Université de Liège

DDA Département Sciences des Denrées alimentaires

Impact of aging technique, muscle and previous vacuum storage time on oxidative stability of beef packaged under high-oxygen atmosphere

FARAH

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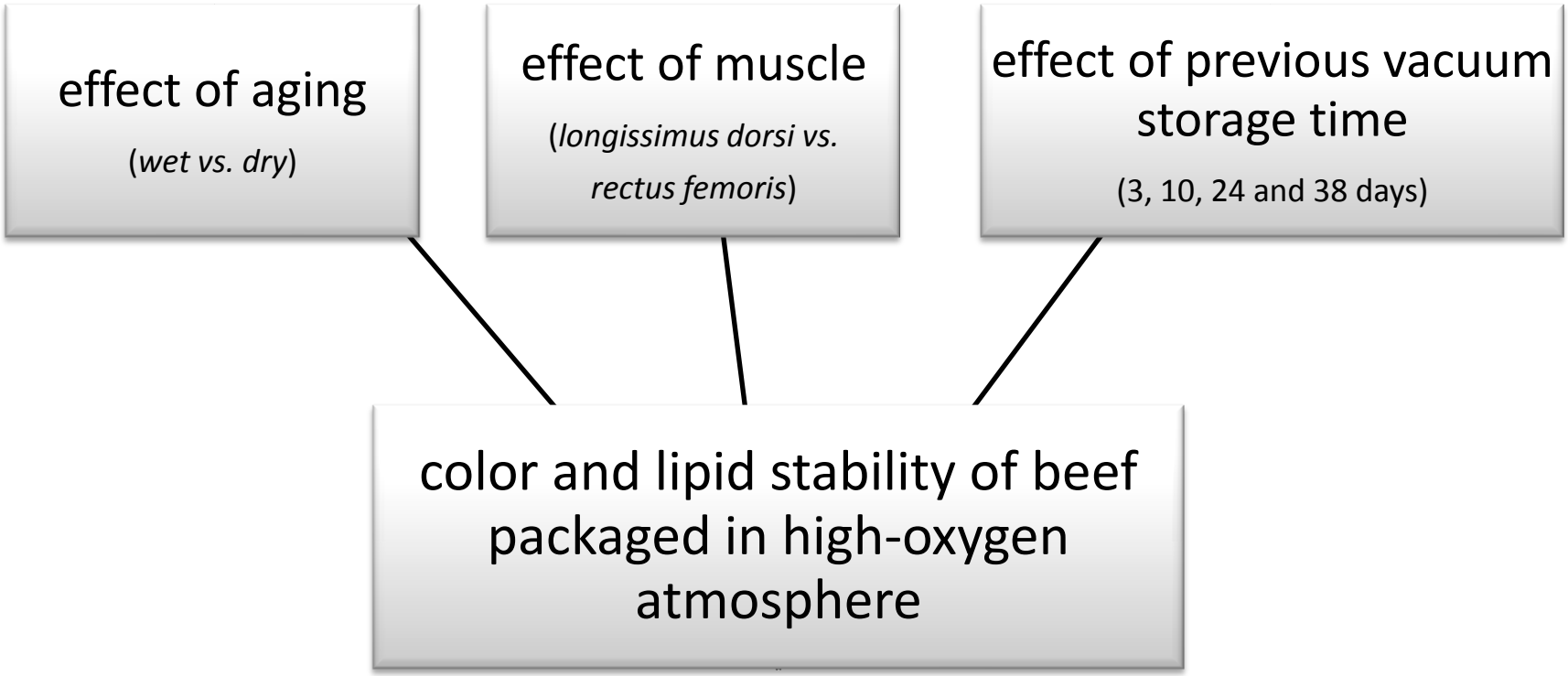
1. Introduction

- Two common approaches for beef aging
  - wet aging: industrial approach
  - dry aging: ancient approach used nowadays to produce beef characterized by its superior quality

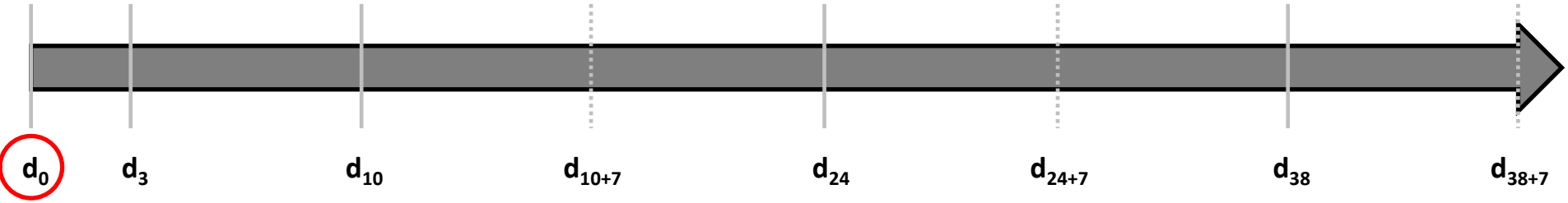
- Limitations to shelf-life of beef
  - development of pathogenic or spoilage microorganisms
  - oxidation of lipids and pigments

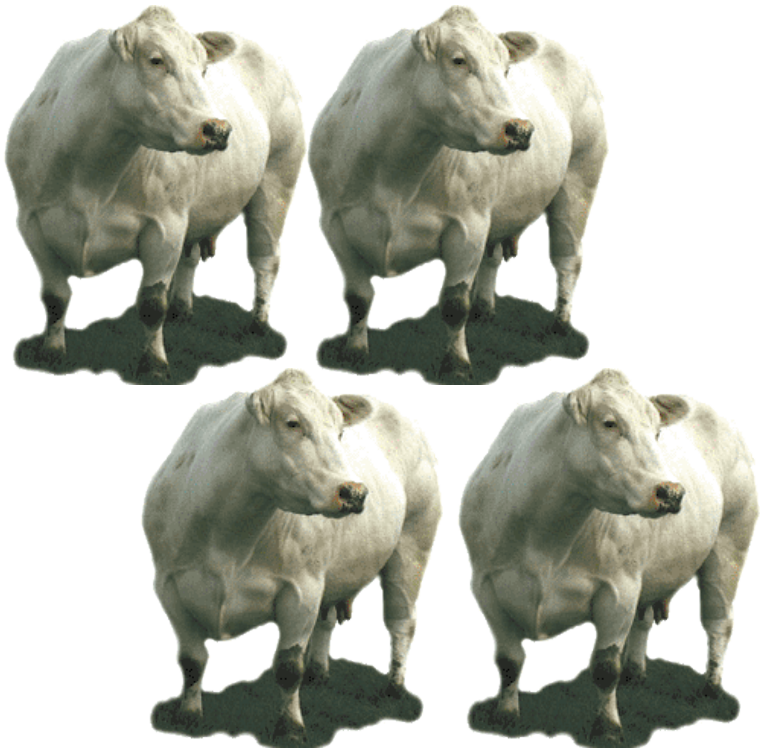
- Meat contains endogenous antioxidants and prooxidants
  - several cellular mechanisms of protection against oxidative processes, including antioxidant enzymes such as catalase (CAT), glutathione peroxidase (GSH-Px) and superoxide dismutase (SOD)

2. Objective


effect of aging
(*wet vs. dry*)
effect of muscle
(*longissimus dorsi vs. rectus femoris*)
effect of previous vacuum storage time
(3, 10, 24 and 38 days)
color and lipid stability of beef packaged in high-oxygen atmosphere

3. Materials and Methods



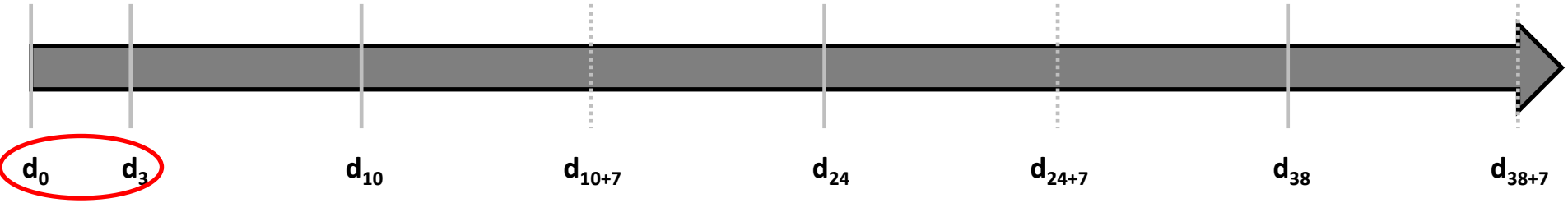


slaughter

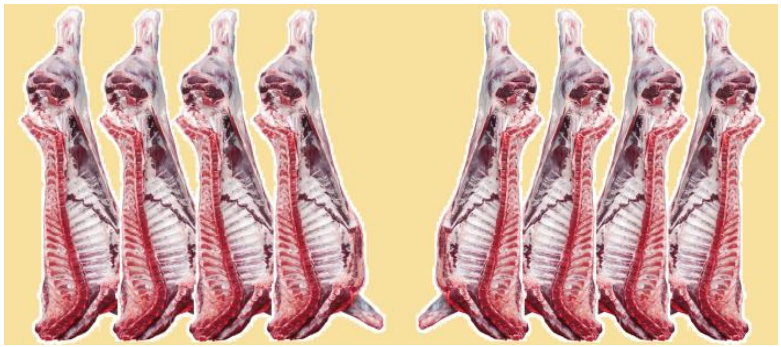
culled cows (Belgian Blue)

7,9 ± 1,4 years

3. Materials and Methods



chilling



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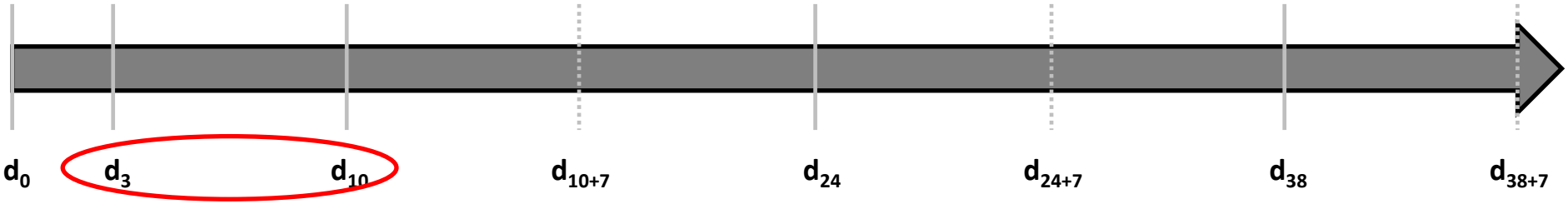


½ carcass (*dry*)

aging at +1,5 °C

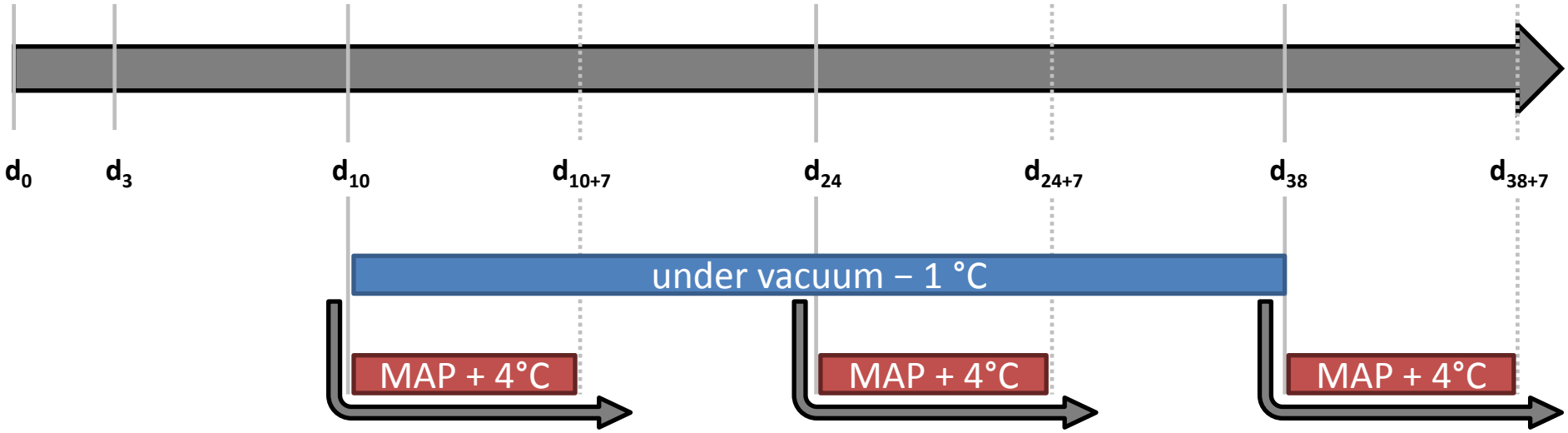
2 muscles:

longissimus dorsi (LD) – striploin

rectus femoris (RF) – sirloin tip

under vacuum (*wet*)

3. Materials and Methods



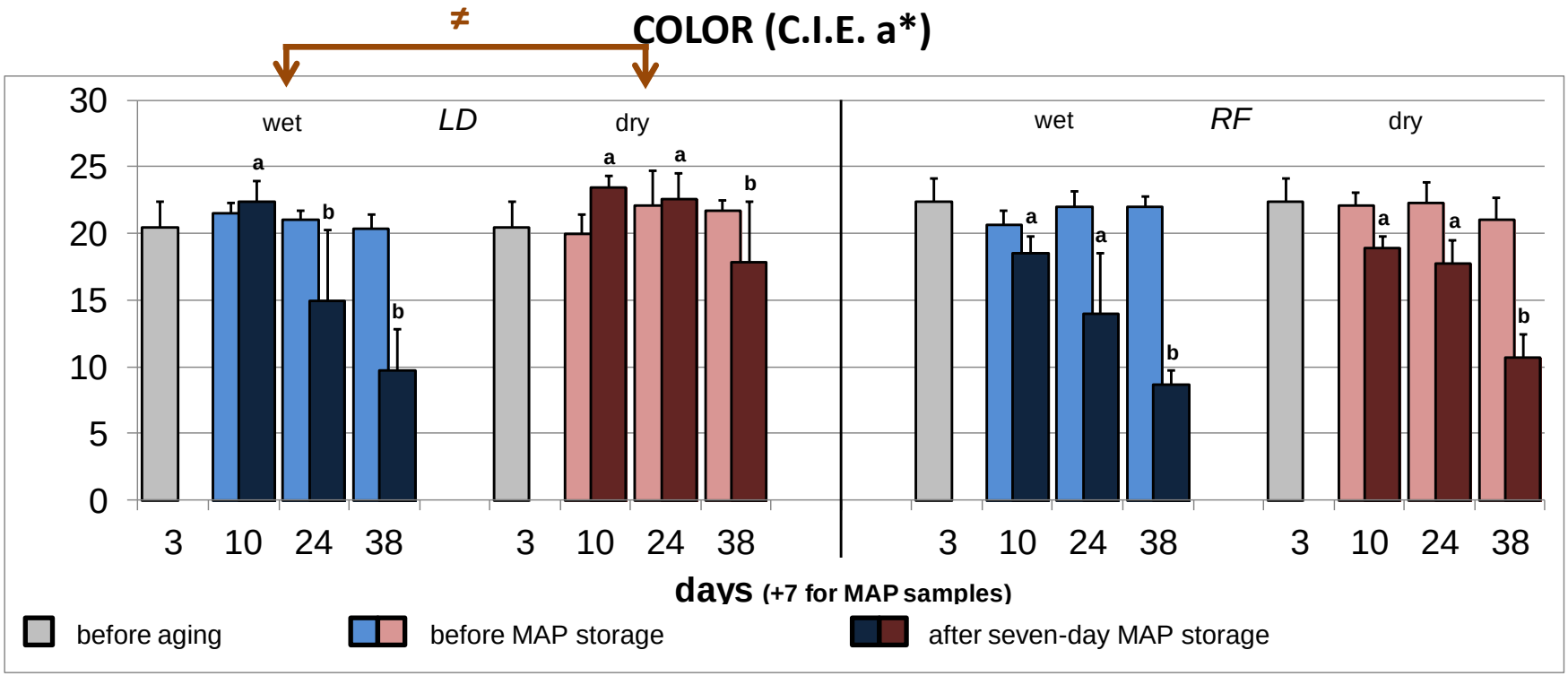
MAP

70 % O_2 : 30 % CO_2

Analysis

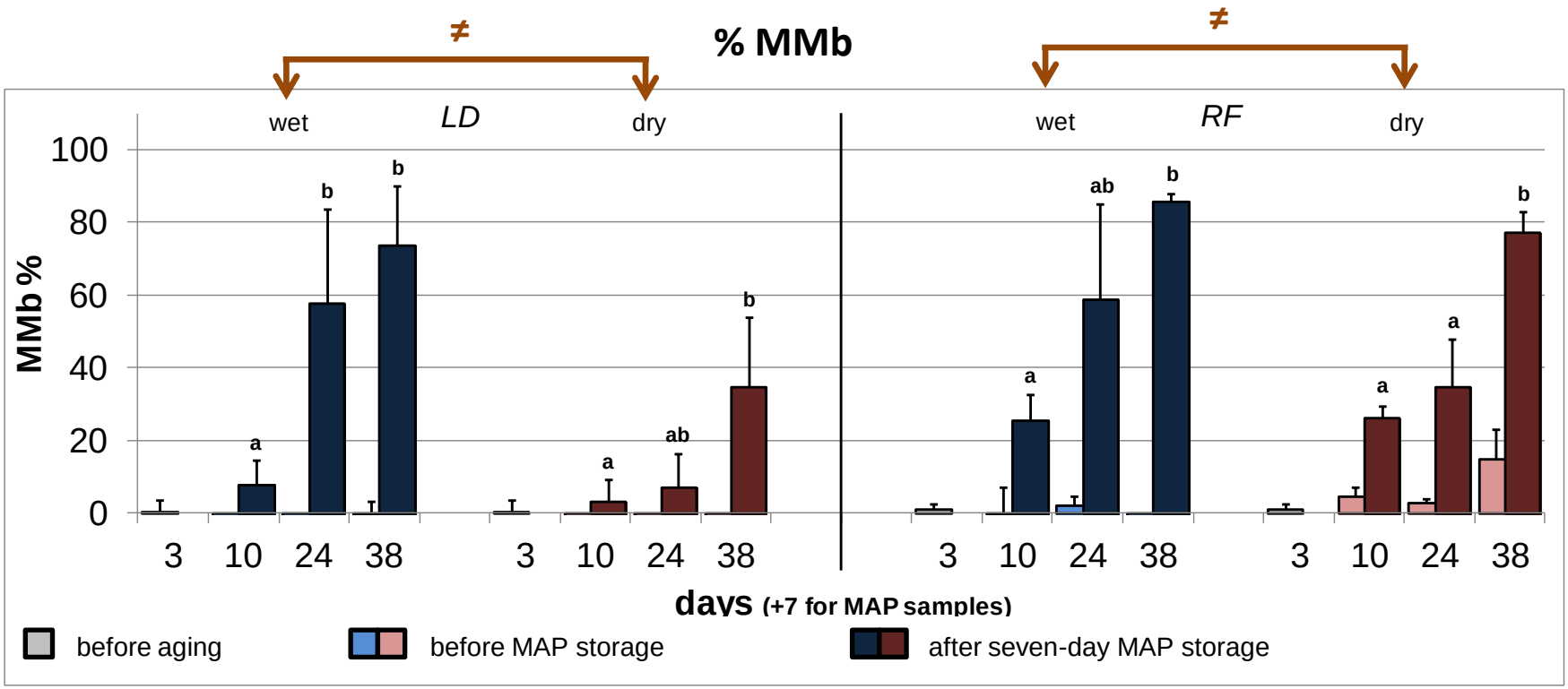
⇨ color (C.I.E. L*a*b*)
⇨ pigment oxidation (% metmyoglobin)
⇨ fat content ⇨ fatty acid profile
⇨ lipid oxidation (TBARS)
⇨ antioxidant enzyme activity (CAT, GSH-Px and SOD)
⇨ vitamin E content

4. Results and discussion



- effect of aging technique (*longissimus dorsi*)

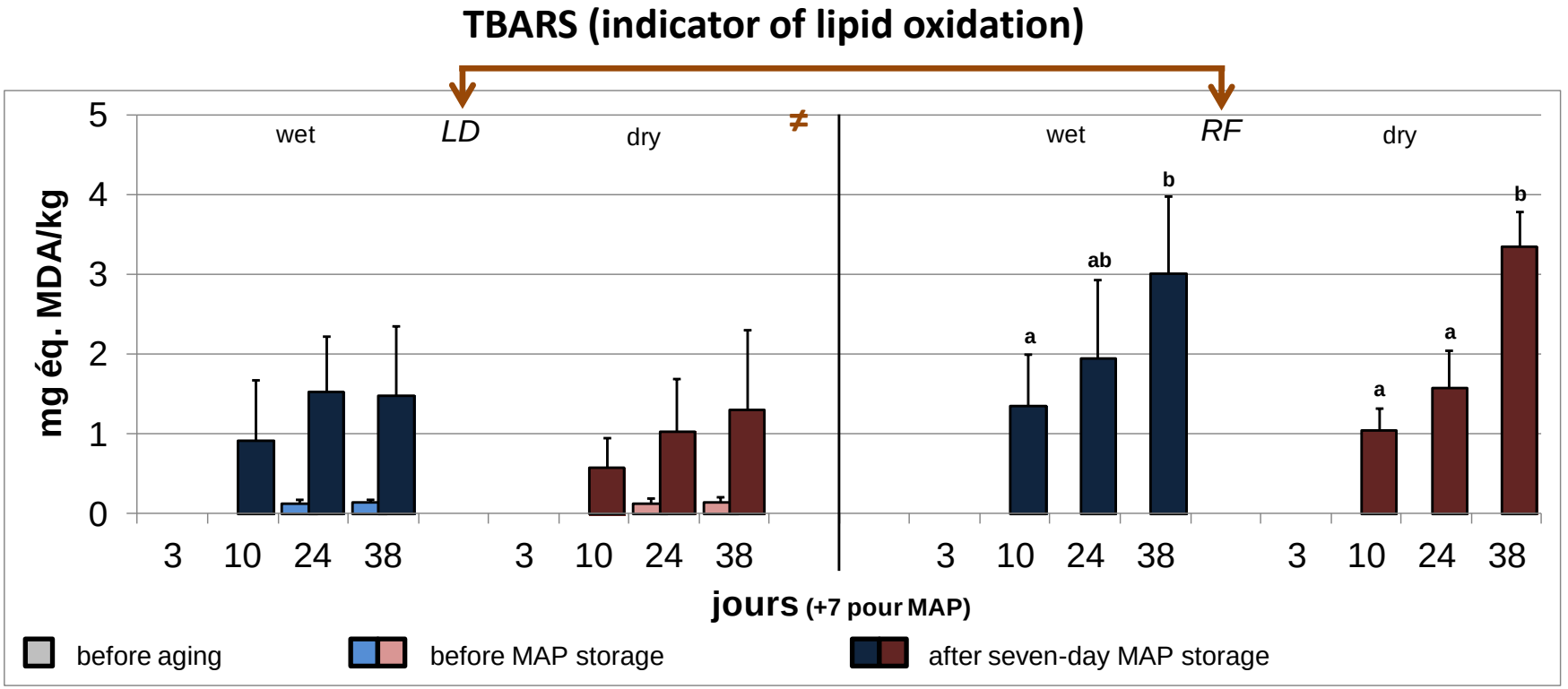
4. Results and discussion



- wet aging favored pigment oxidation

- **metmyoglobin reducing activity (MRA)**: lower in wet aged *rectus femoris*

4. Results and discussion

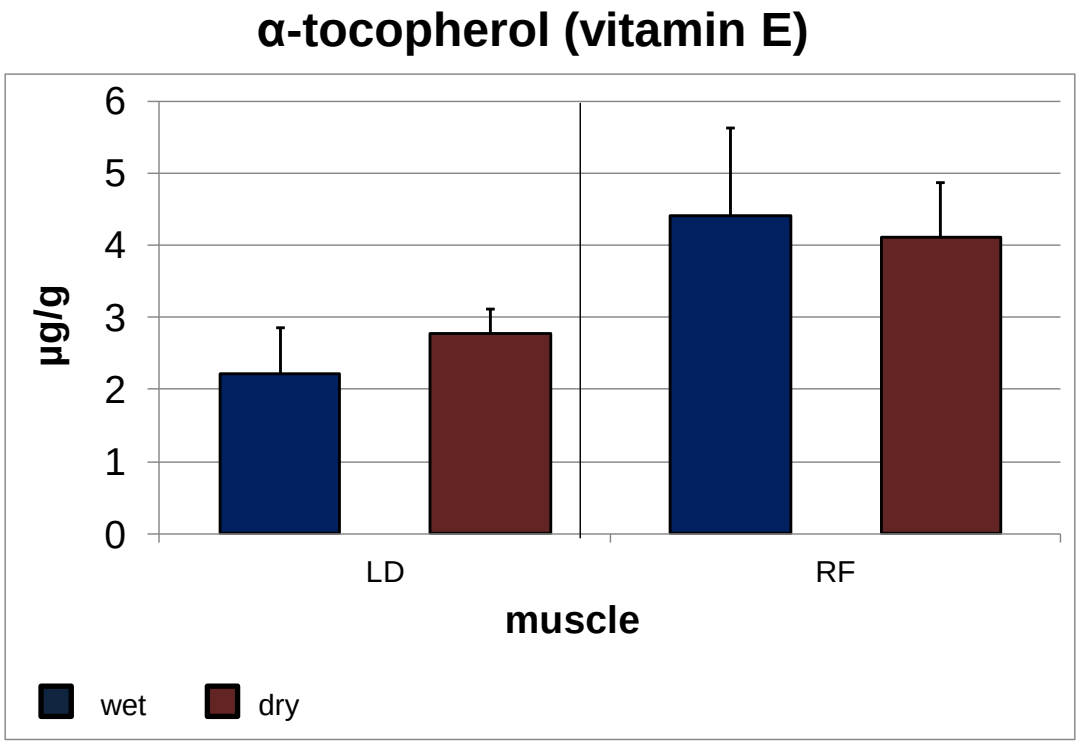


- *rectus femoris* more sensitive to lipid oxidation

- **fat content**: LD: 2,0 % ± 0,8 % *vs*. RF: 1,3 % ± 0,3 %

- **PUFA**: LD: 9,5 % ± 5,7 % *vs*. RF: 20,3 % ± 4,3 %

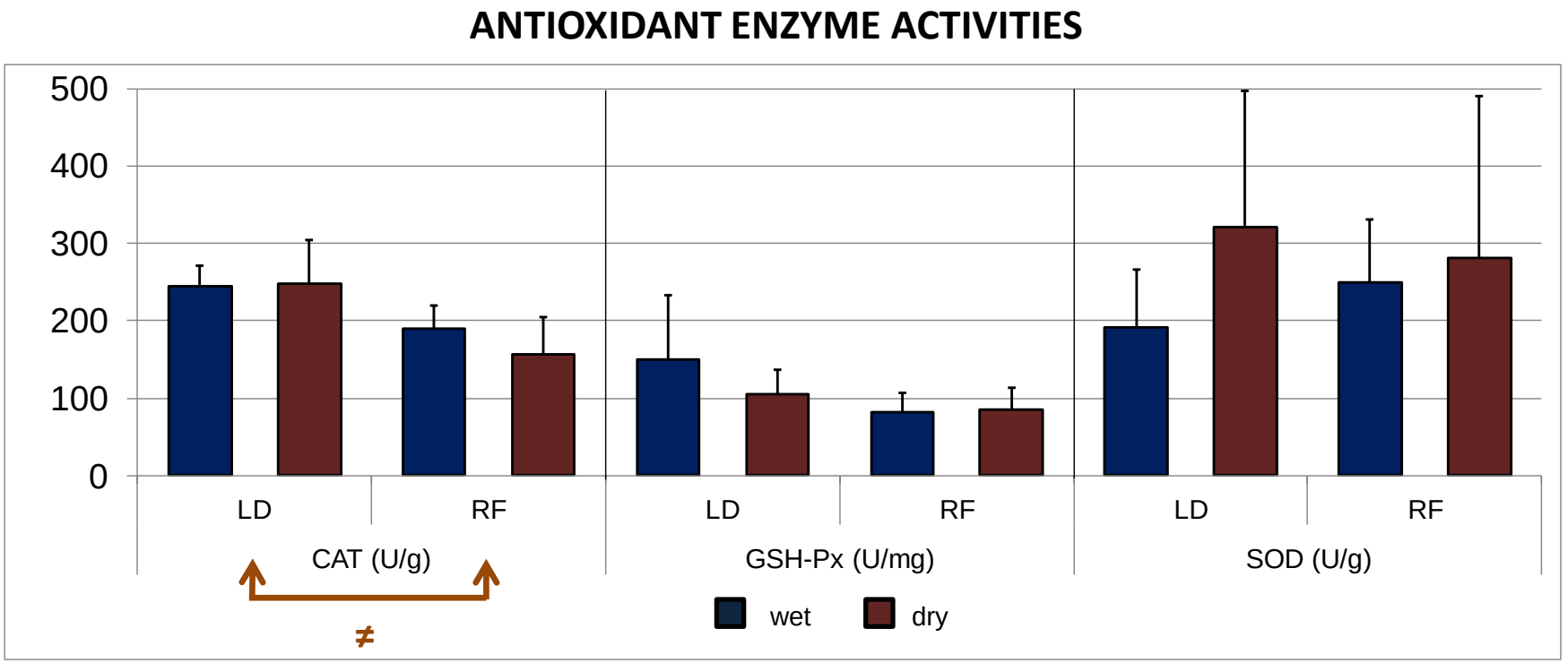
4. Results and discussion



- higher vitamin E content did not prevent *rectus femoris* from being more oxidative

- vitamin E content directly proportional to PUFA %

4. Results and discussion



- no effect of aging technique
- only catalase activity differed according to muscle (LD > RF)
- decrease of enzyme activity after repackaging under MAP

4. Conclusions

- A higher sensitivity to oxidation was observed with wet-aging, and *longissimus dorsi* showed a higher oxidative stability than *rectus femoris*.

- The length of previous vacuum storage favored oxidation reactions when meat was repackaged under modified atmosphere.

- Oxidation stability could be associated with the catalase activity, but no association could be found regarding the α-tocopherol content.

FARAH

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