

Proteomics as a tool to better understand beef tenderness

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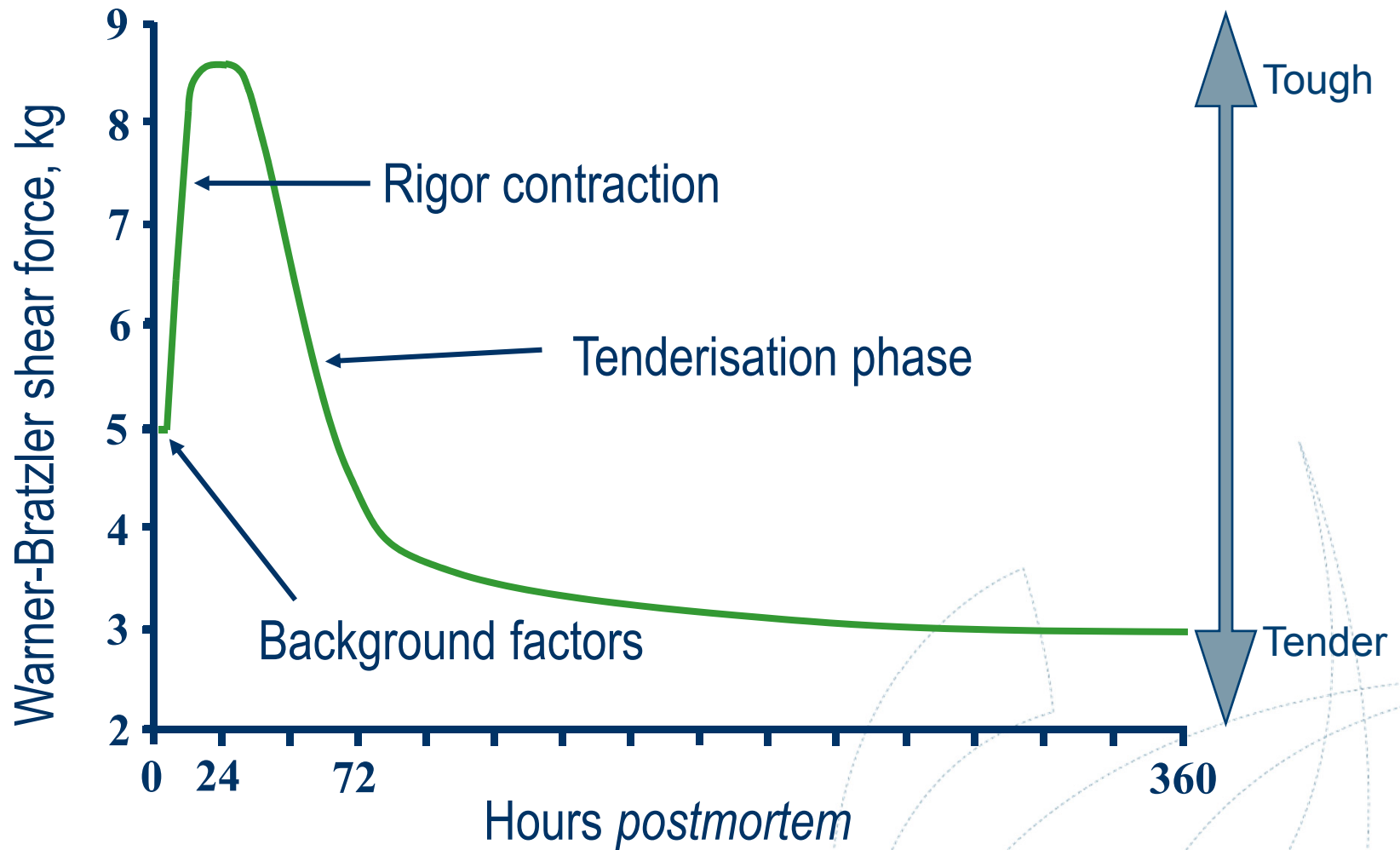
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Why beef tenderness?

- Consumers' rating of beef sensory attributes:
 1. Tenderness
 2. Juiciness
 3. Flavour
- Consumers are willing to pay more for tender beef products
- More variation in tenderness than in either juiciness or flavour



Factors determining beef tenderness



Adapted from Wheeler & Koohmaraie, 1994

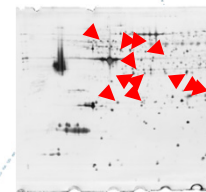
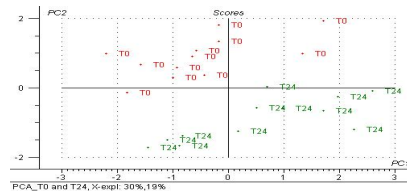
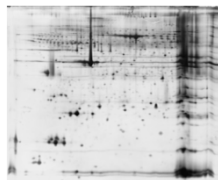
To improve beef tenderness...

...we need to understand:

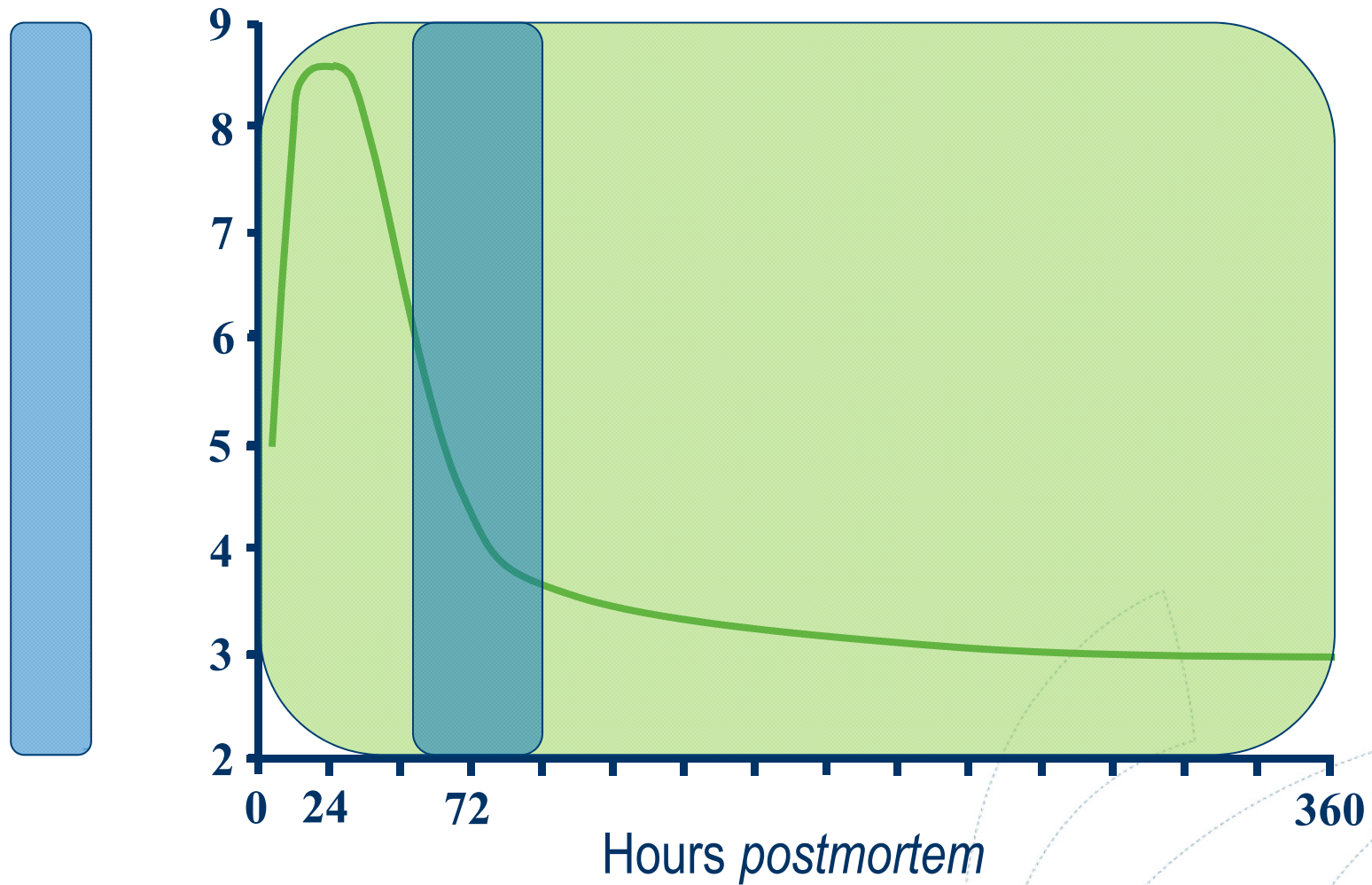
- the complex molecular processes occurring *postmortem*
- the relationships between *postmortem* metabolism and proteolysis and tenderness development



?

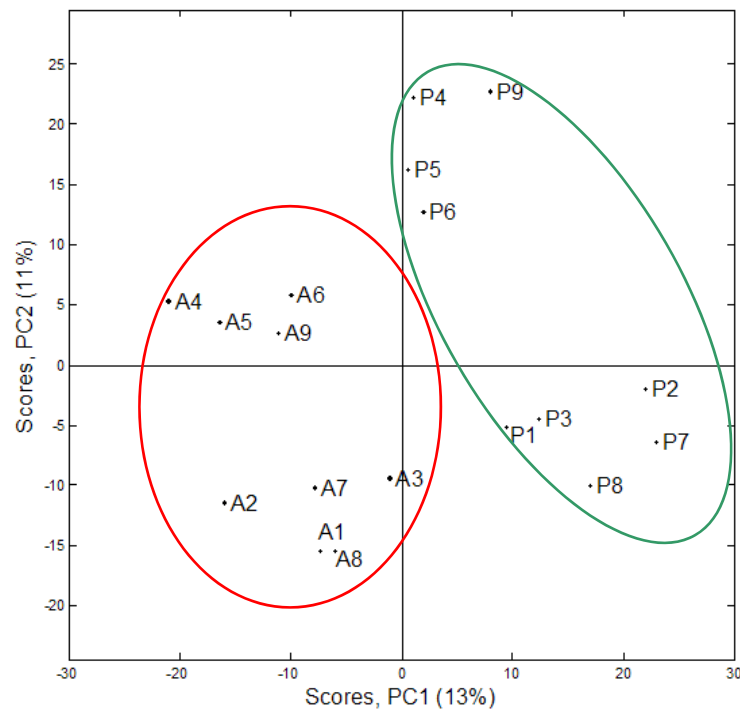


Application of proteomics

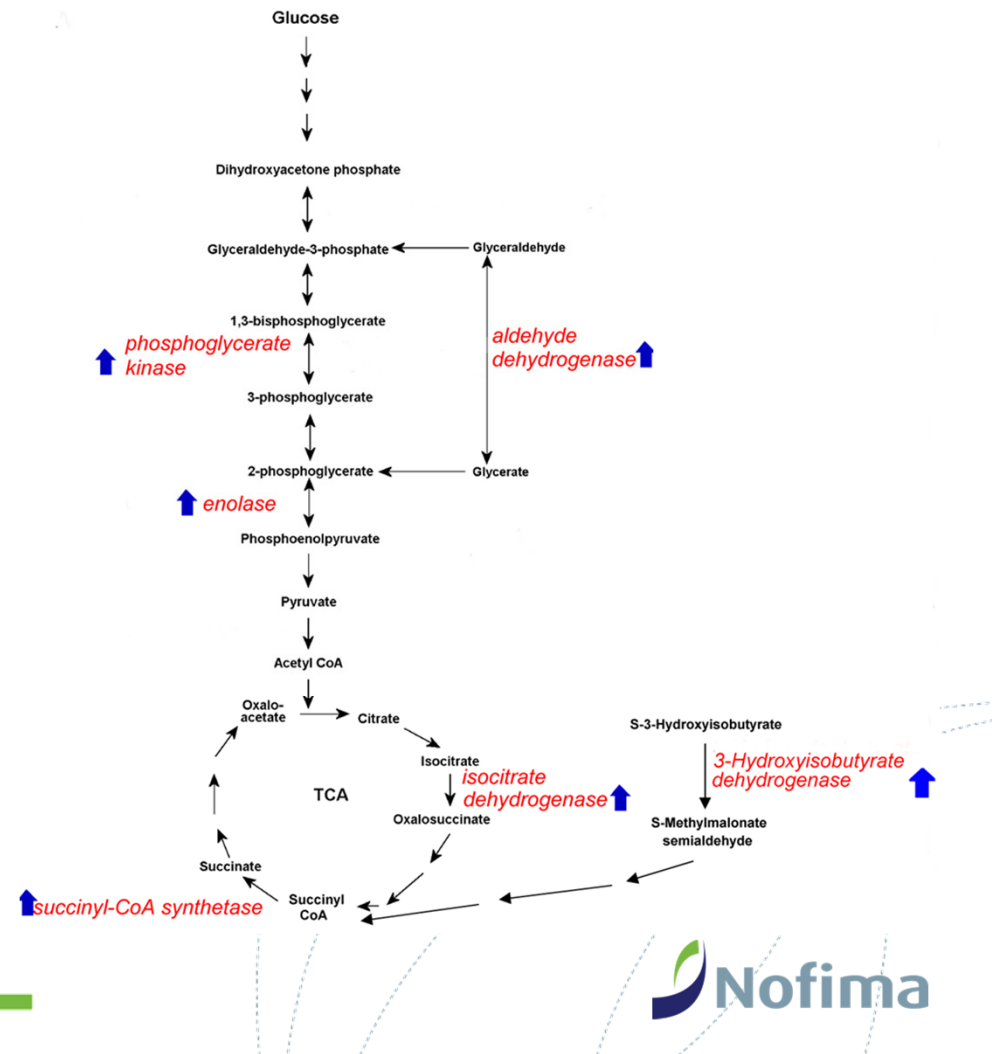


Early *postmortem* changes in muscle

Biopsies from living animals vs samples 1h *postmortem*

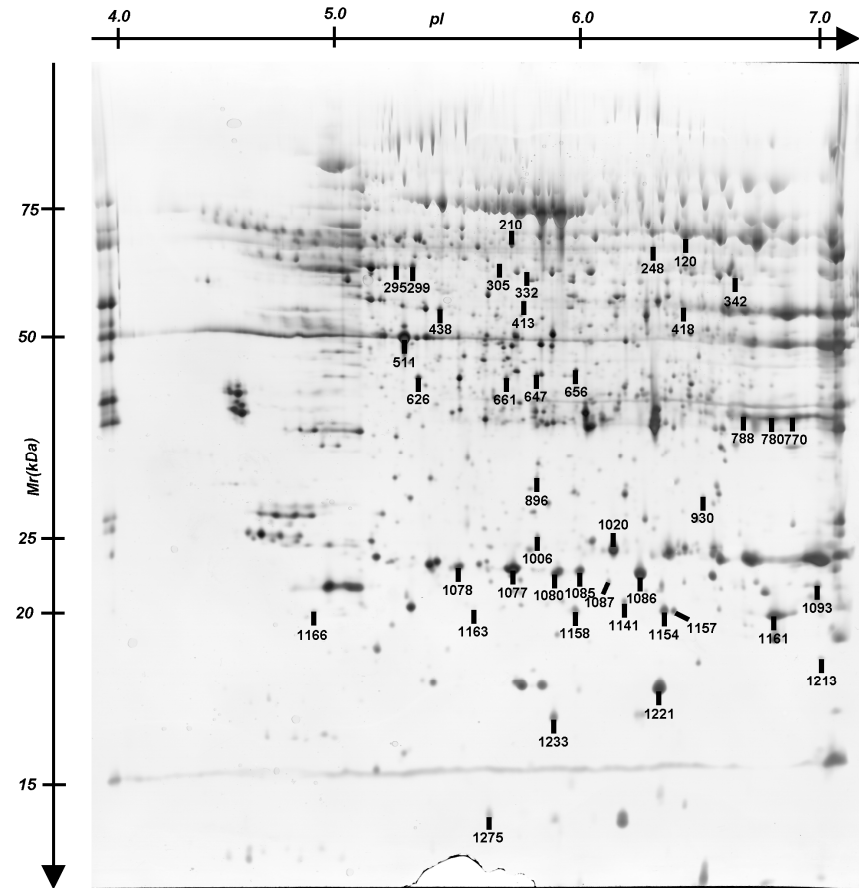
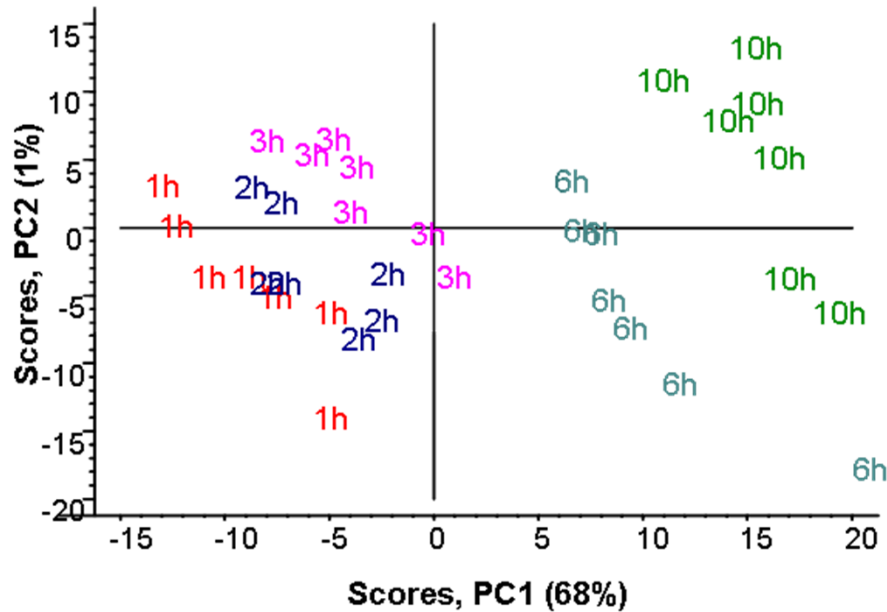


24 spots changed



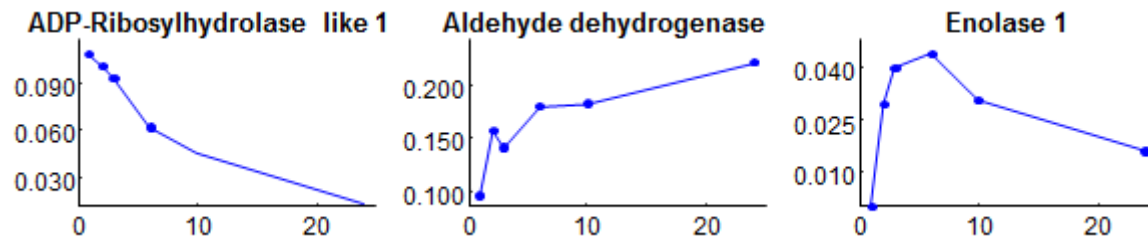
Changes during rigor development

Samples collected at 1, 2, 3, 6, 10 and 24h *postmortem*

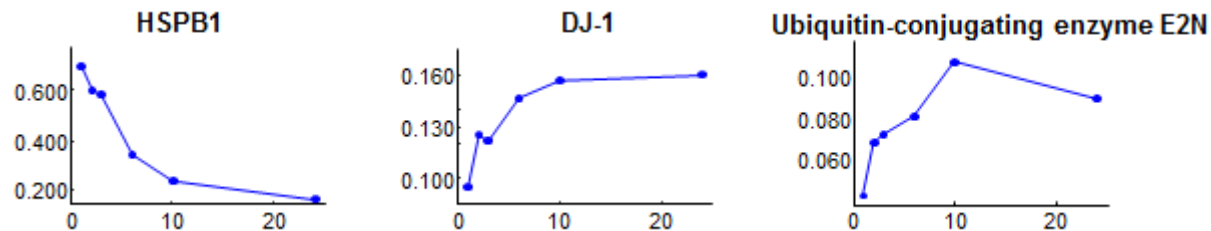


Changes during rigor development

Metabolic proteins:



Stress-related proteins:



Changes in the insoluble protein fraction

- Shift in protein solubility
 - Small HSP decreased in the soluble fraction up to 24 h and increased in the insoluble fraction
- Higher abundance of fragments of structural proteins
 - Reflects degradation of structural proteins

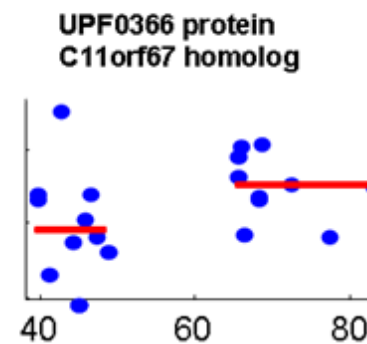
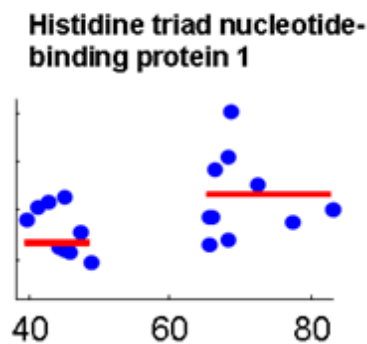
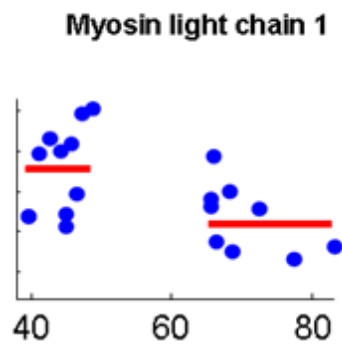
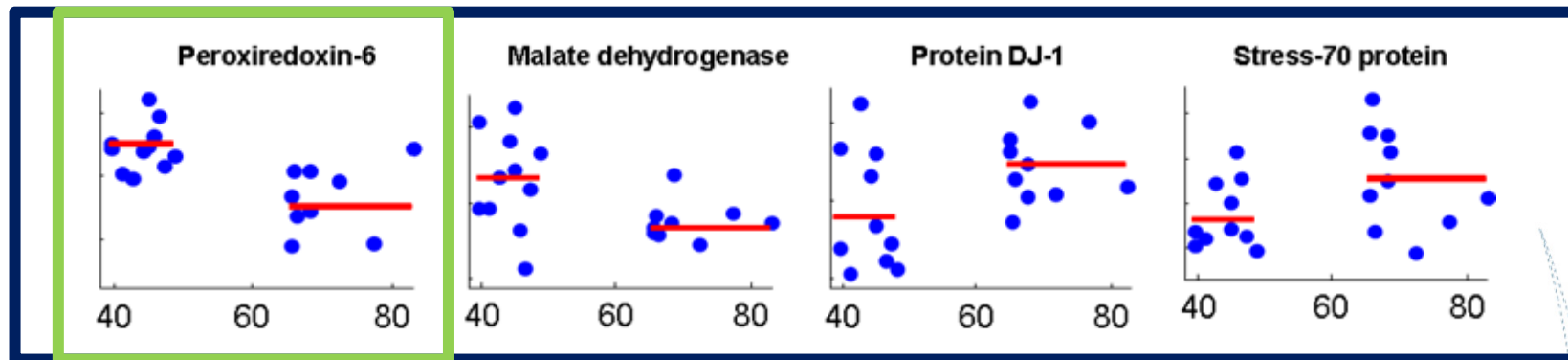
Protein markers for beef tenderness



13 tender
44N (7d pm)



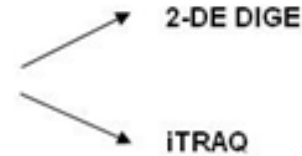
13 tough
69N (7d pm)



Protein markers for beef tenderness



8 Norwegian Red (NRF)
young bulls
(4 tender and 4 tough)



- Proteins found by both methods:
 - Actin, myosin light chain
- Proteins of similar function:
 - Structural, metabolic, apoptosis-related
- Proteins not earlier associated with beef tenderness:
 - Galectin-1 (apoptosis, regulates cell proliferation)
 - Annexin A6 (Ca²⁺ regulation)

Proteomics and beef tenderness

- New knowledge/insight
- Prediction of meat tenderness
- Contribute through selective breeding programs



Acknowledgements

Nofima:

Stefanía Bjarnadóttir
Xiaohong Jia
Ellen M. Færgestad
Martin Høy

Univ of Life Sciences, Norway

Laila Aass

Univ of Aarhus, Denmark

Emøke Bendixen
Margrethe Therkildsen

Fund for Research Levy on Agricultural
Products in Norway

