

Prediction of drip loss and ultimate pH in pork *Semimembranosus* by the NitFom™



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Introduction

A majority of studies dealing with Near InfraRed Spectroscopy (NIRS) prediction of meat quality are focusing on its chemical composition, but the ability of NIRS to predict technological quality of meat has been the subject of many recent publications. This technology gives a quick access to spectral pattern that can also be linked to the water holding capacity of meat. However, very few NIRS devices are suitable for industrial implementation. In this study, a feasibility test was carried out to evaluate the possibility of predicting drip loss and ultimate pH in pork *Semimembranosus* using the NitFom™, a NIRS-based handheld invasive probe suitable for rapid on line measurements in pork carcasses immediately after slaughter.



Figure 1: NitFom™ spectrometer

Material and methods

2 spectrometers:

- NitFom™ (995-2200 nm) - invasive probe suitable for industrial purpose
- ASDI Labspec4® (350-2500 nm) - surface probe dedicated to experimental measurements

■ **Samples:** 2 subpopulations of deboned hams (n=41 and n=45) selected on ultimate pH value (uniform pH distribution, 6 classes: <5.5 ; 5.5-5.6 ; 5.6-5.8 ; 5.8-6.0 ; 6.0-6.2 ; >6.2) from 2 batches of randomly selected bone-in hams (population 1: n=222, Duroc sire; population 2: n=145, Piétrain sire).

Spectral measurement sites:

- Invasive NitFom™ probe: cross section of *Semimembranosus*
- Labspec4®: internal surface of *Semimembranosus*

Reference meat quality parameters:



- ultimate pH of *Semimembranosus*
- Drip loss sampling of the internal surface of *Semimembranosus* (EZ method)

■ Spectral prediction of the ultimate pH and drip loss were investigated with the PLS cross validation procedure (MATLAB software and Eigenvector toolbox).

Tabl 1: Reference calibration data set

	Population 1			Population 2			Population 1+2		
	n	m	sd	n	m	sd	n	m	sd
Drip loss (%)	41	2.0	1.4	45	3.3	2.6	86	2.7	2.2
Ultimate pH	222	5.7	0.12	145	5.8	0.23	367	5.8	0.19

Table 2: Calibration results for the prediction of drip loss and ultimate pH with NitFom™ and Labspec4®

		Population	pre-processing	nb PLS factors	R ² c	R ² cv	rmsecv
	Drip loss (%)	1+2 (n=86)	GLS+ auto-scaling	2	0.59	0.53	1.48
	Ultimate pH	1+2 (n=367)		2	0.70	0.64	0.11
	Drip loss (%)	2 (n=45)	auto-scaling	3	0.61	0.54	1.71
	Ultimate pH	2 (n=45)		5	0.74	0.61	0.17

Results

- The drip loss/ultimate pH relationship pointed out that pH sorting is not efficient enough for drip loss prediction (population dependent sorting, low correlation level for pH values < 5.8).
- Similar accuracy was found for the drip loss prediction with NitFom™ and Labspec4® (R²c=0.59 and rmsecv=1.48 VS R²c=0.61 and rmsecv=1.71).
- NIRS sorting of the meat according to the drip loss level was relevant compared to the ultimate pH sorting.
- Accuracy for NitFom™ and Labspec4® prediction of ultimate pH was satisfactory (R²c=0.70 et R²c=0.74) but prediction errors are still high (0.11 and 0.17).

Figure 2: Relationship between drip loss and ultimate pH

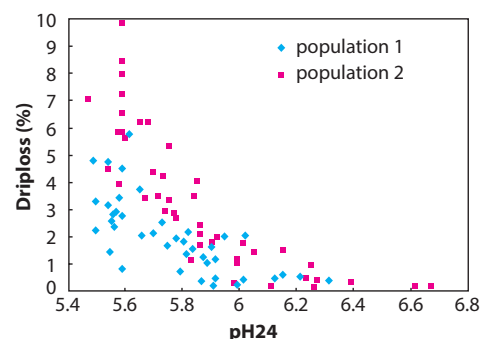
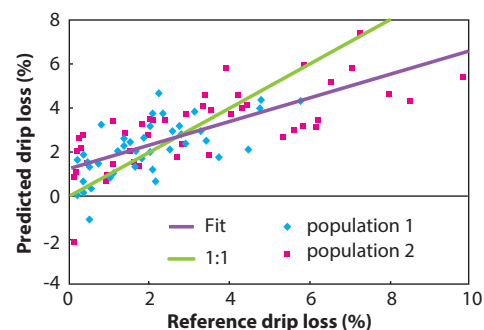


Figure 3: Prediction of drip loss with NitFom™



Conclusion

This study confirmed the ability to predict ultimate pH and drip loss by NIRS in *Semimembranosus* from pork. Prediction of drip loss appeared to be more accurate than measurement of ultimate pH for the sorting of hams. NitFom™ is already installed in several slaughterhouses and used for backfat quality sorting. The present study demonstrates that NitFom™ may be used for prediction of the technological quality of meat in the future. However, to develop a robust generic model, more samples must be added to the data set taking into consideration different genetics, pre-slaughter handling etc.

