



Effetti del microclima su performance e benessere dei suini

OIE TRAINING WORKSHOP

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SUMMARY

01. HOW TO DEFINE WELFARE?

02. ENVIRONMENTAL CONDITIONS
AND WELFARE

04. CONCLUSIONS ??



ANIMAL WELFARE AND SUSTAINABILITY



SUSTAINABLE DEVELOPMENT GOALS



ANIMAL WELFARE INCLUDED

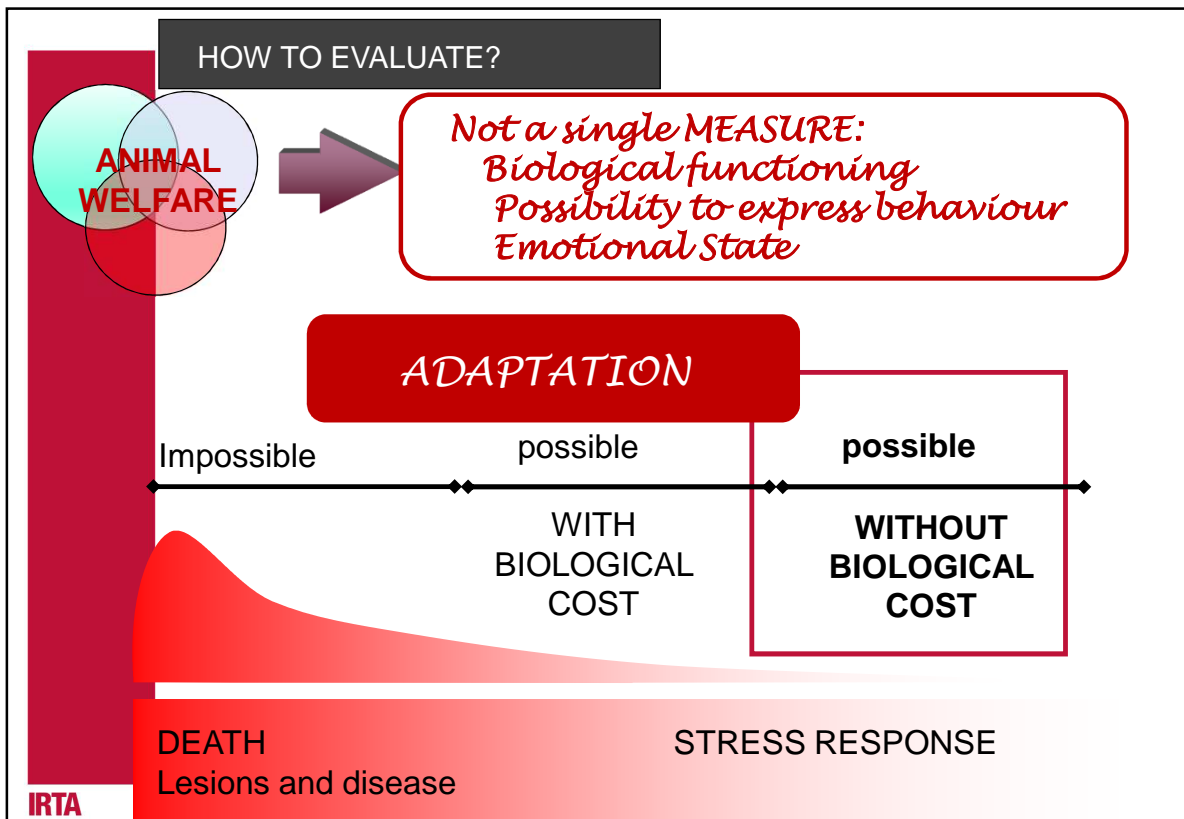
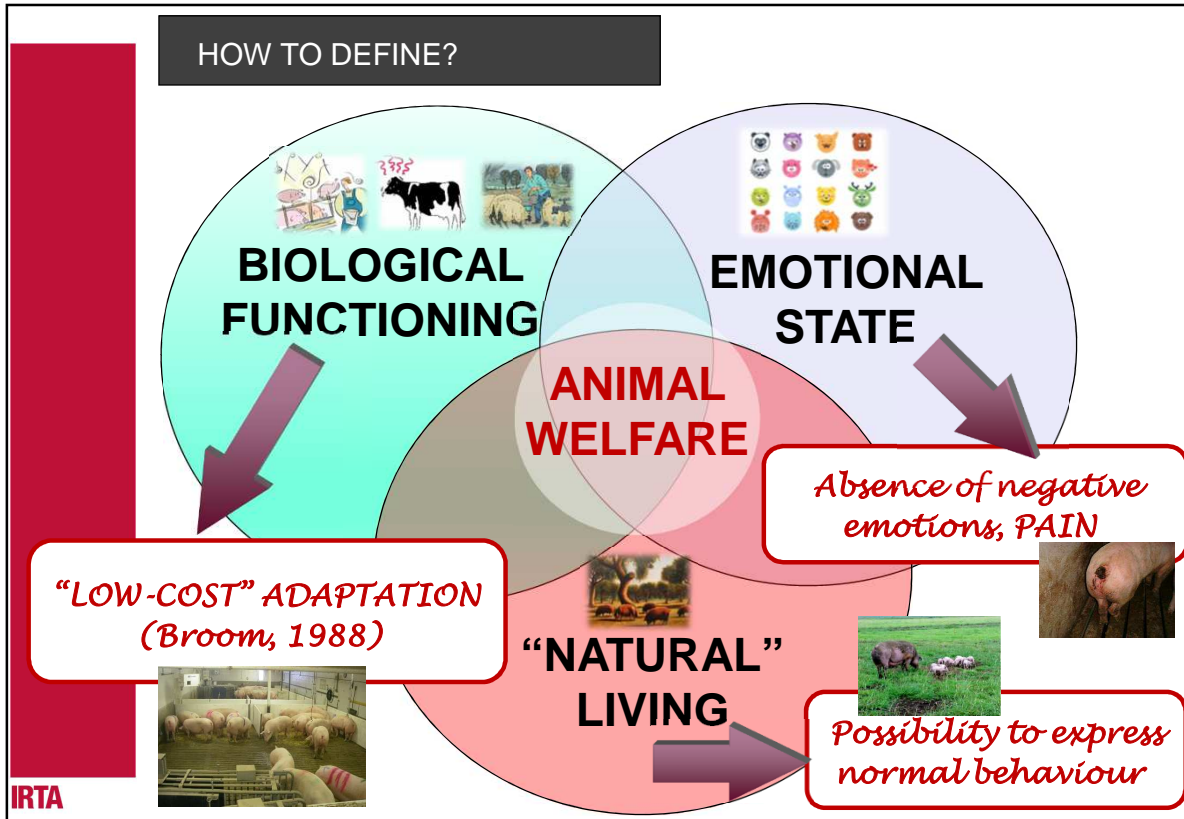
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ANIMAL WELFARE AND SUSTAINABILITY



RECOGNISING THAT ANIMAL WELFARE, BIODIVERSITY AND THE ENVIRONMENT ARE CONNECTED TO HUMAN WELLBEING

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WELFARE QUALITY®

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4 PRINCIPLES	12 CRITERIA	PARAMETERS
GOOD FEEDING	Absence of prolonged hunger	Body condition score
	Absence of prolonged thirst	Water supply
GOOD HOUSING	Comfort around resting	Bursitis, Manure on the body
	Thermal comfort	Shivering, Panting, Huddling Temperature
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GOOD HEALTH	Absence of injuries	Wounds, Lameness, Tail biting
	Absence of disease	Respiratory and enteric problems Skin condition, Hernias Criteria of euthanasia
	Absence of pain induced by management procedures	Castration Tail docking
APPROPRIATE BEHAVIOUR	Expression of social behaviour	Positive & Negative social behaviour
	Expression of other behaviours	Exploratory behaviour
	Good Human-Animal relationship	Human-animal relationship test
	Positive emotional state	Qualitative Behaviours Assessment



Welfare Quality **NEN**



Welfare Quality **NEN**




Welfare Quality **NEN**





**Do you know the Welfair™
certificate of Animal Welfare?**



www.animalwelfare.com

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ANIMAL WELFARE AND HOUSING CONDITIONS

= GENETICS

= FEEDING

	WITH Controlled and Ventilation and Temperature	WITHOUT Controlled Ventilation and Temperature
Date of birth	07/01/00	07/01/00
Date of slaughter	26/06/00	24/07/00
AGE AT 105 kg	172	200

Average Feed
Consumption 90-105Kg:
3% PV (2.5-3kg)

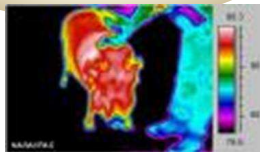


(Fàbrega unpublished results)

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HOUSING CONDITIONS

TEMPERATURE
/RELATIVE HUMIDITY



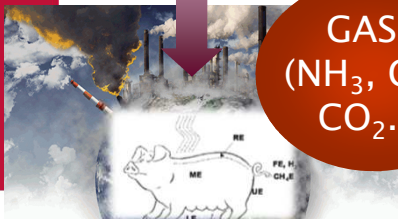
ENRICHMENT
MATERIAL/FLOOR
TYPE



AIR
QUALITY



GASES
(NH₃, CH₄,
CO₂...)



DUST (PM)



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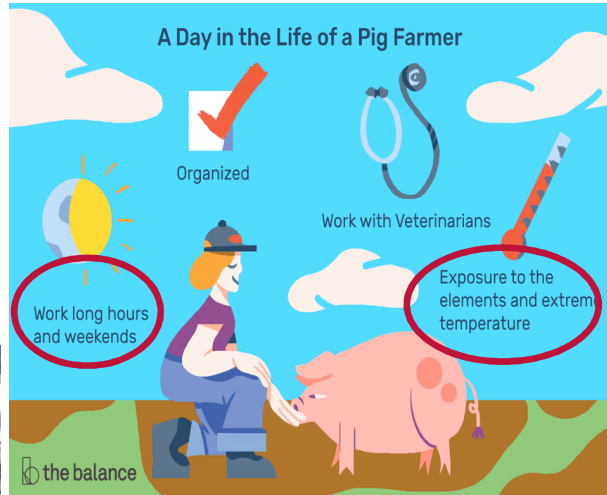
EFFECT OF PIG FARM AIR QUALITY ON HUMAN HEALTH

>50% of workers of the pig industry have **respiratory problems**

(Reynolds et al. 1996)



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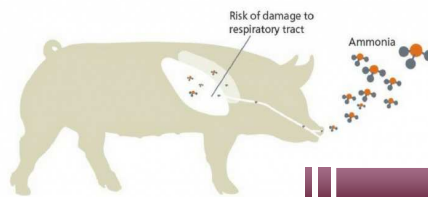


<https://www.thebalancecareers.com/pig-farmer-125879>

EFFECT OF PIG FARM AIR QUALITY ON PIG HEALTH

AIR QUALITY

HEALTH,
RESPIRATORY
PROBLEMS



INCREASED
RISK

DUST (PM) POSITIVELY ASSOCIATED WITH PNEUMONIA AND PLEUROSITY

NH₃ POSITIVELY ASSOCIATED WITH PLEUROSITY

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(Michiels et al., 2015)

EFFECT OF PIG FARM AIR QUALITY ON PIG PERFORMANCE

AIR QUALITY

PERFORMANCE INDICATORS

ENZOOTIC PNEUMONIA



(Straw et al., 1989; Meyns et al., 2011)

PARAMETER	PNEUMONIA (Mycoplasma)	PLEUROPNEUMONIA
LIVE WEIGHT GAIN	17 %	34 %
FEED CONVERSION	14 %	26 %

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EFFECT OF PIG FARM AIR QUALITY ON PIG PERFORMANCE

AIR QUALITY

PERFORMANCE INDICATORS



Weaned piglets exposed to 5.5 weeks to airborne dust and ammonia

Inhalable **DUST** concentrations of >5.1 or 9.9 mg/m^3 across **AMMONIA** concentrations up to 37 p.p.m...

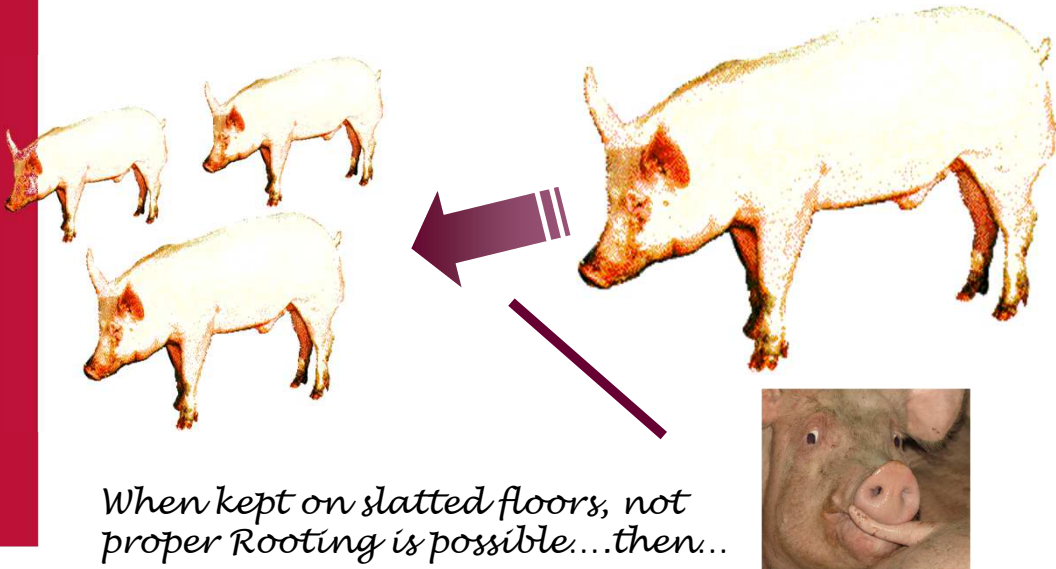
LIVE WEIGHT GAIN (REDUCED FEED CONSUMPTION??)

(Whates et al., 2004)

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AIR QUALITY AS A RISK FACTOR FOR TAIL BITING

REDIRECTED BEHAVIOUR

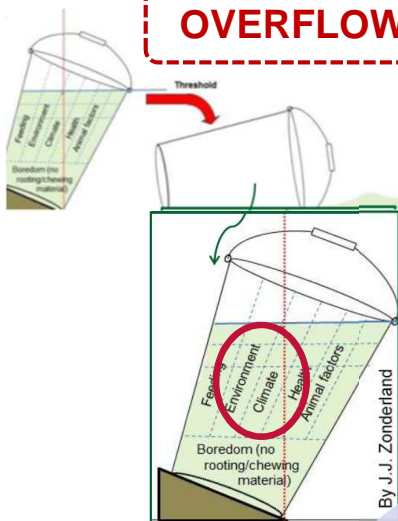


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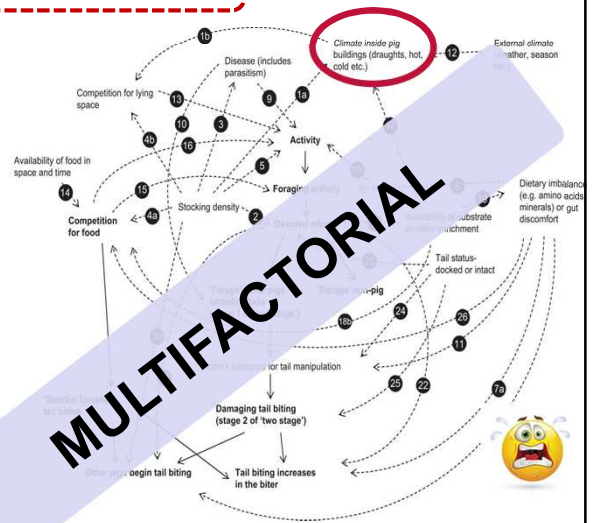
WHY PIGS PERFORM TAIL-BITING?

HOWEVER...

OVERFLOWING BUCKET



(Camerlink, 2017; from Zonderland)



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AIR QUALITY AS A RISK FACTOR FOR TAIL BITING

(Scollo et al., 2016)

Table 3
Univariate analysis of the prevalence of different risk factors for farms showing at least one tail lesion (TB %) in weaning and fattening herds.

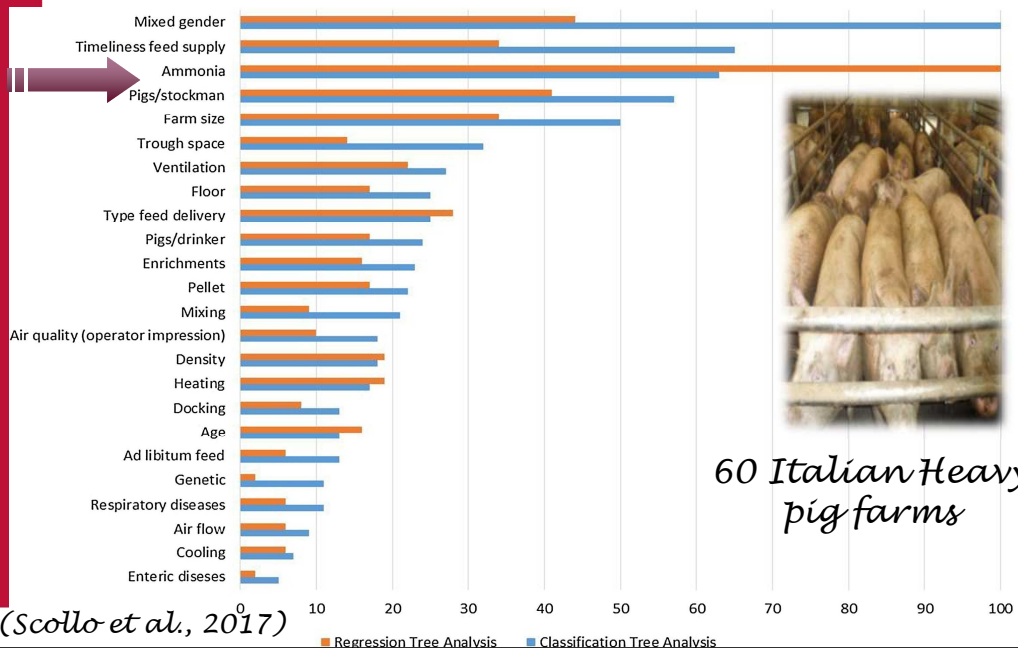
Variable	Category	Weaning sites			Fattening sites				
		n (%) ^a	TB %	<i>z</i> ²	<i>P</i>	n (%) ^a	TB %	<i>z</i> ²	<i>P</i>
Management and health									
Single-sex pens	Yes	22 (56.4)	22.7	0.003	0.953	6 (21.4)	50.0	1.718	0.189
	No	17 (43.6)	23.5			22 (78.6)	22.7		
Tail length	Tipped	11 (28.2)	45.4	4.322	0.038	7 (25.0)	28.6	0.001	0.999
	Short-dock	28 (71.8)	14.3						
Grouping by sorting weight	Yes	20 (51.3)	10.0	3.955	0.047				
	No	19 (48.7)	36.8						
Environmental enrichments	Absence	22 (56.4)	18.2	0.681	0.409				
	Presence	17 (43.6)	29.4						
Stocking density	High	6 (15.8)	50.0	2.730	0.098				
	Sufficient	32 (84.2)	18.7						
Respiratory disease	Yes	6 (15.4)	50.0	2.895	0.088				
	No	33 (84.6)	18.2						
Enteric disease	Yes	9 (23.0)	22.2	0.005	0.945				
	No	30 (76.9)	23.3						
Structure and environment									
Floor type	Slatted	33 (86.8)	24.2	0.043	0.835				
	Solid	5 (13.2)	20.2						
Cooling systems	Presence	16 (41.0)	31.2	1.021	0.312				
	Absence	23 (59.0)	17.4						
Ventilation	Artificial	32 (84.2)	25.0	0.194	0.659				
	Natural	6 (15.8)	16.7						
Ammonia levels	High	5 (13.9)	60.0	4.794	0.029				
	Low	31 (86.1)	16.1						
CO ₂ levels	High	18 (58.1)	22.2	0.003	0.955				
	Low	13 (41.9)	23.1						
Perception of mucosal irritation for adverse air quality	Yes	4 (10.5)	75.0	6.513	0.011				
	No	34 (89.5)	17.6						
Perception of air turnover	Yes	29 (76.3)	24.1	0.014	0.907				
	No	9 (23.7)	22.2						
Nutrition and feed provision									
Feed dispensing system	Manual	13 (33.3)	30.7	0.650	0.420				
	Automated	26 (66.6)	19.2						
Timeliness in feed supply	Reliable	32 (82.0)	15.6	5.577	0.018				
	Changeable	7 (17.9)	57.1						
Pelleted feed	Yes	19 (48.7)	26.3	0.219	0.639				
	No	20 (51.3)	20.0						
Ad libitum feed	Yes	33 (84.6)	27.3	NE	NE				
	No	6 (15.4)	0.00						
Feeders in the lying area	Yes	25 (65.8)	28.0	0.753	0.385				
	No	13 (34.2)	15.4						
Drinkers in the lying area	No	20 (52.6)	15.0	1.762	0.184				
	Yes	18 (47.4)	33.3						
Sodium provision	Imbalanced	6 (22.2)	16.7	0.018	0.895				
	Adequate	21 (77.8)	19.0			8 (50.0)	12.5		
Lysine provision	Insufficient	25 (86.2)	24.0	NE	NE	9 (50.0)	33.3	1.286	0.257
	Adequate	4 (13.8)	0.00			9 (50.0)	11.1		



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AIR QUALITY AS A RISK FACTOR FOR TAIL BITING: PARMA PIG PRODUCTION

RELATIVE IMPORTANCE OF RISK FACTORS FOR TAIL BITING



60 Italian Heavy pig farms

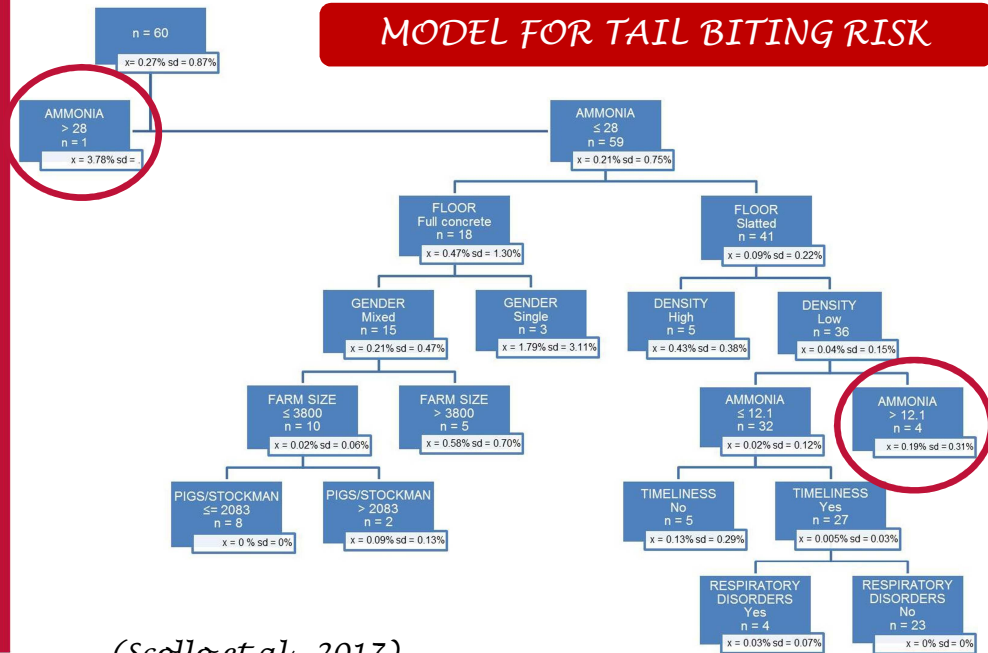
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(Scollo et al., 2017)

Regression Tree Analysis Classification Tree Analysis

AIR QUALITY AS A RISK FACTOR FOR TAIL BITING






MODEL FOR TAIL BITING RISK



(Scollo et al., 2017)

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SO, IN THE MEGA LIFE PROJECT...WELFARE PARAMETERS

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GOOD HOUSING MANURE ON THE BODY



0



1



2

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SO, IN THE MEGA LIFE PROJECT...WELFARE PARAMETERS

**PERFORMANCE
(WEIGHT..ADG)**

**HEALTH, CLINICAL
MEASURES**

**CARCASS
CONDEMNATIONS**

Condition score of swine

Score	Condition	Body Shape
1	Emaciated	Hips, backbone prominent to eye
2	Thin	Hips, backbone easily felt without applying palm pressure
3	Ideal	Hips, backbone felt only with firm palm pressure
4	Fat	Hips, backbone cannot be felt
5	Overfat	Hips, backbone heavily covered

(Patience and Thacker, 1989.)

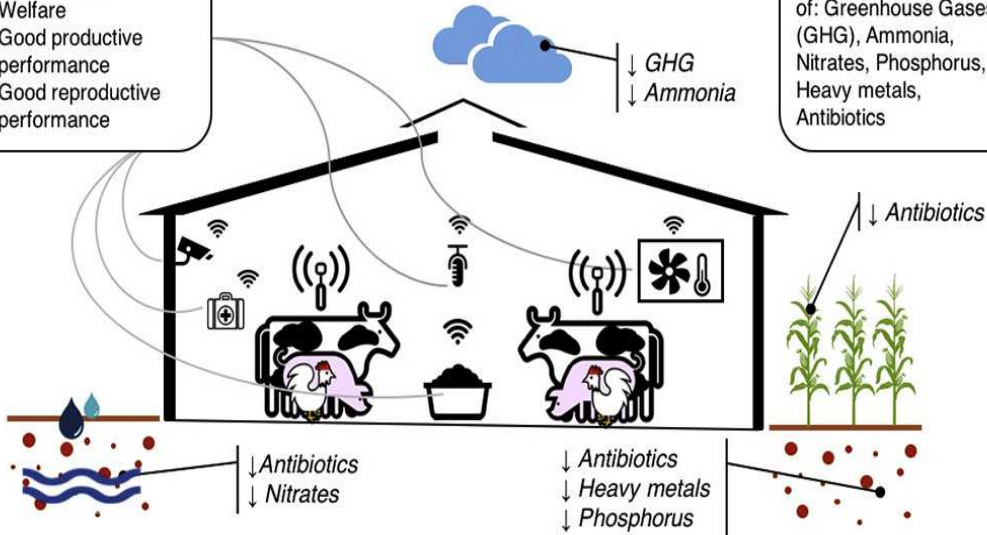


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SUSTAINABILITY AND PRECISION FARMING: ANIMAL WELFARE AND AIR QUALITY

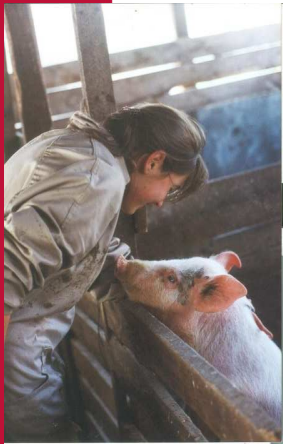
- PLF sensors to obtain:
- Good health
 - Welfare
 - Good productive performance
 - Good reproductive performance

PLF potentially reduces environmental releases of: Greenhouse Gases (GHG), Ammonia, Nitrates, Phosphorus, Heavy metals, Antibiotics



(Environmental impact of livestock farming and Precision Livestock Farming as a mitigation strategy *Graphical Abstract from: Tullo et al., 2019*)

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GRAZIE MILLE

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**MANY THANKS FOR
ATTENTION!!**

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