

Integrative Sustainability Analysis of European Pig Farms: Development of a Multi Criteria Assessment Tool

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Supplementary Material Table S1: Allocated weights of sub-themes within themes and the number of indicators per subtheme for the economic dimension and the three farm types.

Economy	Breeding farms		Finishing farms		Breeding-to-finishing farms	
	Weight	N indicators	Weight	N indicators	Weight	N indicators
ECO1: Technical efficiency						
Feed Efficiency	-	-	0.54	1	0.38	1
Reproductive Efficiency	0.48	6	-	-	0.30	6
Health Management	0.52	4	0.46	4	0.32	-
ECO2: Economic resilience						
Entrepreneurship*	-	-	-	-	-	-
Profitability*	-	-	-	-	-	-
Risk Management	0.57	1	0.57	1	0.57	2
Labour Productivity	0.43	3	0.43	3	0.43	3
Resilience of Resources*	-	-	-	-	-	-

N = number. *Excluded from the present study due to the data availability issues. For complete economic protocol see : Malak-Rawlikowska, A.; Gębska, M.; Hoste, R.; Leeb, C.; Montanari, C.; Wallace, M.; de Roest, K. Developing a Methodology for Aggregated Assessment of the Economic Sustainability of Pig Farms. *Energies* 2021, 14, doi:10.3390/en14061760.

Supplementary Material Table S2: Allocated weights of sub-themes within themes and the number of indicators per subtheme for the environmental dimension. Weights were the same across all farm types.

Environment	All farms	
	Weights	N indicators
ENV1: Atmosphere		
Greenhouse gas emissions	0.50	15
Air quality	0.50	8
ENV2: Water		
Water Withdrawal	0.50	6
Water Quality	0.50	18
ENV3: Soil		
Soil Quality	0.50	19
Land Degradation	0.50	16
ENV4: Biodiversity		
Ecosystem Diversity	0.33	17
Species Diversity	0.33	16
Genetic Diversity	0.33	6
ENV5: Material & Energy		
Material use	0.33	14
Energy use	0.33	16
Waste Reduction	0.33	3

N = number

Supplementary Material Table S3: Allocated weights of sub-themes within themes and the number of indicators per subtheme for the social dimension. Weights were the same across all farm types.

Social wellbeing	All farms	
	Weights	N indicators
SOC1: Decent Livelihoods		
Quality of life	0.45	11
Succession	0.15	1
Capacity Building	0.15	3
Fair access to means of production	0.25	4
SOC2: Fair Trading Practices		
Responsible buyers	0.50	2
Right of suppliers	0.50	2
SOC3: Labour Rights		
Employment relations	0.70	2
Child labour	0.30	2
SOC4: Equality, non-discrimination, gender equality, vulnerable groups		
Non-discrimination	0.45	3
Gender equality	0.30	1
Vulnerable groups	0.25	1
SOC5: Human health & safety		
Safety and health training/safety at workplace	1.00	4
SOC6: Good governance		
(Negative) Impact on society and environment	0.50	3
Positive contribution	0.50	3

N = number

Supplementary Material Table S4: Allocated weights of sub-themes within themes and the number of indicators per subtheme for the animal health and welfare dimension. Weights were distinguished for farm type and farms with and without pasture access as well as mixed systems.

Animal health and welfare	Breeding farms		Finishing farms		Breeding-to-finishing farms	
	Weights	N indicators	Weights	N indicators	Weights	N indicators
AHW1: Absence of hunger and thirst						
Clinical findings	0.29	3	-	-	0.29	3
Feeding system*	-	-	-	-	-	-
Water provision	0.29	5	0.67	4	0.29	5
Roughage	0.14	1	0.33	1	0.14	1
Management	0.29	3	-	-	0.29	3
AHW2: Pig comfort						
Clinical findings	0.12	4	0.16	2	0.12	4
Creep area	0.12	1	-	-	0.12	1
Floor quality	0.19	5	0.25	5	0.19	5
Space allowance	0.20	2	0.27	2	0.20	2
Hospitalisation	0.12	1	0.16	1	0.12	1
Husbandry system	0.12	2	-	-	0.12	2
Treatments	0.12	2	0.16	1	0.12	2
Slaughter remarks*	-	-	-	-	-	-
AHW3: Absence of injuries and disease						
Biosecurity	0.14	3	0.14	2	0.14	3
Clinical findings	0.29	11	0.29	7	0.29	11
Hospitalisation	0.14	2	0.14	2	0.14	2
Mortality	0.29	1	0.29	1	0.29	1
Treatments	0.14	4	0.14	2	0.14	4
Slaughter remarks*	-	-	-	-	-	-
AHW4: Absence of pain by management						
Clinical findings	0.30	5	0.40	4	0.30	5
Hospitalisation	0.20	1	0.27	1	0.20	1
Mutilations	0.25	3	0.33	1	0.25	3
Castration	0.25	2	-	-	0.25	2
AHW5: Possibility to perform appropriate behaviour						
Behaviour	0.21	4	0.27	4	0.21	4
Clinical findings	0.12	6	0.15	5	0.12	6
Enrichment	0.17	5	0.22	4	0.17	5
Pasture	0.12	3	0.15	3	0.12	3
Space allowance	0.17	2	0.22	2	0.17	2
Restricted normal behaviour	0.22	6	-	-	0.22	6
Slaughter remarks*	-	-	-	-	-	-
AHW6: Good human-animal relationship						
Negative characteristics	0.30	2	0.30	2	0.30	2
One welfare	0.30	2	0.30	2	0.30	2
Positive characteristics	0.40	4	0.40	4	0.40	4

N = number. *Excluded from the present study due to the data availability issues.

Supplementary Material Table S5: Economical sustainability performance (min, median, max) of breeding, finishing and breeding-to-finishing farms on sub-theme level.

	Breeding farms			Finishing farms			Breeding-to-finishing farms		
	Min	M	Max	Min	M	Max	Min	M	Max
Number of farms		13			23			27	
ECO1: Technical efficiency									
Feed Efficiency	.	.	.	0	49	100	0	56	100
Reproductive Efficiency	32	46	56	.	.	.	14	35	64
Health Management	25	57	100	18	80	100	14	64	98
ECO2: Economic resilience									
Risk Management	0	40	100	0	89	100	0	67	100
Labour Productivity	0	18	59	0	22	100	0	6	70
Entrepreneurship*	-	-	-	-	-	-	-	-	-
Profitability*	-	-	-	-	-	-	-	-	-
Resilience of Resources*	-	-	-	-	-	-	-	-	-

*Excluded from the present study due to the data availability issues.

Supplementary Material Table S6: Environmental sustainability performance (min, median, max) of breeding, finishing and breeding-to-finishing farms on theme and sub-theme level.

	Breeding farms			Finishing farms			Breeding-to-finishing farms		
	Min	M	Max	Min	M	Max	Min	M	Max
Number of farms		13			23			27	
ENV1: Atmosphere									
Greenhouse gas emissions	43	57	68	30	51	82	34	59	71
Air quality	29	51	81	23	43	86	18	50	92
ENV2: Water									
Water Withdrawal	67	100	100	67	84	100	42	100	100
Water Quality	50	66	71	51	66	81	49	62	77
ENV3: Soil									
Soil Quality	35	54	66	30	54	73	20	50	73
Land Degradation	43	64	77	47	63	83	41	61	85
ENV4: Biodiversity									
Ecosystem Diversity	49	58	68	42	58	83	42	56	73
Species Diversity	47	51	65	35	51	77	34	45	68
Genetic Diversity	7	27	81	5	27	64	1	25	68
ENV5: Material & Energy									
Material use	44	71	81	33	67	79	31	67	89
Energy use	32	48	60	20	50	84	34	57	84
Waste Reduction	83	87	98	80	87	100	72	85	100

Supplementary Material Table S7: Social sustainability performance (min, median, max) of breeding, finishing and breeding-to-finishing farms on theme and sub-theme level.

	Breeding farms			Finishing farms			Breeding-to-finishing farms		
	Min	M	Max	Min	M	Max	Min	M	Max
Number of farms		13			23			27	
SOC1: Decent Livelihoods									
Quality of life	37	62	83	34	64	82	44	70	81
Succession	0	100	100	0	100	100	0	100	100
Capacity Building	0	60	100	40	75	100	13	75	100
Fair access to means of production	31	56	100	44	75	100	25	69	100
SOC2: Fair Trading Practices									
Responsible buyers	0	55	85	15	70	100	15	55	100
Right of suppliers	0	50	88	0	63	100	0	38	75
SOC3: Labour Rights									
Employment relations	40	100	100	40	100	100	40	100	100
Child labour	30	100	100	23	100	100	15	100	100
SOC4: Equality, non-discrimination, gender equality, vulnerable groups									
Non-discrimination	0	50	100	25	50	100	0	75	100
Gender equality	0	75	100	0	50	100	0	100	100
Vulnerable groups	100	100	100	100	100	100	100	100	100
SOC5: Human health & safety									
Safety and health training at workplace	56	88	100	63	91	100	38	91	100
SOC6: Good governance									
(Negative) Impact on society and environment	65	80	100	30	85	100	65	80	100
Positive contribution	8	68	100	9	66	93	24	59	100

Supplementary Material Table S8: Animal health and welfare sustainability performance (min, median, max) of breeding, finishing and breeding-to-finishing farms on theme and sub-theme level.

	Breeding farms			Finishing farms			Breeding-to-finishing farms		
	Min	M	Max	Min	M	Max	Min	M	Max
Number of farms		13			23			27	
AHW1: Absence of hunger and thirst									
Clinical findings	19	54	96	.	.	.	12	65	100
Water provision	56	69	88	26	60	100	46	76	94
Feeding system	100	100	100	100	100	100	100	100	100
Roughage	0	40	80	0	0	100	0	27	85
Management	18	45	80	.	.	.	13	53	93
Pasture	25	25	25	.	.	.	38	39	52
AHW2: Comfort (thermal, physical, when resting and during locomotion)									
Clinical findings	48	71	87	9	85	100	37	80	95
Creep area	50	50	100	.	.	.	50	50	88
Floor quality	10	32	56	4	29	86	9	24	67
Space allowance	3	10	39	8	34	69	8	21	65
Pasture	100	100	100	.	.	.	100	100	100
Hospitalisation	0	50	100	0	0	100	0	33	100
Husbandry system	0	0	0	.	.	.	0	0	40
Treatments	0	70	100	0	90	100	0	80	100
AHW3: Absence of injuries and disease									
Biosecurity	0	75	75	0	100	100	25	75	100
Clinical findings	35	62	80	19	60	77	34	68	93
Hospitalisation	9	56	100	0	56	100	0	56	100
Mortality	29	53	95	18	80	100	11	69	100
Pasture	0	0	0	.	.	.	0	0	50
Treatments	5	71	100	0	90	100	0	69	89
AHW4: Absence of pain by management									
Clinical findings	0	49	100	0	35	64	9	48	100
Hospitalisation	17	67	100	0	100	100	0	89	100
Mutilations	41	79	100	0	0	100	43	68	100
Castration	0	33	100	.	.	.	0	50	100
AHW5: Possibility to perform appropriate behaviour									
Behaviour	40	57	80	32	58	96	42	59	90
Clinical findings	4	40	92	7	45	71	18	44	95
Enrichment	17	51	68	0	64	91	0	49	87
Pasture	0	0	16	0	0	0	0	0	50
Space allowance	3	10	39	8	34	69	8	21	65
Restricted normal behaviour	36	56	78	.	.	.	27	61	98
AHW6: Good human-animal relationship									
Negative characteristics	25	100	100	38	88	100	38	75	100
One welfare	50	63	100	50	75	100	13	75	100
Positive characteristics	50	81	100	44	69	100	50	81	100

Supplementary Material Table S9: Contribution of all economic indicators to the respective themes in percentage.

	Breeding farms	Breeding-to-finishing farms	Finishing farms
ECO1 Technical efficiency			
Feed conversion rate finishing pigs	-	38%	54%
Number of litters per sow	3%	2%	-
Number of piglets weaned per litter	6%	4%	-
Number of piglets weaned per sow	25%	16%	-
Age of piglets at weaning	6%	4%	-
Weight of piglets at weaning	9%	5%	-
Pre-weaning mortality rate	21%	10%	-
Post-weaning mortality rate	20%	9%	-
Sow mortality	10%	5%	-
Mortality rate finishing pigs	-	9%	46%
Veterinary costs per sow*	-	-	-
Veterinary costs per finishing pig*	-	-	-
ECO2 Economic resilience			
Percentage of rented land	19%	19%	19%
Percentage of family labour	38%	38%	38%
Kg of pig meat per Annual Working Unit	-	21%	31%
Number of sows per Annual Working Unit	43%	14%	-
Number of finishing pigs per Annual Working Unit	-	8%	12%
Gross margin over feed costs per finishing pig*	-	-	-
Gross margin over non-factor costs per finishing pig*	-	-	-
Gross margin over feed costs per sow*	-	-	-
Gross margin over non-factor costs per sow*	-	-	-
Production non-factor costs per kg of pig meat*	-	-	-
Bargaining power in the chain*	-	-	-
Horizontal cooperation between farmers*	-	-	-
Degree of specialization*	-	-	-
Degree of modernity *	-	-	-
Capital intensity *	-	-	-
Investment potential*	-	-	-
Innovation potential *	-	-	-

*Excluded from the present study due to the data availability issues.

Supplementary Material Table S10: Contribution of all environmental indicators to the respective themes in percentage.

Indicators (scaled units)	ENV1	ENV2	ENV3	ENV4	ENV5
Greenhouse gas potential (kg CO ₂ -eq kg ⁻¹ BMNS)	13%				
Greenhouse gas potential (kg CO ₂ -eq ha ⁻¹)	10%				
Acidification (g SO ₂ -eq kg ⁻¹ BMNS)	14%				
Acidification (g SO ₂ -eq ha ⁻¹)	8%				
Eutrophication (g P-eq kg ⁻¹ BMNS)		8%			
Eutrophication (g P-eq kg ⁻¹ ha ⁻¹)		8%			
Land use (ha kg ⁻¹ BMNS)			10%		3%
Energy (MJ kg ⁻¹ BMNS)					7%
Energy (MJ ha ⁻¹)					5%
Certified feed	7%		4%		
Energy-saving methods	4%				7%
N - high precision fertilisation	7%	3%	2%	3%	7%
N - fertilisation based on soil and plant analysis	5%	3%	2%	2%	8%
Arable land not ploughed	2%	1%	10%		3%
Leguminous crops/grassland	3%		5%	5%	
Conversion of permanent grassland into arable land	3%	3%	10%	4%	
Woodland on farm	1%	1%	3%	12%	
Woodland deforested	5%	1%	6%	4%	1%
Catch crops	2%	3%	4%	4%	1%
Ecological compensation area	1%	3%	3%	12%	1%
Agricultural land on drained moorland	2%		5%	8%	
Techniques for reducing emissions	16%	3%	2%		
Application of mineral P- and K-fertilisers based on the results of soil or plant analysis		3%	5%	3%	7%
(Proportion of) agricultural land with chemical synthetic insecticides / herbicides / fungicides		3%	7%	9%	6%
Average pesticide treatment frequency		3%	5%	5%	6%
Calculation of humus balances for farmland			5%	2%	3%
Water-saving technology in the barn		17%			
Access to communal (tap) water with sufficient water supply in the pig barn		3%			
Sufficient water supply or storage capacities		10%			3%
Field irrigation		5%			2%
Use of information about local precipitation and evaporation rate		6%			2%
Water-saving technology for irrigation of fields (e.g. drip irrigation)		10%			4%
Feeding GMO crops				8%	
On-farm cultivation of GMO crops				3%	
Cultivating and harvesting crops on riparian strips		3%	6%	8%	
Fertilisation or pesticide use on riparian strips		3%			
Access of animals (pigs, cows, sheep ect.) to surface water bodies and/or riparian strips		3%	3%	1%	
Slope of the paddock towards natural water bodies (which is not interrupted by a buffer strip)		3%	3%		
Growing rare or endangered agricultural crops				6%	
Permanent grassland or pasture converted to arable land					1%
Proportion of discarded inputs					27%
Degraded land			5%		

BMNS = body mass net sold, CO₂-eq = carbon dioxide equivalents; SO₂-eq = sulphur dioxide equivalents; P-eq = phosphorous equivalents; MJ = megajoule.

Supplementary Material Table S11: Influence of all social indicators to the respective themes in percentage.

	SOC1	SOC2	SOC3	SOC4	SOC5	SOC6
Job satisfaction	8%					
Motivation to be a pig farmer	2%					
Demotivation	2%					
Workload	5%					
Working conditions	5%					
Level of stress	3%					
Health status	3%					
Leisure time with family, including holiday	6%					
Relationship with neighbours	2%					
Farming as a main source of income	7%					
Support in case of emergency	2%					
Relevance/importance of succession	15%					
Farmer's training (in relation to his/her business)	6%					
Other training opportunities (for family and workers, if any)	5%					
Access to unpaid advisory services	4%					
Land (owned or leased)	6%					
Financial capital	6%					
Buildings and other farming equipment/facilities	6%					
Farming knowledge	6%					
Fairness of prices (buyers pay)		30%				
Access to market information (e.g. price)		20%				
Fairness of prices (throughout supply chain)		25%				
Fairness of contracts/agreements with input suppliers		25%				
sufficient number of workers			42%			
workers' understanding of their rights (e.g. wages and work conditions)			28%			
Employment relations: Children (under 16) involved on farm work?			21%			
Children (under 16) involved on farm work at any time and interfering with school			9%			
Clear rules/guidelines regarding non-discrimination				11%		
If yes, are these rules/guidelines clearly specified and made available to all staff?				11%		
Do all your employees have equal access to training opportunities?				23%		
Gender Equality indicator				30%		
Vulnerable Groups indicator				25%		
Health and safety training provision for employees					25%	
Status of workplace (buildings, machinery etc.) regarding health and safety					25%	
Accident and injury rate on farm					25%	
Provision of protective equipment to employees					25%	
Responsibility for negative environmental impacts						25%
Risk level of polluting/contaminating the environment						15%
Communication of risks to others (potentially affected)						10%
Positive contribution to local economy						18%
Positive contribution to local environment						18%
Positive contribution to local culture						15%

Supplementary Material Table S12: Contribution of all animal health and welfare indicators to the respective themes in percentage (B = Breeding farms, F = Finishing farms, BF = Breeding-to-finishing farms). Part I

	AHW1			AHW2			AHW3			AHW4			AHW5		
	B	F	BF	B	F	BF	B	F	BF	B	F	BF	B	F	BF
Clinical findings															
Runts	9%		9%	7%		7%	8%	0%	8%						
Thin sows	9%		9%				1%	0%	1%						
Shoulder lesions	11%		11%	1%		1%	2%	0%	2%	5%	0%	5%			
Lameness				2%	9%	2%	3%	5%	3%						
Body lesions				2%	7%	2%	2%	4%	2%				2%	3%	2%
Ear lesions							2%	4%	2%	6%	10%	6%	2%	3%	2%
Tail lesions							3%	5%	3%	9%	14%	9%	3%	4%	3%
Shortened tail							1%	3%	1%	4%	7%	4%	1%	2%	1%
Stumps							2%	3%	2%	5%	9%	5%	2%	3%	2%
Vulva lesions							1%	0%	1%				1%	0%	1%
Ectoparasites							2%	4%	2%						
Behaviour															
Stereotypies													5%	7%	5%
Pigs manipulating pen/floor													4%	5%	4%
Pigs manipulating enrichment													5%	7%	5%
Pigs manipulating other pigs													6%	8%	6%
Water provision															
Automatic drinking system	5%	15%	5%												
Natural drinking behaviour	6%	18%	6%												
Sufficient ratio of number of pigs per number of drinkers	8%	23%	8%												
Availability of drinkers, when feeding	3%	10%	3%												
Water access for piglets	6%	0%	6%												
Roughage															
Quality of roughage	14%	33%	14%										3%	5%	3%
Enrichment															
Quality of enrichment													4%	6%	4%
Soiled enrichment													3%	5%	3%
Access to enrichment for an adequate number of pigs													4%	6%	4%
Access to enrichment in farrowing pen													4%	0%	4%
Creep area															
Proper creep area (suckling piglets and weaners)				12%	0%	12%									

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Supplementary Material Table S12: Contribution of animal health and welfare indicators to the respective themes in percentage (B = Breeding farms, F = Finishing farms, BF = Breeding-to-finishing farms). Part II

	AHW1			AHW2			AHW3			AHW4			AHW5		
	B	F	BF	B	F	BF	B	F	BF	B	F	BF	B	F	BF
Floor quality															
Thickness of bedding				3%	5%	3%									
Size of bedded area				4%	6%	4%									
Size of slatted area				5%	6%	5%									
Dirtiness of lying area				4%	6%	4%									
Amount of bedding per animal and day				2%	3%	2%									
Space allowance															
Total indoor area per pig				14%	19%	14%							12%	15%	12%
Total outdoor area per pig				6%	8%	6%							5%	6%	5%
Pasture															
Paddocks with sufficient shelter				0%	0%	0%									
Vegetation cover of paddocks - gestating sows	0%	0%	0%										4%	5%	4%
Pasture area per pig - gestating sows	0%	0%	0%										4%	5%	4%
Interval of moving to fresh pasture							0%	0%	0%						
Interval of moving huts on field							0%	0%	0%						
Access to pasture													4%	5%	4%
Restricted normal behaviour															
Confinement during lactation				7%	0%	7%							4%	0%	4%
Confinement in service area				5%	0%	5%							4%	0%	4%
Use of hormones to synchronise estrus/births													2%	0%	2%
Use of hormones to trigger/induce births													2%	0%	2%
Use of Oxytocin during birth (not after)													2%	0%	2%
Nose rings													8%	0%	8%
Hospitalisation															
Pigs needing hospitalisation							8%	8%	8%	20%	27%	20%			
Suitable sick pens				12%	16%	12%	6%	6%	6%						
Mortality															
Mortality	11%	0%	11%				29%	29%	29%						
Age at weaning	10%	0%	10%												
Number of piglets born alive per sow and year	7%	0%	7%												

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Supplementary Material Table S12: Contribution of animal health and welfare indicators to the respective themes in percentage (B = Breeding farms, F = Finishing farms, BF = Breeding-to-finishing farms). Part III

	AHW1			AHW2			AHW3			AHW4			AHW5		
	B	F	BF	B	F	BF	B	F	BF	B	F	BF	B	F	BF
Treatments															
Antibiotic MMA treatment							2%	0%	2%						
Parasite treatment							3%	4%	3%						
Antibiotic diarrhoea treatment				6%	0%	6%	4%	0%	4%						
Antibiotic respiratory disease treatment				6%	16%	6%	5%	10%	5%						
Mutilations															
Tail docking										11%	33%	11%			
Nose rings										11%	0%	11%			
Teeth clipping or grinding										4%	0%	4%			
Castration															
Castration										17%	0%	17%			
Age at surgical castration										8%	0%	8%			
Quarantine															
All-in-all-out per room							7%	9%	7%						
Number of sources (farms) where pigs are bought in							4%	6%	4%						
Proper quarantine							4%	0%	4%						
													AHW6		
Negative characteristics															
My sows/ pigs are difficult to move (e.g. from the gestation unit to the farrowing unit)													15%		
My sows/ pigs are often nervous													15%		
One welfare															
When my well-being is at risk the welfare of my pig is at risk													15%		
Good overall farm performance is directly linked to good sow/ pig welfare													15%		
Positive characteristics															
My sows/ pigs are a pleasure to work with													10%		
It is important to talk to and/or friendly touch (stroke, pet, scratch) your pigs													10%		
Importance to avoid force when handling pigs													10%		
You can calm down sows/ pigs by talking to them calmly													10%		

Supplementary Material Table S13: Interobserver Reliability Test (IOR)

Before start of farm visits, two experienced pig researchers (CM, CL) trained two observers (AR; JH). This included classroom training, joint scoring of animals and discussions on 2 farms in Austria. Already straight after this training, interobserver reliability (IOR) was tested on-farm for several animal based indicators. This was followed by another IOR observer session in Germany (2 days, 2 farms) and a third two-day observer session in Austria (2 farms) with the two observers present and independent scoring of pigs. Visited farms included three research farms and three practical farms. After farm visit one, IOR was repeated for selected animal based indicators.

IOR was calculated as exact agreement between two observers and expressed as weighted Kappa, PABAK and percentage agreement and sufficient agreement was achieved. For most of the parameters, only farms with zero or low median prevalence were available for inter-observer tests. Furthermore, assessment of group level presents specific challenges, as pigs are constantly moving, different body sizes might be visible and some parameters can change during assessments (e.g. soiling, lesions). Therefore, IOR testing was complemented with pictures and videos on an individual animal basis for several parameters.

Results for weighted kappa and percentage agreement were categorized as followed:

Kappa	<0,4	poor
	0,4- 0,6	moderate
	>=0,6	good
Percentage agreement	<60%	poor
	60-80%	moderate
	>=80%	good

Parameter	Animal category	Level	N	Percentage	(Weighted) Kappa before V1	PABAK	Prevalence index	Percentage	(Weighted) Kappa after V1	PABAK	Prevalence index
Body condition score ok	Gest	A-OF	30	97%	0.65	0.93	0.90				
Body condition score too fat	Gest	A-OF	30	97%	0.65	0.93	-0.90				
Body condition score too thin	Gest	A-OF	30	100%		1.00	-1.00				
Body lesions	Gest	A-OF	30	100%	1.00	1.00	-0.93				
Body lesions	Finish	G-OF	26	88%	0.70	0.63	-0.69				
Body lesions	Finish	A-P	68					67%	0.34	0.34	-0.28
Ear lesions	Finish	G-OF	26	100%		1.00	-1.00				
Ear lesions	Finish	A-P	31	100%	1.00	1.00	-0.23	97%	0.94	0.93	-0.23
Ectoparasites	Gest	A-OF	30	100%		1.00	-1.00				
Ectoparasites	Gest	A-P	11	91%	0.00	0.82	0.91				
Ectoparasites	Finish	G-OF	26	100%		1.00	-1.00				
Lameness	Gest	G-OF	30	100%	1.00	1.00	-0.93				
Lameness	Gest	A-V	9	100%	1.00	1.00	-0.33	100%	1.00	1.00	-0.33
Lameness	Finish	G-OF	26	81%	0.50	0.54	-0.69				
Nose rings	Gest	A-OF	30	100%		1.00	-1.00				
Nose rings	Lact	A-OF	10	100%		1.00	-1.00				
Pigs requiring hospitalization	Gest	A-OF	30	100%		1.00	-1.00				
pigs requiring hospitalization	Finish	G-OF	26	88%	0.34	0.77	-0.81				
Runts	Lact	G-OF	10	70%	0.67	0.40	-0.70				
Runts	Wean	G-OF	26	100%		1.00	-1.00				
Runts	Lact and Wean	G-P	31					94%	0.89	0.88	-0.02
Shoulder lesions	Gest	A-OF	30	100%		1.00	-1.00				
Shoulder lesions	Gest	A-P	30	86%	0.71	0.72	-0.24	97%	0.93	0.93	-0.23

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Gest = gestating sows, Lact = Lactating sows, Wean = weaners, Finish = Finisher. A=animal level, G=group level, OF=on farm, P=pictures, V=videos

Parameter	Animal category	Level	N	Percentage	(Weighted) Kappa before V1	PABAK	Prevalence index	Percentage	(Weighted) Kappa after V1	PABAK	Prevalence index
Tail damage freshness: score 1 (older)	Finish	G-OF	26	80%	0.43	0.60	-0.72				
Tail damage freshness: score 2 (fresh)	Finish	G-OF	26	81%	0.45	0.62	-0.50				
Tail damage type: score 1 (mild)	Finish	G-OF	26	80%	0.42	0.60	-0.72				
Tail damage type: score 2 (severe)	Finish	G-OF	26	96%	0.92	0.77	-0.65				
Tail lesion	Finish	A-P	45					75%	0.72	0.00	-0.50
Tail length: shortened	Finish	G-OF	26	100%		-1.00	0.00				
Tail length: stump	Finish	G-OF	26	77%	0.41	0.54	-0.69				
Tail length	Finish	A-P	44					89%	0.87	0.23	-0.02
Vulva deformed	Gest	A-OF	30	93%	0.63	0.87	-0.80				
Vulva lesion	Gest	A-OF	30	100%	1.00	1.00	-0.93				
n pigs manipulating enrichment	Finish	G-OF	24	100%	1.00	0.90	-0.76				
n pigs manipulating floor or pen fixtures	Finish	G-OF	24	79%	0.44	0.58	-0.63				
n pigs manipulating other pigs	Finish	G-OF	24	100%	1.00	0.83	-0.75				
n pigs performing stereotypies (scan)	Finish	G-OF	24	75%	0.56	0.42	-0.54				

Gest = gestating sows, Lact = Lactating sows, Wean = weaners, Finish = Finisher. A=animal level, G=group level, OF=on farm, P=pictures, V=videos