

Feeding and protein oxidation of meat constituents

Katleen Raes – Stefaan De Smet

1. Introduction

Oxidative status is determined by the balance between

- Antioxidants
 - Tocopherols
 - Carotenoids
 - Polyphenols
 - Endogenous antioxidative enzymes
- Pro-oxidants
 - PUFA
 - Cu, Fe



1. Introduction

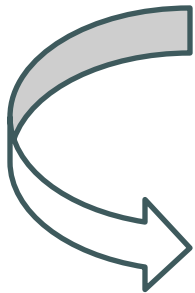
Oxidation parameters in meat

- Colour oxidation
- Lipid oxidation
- Protein oxidation

1. Introduction

Oxidation parameters in meat

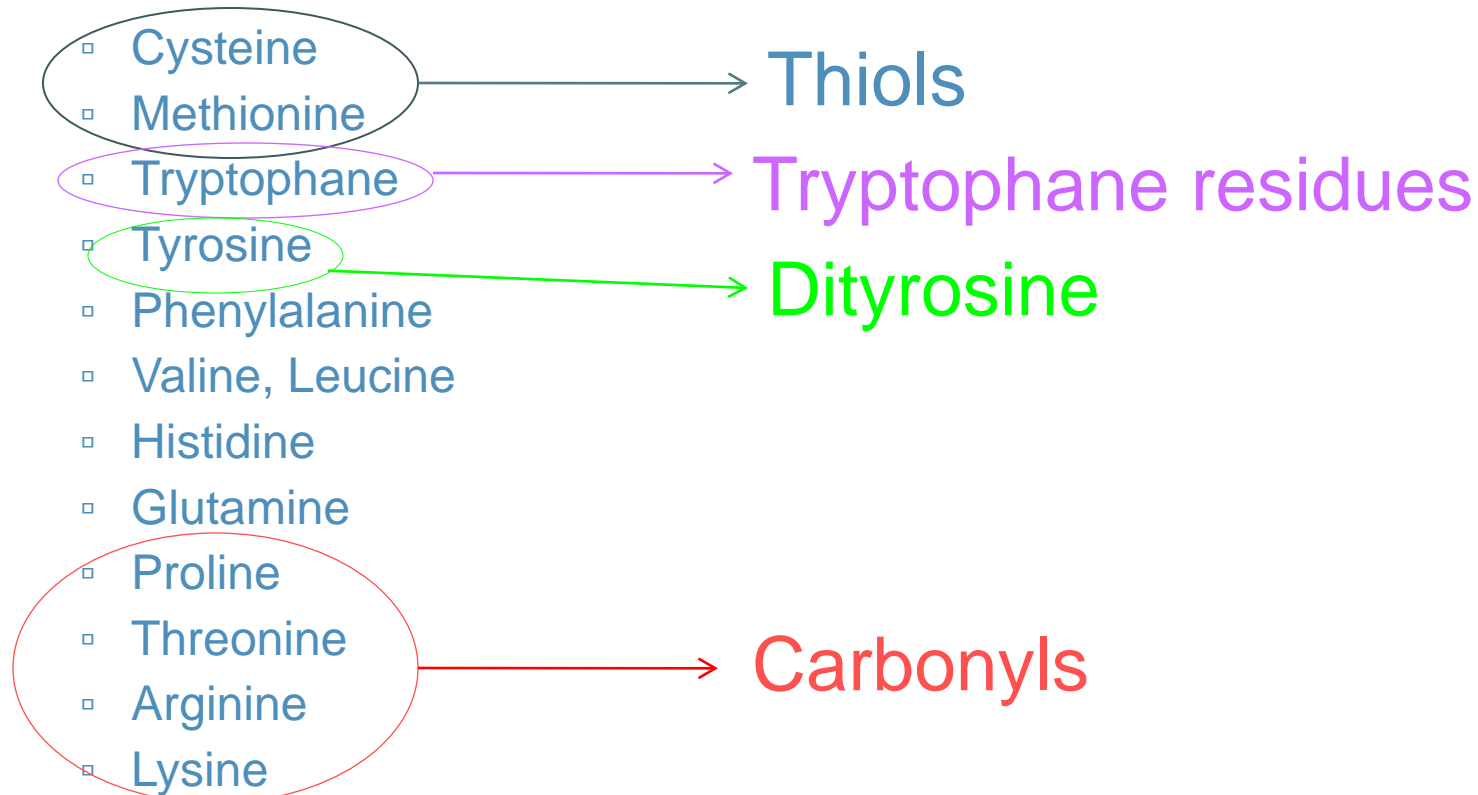
- Colour oxidation
- Lipid oxidation
- Protein oxidation



Formation of amino acid derivatives
Changes in protein solubility
Protein fragmentation or aggregation

1. Introduction

Protein oxidation



1. Introduction

Endogenous antioxidative enzymes

- Superoxide dismutase SOD (CuZn – Mn - Fe)



- Catalase Cat (Fe)



- Glutathion peroxidase GSH-Px (Se)



- Other : Glutathion reductase, xanthine oxidase, heme oxygenase, thioredoxin reductase, ...

2. Effect of dietary constituents

Dietary fat sources

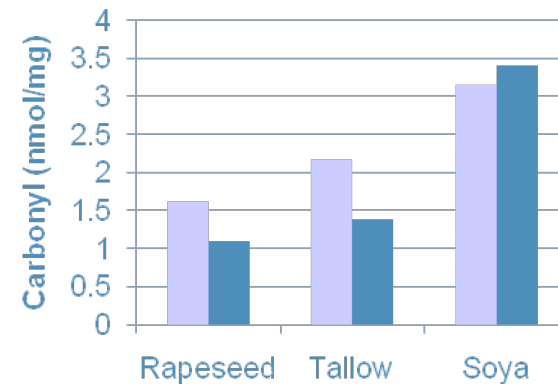
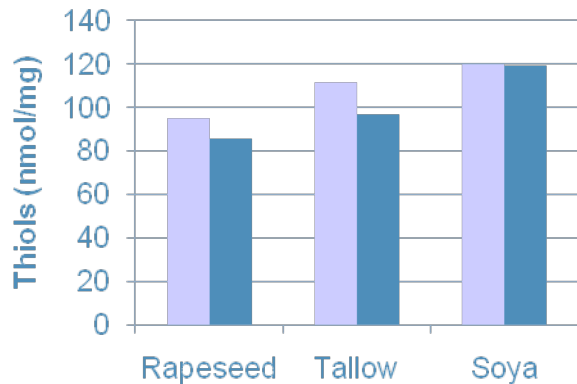
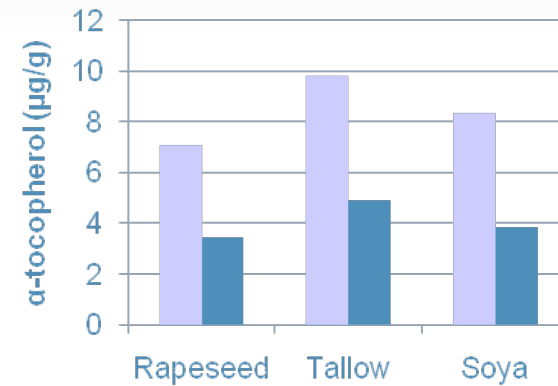
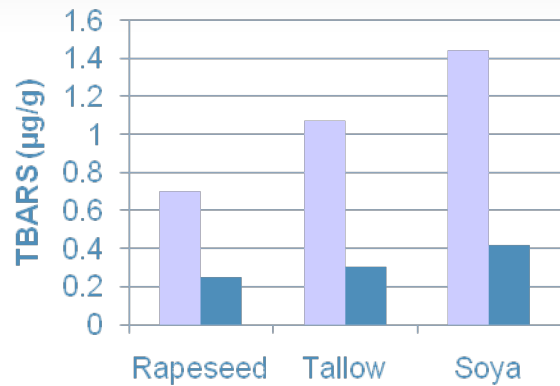
- PUFA rich oils
- Pastures vs concentrates

Antioxidants

- α -tocopheryl acetate
- Natural antioxidants

2. Effect of dietary constituents

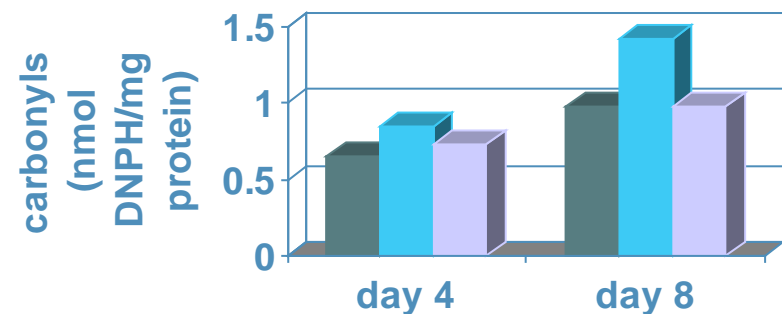
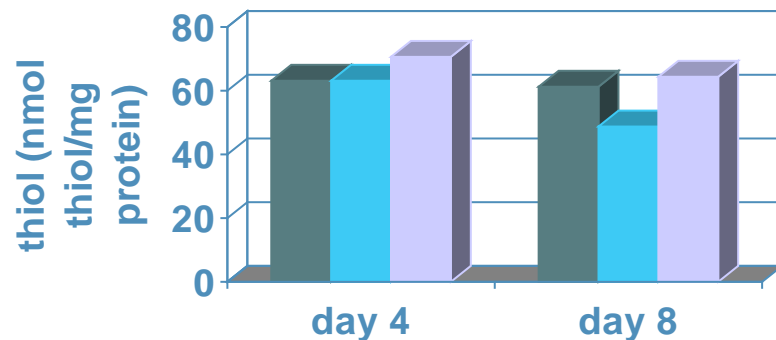
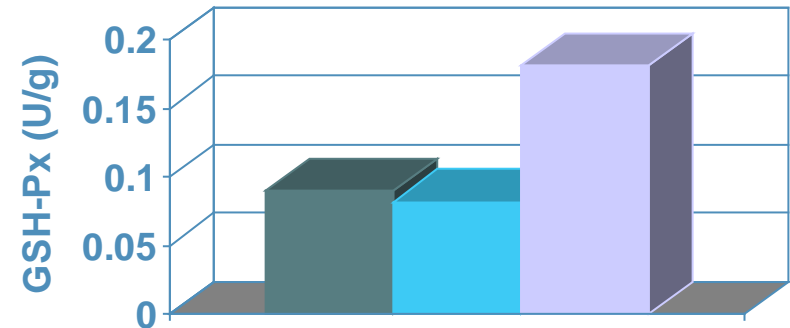
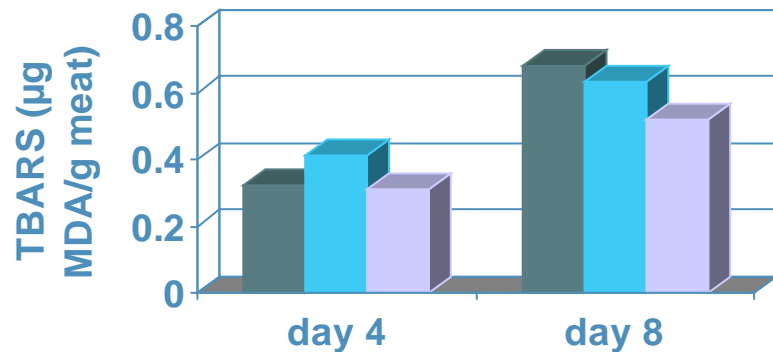
Oil types



■ *M. sartorius* ■ *M. pectoralis*

2. Effect of dietary constituents

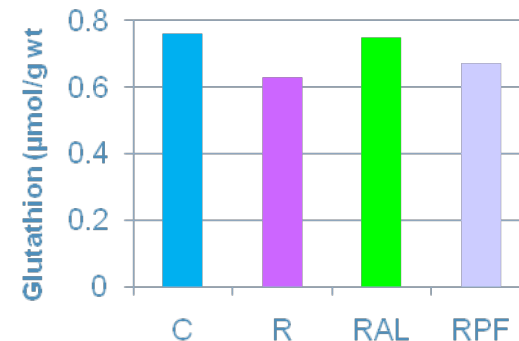
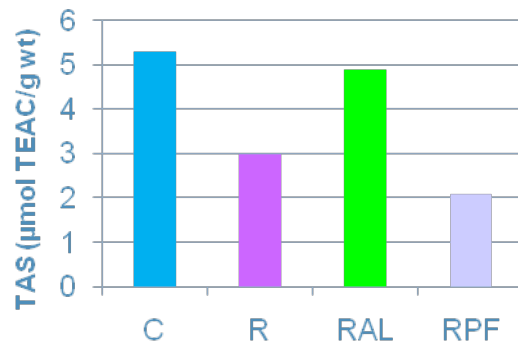
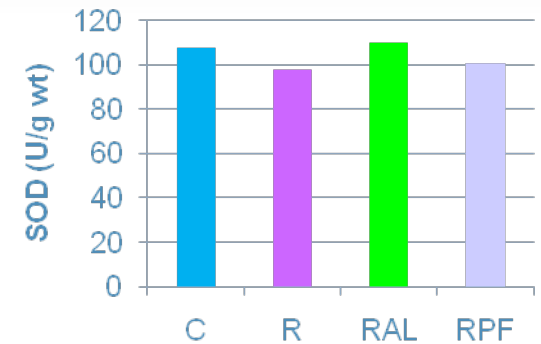
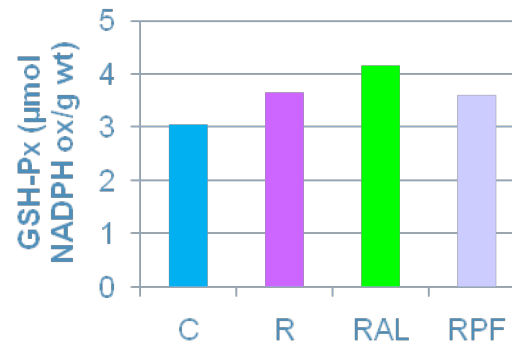
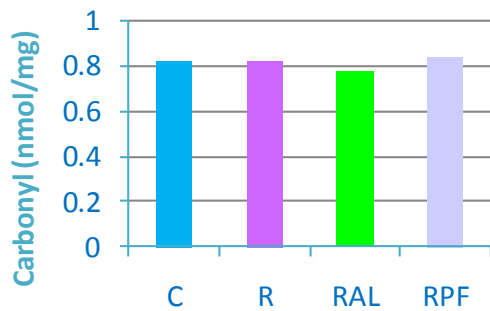
Pasture types



IR BD LR

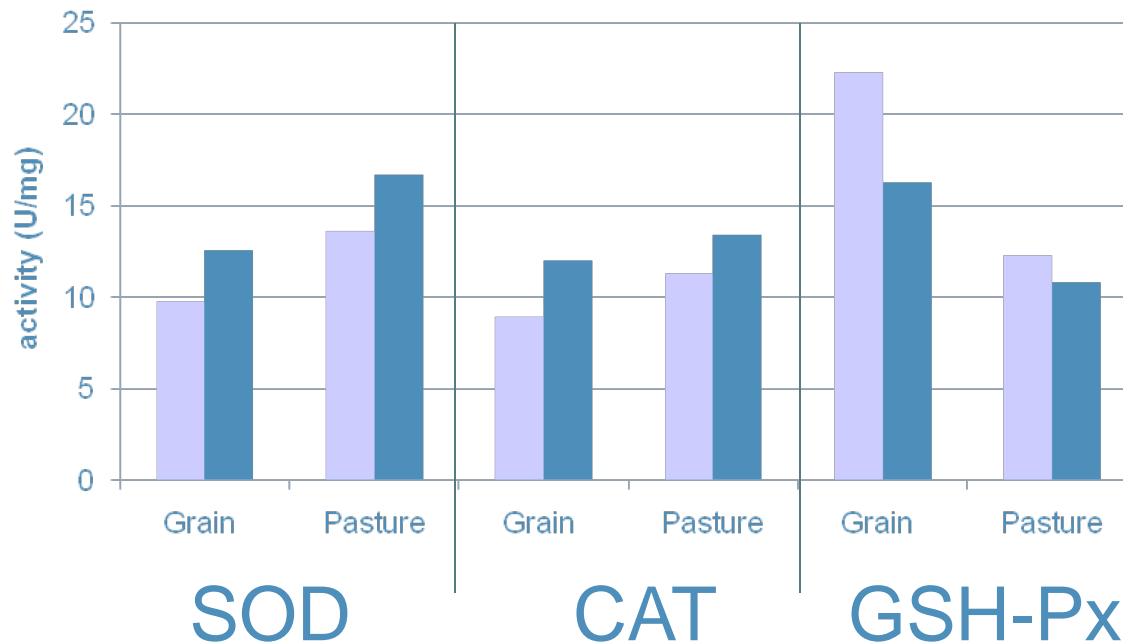
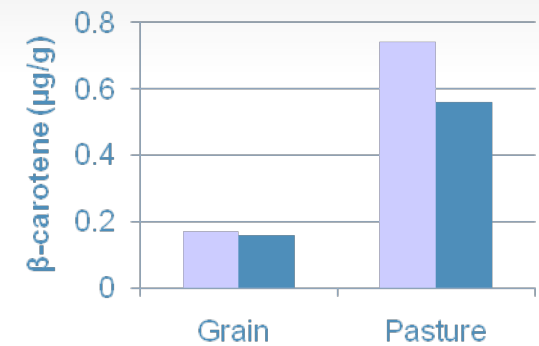
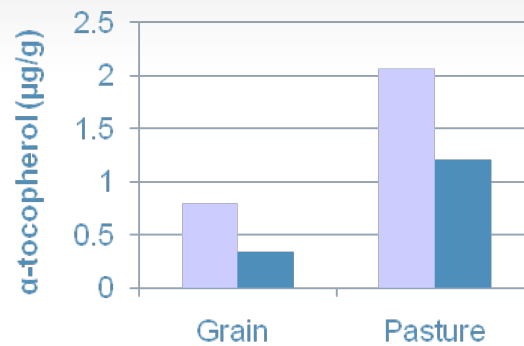
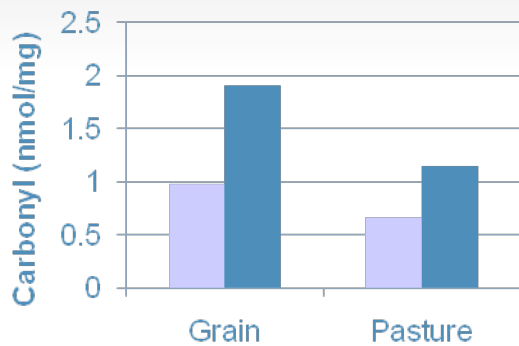
2. Effect of dietary constituents

Restricted feeding



2. Effect of dietary constituents

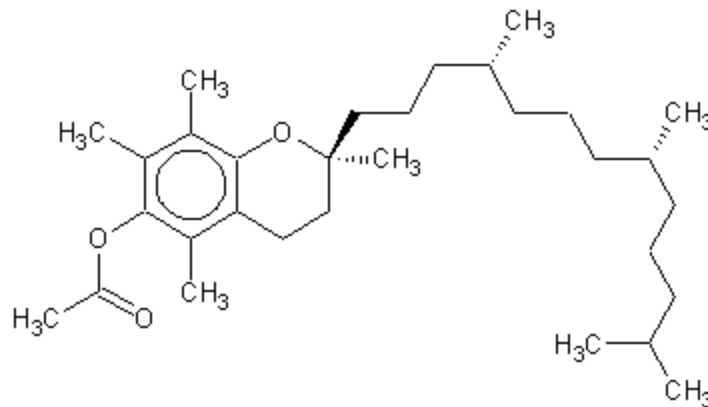
Pasture vs concentrate



2. Effect of dietary constituents

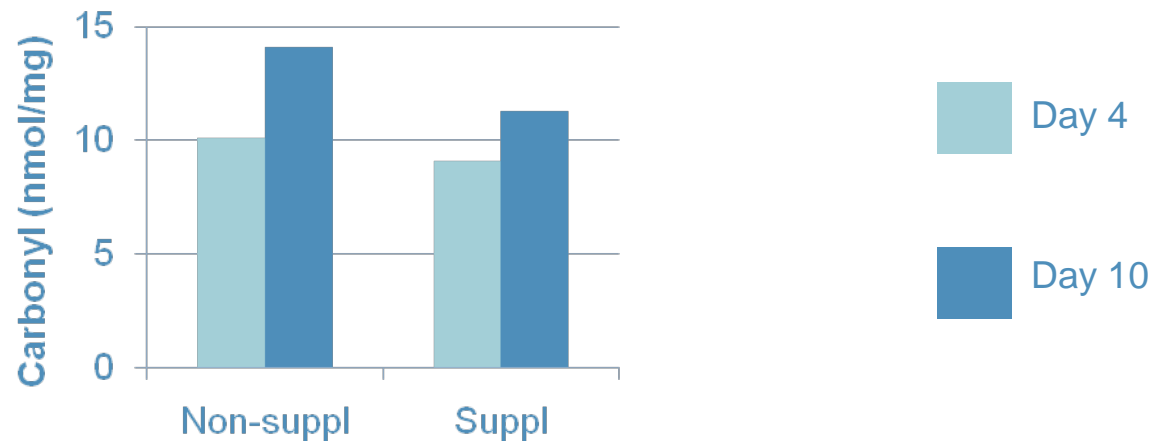
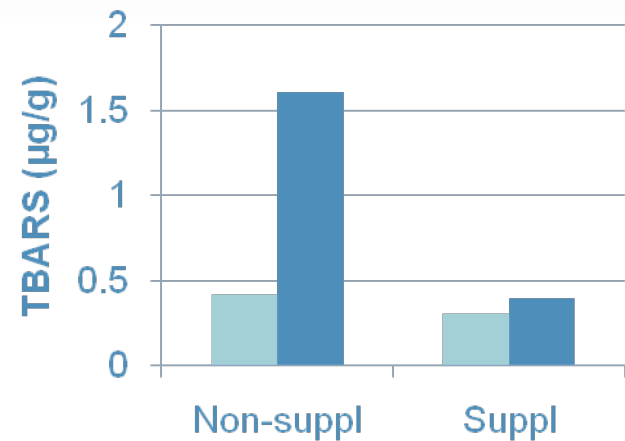
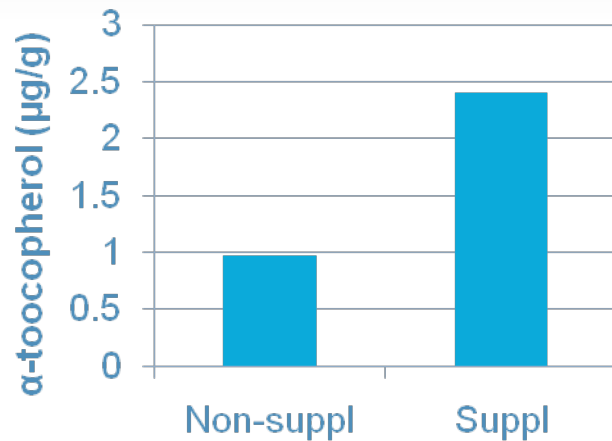
Dietary antioxidants

Most used one: α -tocopherylacetate



2. Effect of dietary constituents

Dietary antioxidants

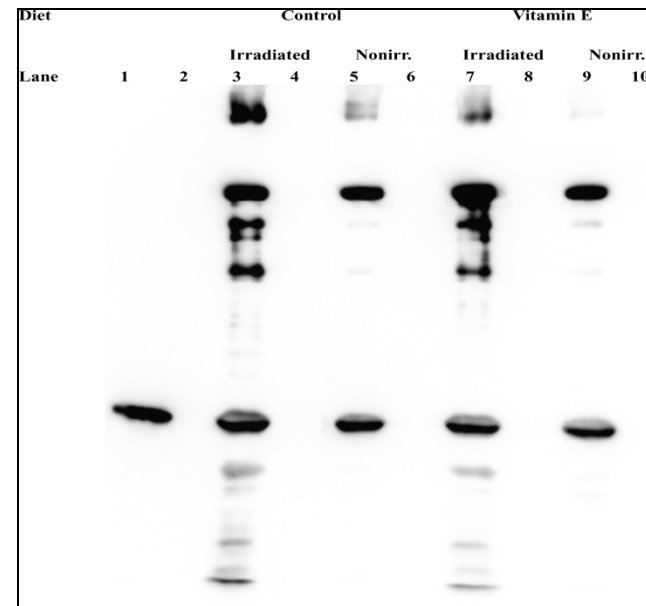
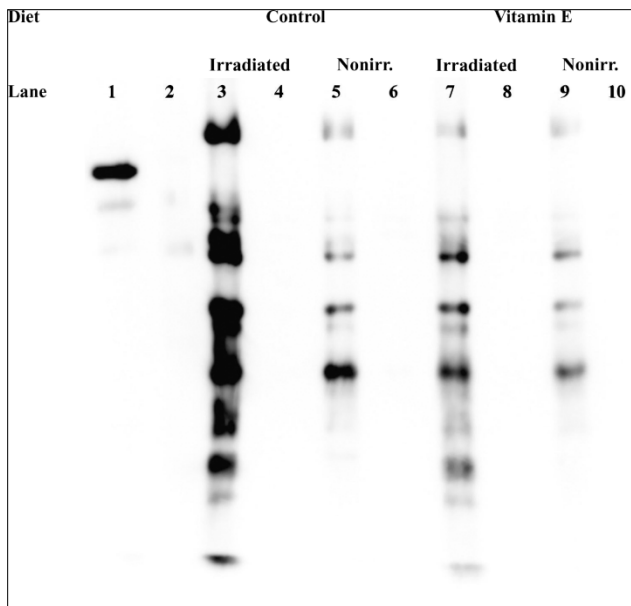


2. Effect of dietary constituents

Dietary antioxidants

Carbonyl content (nmol/mg protein)

	Day 0	Day 14
Myofibrillar protein	2.50	4.19
Sarcoplasmic protein	2.72	12.4



2. Effect of dietary constituents

Dietary antioxidants

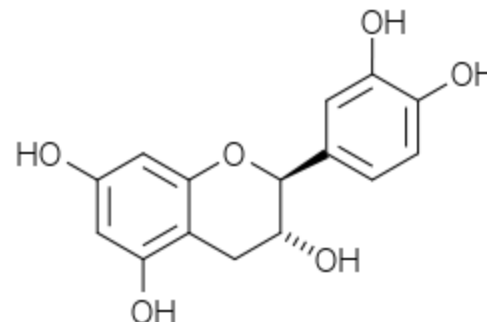
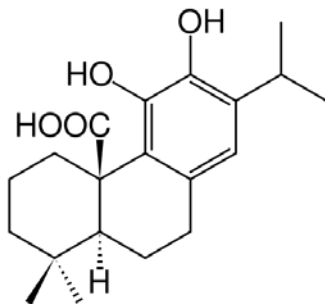
Most used one: α -tocopherylacetate

Trend to replace synthetic ao by natural extracts

Different responses when ao added to the diet or post mortem

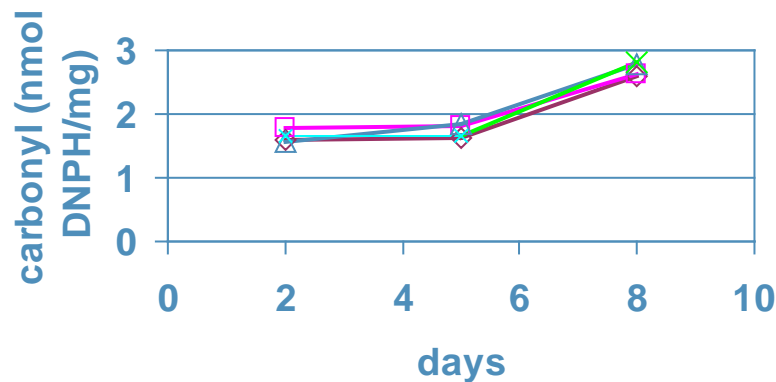
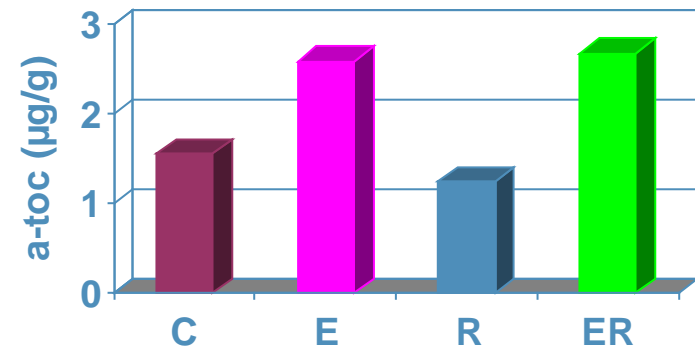
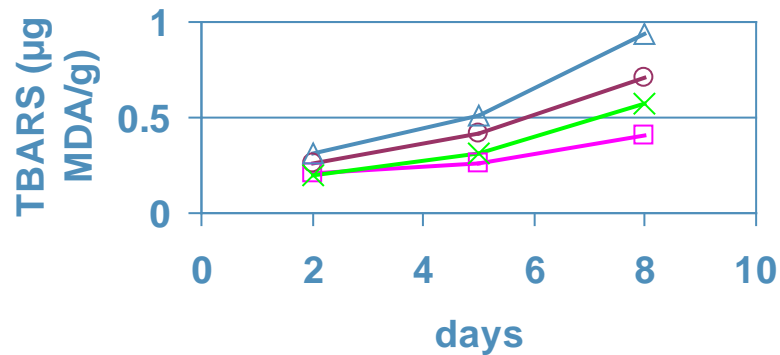
Several studies:

- Pigs: Haak et al (2006) – Haak et al (2008)
- Poultry: Smet et al (2008)

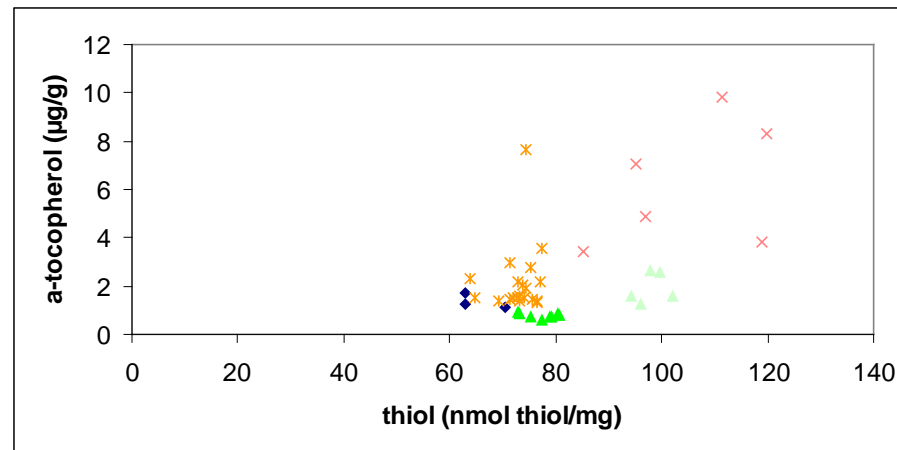
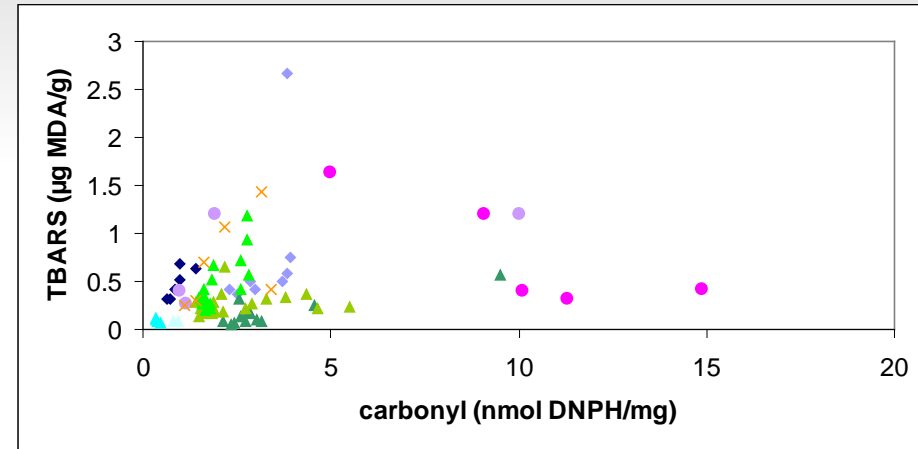
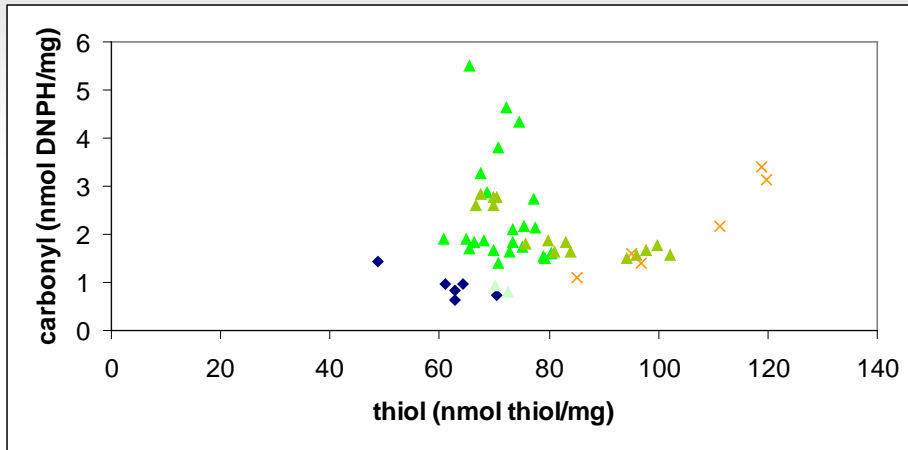


2. Effect of dietary constituents

Dietary antioxidants



3. Oxidative parameters: relationship



- ◆ Lamb
- Beef
- ▲ Pork
- × Turkey
- × Poultry

4. Conclusion

- Not many studies available
- Methods measuring protein oxidation
- Measuring enzyme activities
- Further attention to:
 - Dietary effects
 - Processing effects

Thanks for your attention!!

Further information

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