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

Department of Food Science

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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)
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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**
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3. Materials and Methods

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½ carcass (dry)

2 muscles: longissimus dorsi (LD) – striploin
rectus femoris (RF) – sirloin tip

aging at +1,5 °C

under vacuum (wet)
3. Materials and Methods

**MAP**
70 % O₂ : 30 % CO₂

**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

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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*
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4. Results and discussion

TBARS (indicator of lipid oxidation)

- *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

**ANTIOXIDANT ENZYME ACTIVITIES**

- 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.
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Projet CONSBB: Conservation longue durée de la viande fraîche de bovins Blanc Bleu Belge : contraintes, évaluation et recommandations

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