

Predicting drip and thaw loss early post-mortem

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Poor meat waterholding capacity cost the meat industry million of dollars in lost revenue yearly

(Huff-Lonergan & Lonergan, 2005)

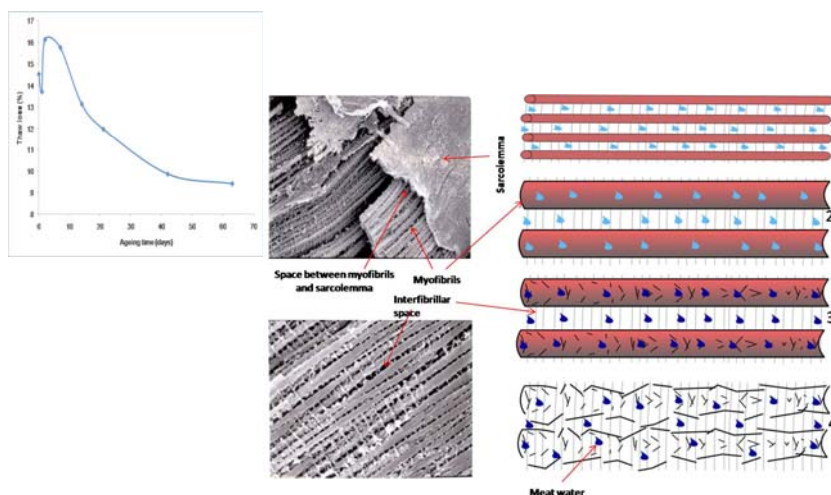
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Forms of moisture loss in meat

- Evaporative loss from carcasses
- Purge in vacuum packages from primal, sub-primal and retail packages
- Drip loss in retail packages
- Thaw loss from frozen meat
- Cook loss from cooked meat



Changes in drip/thaw loss post-mortem

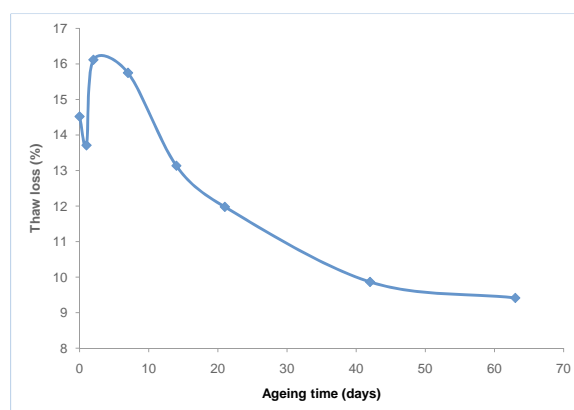


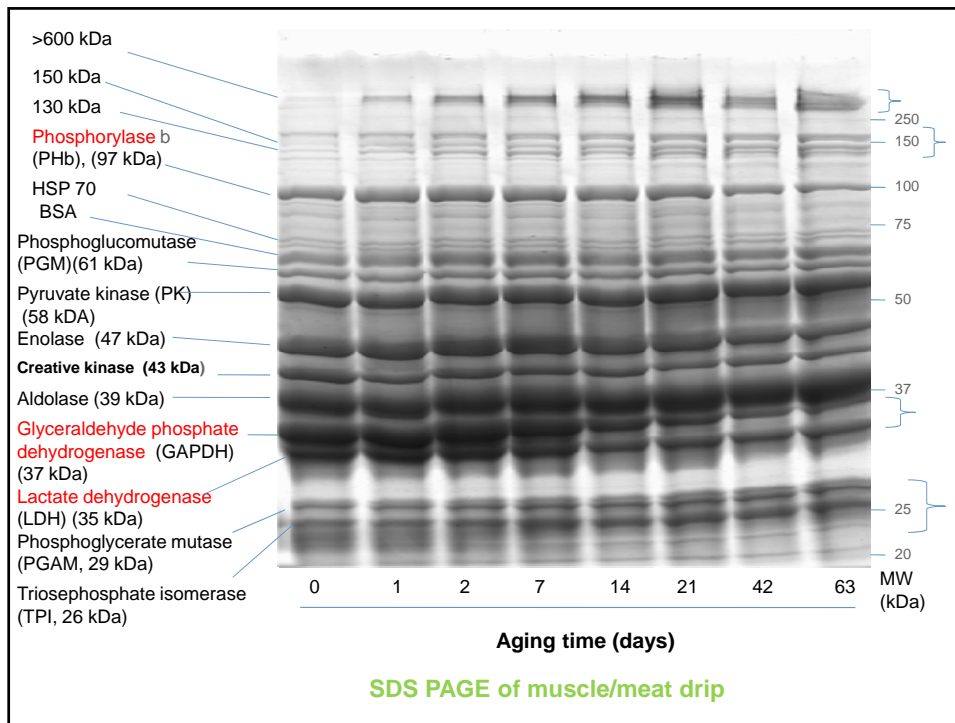
What we did

- Experiment 1: Thaw loss
 - Beef *semimembranosus*
 - Ageing time: 0 (30min), 1d, 2d, 1w, 2w, 3w, 6w & 9w
 - Storage: Vacuumed packaged at -1.5 °C then frozen at -30°C
- Experiment 2: Centrifugal drip loss
 - Beef LD (stimulated and non-stimulated)
 - Ageing time: 0 (30min) 1d, 2d, 1w, 2w, 3w & 4w
 - Storage: Vacuumed packaged -1.5 °C



Thaw loss decreased with ageing of beef





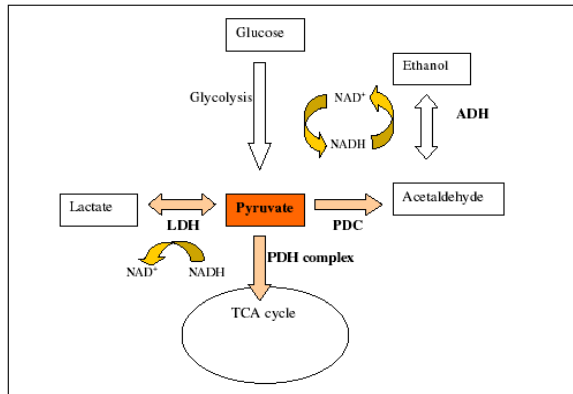
Correlation matrix of thaw loss vs glycolytic enzymes

Correlation matrix of thaw loss at various times versus candidate predictors of drip loss

time	OD(PHb) drip	OD(LDH) drip	OD(GAPDH) drip
0	0.852	0.931	0.806
1	0.369	0.363	0.430
2	0.539	0.806	0.386
7	0.660	0.797	0.733
14	0.257	0.343	0.458
21	0.735	0.907	0.755
42	0.689	0.964	0.623
63	0.804	0.813	0.916

$p < 0.05 = 0.81$

Lactate Dehydrogenase (LDH)



Source: Google Image

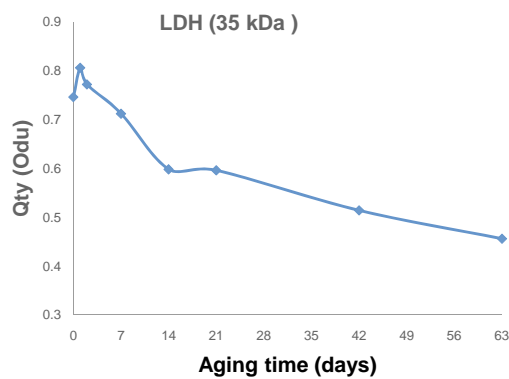
Higher-than-normal levels of LDH in blood serum may indicate:

- Blood flow deficiency (ischemia)
- [Cerebrovascular accident](#) (such as a stroke)
- [Heart attack](#)
- [Hemolytic anemia](#)
- [Infectious mononucleosis](#)
- [Liver disease](#) (for example, [hepatitis](#))
- Low blood pressure
- Muscle injury
- [Muscular dystrophy](#)
- New abnormal tissue formation (usually cancer)
- [Pancreatitis](#)
- Tissue death

Source: <http://www.nlm.nih.gov/medlineplus/ency/article/003471.htm>

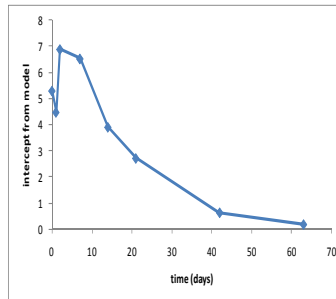
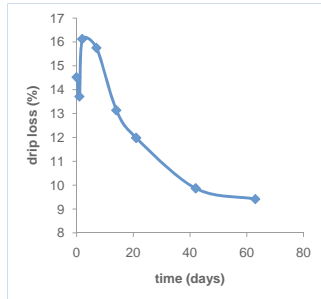
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Pattern of changes in LDH with ageing similar to that of thaw loss



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Actual and predicted changes in thaw loss with ageing

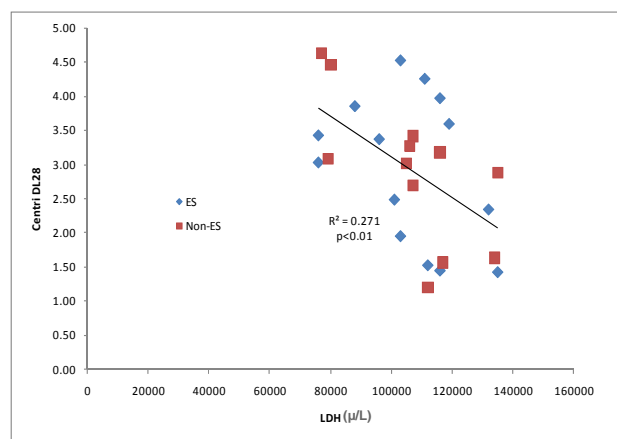


LOGISTIC MODEL FOR TIME

$$\text{Drip loss} = 8.49 / (1 + \exp(0.126 * (\text{time} - 13.05))) + 0.3239 * \text{OD}(\text{LDH})$$



Centrifugal drip relationship with LDH



Conclusion

- LDH concentration in thaw drip very early post-mortem can be used to predict thaw loss in frozen meat
- LDH concentration in meat very early post-mortem could be a good indicator of centrifugal drip in meat during chilled storage
- The use of LDH as an early predictor of drip need to be validated under various processing and storage conditions before use



Acknowledgement

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