Wrapping up the day
- knowledge gaps and research needs

Organic pig production - where are we now and where should we be by 2030?

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CONCLUSIONS – 2013 workshop talk

Future Challenges: (SUSTAINING A PROFITABLE MARKET)

- Justify a substantial market premium
  - Reliably higher product quality
  - Maintain a strongly differentiated image
    - High animal welfare
    - Low environmental impact
- Reduce cost of production
  - Improve feed efficiency
  - Improve prolificacy
  - Reduce mortality
  - Use labour more efficiently
- A reliable, current EU evidence base!

Higher Product Quality

- What is quality?
  - Product safety
  - Nutritional value
  - Organoleptic characteristics

  - Perception of production methods

Higher Product Quality

Product Safety

- 7/7 studies indicate a lower prevalence of antibiotic resistant bacteria in organically reared pigs
- Salmonella prevalence has been reported to be higher (two studies), lower (one study) or no different (two studies) in organic compared to conventional pigs
- 5/5 studies indicate a higher percentage of organic pigs carrying antibodies against Toxoplasma gondii

(van Loo et al., 2012; Luecke, 2016)

Need to manage zonoses risks in extensive systems

Higher Product Quality

Nutritional value

few published studies comparing composition of organic and conventional pigmeat (4-6 studies per parameter).

- no difference in total or intramuscular fat content
- concentrations of saturated fatty acids (health -) lower in organic pork [-3% daily consumption]
- concentrations of polyunsaturated fatty acids (health +) higher in organic pork [+14% daily consumption]
- concentrations of n-3 PUFA (health ++) higher in organic pork [+16% daily consumption]

(Srednicka-Tober et al., 2016)

? Minerals and micronutrients

Higher Product Quality

Organoleptic characteristics

- no consistent objective evidence that the organoleptic quality and eating experience of pigmeat is improved by organic rearing
- many aspects of production which might be modified in organic systems have the potential to influence meat quality:

  use of traditional breeds, growth rate, carcass adiposity,

  choice of feed ingredients, pre-slaughter stress

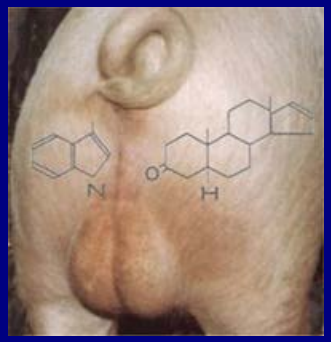
(Edwards, 2005)

Strategies need to be developed

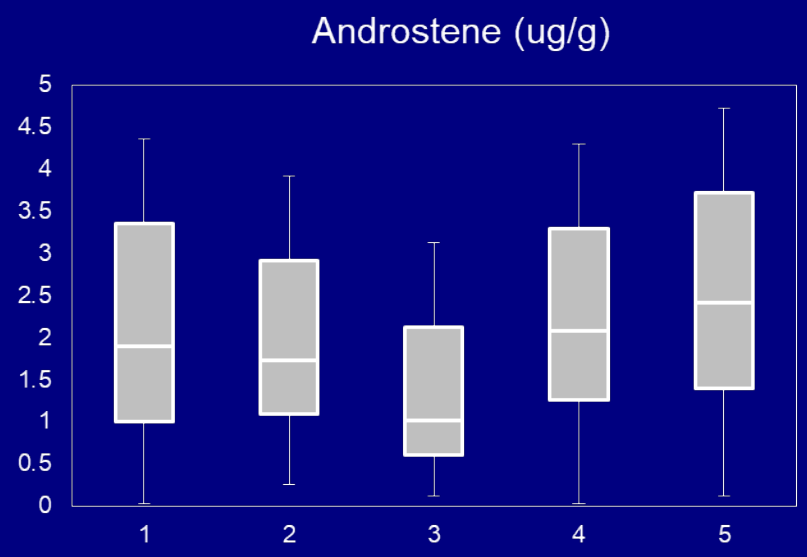
The Challenge of Boar Taint

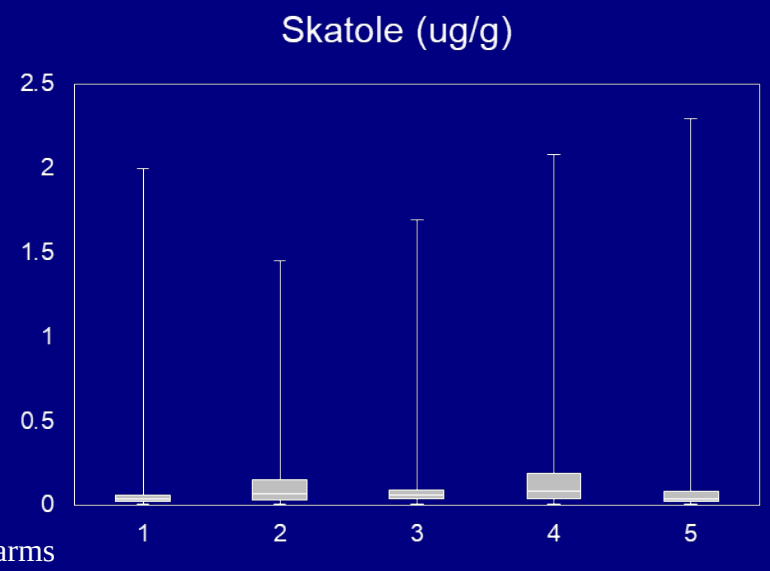
- Organic production wishes to avoid mutilations, but castration is still the norm.
- Could organic systems use entire males?

VS



Boar taint in DK organic entire males





5 different farms

(Thomsen, 2015)

% carcasses (90-130 kg lwt) which would be rejected:

75.7% for androstenone (>1.0 µg/g)

9.8% for skatole (>0.25 µg/g)

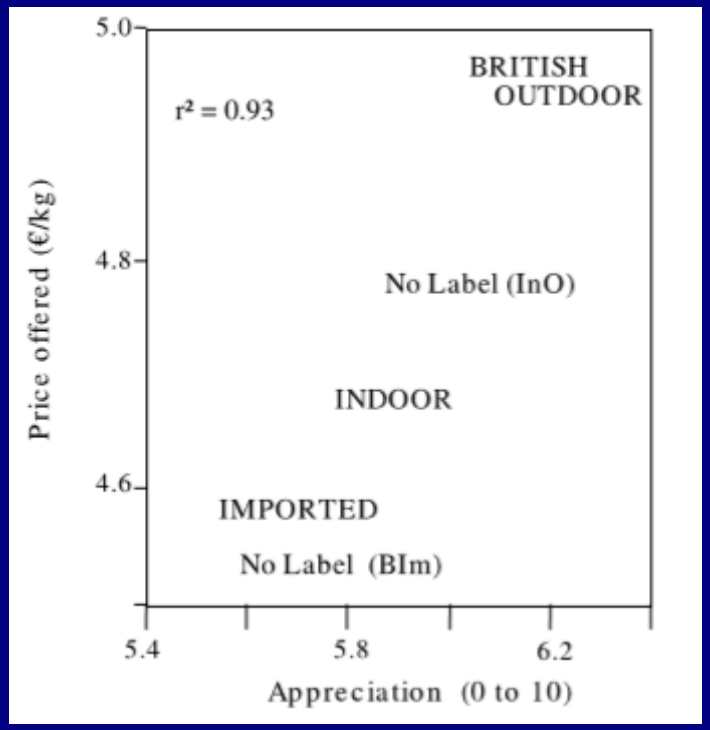
18.3% with a positive human nose sensory evaluation

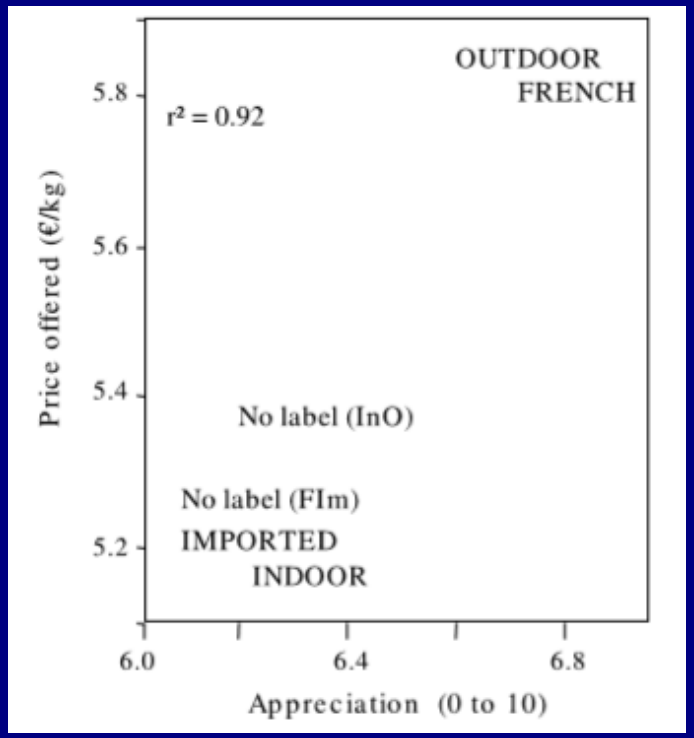
Resolution of dilemma needed

Higher Product Quality

- sensory evaluation of product quality can be influenced by cognitive factors (beliefs and attitudes) regarding consumers views on the production system

(Dransfield et al., 2005)





Higher Product Quality

Perception of production methods

- Maintain a strongly differentiated image
  - High animal welfare
  - Low environmental impact

http://www.farmhealthonline.com/health-welfare/pigs/pig-outdoor-access/

CORE organic II

University of Natural Resources and Life Sciences, Vienna

Does animal health, welfare and environmental impact of organic pigs differ between husbandry systems?

(Rudolph, 2015)

Indoor with outside run (IN)


Pregnant & lactating sows (**SO**)

Weaners (**WE**)

Fatteners (**FA**)




Outdoor system (OUT)

Animals, materials, methods

Indoor with outside run (n=34)

=?

Partly outdoor (n=28)

=?

Outdoor (n=12)

7 assessors in 8 countries

3 training sessions

2 inter-observer repeatability tests

one day visit / farm by one person

74 farms

Non-parametric Kruskal-Wallis tests, if $p < 0.05$ pairwise testing (Wilcoxon rank sum; Bonferroni corrected) $p<0.05$

Results I – Good welfare across systems

Parameter (median)	INDOOR (n=34)	POUT (n=28)	OUT (n=12)	p
Ectoparasites SO, FA [%]	0.0	0.0	0.0	ns
Lameness FA [%]	0.7	0.7	0.0	ns
Tail lesions WE [%]	0.0	0.0	0.0	ns
Sick Pigs [%pen] WE; FA; SO	0.0	0.0	0.0	ns

Results II – Disadvantages Indoors

Parameter (median)	INDOOR (n=34)	POUT (n=28)	OUT (n=12)	p
Lameness SO [%]	7.1[a]	3.4[b]	0.0[b]	0.001
MMA treatment [%]	16.5[a]	1.6[b]	0.0[c]	0.000
Resp. probl. FA [%pens]	66.7[a]	60.0[a]	0.0[b]	0.002
Diarrhoea WE [%pens]	25.0[a]	0.0[ab]	0.0[b]	0.015

Results III Improvement needed

Parameter (median)	INDOOR (n=34)	POUT (n=28)	OUT (n=12)	p
Total suckling piglet losses [%] (live+dead born)	21.3	21.6	19.2	ns

We have more knowledge: VIPiglet
But improvements in practice still needed

Prevalence per thousand (1DK abattoir, 2y, 1.1m pigs)	Conventional indoor	Conventional free range	Organic free range
Dead on arrival	0.1	0.1	0.1
Unthrifty	0.4	0.7	1.6
Condemned	1.6	2.4	2.0
Respiratory lesion	225.2	209.8	177.7
Leg swelling	30.9	15.8	12.7
Abscess	30.2	37.4	33.6
Septicema	21.4	31.8	24.5
Hernia	12.1	9.6	7.2
Skin lesions	10.7	23.2	40.8
Hoof abscess	7.8	7.0	5.9
Tail lesion	7.1	29.3	21.0
Bone fracture	5.1	10.3	11.7
White spot liver	4.6	12.2	15.8
Arthritis	2.6	9.7	9.0
Enteritis	0.8	0.7	0.6
Kidney lesion	0.4	0.5	0.5

Improvements in practice still needed

(Kongsted & Sørensen, 2017)

Biosecurity in pasture systems

Difficult (? impossible) to control wildlife contact

What happens if ASF becomes endemic in wild boar?

Environmental Impact

	Greenhouse Gas Emissions		Acidification Potential		Eutrophication Potential	
Functional unit 1kg LWT (except Williams – 1kg carcass wt)	kg CO2-eq	cf CON	g SO2-eq	cf CON	g PO4-eq	cf CON
Williams et al (2006) UK	5.6	-11%	129	-67%	57	-43
Basset-Mens et al (2005) France	4.0	+73%	37	+17%	22	+4%
Halberg et al (2010) Denmark	2.8-3.3	+7–22%	50 to 61	+35–45%	25 - 38	+21-65%
Dourmad et al (2014) 5 EU countries	2.4	+8%	57	+29%	16	-16%
Kool et al (2015) 4 EU countries	4.3-5.0	+14-26%				

NB. Ranking of system impacts depends on which functional unit is used in a study. The degree of intensification was inversely proportional to environmental impacts expressed per kg of pig weight produced, but proportional when expressed per ha of land used.

Results III – Pros & Cons

Parameter (median)	INDOOR (n=24)	POUT (n=307)	OUT (n=10)	p
Greenhouse gas emissions	2.20	2.21	2.21	ns
Acidification potential	61.9	51.9	55.4	<0.05
Eutrophication potential	21.6	20.1	28.7	<0.05

(Rudolph, 2015)

Environmental Impact

(Jakobsen et al., 2015)



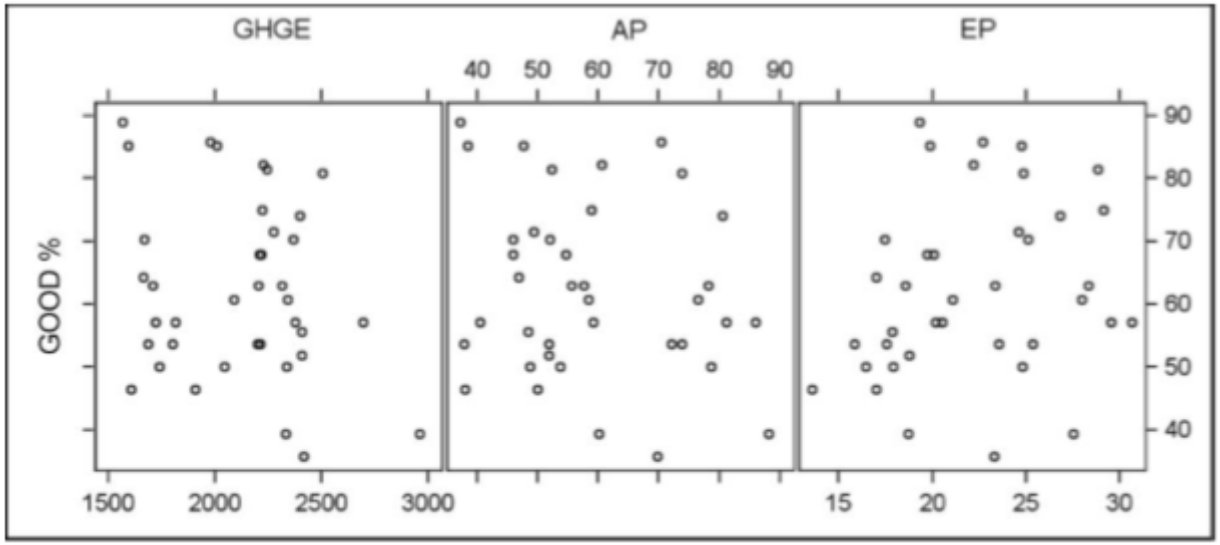
Scenario	Indoor	Pasture foraging	Lucerne /Artichokes
Greenhouse Gas Emissions (kg CO2 eq/ per kg pig lwt)	3.69	3.68	3.12
Ammonia Emission (kgN/ha)	49	24	20
N leaching (kgN/ha)	99	100	110
Total N losses (kgN/ha)	144	135	141

GHG emissions also refer to contributions from soil C changes and indirect land use change

More studies with real data needed on rotations

Associations between welfare and environment ?

Good % = % of welfare outcomes better than median score



(Rudolph, 2015)

BUT we know there are trade offs

Resolution of dilemma needed

Objectives for Organic Pigs

- **SUSTAINING A PROFITABLE MARKET**
  - focussing on product quality
  - maintaining high-welfare, environment-friendly image
- **INTEGRATING IN A SUSTAINABLE FARM SYSTEM**
  - implementing appropriate rotations
  - maximising nutrient utilisation

- **REDUCING PRODUCTION COST**
  - increasing output
  - improving feed efficiency

Results IV – Production efficiency

Parameter (median)	INDOOR (n=23)	POUT (n=27)	OUT (n=10)	p
Pigs weaned/sow/y	19.4	19.0	13.5	0.049
Finishing herd FCR	3.3	3.2	4.9	<0.05

We have more knowledge: ICOPP
But efficiency improvements still needed in practice

(Rudolph, 2015)

High Animal Welfare

Future Challenges: (SUSTAINING A PROFITABLE MARKET)

- Justify a substantial market premium
  - Reliably higher product quality [healthiness, succulence, boar taint]
  - Maintain a strongly differentiated image
    - High animal welfare [CorePig, ProPig, mutilations]
    - Low environmental impact [integrated systems, nutrient surpluses, nutrient capture – theory to practice]

- Reduce cost of production
  - Improve feed efficiency [ICOPP]
  - Improve prolificacy [LowInputBreeds]
  - Reduce mortality [VIPiglet, POWER]
  - Use labour more efficiently [mechanisation]

  - A reliable, current EU evidence base! [CorePig, ProPig, SusAn]

ORGANIC PIG PRODUCTION year 2030

Where might we be?

The sector has 2 potentially conflicting challenges:

- Achieving a high product premium
- Growing the volume of meat sales

This is likely to lead to diversification of production strategy within the sector

ORGANIC PIG PRODUCTION year 2030

Strategy 1 – high premium production

This requires very clear differentiation in all areas of consumer perception targeting an affluent and discerning consumer sector

- Enriched outdoor environment
- Mutilation free
- (local) breeds with good eating quality
- Aesthetically appealing!

Likely to require high focus marketing, lower slaughter weights, lower stocking rates, integration with wider ranging farm enterprises

ORGANIC PIG PRODUCTION year 2030

Strategy 2 – high volume production (and sales!)

This requires a minimal price differential and a greater focus on primary quality attributes

- Efficient production with improved breeds
- More controlled environment, incl biosecurity
- Healthy and tasty product
- Scientifically ethical

Likely to require more sophisticated housing, specialist organic breed, low emission manure management, feeds for product characteristics

Acknowledgements

- Colleagues across Europe in:

  – CORE Organic I – CorePig

  https://www.coreorganic.org/core1/research/projects/corepig/index.html

  – CORE Organic II - ProPIG

  http://www.coreorganic2.org/coreorganic2.asp