CHILLING OF CARCASSES FROM DOUBLE MUSCLED CATTLE :
TIME-TEMPERATURE EVOLUTION AND PREDICTIVE MODELLING OF GROWTH OF *LISTERIA MONOCYTOGENES* AND *CLOSTRIDIUM PERFRINGENS*

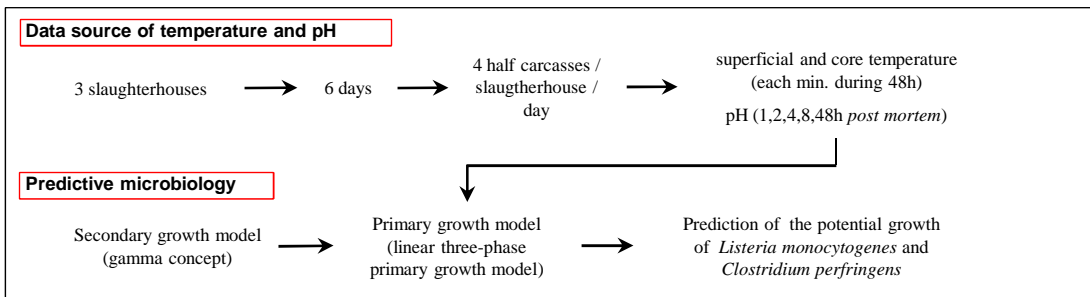L. Delhalle, B. Collignon, S. Dehard, P. Imazaki, G. Daube and A. Clinquart

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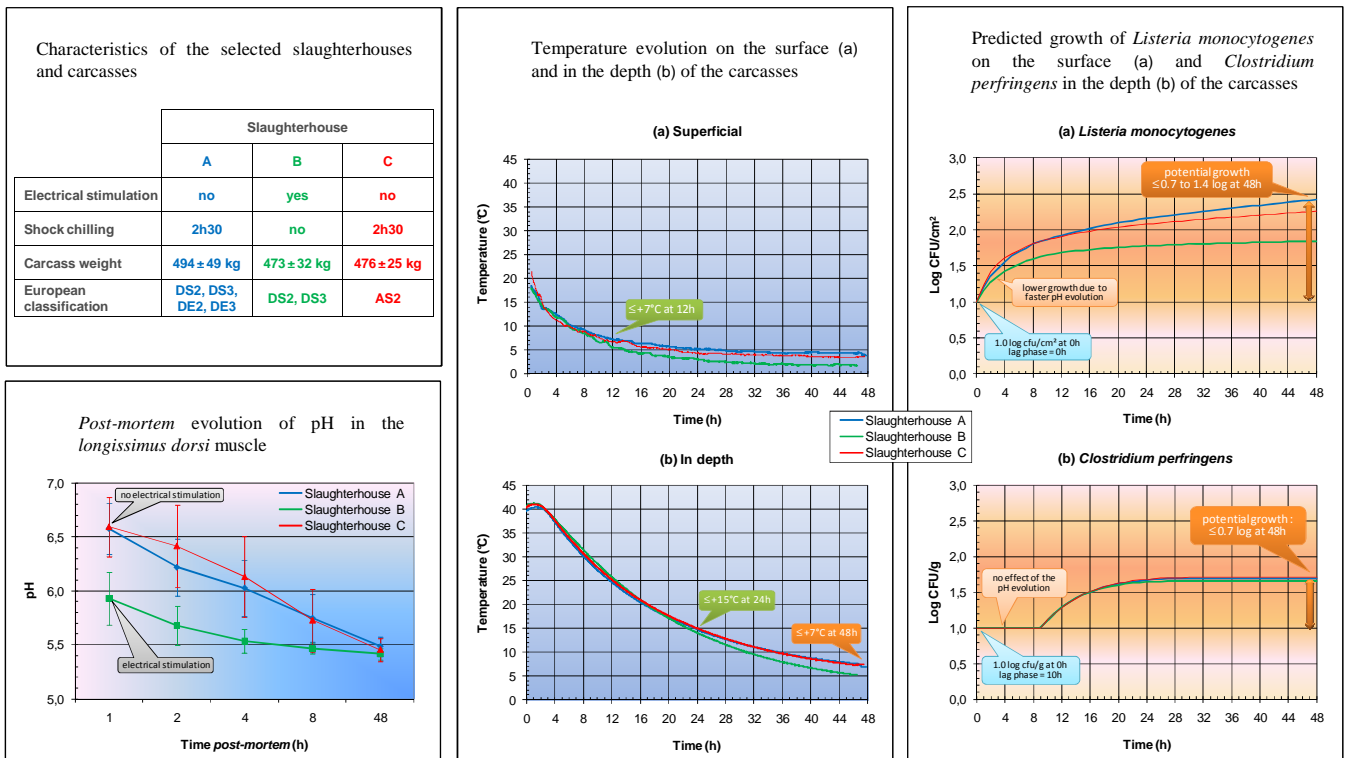
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Objectives

- study the feasibility of complying with chilling recommendations in heaviest carcasses of the Belgian Blue cattle
- predict the potential growth of *Listeria monocytogenes* on the surface and *Clostridium perfringens* in the depth of carcasses

Materials and methods

Data source of temperature and pH

3 slaughterhouses → 6 days → 4 half carcasses / slaugtherhouse / day → superficial and core temperature (each min. during 48h)

pH (1,2,4,8,48h *post mortem*)

Predictive microbiology

Secondary growth model (gamma concept) → Primary growth model (linear three-phase primary growth model) → Prediction of the potential growth of *Listeria monocytogenes* and *Clostridium perfringens*

Results and discussion

Characteristics of the selected slaughterhouses and carcasses

	Slaughterhouse		
	A	B	C
Electrical stimulation	no	yes	no
Shock chilling	2h30	no	2h30
Carcass weight	494 ± 49 kg	473 ± 32 kg	476 ± 25 kg
European classification	DS2, DS3, DE2, DE3	DS2, DS3	AS2

Post-mortem evolution of pH in the *longissimus dorsi* muscle

no electrical stimulation
electrical stimulation

Slaughterhouse A
Slaughterhouse B
Slaughterhouse C

Temperature evolution on the surface (a) and in the depth (b) of the carcasses

(a) Superficial

≤ +7°C at 12h

Slaughterhouse A
Slaughterhouse B
Slaughterhouse C

(b) In depth

≤ +15°C at 24h
≤ +7°C at 48h

Predicted growth of *Listeria monocytogenes* on the surface (a) and *Clostridium perfringens* in the depth (b) of the carcasses

(a) *Listeria monocytogenes*

potential growth ≤ 0.7 to 1.4 log at 48h
lower growth due to faster pH evolution
1.0 log cfu/cm² at 0h lag phase = 0h

(b) *Clostridium perfringens*

potential growth : ≤ 0.7 log at 48h
no effect of the pH evolution
1.0 log cfu/g at 0h lag phase = 10h

Conclusions

The observed time-temperature combinations in the selected slaughterhouses comply with recommendations and limit the growth of both pathogens in case of accidental contamination of carcasses.

This study contributes to demonstrate that modeling approach could be used on available environmental data in order to evaluate the risk associated with pathogens. The impact of the variation of environmental conditions can also be evaluated.