

➤ Organic pig farming: from feeding strategy to meat organoleptic quality - Results from an animal experiment

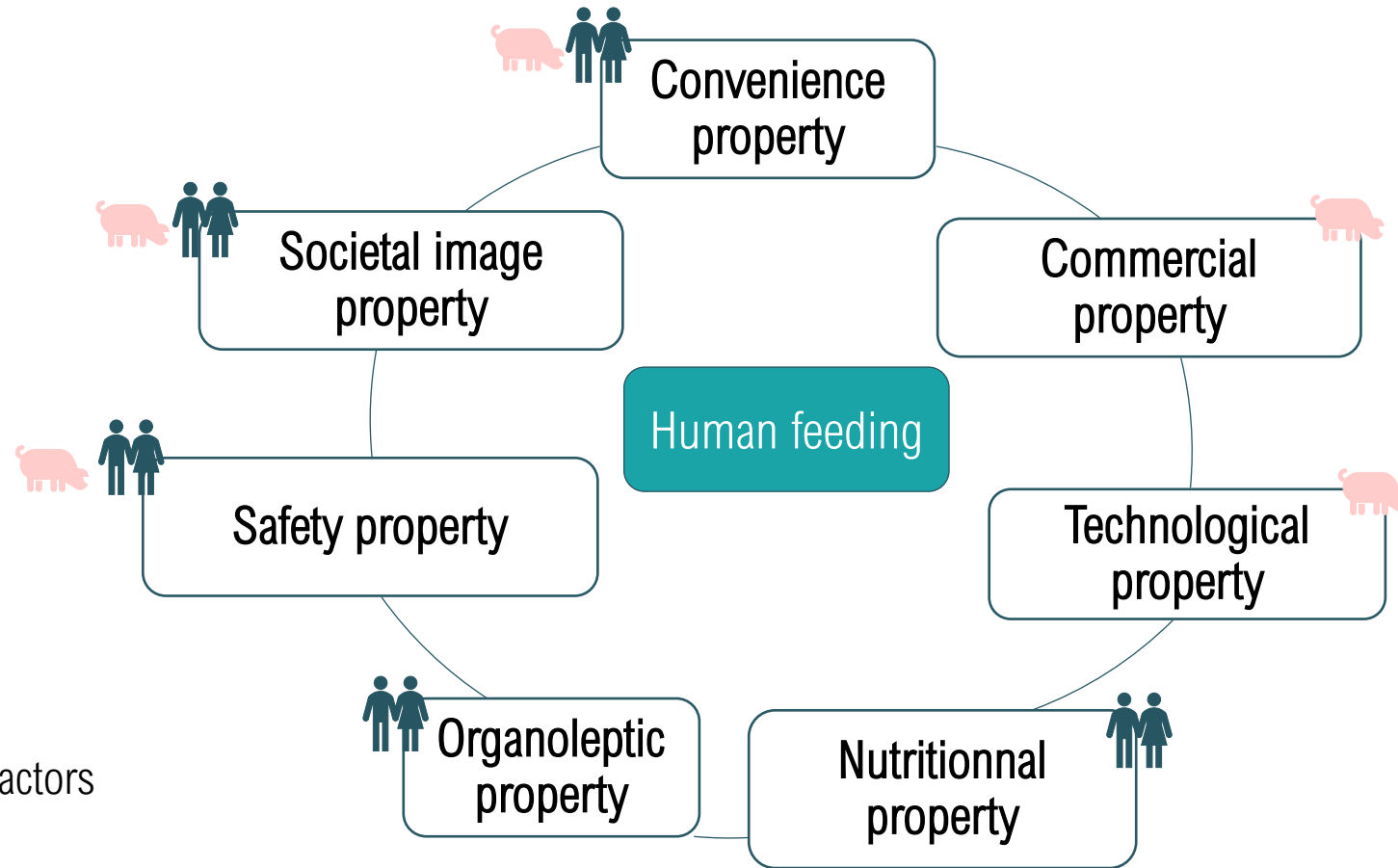
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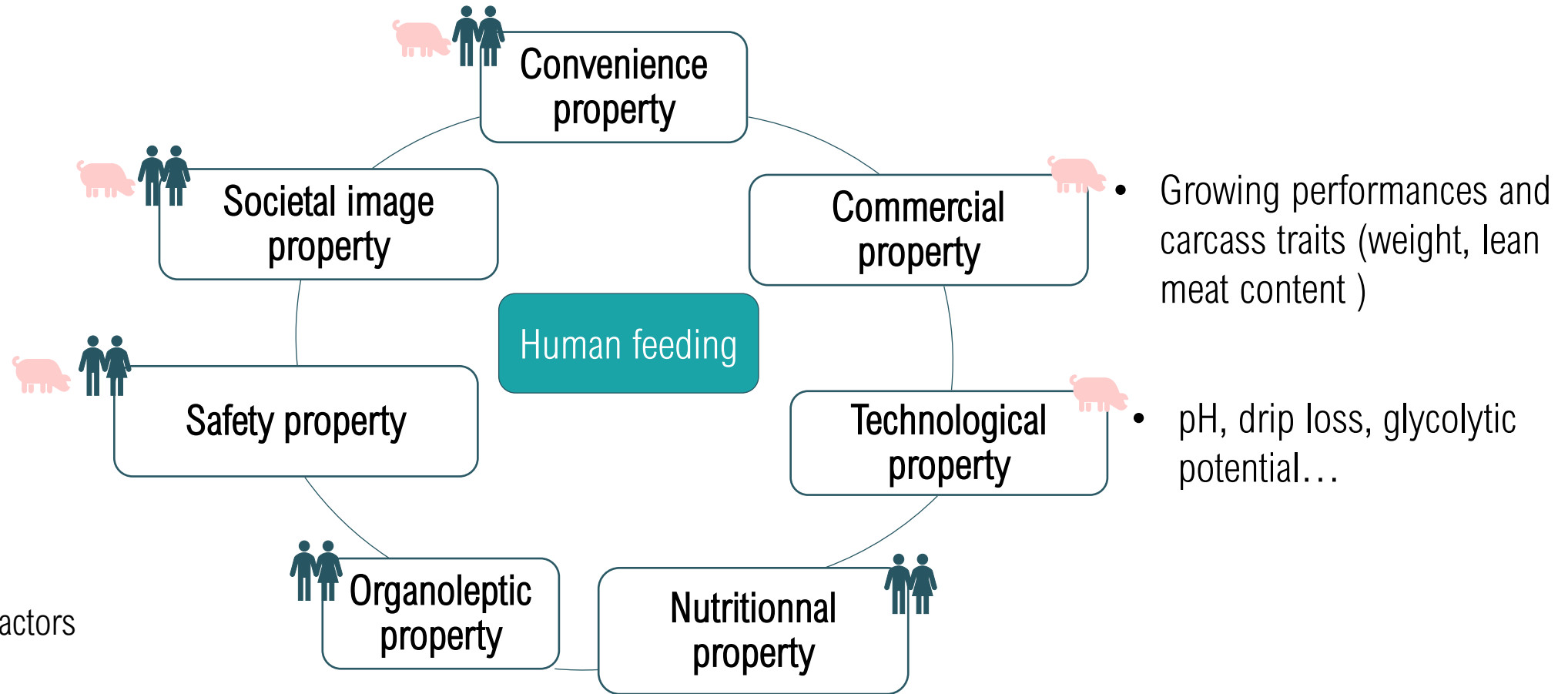


> The multiple properties of product quality



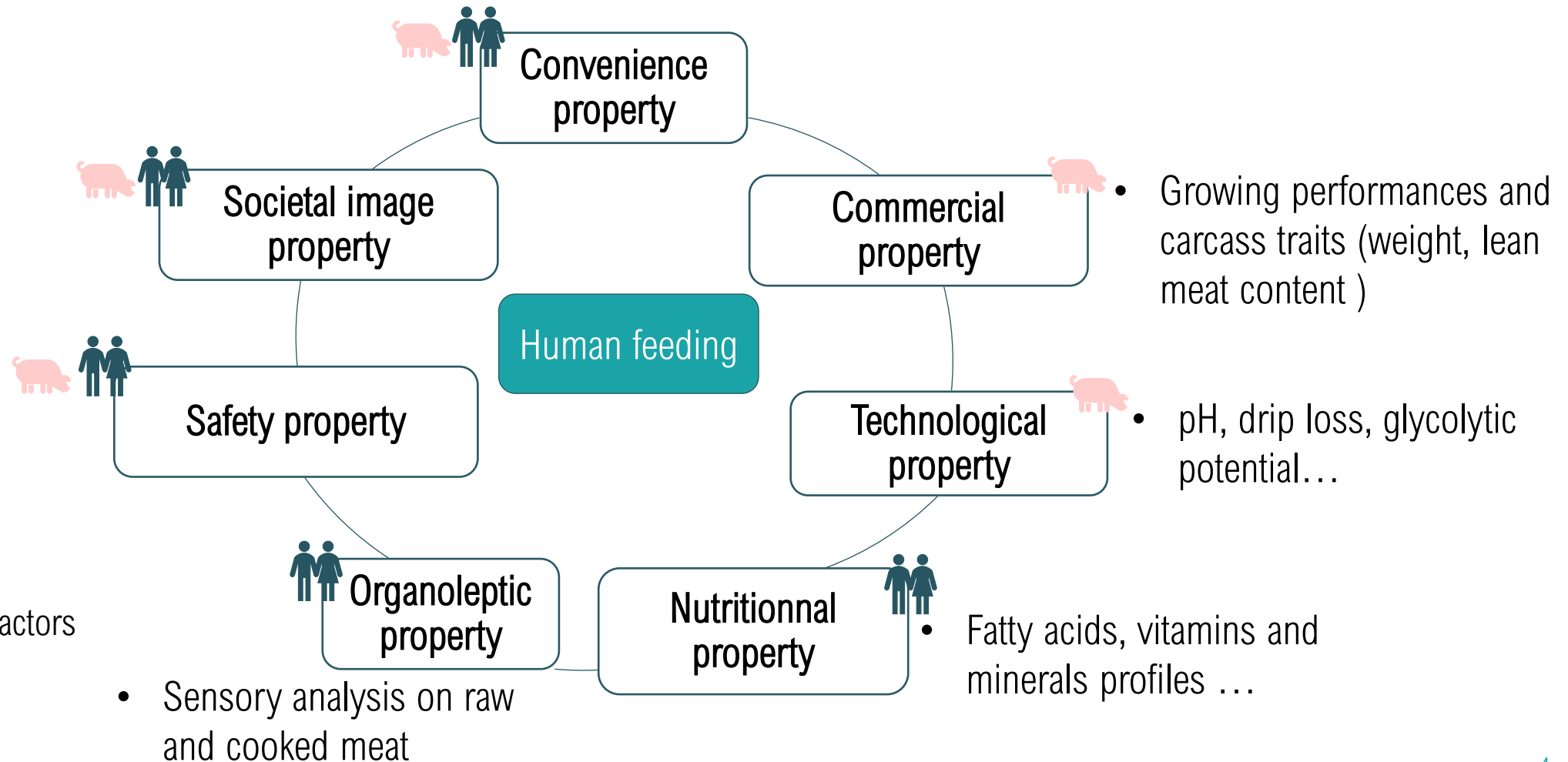
 Producers/Processing actors
 Consumers

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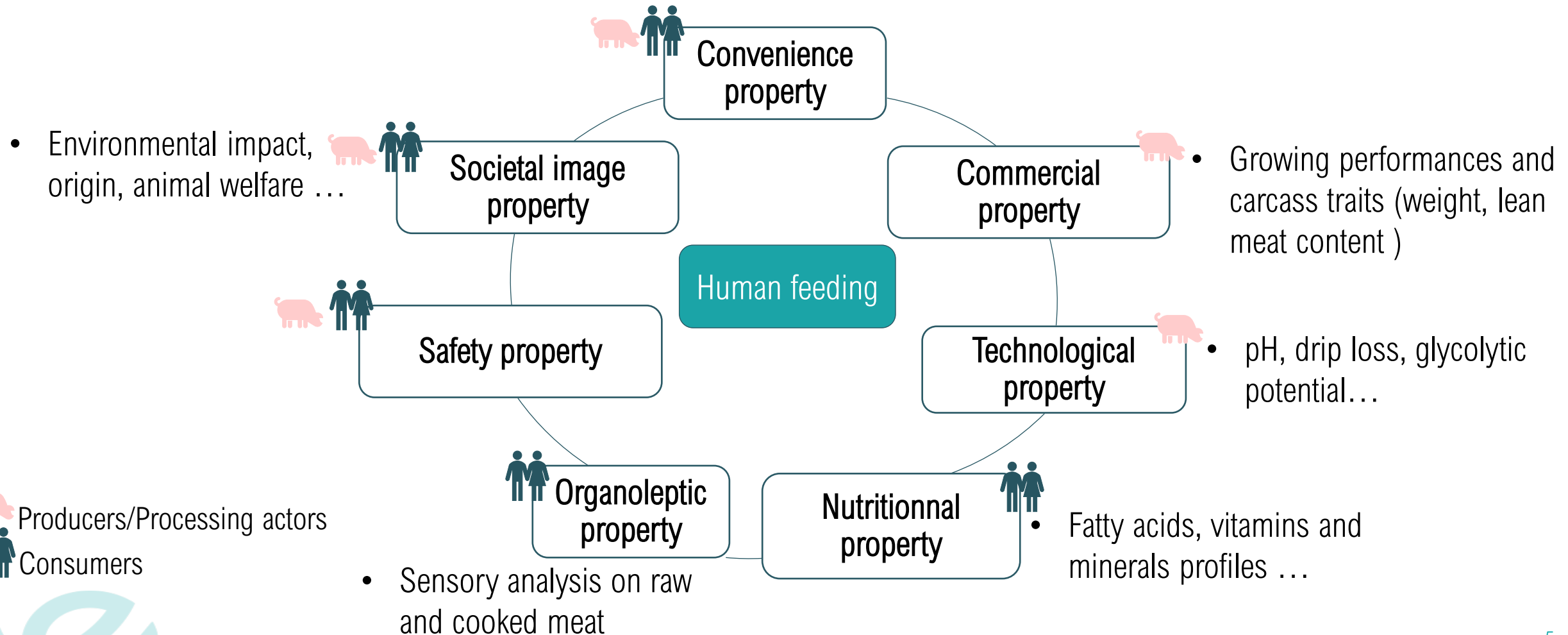


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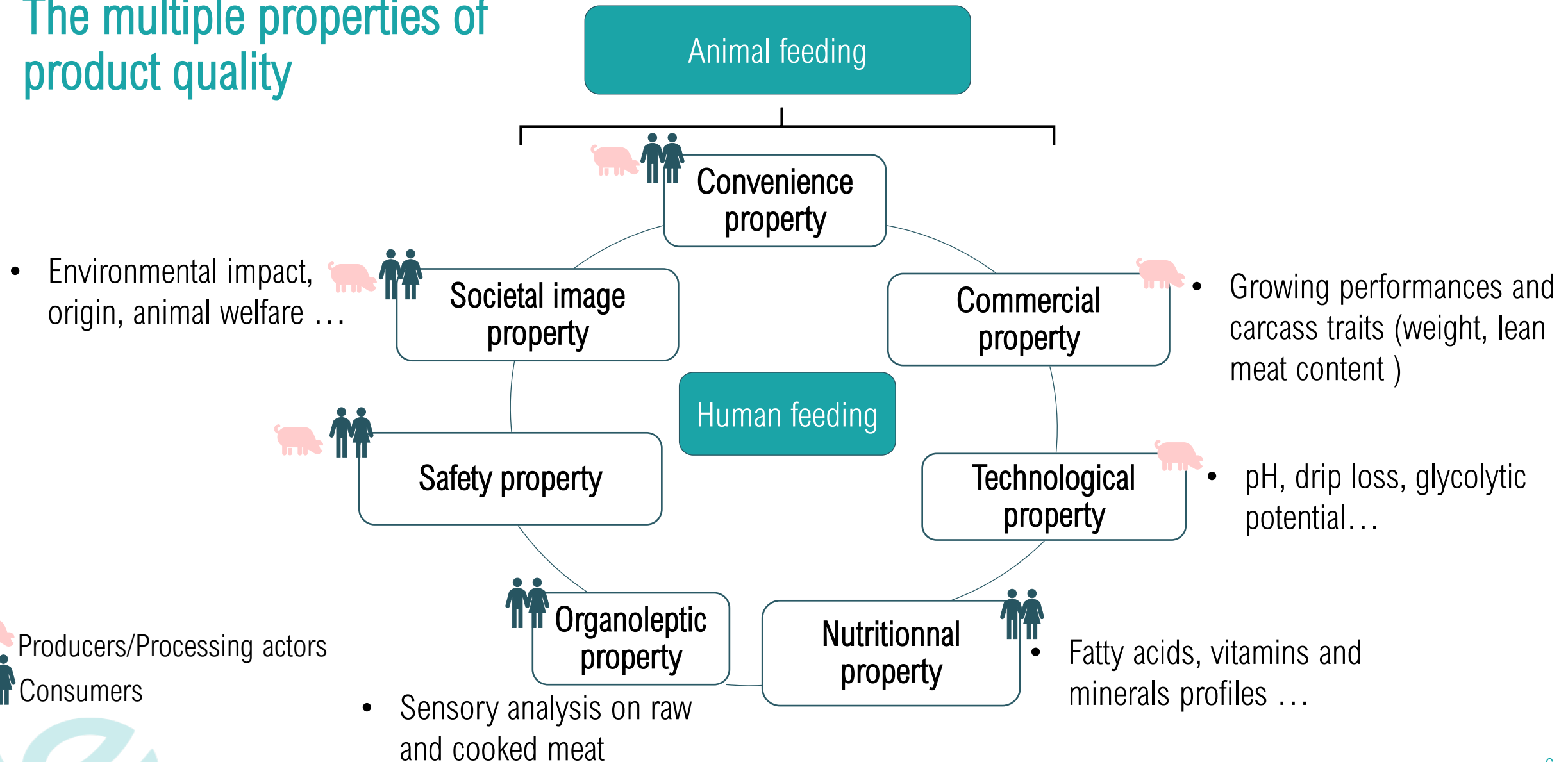
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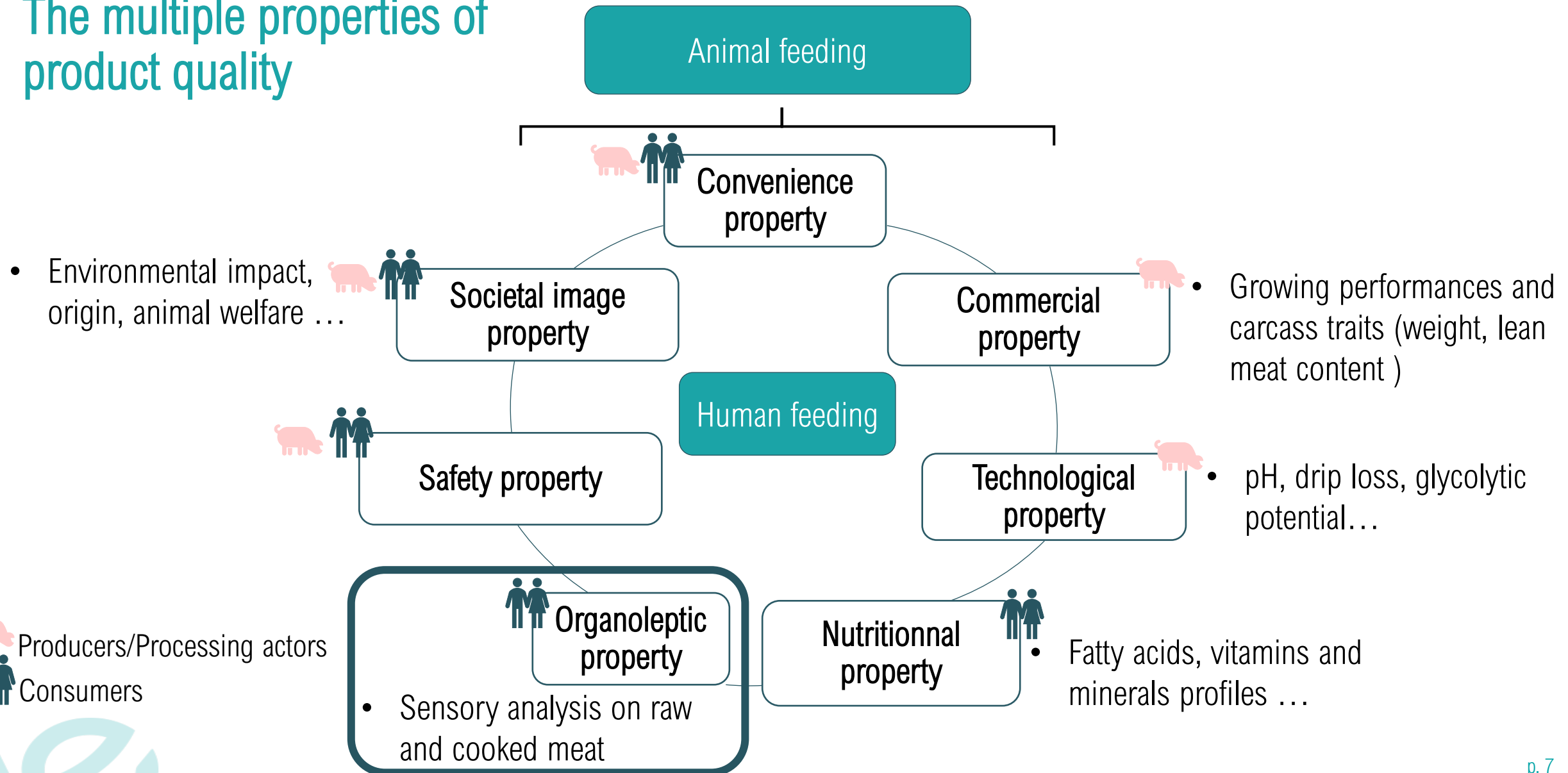
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 Producers/Processing actors
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> Organic pig farming : some key elements



Environment & Feeding

- Relocation of resources (at least 30 % of « local »)
- Prohibition on the use of synthetic amino acids



Housing

- Resting area on bedding (1,3 m²/pig) + outdoor access
- Forages



Animal welfare & Health

- 1 allopathic treatment max per growing pig
 - Tail docking forbidden
- + Castration with analgesia and anesthesia

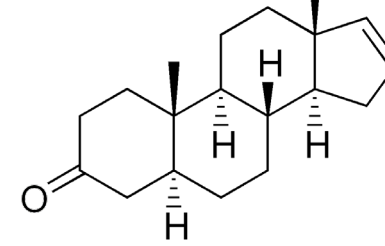
*Specifications EU 2018/848
Castration regulation - DGAL/SDSBEA/2021-
866*

➤ The risks of breeding non castrated male pigs

- Risks of unpleasant odours and/or flavours known as boar taint
 - Odorous compounds → adipose tissue
- Carcass have to be identified and meat used accordingly
 - Human nose method to downgrade or not the carcass
- Risks of harmful behaviours (aggressions, sexual mounting)

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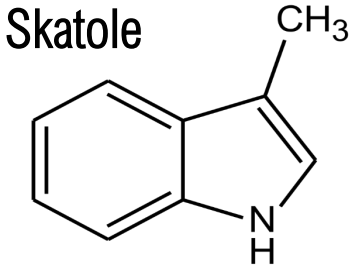
Androstenone

Σ from cholesterol

🏠 Saliva and liver



Urine odour

Skatole

Σ from tryptophan

🏠 Faeces and liver



Fecal odour

Variation factors : genetic, feeding strategy, age, live weight, health, stress, physical and social environment

Lundström et al, 2009
Moerlein et al., 2012
Parois et al., 2018

➤ The feeding strategy as a lever to improve multiple quality dimensions

Objective of the experiment : compared to a control diet, evaluate the consequences of a feeding strategy in non-castrated pigs, on several quality dimensions of pork

➤ Feeding strategies

- **Control** : feeds meeting minimum the organic specifications
- **Bio +** : feeds richer in $\Omega 3$ fatty acids (camelina meal) and protein crops (faba bean) + forages + relocation of feed resources
 - reducing the risk of skatole-related odours (*Wesoly & Weiler, 2012*)

First results : Improvement of technological (higher pHu), nutritional (lower $\Omega 6:\Omega 3$ fatty acids ratio) and organoleptic quality (reduction of backfat skatole concentration) (*Van Baelen et al, 2024*)



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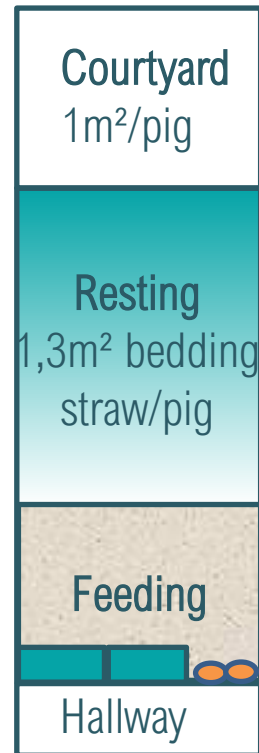
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Objective of this study

To assess the effect of these feeding strategies on some sensory properties and aromatic volatile compounds profile in non-castrated male pigs reared under organic farming conditions

➤ Experimental design



- Organic experimental farm INRAE Porganic
- 77 Piétrain (NN) × Large White non-castrated male pigs, in 2 batches

> Experimental design

33 kg BW (10 weeks of age)

Slaughter - 125 kg BW
(~24 weeks of age)

66 kg

Growing phase

Finishing phase

Barley, Wheat, Peas, Alfalfa
1.2 g lysine /MJ NE

French soya cake, Camelina cake, Faba bean,
exported Soya cake, Bran, Sunflower cake

α -linolenic acid (C18:3 n-3) = 7.6 % of identified FA
 α -linolenic acid (C18:3 n-3) = 6.0 % of identified FA

Faba bean, Sunflower cake,
Linseed extruded with 40% Faba bean,
exported Soya cake, Bran, Sunflower cake, Alfalfa

α -linolenic acid (C18:3 n-3) = 17.8 % of identified FA
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Bio+

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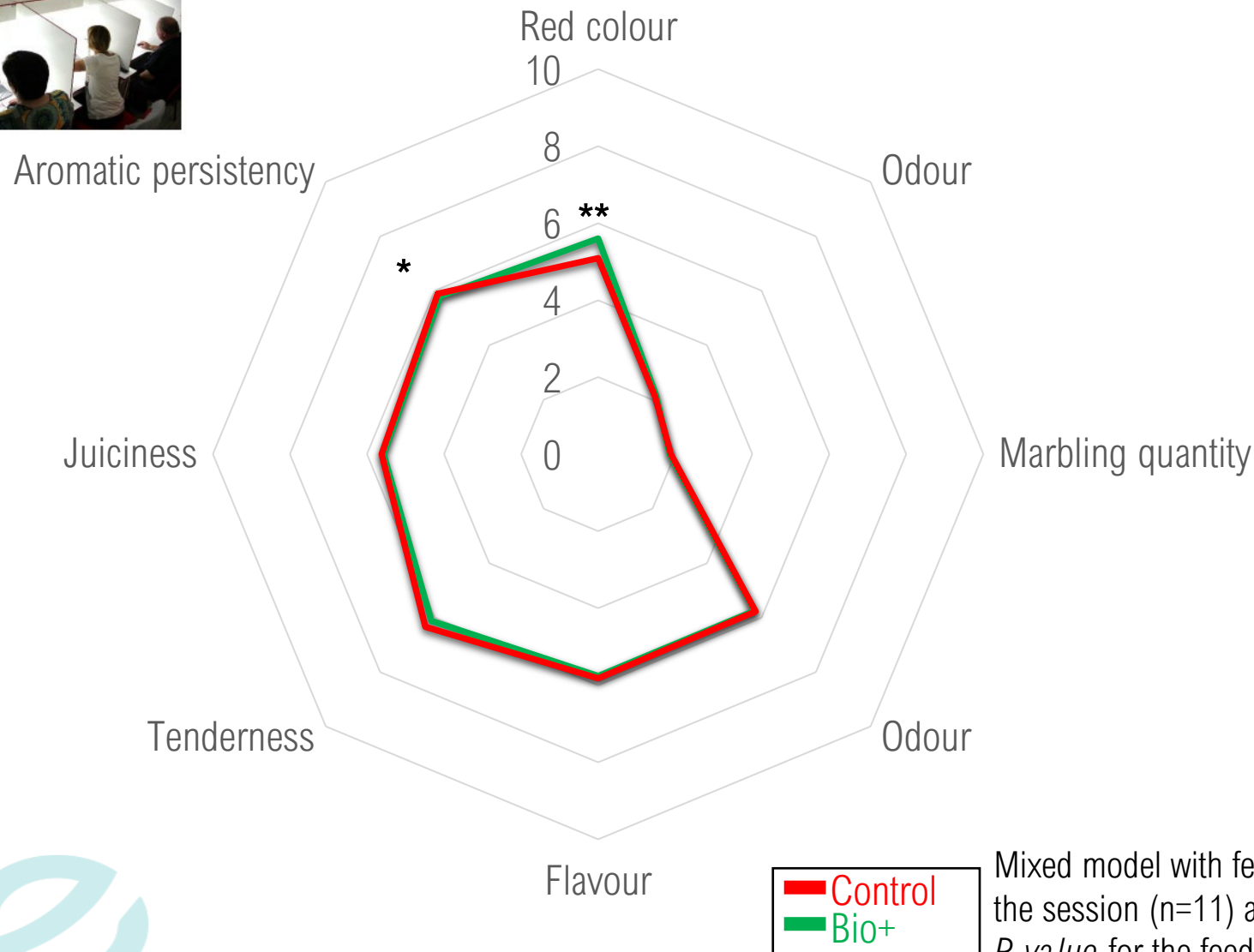
Sensory analysis:

Trained panel
10 to 13 person / session
Raw and cooked meat

Loin muscle 7 days ageing
(under vacuum, + 4°C)

Volatile compounds profile analysis:
GC-MS SPME

> Sensory analysis



Difference for red colour intensity (raw meat) and aromatic persistency (cooked meat) in compliance with some measured colour indicators : lightness and hue angle

But for other traits no difference between the two feeding strategies

None of the samples were qualified as boar taint by the trained panel

No carcasse detected odorous at the slaughterhouse (human nose method)

Mixed model with feeding strategy (n=2) and batch (n=2) as fixed effect and the session (n=11) as random effect

P-value for the feeding strategy : * $P < 0.05$, ** $P < 0.01$

> Volatile compounds analysis

Chemical family : Aldehydes, S-containing compounds, aromatics, furans, hydrocarbons, alcohols, ketones
→ possible flavours according to FlavorNet (<https://www.flavornet.org/>): cabbage, almond, fatty, buttery, onion...

Among the 27 volatile compounds :

2 compounds found in all samples (Bio+ and Control) : Benzaldehyde → almond, burnt, sugar
Heptanal → fat, citrus, rancid

7 compounds found in some Bio+ samples

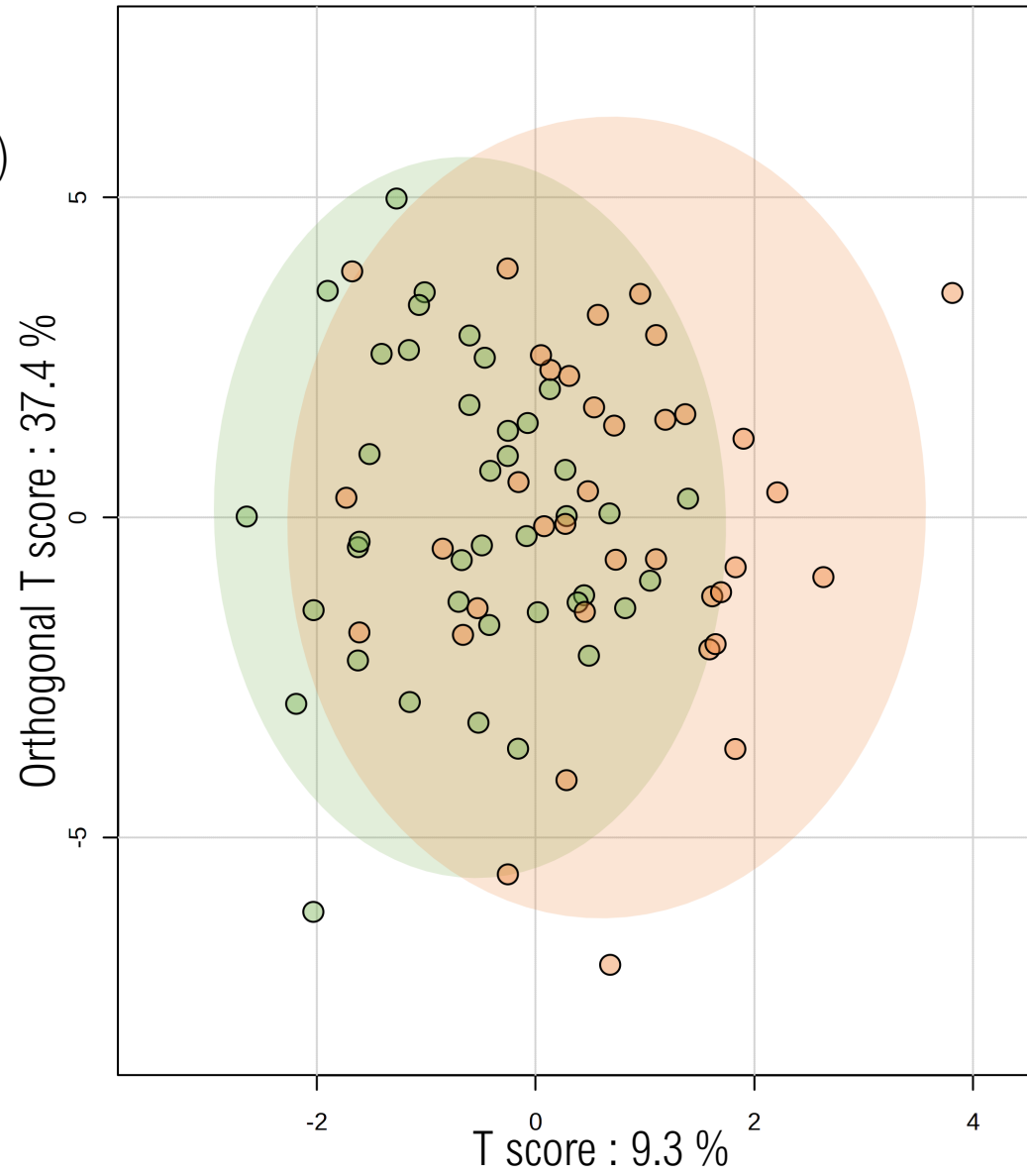
1 compounds found in some Control samples

1 compound found with a higher relative abundance in Control than in Bio+ samples
dimethyl disulfide → onion, cabbage, putrid



> No discrimination between the feeding strategies based on sensory traits and volatile compounds

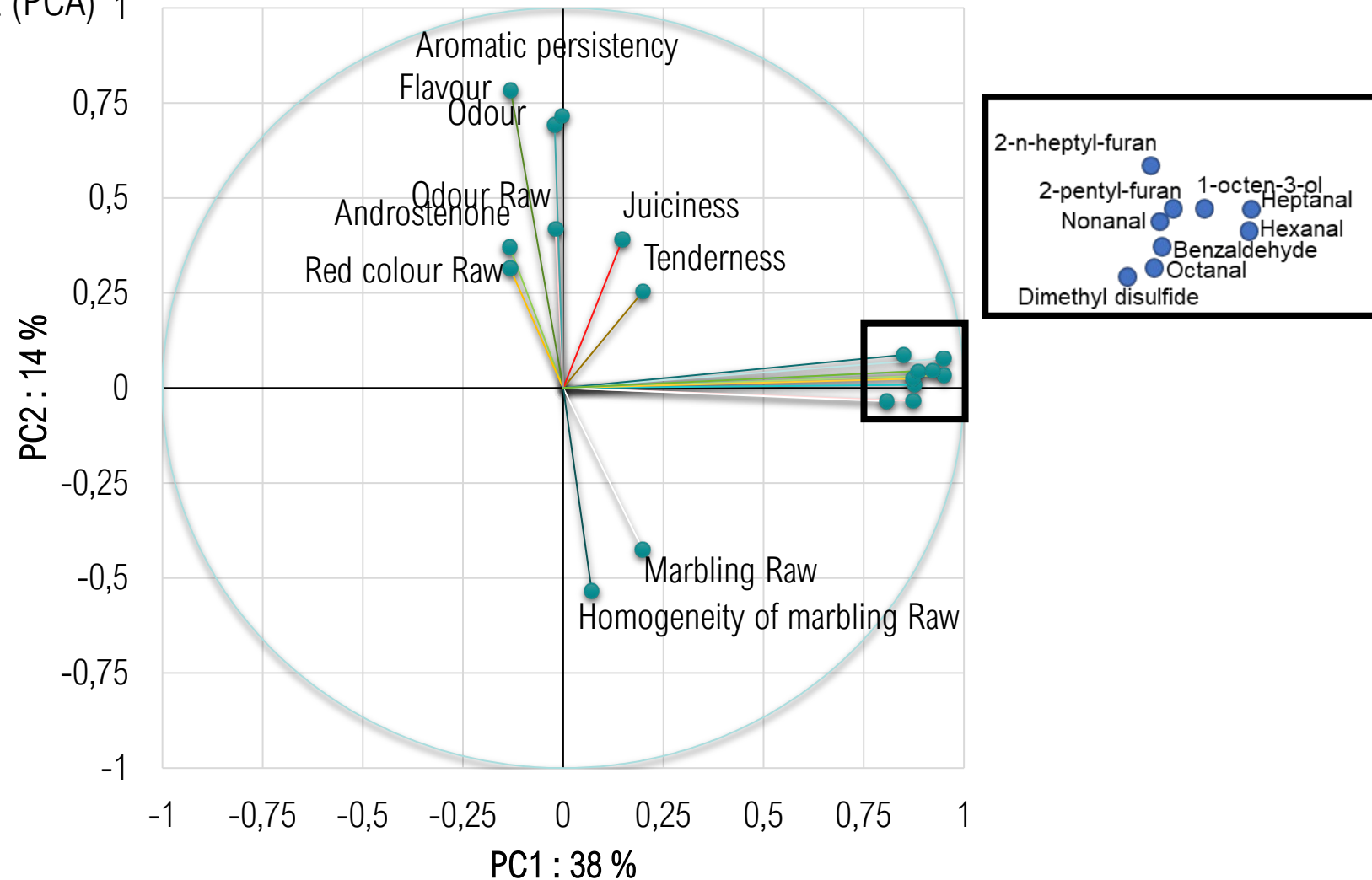
Orthogonal partial-least square analysis (oPLSDA)



Control
Bio+

> No statistical relationships between sensory traits and volatile compounds profile

Principal analysis component (PCA) 1



> Take home messages



Bio+ : red colour ++ and more volatile compounds
→ due to the forages and/or the composition of the diet?

No significance difference and no discrimination between the feeding strategies on sensory traits and volatile compounds profile on fresh pork

Feeding strategies improved together organoleptic and societal image properties *via* the relocation of resources for feeding strategies

➤ Thank you for your attention



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