GLOBAL PORK QUALITY BENCHMARKING - PIC® COMPASS™

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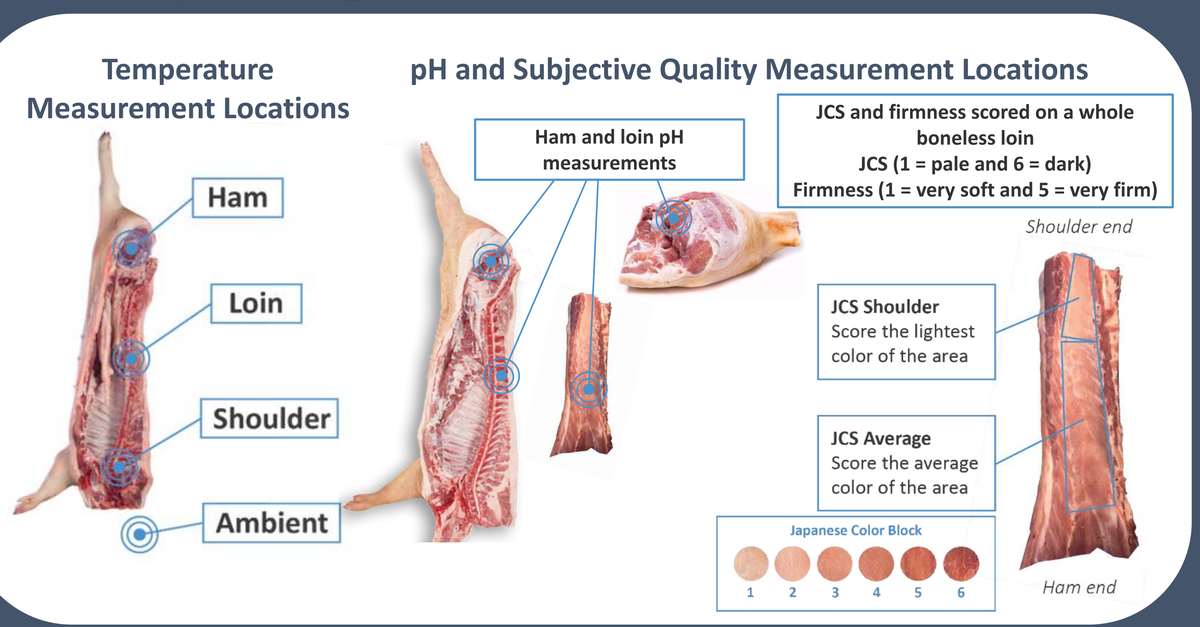
INTRODUCTION

Pork quality attributes are generally measured by independent companies as a means of meeting customer and consumer expectations and demands. Various factors can impact the development of overall pork quality as influenced by plant operations [1,2]. Global swine genetics company, PIC®, sought to provide a means of assessing pork quality where all measurements are standardised across processing plants. Ultimately, this benchmark data termed PIC® Compass™, provides an independent reference for companies to assess how comparable and competitive their overall pork quality performance is on a national or global basis.

MATERIAL AND METHODS

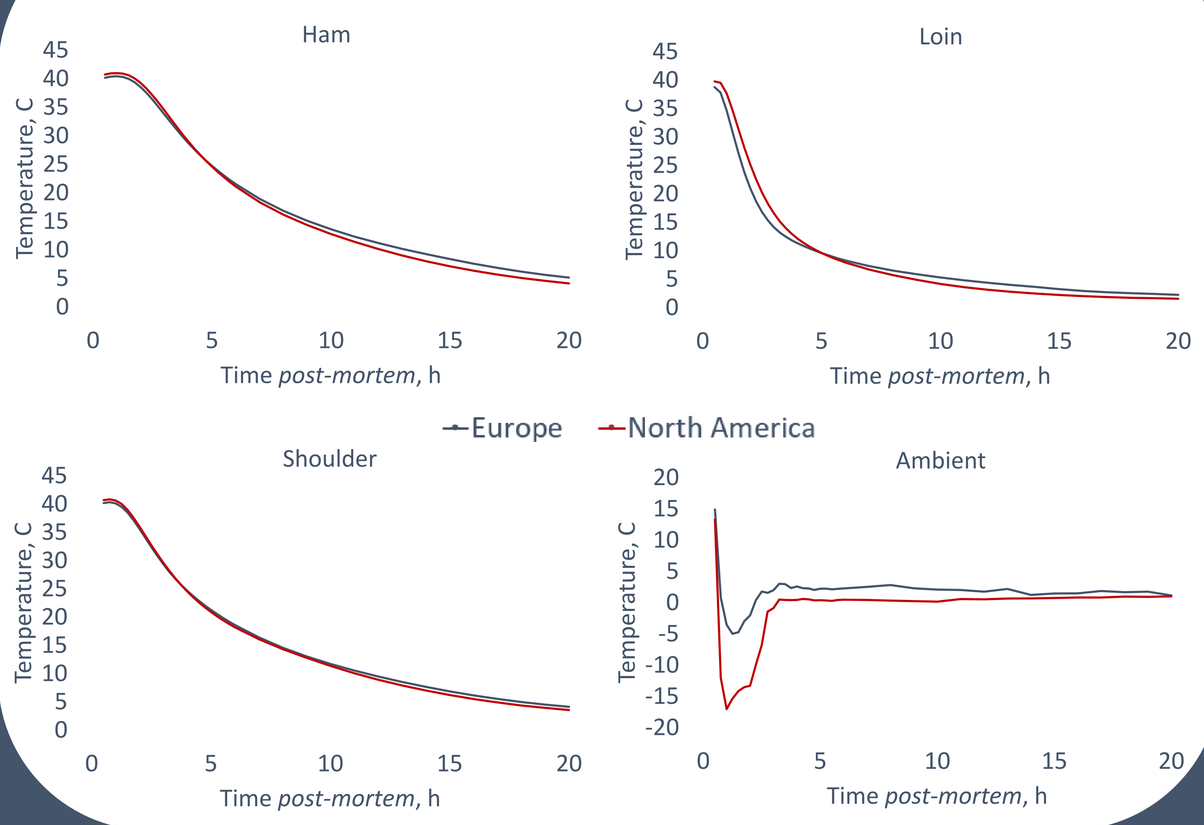
- Thus far, data have been collected from 19 commercial pork processing facilities in North America and Europe.
- Carcass temperature probes were randomly placed in carcasses (n > 12 carcasses across multiple days at each plant) on the slaughter floor before chilling with measurements logged every minute thereafter for approximately 20 h.
- Ham (*semimembranosus*) and loin (last rib) pH were measured at two different time points: initial pH (pHi) was collected immediately before chilling and ultimate pH (pHu) was collected approximately 20 h *post-mortem*.
- Subjective loin quality measurements, Japanese Colour Score (JCS) and firmness, were collected on boneless loins. The pH and loin quality data (n > 275) were taken across multiple days at each processing plant.



RESULTS AND DISCUSSION

- All plants in this study used CO_2 stunning, whereas animal handling systems prior to stunning were somewhat variable.
- *Post-mortem* chilling rates were variable across processing facility and between regions, with regional differences observed for loin ($P < 0.01$) and ambient ($P < 0.0001$) temperatures (Figure 1).

Figure 1. Temperature Decline Curves



- Carcass chilling is one of the first *post-mortem* processes that impacts the development of pork quality, with chilling system variation resulting in differences across muscles [3].

RESULTS AND DISCUSSION

- Differences in both pHi and pHu were observed in the present benchmark data (Table 1). Initial pH values can be indicative of poor animal handling or stressed pigs before slaughter when values fall below 6.00 due to rapid *post-mortem* pH decline [1].
- Ultimate pH values below 5.60 can be an indicator of poor carcass chilling and can result in more PSE-like (pale, soft, and exudative) or even intermediary RSE-like (red, soft, and exudative) pork with lower water-holding capacity and product unacceptable for many consumers [2,4].
- Colour and firmness scores aligned with differences observed in carcass chilling and resulting pHu values.

Table 1. PIC® Compass™ – *Post-mortem* pH, Colour, and Firmness

Trait	Avg	Min	Max	SD
Ham pHi	6.58	6.49	6.83	0.08
Loin pHi	6.66	6.56	6.74	0.04
Ham pHu	5.75	5.62	5.91	0.08
Loin pHu	5.67	5.55	5.84	0.08
JCS Average Score	3.41	3.15	3.82	0.20
Firmness Score	2.47	1.67	2.98	0.35

- When comparing benchmark data across regions, additional pork quality differences were observed (Table 2). Higher pHu values ($P < 0.05$) for the loin were observed in North American plants compared to European plants.
- North American plants tended to have darker colour ($P < 0.10$) and had higher firmness ($P < 0.05$) scores, likely resulting from differences in chilling systems.

Table 2. PIC® Compass™ – Comparison of Pork Quality Between Regions

Trait	Europe	N. America	P-value	Pooled SEM
No. of plants	7	12	-	-
Time of pHi, min PM	32.6	37.2	0.10	1.80
Ham pHi	6.60	6.57	0.54	0.03
Loin pHi	6.65	6.67	0.50	0.01
Ham pHu	5.71	5.78	0.06	0.02
Loin pHu	5.60	5.71	0.002	0.02
JCS Average Score	3.29	3.47	0.07	0.06
Firmness Score	2.19	2.64	0.005	0.09

CONCLUSIONS

- Pork quality is influenced by several factors and global variation was observed based on processing capabilities and techniques.
- Factors such as animal handling, transportation length, time in lairage, and rate and extent of carcass chilling are critical in the development of pork quality attributes. These data enable processing plants to assess competitiveness and implement changes as needed to produce high-quality pork that meets demands for various markets.

REFERENCES

1. Berg, E. (2006). Critical points affecting fresh pork quality within the packing plant. http://porkgateway.org/resource/critical-points-affecting-fresh-pork-quality-within-the-packing-plant/
2. Lonergan, S. (2012). Pork Quality: pH decline and pork quality. http://porkgateway.org/resource/pork-quality-ph-decline-and-pork-quality/
3. Blakely, A., Prusa, K., Fedler, C. A., Sherrard, G. B., Steadham, E. M., Stalder, K. J., Lorenzen, C. L., Huff-Lonergan, E., Lonergan, S. M. (2019). The effect of rapid chilling on pork carcasses during the early postmortem period on fresh pork quality. Meat and Muscle Biology 3:424-432.
4. Buege, D. (2006). Variation in pork lean quality. https://porkgateway.org/resource/variation-in-pork-lean-quality/

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