Expression of the mitochondrial tricarboxylate carrier is associated with high level of intramuscular fat in cattle

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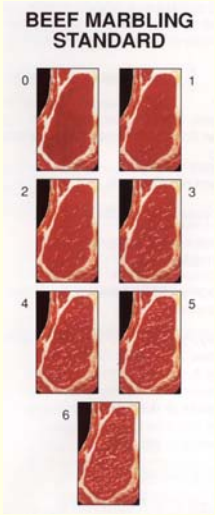
Introduction

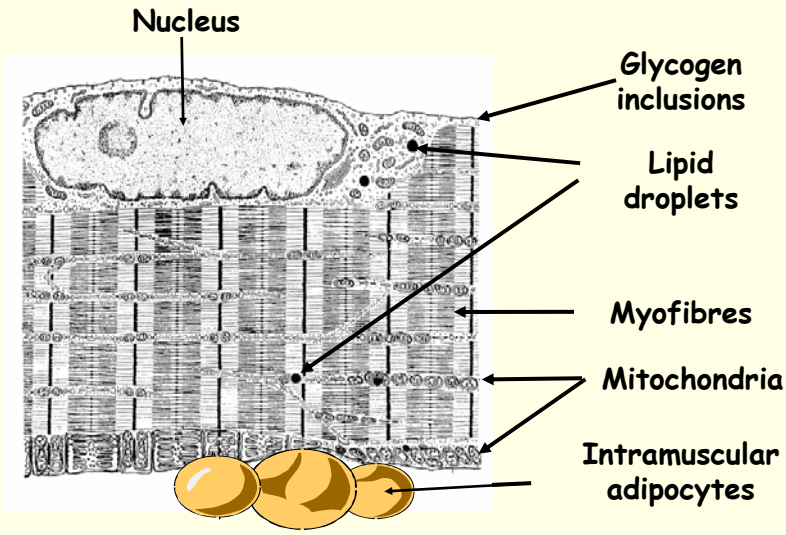


Marbling (the visible fat in beef) determines the quality grade of beef in North America, Australia and Japan

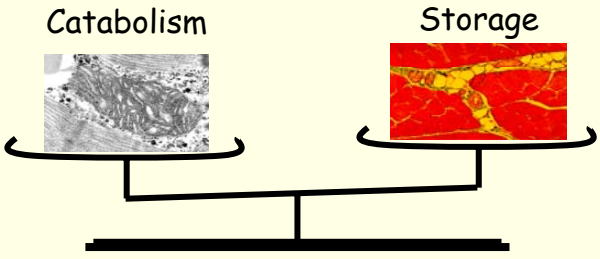
Japanese Beef Marbling Standard

By contrast, beef produced in France is lean (5% on average in fresh tissue)

Muscle fibre structure



Objectives



- number of intramuscular adipocytes (EAAP Meeting, Rostock, 2003)
- metabolic properties of muscle fibres (EAAP Meeting, Rostock, 2003)
- lipogenic activities in muscle fibres (EAAP Meeting, Rostock, 2003)
- lipogenic activities of intramuscular adipocytes (EAAP Meeting, 2005)
- Metabolism of lipogenic precursors (citrate) (This EAAP Meeting)

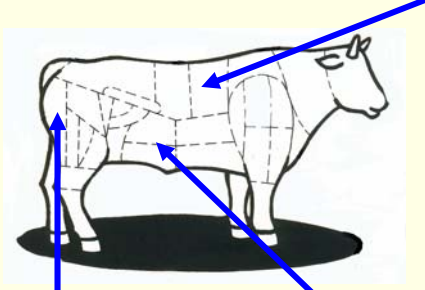
Material and methods : Animals

Steers	12 Limousin	10 Angus
Finishing period	6 months	10 months

Rolled wheat (47-50%), triticale (17-18%), lupins (9%) hay (14-16%)
Metabolizable Energy: 12 KJ/kg DM, Crude Protein: 15%

ADG Finishing period	1022 g/d	1100 g/d
Age at slaughter	23 months	28 months
Slaughter weight	738 kg	755 kg
Hot carcass weight	464 kg	413.5 kg

Material and methods : samples

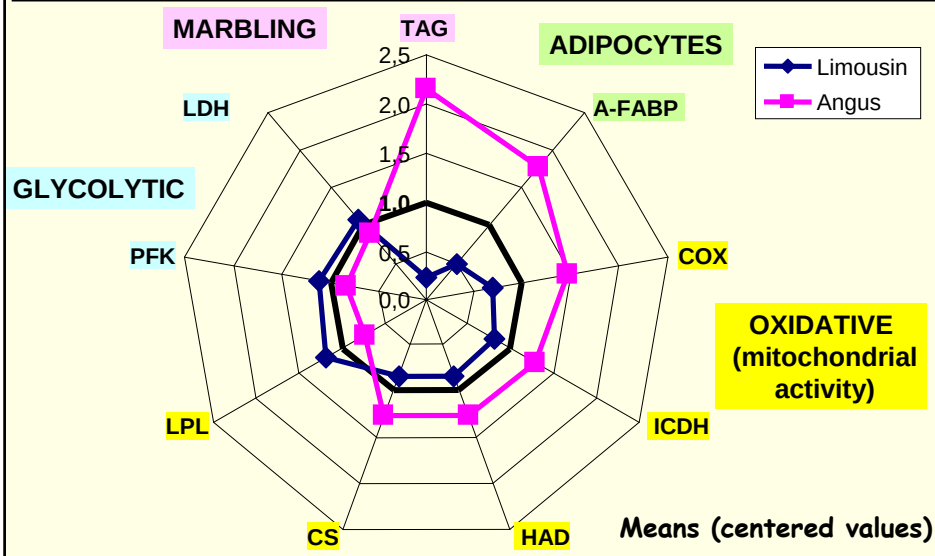


Longissimus dorsi
(LD)

Oxido-glycolytic

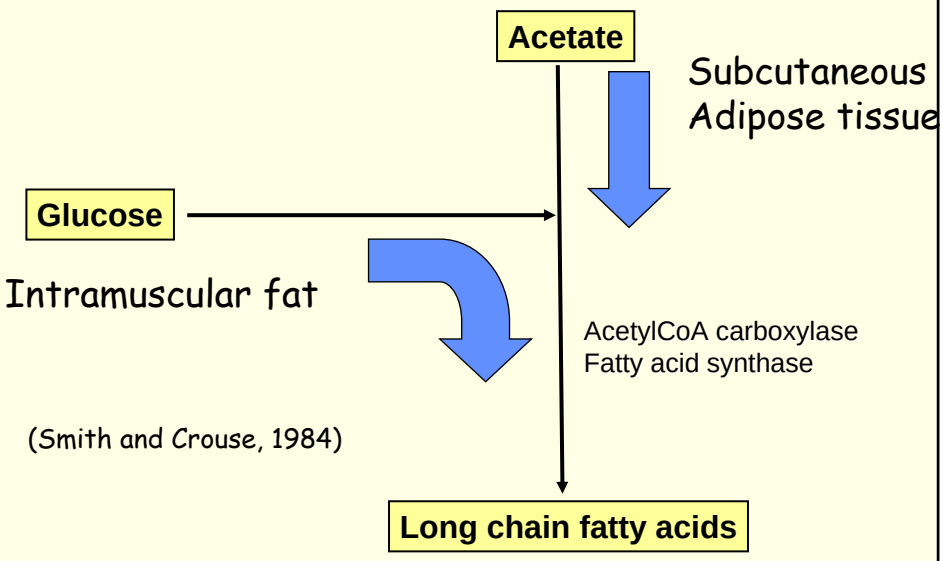
+ Semitendinosus (ST) and Rectus Abdominis (RA) for Limousin only

Results for LD muscle (EAAP, Rostock, 2003)



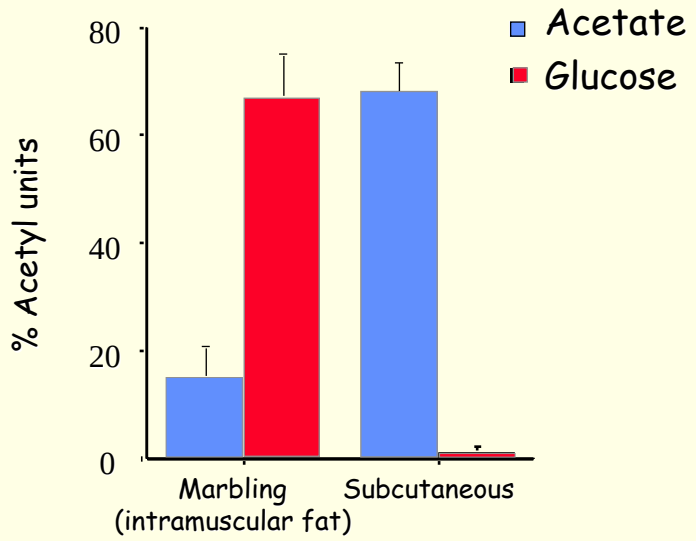
Means (centered values)

Assay of lipogenic potential

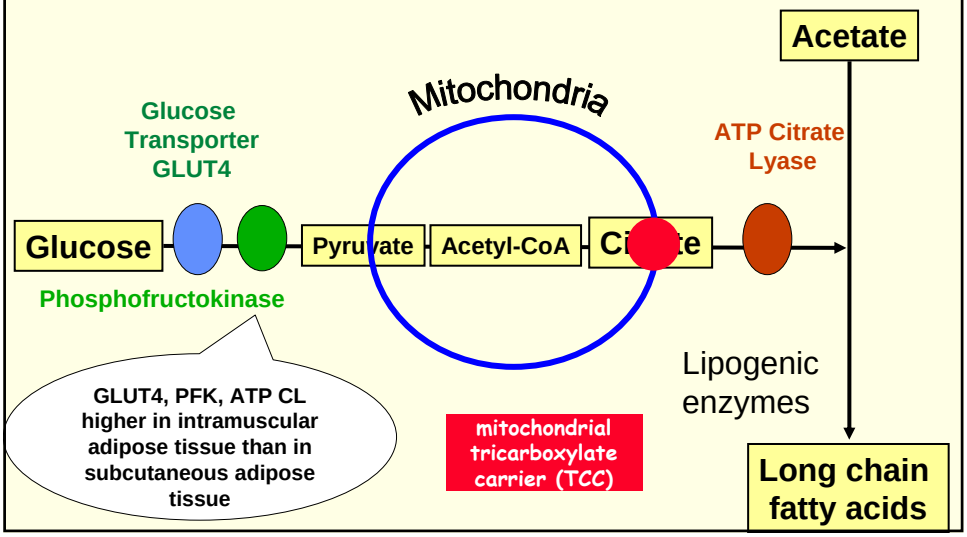


Substrates for marbling fat

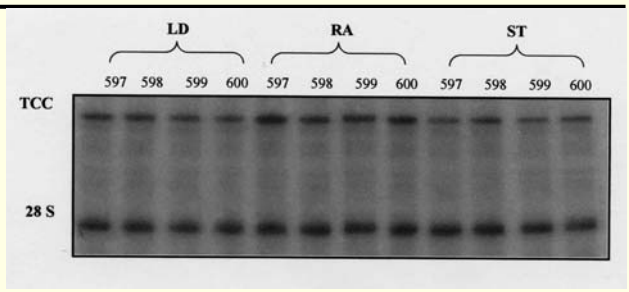
Smith & Crouse (1984)

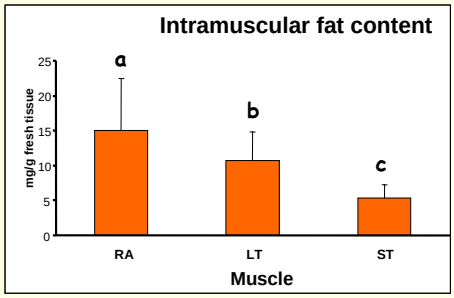


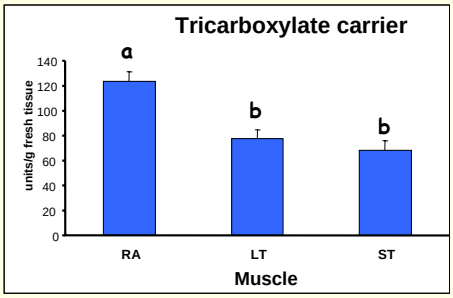
Conversion of glucose into fatty acids



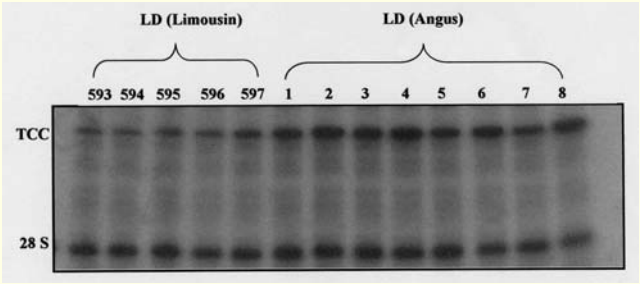
Comparison of muscle types

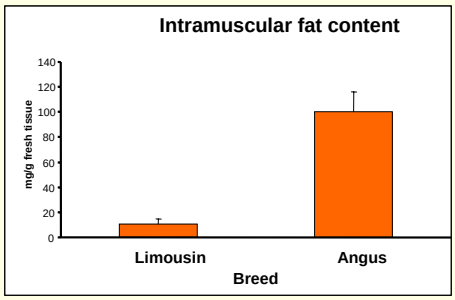


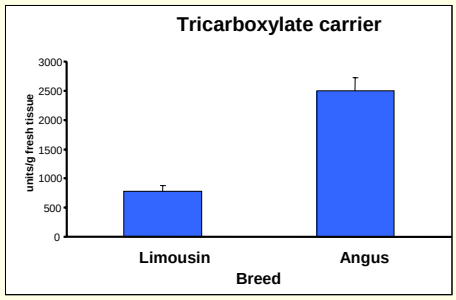




Comparison of breeds







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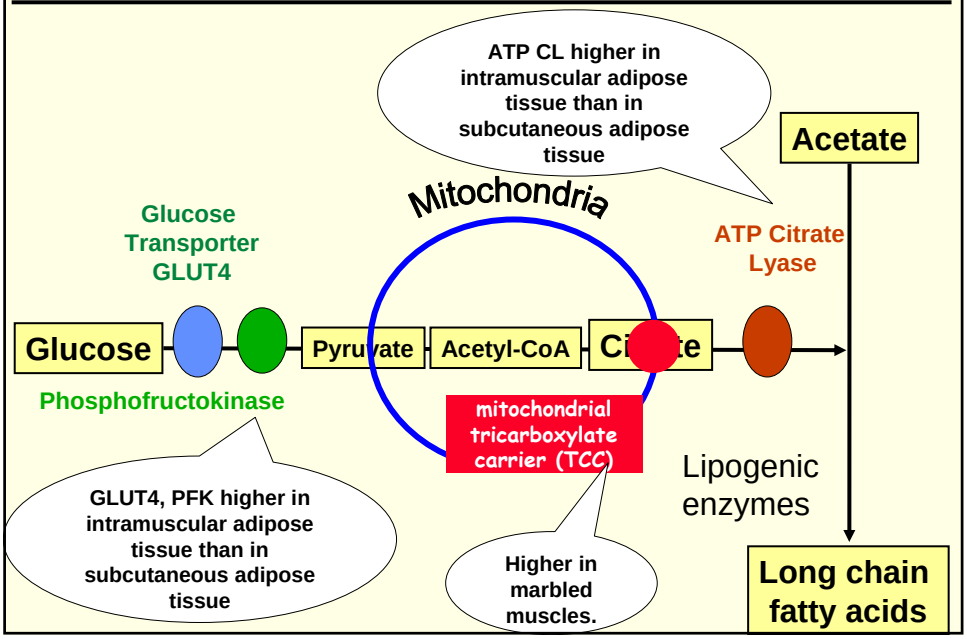

Conclusions

A higher intramuscular fat content may be explained by:

- a higher mitochondrial activity (which means a higher fat turnover) (Hocquette et al., EAAP, Rostock, 2003)

- a higher number of intramuscular adipocytes (Hocquette et al., EAAP, Rostock, 2003)

- a higher lipogenic activity (Bonnet et al., EAAP, Uppsala, 2005)

- a higher lipogenic activity from glucose within intramuscular adipocytes (Hocquette et al., EAAP, Uppsala, 2005) and/or within muscles (this presentation).

Acknowledgement

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Thank you for your attention

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