

# CONVERSION FROM WARNER-BRATZLER SHEAR FORCE (WBSF) TO SLICE SHEAR FORCE (SSF) TO CLASSIFY PORK LOIN TENDERNESS

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## OBJECTIVE

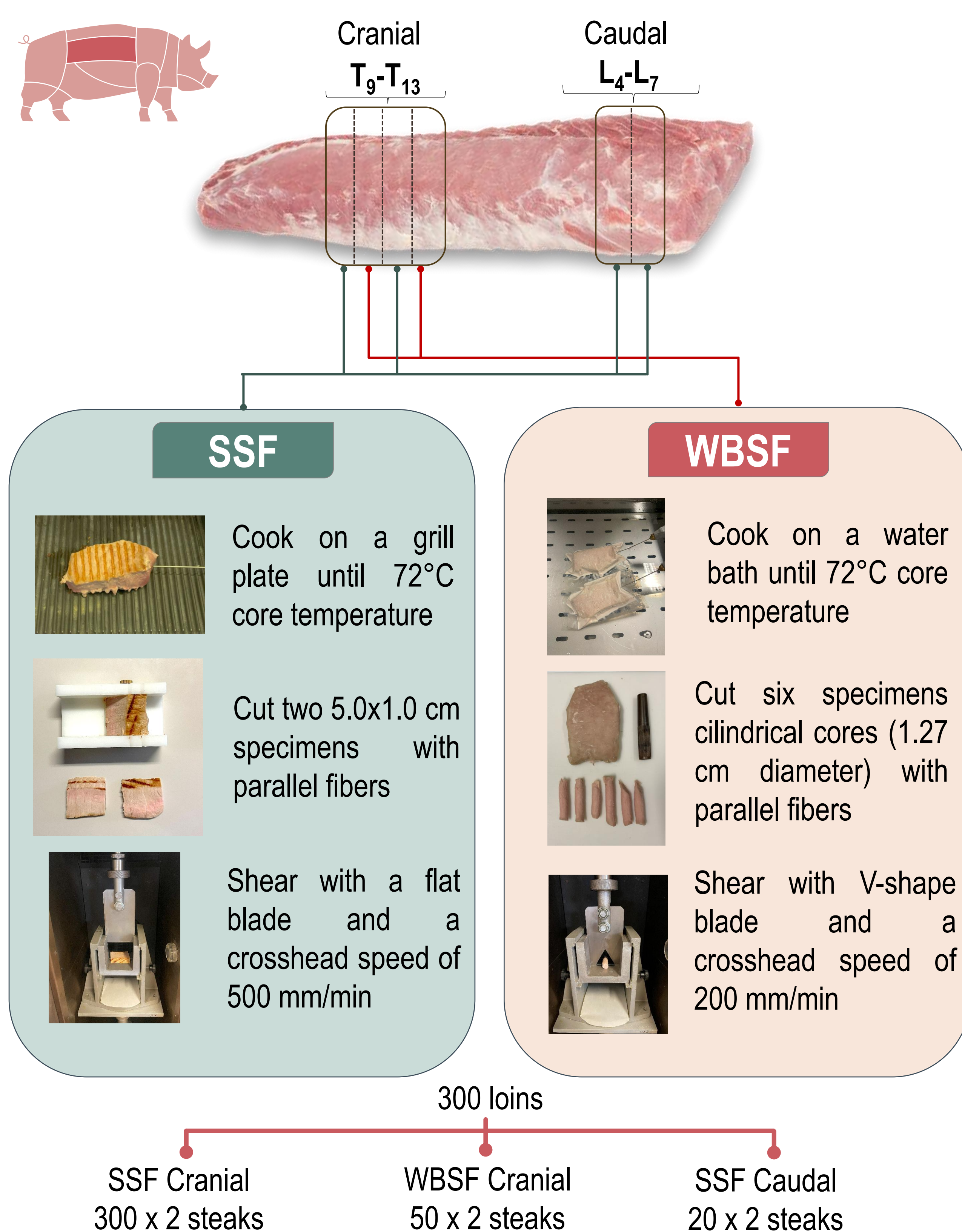
- To correlate SSF and WBSF instrumental texture values through a regression model
- To define 4 tenderness classes by converting WBSF into SSF thresholds to classify pork loin
- To assess the effect of rearing conditions (genetics, quality of space, space allowance) and sampling location (cranial vs caudal) on pork loin texture.

## 1 Introduction

Tenderness is a key attribute of pork quality. Instrumental methods like Warner-Bratzler (WBSF) and Slice Shear Force (SSF) offer reliable alternatives to sensory evaluation. Tenderness classification based on WBSF values was proposed by Destefanis et al. [1], but limited research has addressed the application of SSF to classify tenderness in pork. This research is part of the EU Horizon 2020 project **mEATquality**, examining the impact of husbandry practices on intrinsic meat quality.

## 3 Methodology

Pork loin steaks (3.5 cm thick) collected at 72h postmortem between the T9<sup>th</sup> and T13<sup>th</sup> ribs (cranial), and from the L4<sup>th</sup> and L7<sup>th</sup> (caudal) ribs.



SSF and WBSF were analyzed with Instron 5545 equipped with a 500 N load cell, by following AMSA (2016) guidelines and the peak maximum shear force as Newton (N) was recorded.

## REFERENCES

[1] Destefanis, G., et. Al (2008). Meat Science, 78(3), 153–156.

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## 2 Experimental design

### Genetics



50 pigs from local breeds Mora Romagnola (MR), Cinta Senese (CS), crossbreeds CS×Large White (CS×LW), CS×Duroc (CS×D), LW×Duroc (LW×D) (10 pigs each).

### Quality of space



100 commercial heavy pigs with minimal enrichment (40 pigs), access to branches (20 pigs) or access to branches and shaded areas (40 pigs). Summer/Winter trials.

### Space Allowance – Indoor



60 commercial heavy pigs housed with different space allowance indoor (20 pigs each) 1.15 m<sup>2</sup>/pig, 1.9 m<sup>2</sup>/pig or 3 m<sup>2</sup>/pig. Summer/Winter trials.

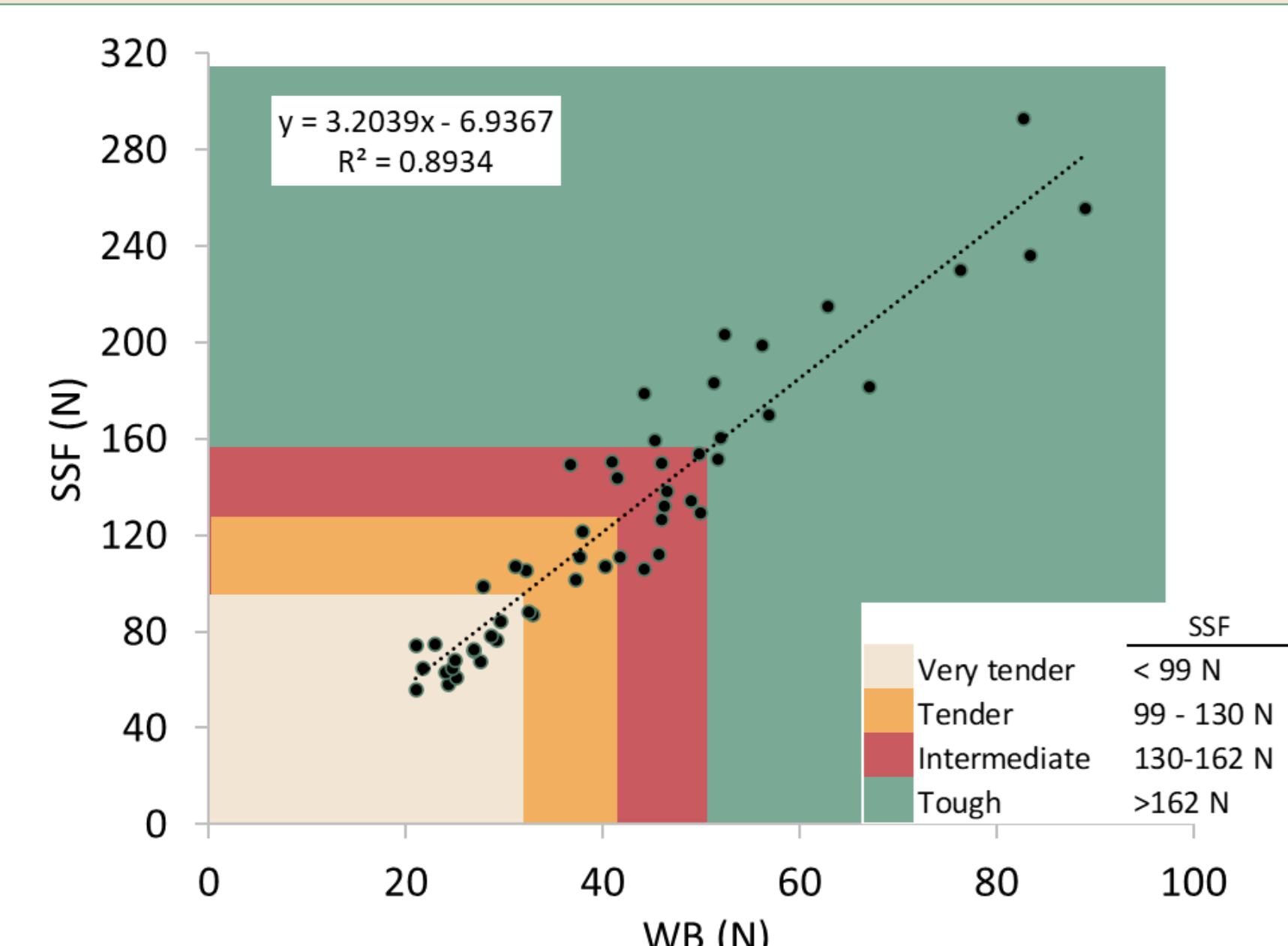
### Space Allowance – Indoor + Outdoor



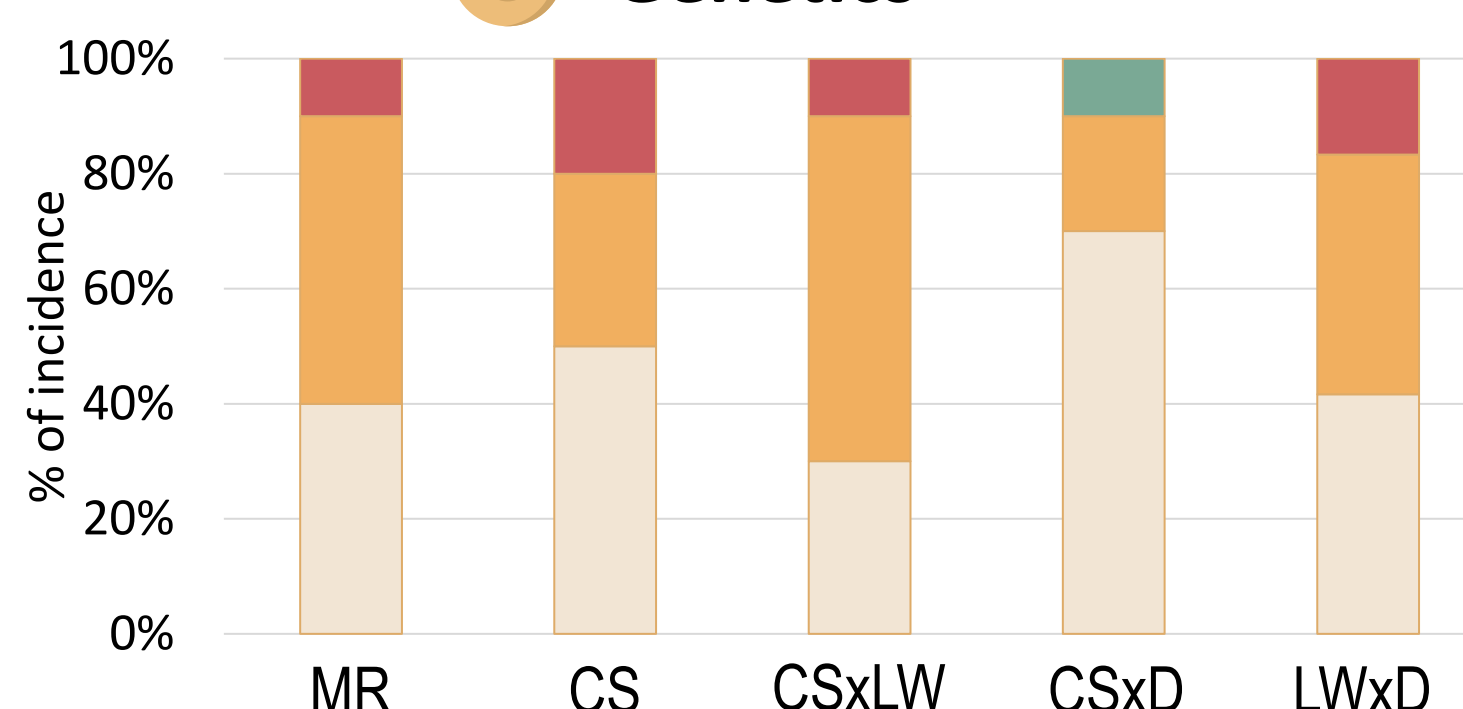
90 commercial heavy pigs housed with different space allowance indoor and outdoor 1.4+1.0 m<sup>2</sup>/pig (34 pigs), 2.6+2 m<sup>2</sup>/pig (22 pigs) or 3.9+3 m<sup>2</sup>/pig (33 pigs). Summer/Winter trials.

## 4 Results

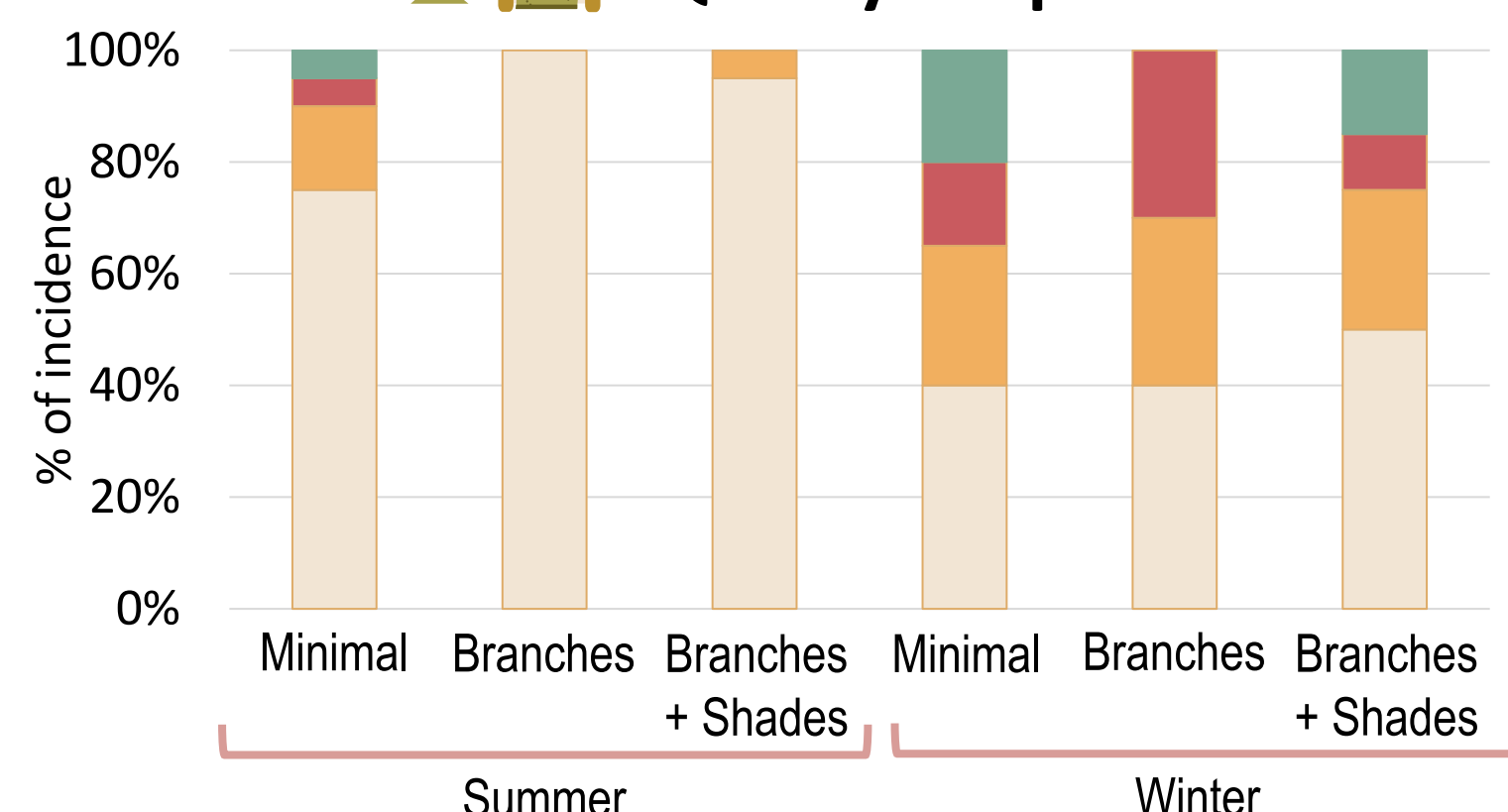
- 50 paired WBSF and SSF values were used to develop a regression model and tenderness classes [1] were defined into SSF values: very tender (<99 N), tender (99-130 N), intermediate (130-162 N), tough (>162 N).
- 300 SSF values were used to classify loins into tenderness classes, evaluating the incidence (%) across treatment groups.



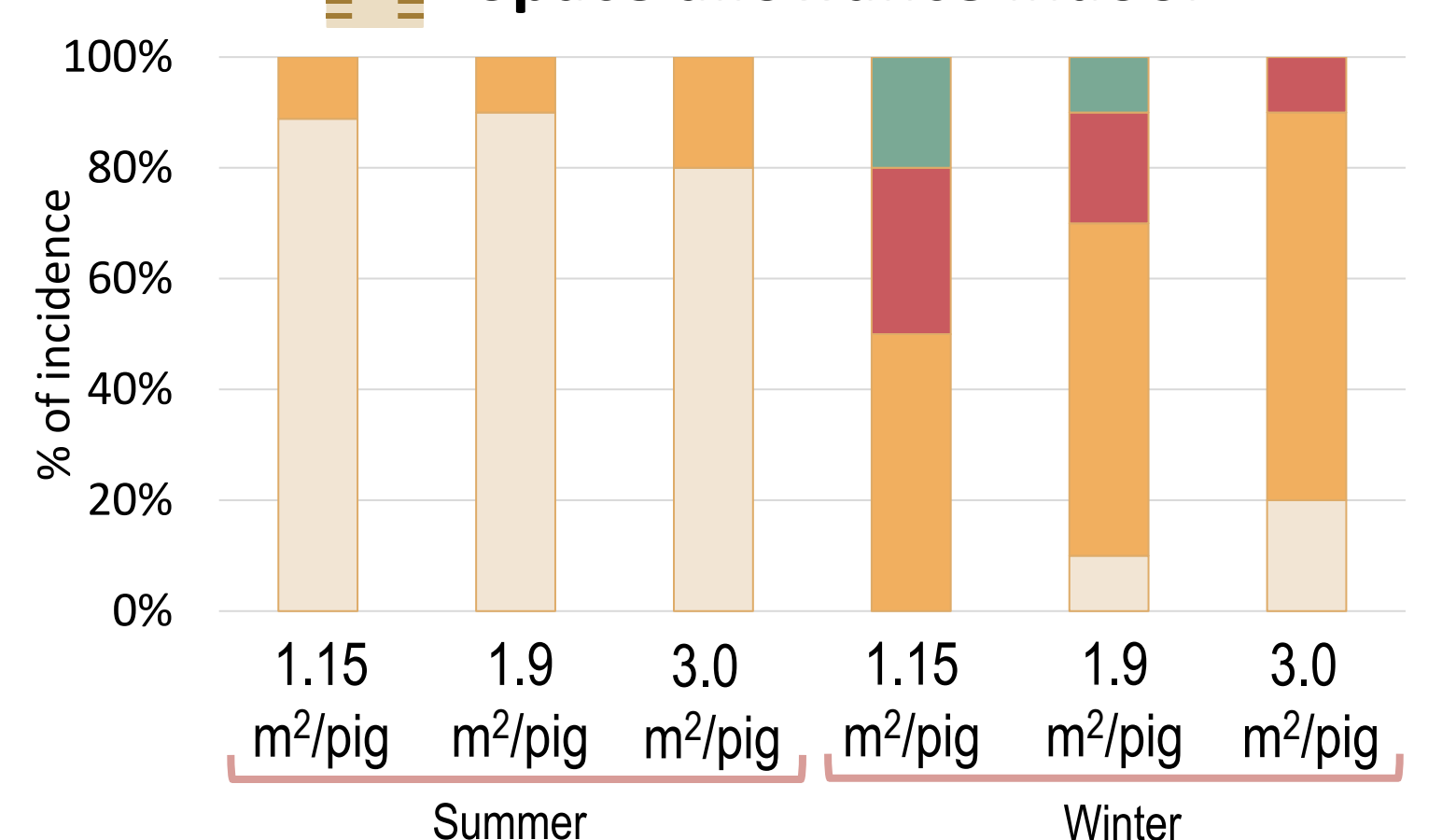
### Genetics



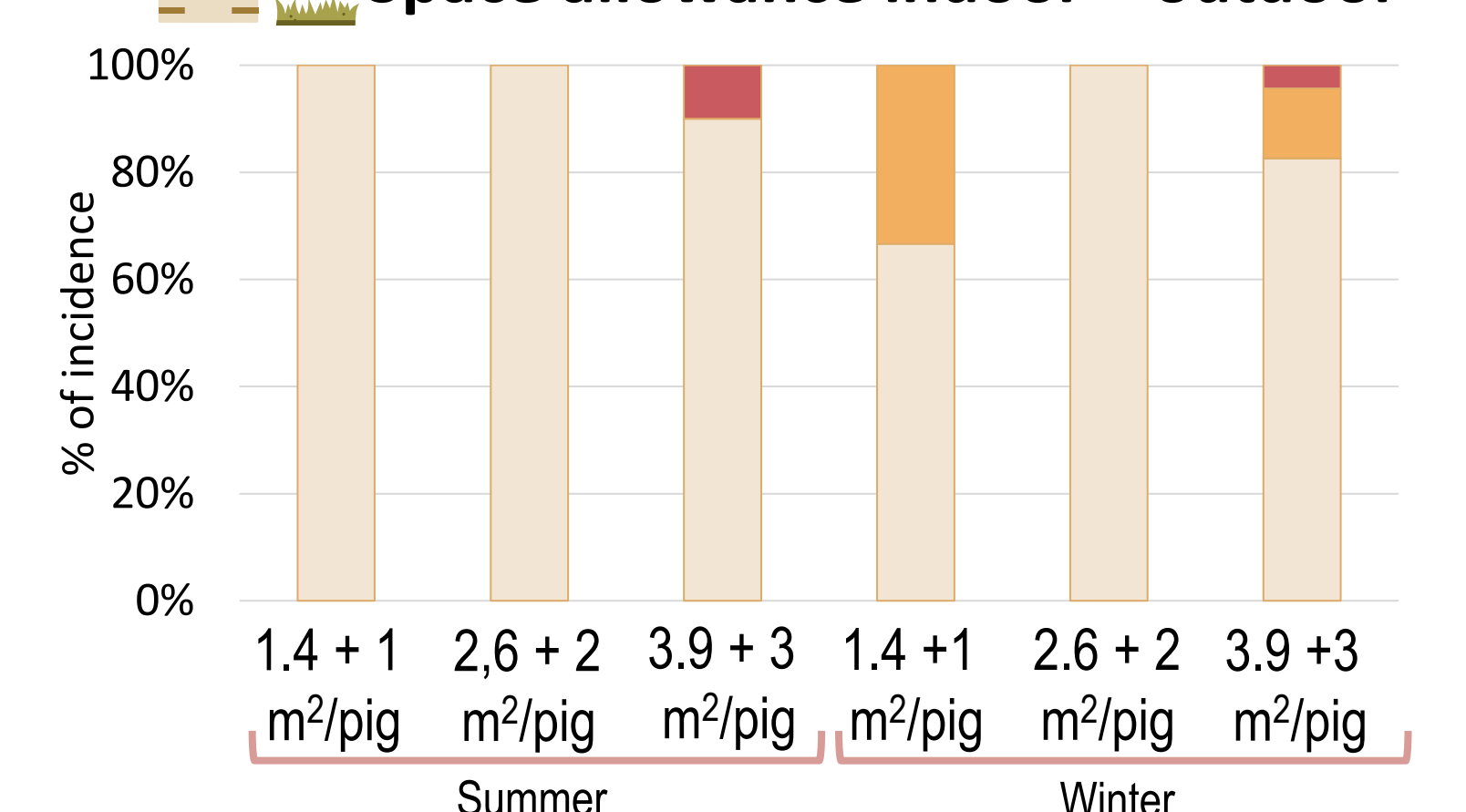
### Quality of space



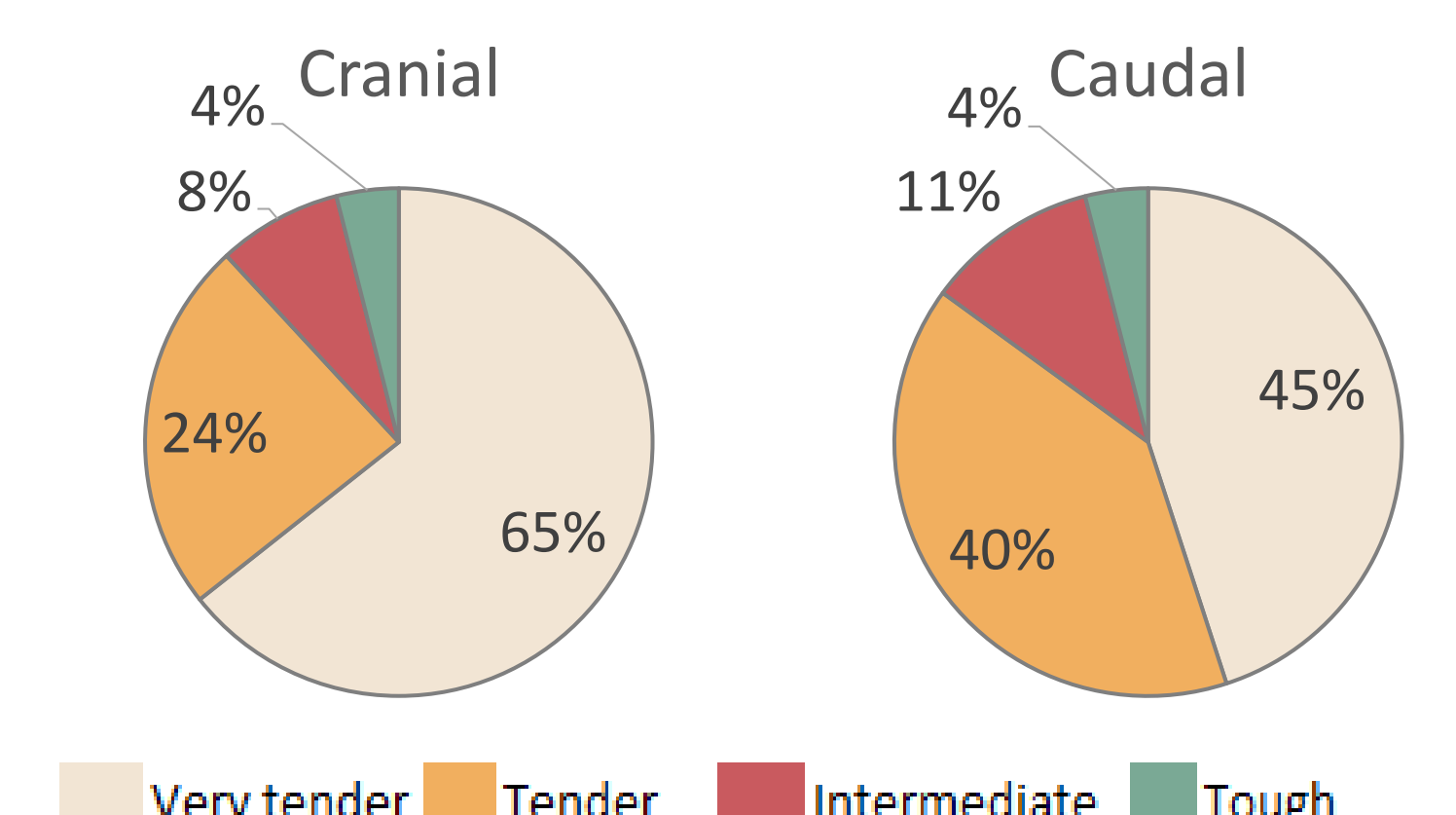
### Space allowance indoor



### Space allowance indoor + outdoor



- 20 paired SSF cranial and caudal values were used to develop a regression model ( $y = 0.8329x + 27.952$ ;  $R^2 = 0.8392$ ); the SSF value was consistently higher ( $p < 0.001$  t-Test) in the caudal loin steaks.
- Caudal SSF value was estimated for 300 loins, and the incidence (%) across tenderness classes is reported.



## 5 Conclusion

- Texture is influenced by animal genetics, confirming its role in intrinsic meat quality.
- Quality of space has little effect on loin tenderness, but seasonal influence is evident.
- Space allowance affects texture: reduced space led to tougher meat, especially in indoor-housed pigs during winter.
- The caudal portion of the loin is consistently tougher than the cranial portion.



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