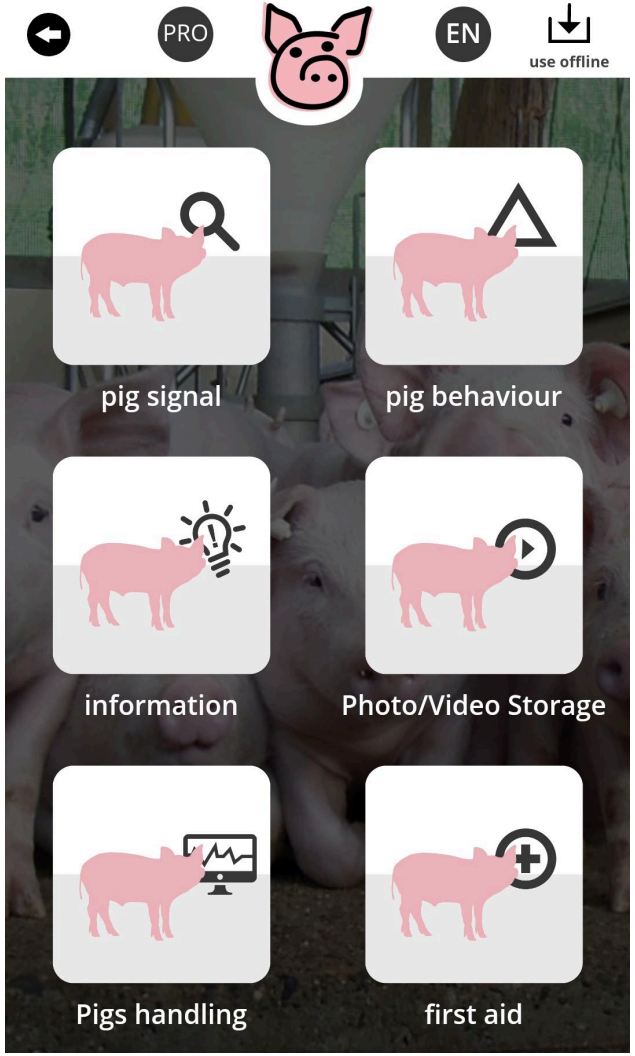

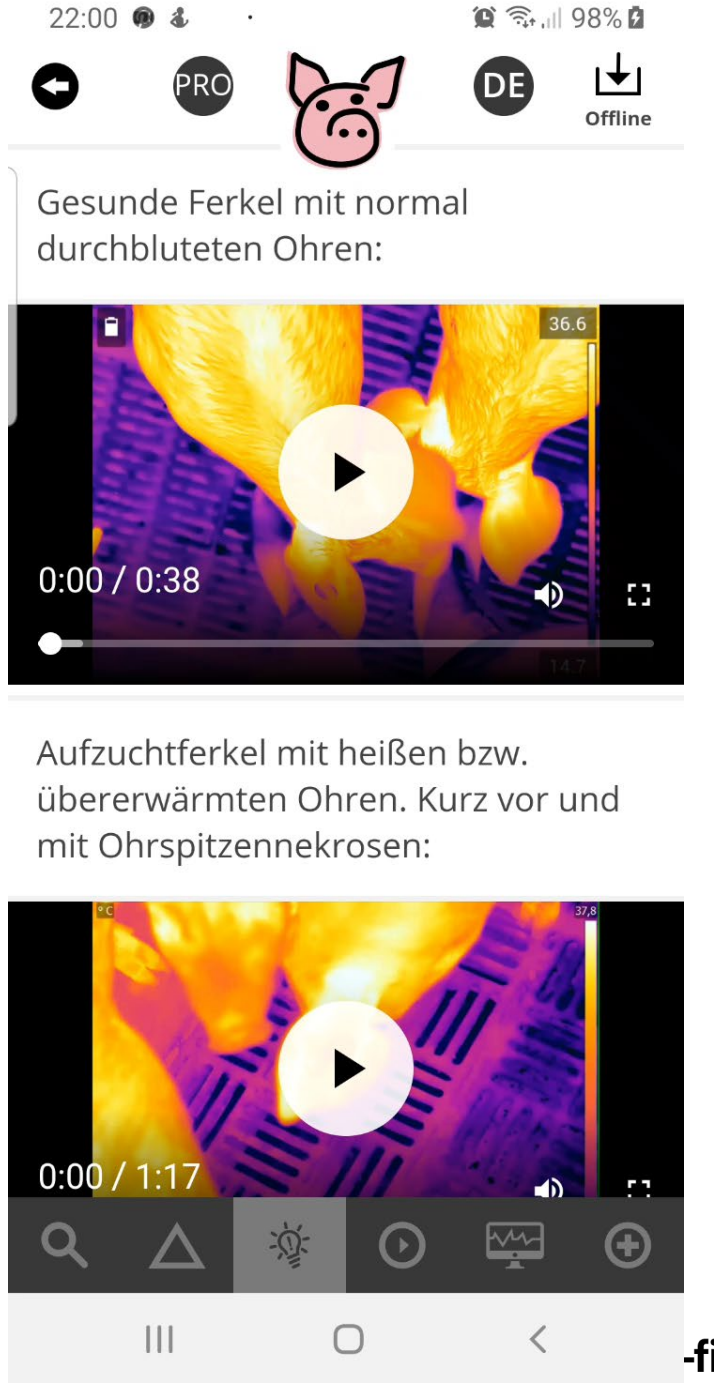

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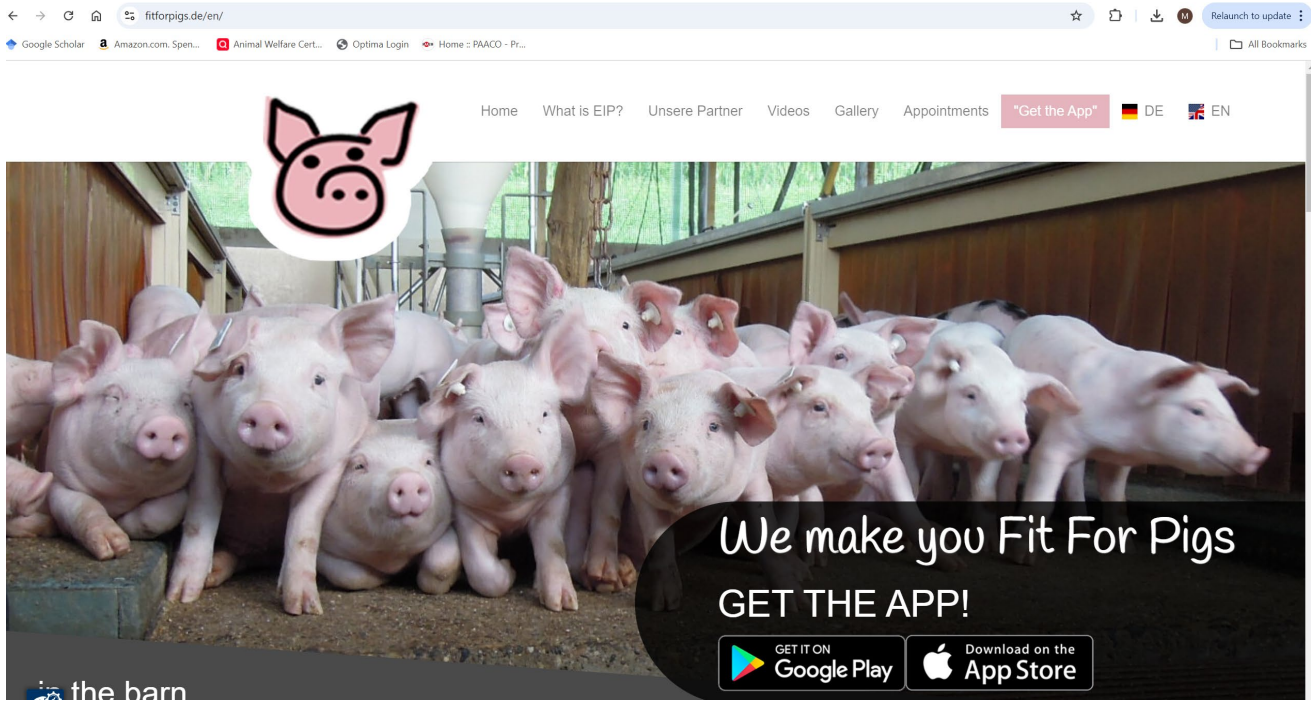

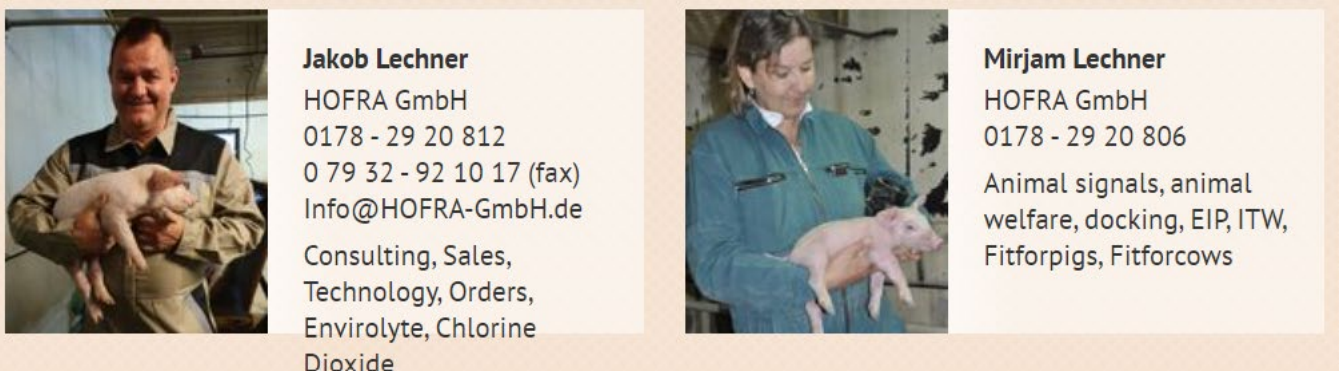

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