



EAAP 2016

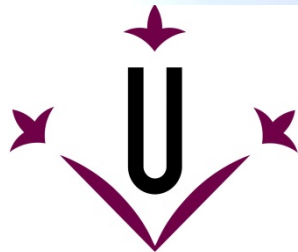
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The effect of linseed expeller supplementation on growth, carcass traits and meat colour of finishing gilts

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INTRODUCTION

- ❑ Pork is the most consumed meat in the world, and its fatty acid content and composition is directly influenced by diet.
- ❑ The idea of modifying the fatty acid composition of pork to make it more healthful.
- ❑ Consumers relation the perception of meat quality with visual appearance characteristics:
 - ❑ Subcutaneous fat content
 - ❑ Drip loss
 - ❑ Colour.....



INTRODUCTION

LINSEED EXPELLER

	Linseed expeller
EM (kcal/kg)	2970
Crude Protein(%)	32.4
SFA (% total of fatty acids)	8.7
MUFA (% total of fatty acids)	18.6
ω -6(% total of fatty acids)	17.9
ω -3 (% total of fatty acids)	54.8
balance ω -6 / AGPI ω -3	0.3




INTRODUCTION

- Balance between level of inclusion and length of supplementation period



INTRODUCTION

- Effect of linseed meal on c18:3 (g/Kg) in pigs slaughtered at 115kg of BW

Item	0 Flaxseed level in diet g/ Kg	5 Flaxseed level in diet g/ Kg	10 Flaxseed level in diet g/ Kg	15 Flaxseed level in diet g/ Kg
α -linolenic				
Backfat	11.1	21.7	34.4	47.4
 Loin	5.0	6.4	9.3	10.1

Eastwood et al.2009

OBJECTIVES

- To Evaluate the effect of linseed expeller supplementation on carcass traits, meat colour and fatty acids profile of finishing gilts.



MATERIAL AND METHODS

Animal

- **82 crossbred gilts (Landrace--Large- White x Pietrain)**



Age (168 ± 3 days)

Initial Body-Weight (92.5 ± 2 kg)

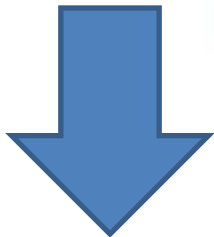
- **Gilts were housed in 4 pens (20-21 pigs each) based on initial BW**



MATERIAL AND METHODS

Experimental diet

- There were 2 treatments:
 - 1) Growing-finishing feed (**control**) *ad libitum* (2365 kcal EN/kg, 1.0% Lys, vit E 29 mg/kg)
 - 2) Growing-finishing feed *ad libitum* with a supplement of linseed expeller top-dressing (**supplementation**) + 0,5 kg/day of supplement (level of inclusion 15% of the expected daily intake)



During 21 days



MATERIAL AND METHODS

Slaughtering and carcass quality traits

- In vivo:
 - **Final Body-Weight** (same day, before departure to slaughter)
 - **Daily gain**
- ✓ 24h fasting time
- ✓ 1,5 h lairage time
- Post-mortem:
 - **Carcass Weight**
 - **Back-fat depth** using an on-line ultrasound automatic scanner (Autofom):
 1. At the 3th-4th last rib area
 2. At the last lumbar vertebrae

Half of the gilts were sampled for loin evaluation:

- **400g of caudal Longissimus thoracis muscle**



MATERIAL AND METHODS

Technological and chemical composition of meat

- **pH:** 45min and 24h post mortem
- **WBSF:** cooked at internal temp 70°C (sample 30x10mm) with a texturer analyser . TX2.
- **Cooking loss**
- **IMF**
- **Crude protein**



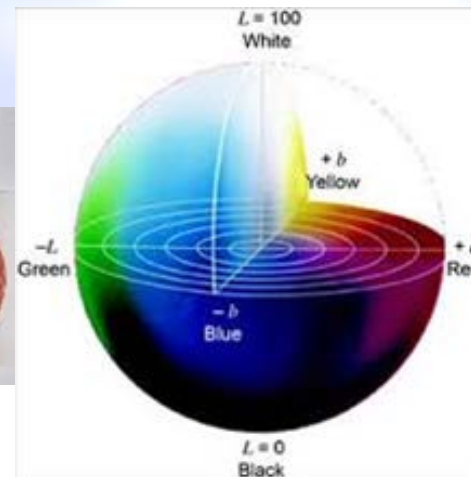
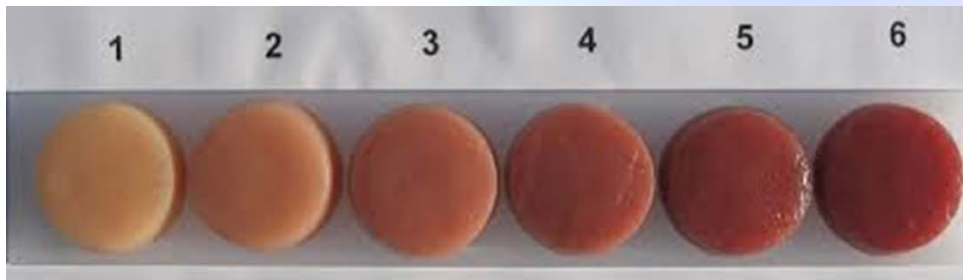
MATERIAL AND METHODS

Map Storage and colour

1-cm slices were stored in modified atmosphere package (MAP, 70% O₂, 30% CO₂) at 4 ° C for colour assessment:

1. **Colour attributes** (CIELab) with a chromameter (Minolta Camera, Japan).
2. **Japanese Colour Standard** (Visual evaluation): Two non-related people scored meat separately.

At days **1, 4, 8** and **12**.



MATERIAL AND METHODS

Intramuscular fatty acids

- Measure %**IMF** (intramuscular fatty acids) with Soxhlet extractor: 4g of lyophilized and homogenized meat.
- **Fatty acid profile**: Direct transesterification with boron trifluoride 20% in methanol (100mg sample) and quantification by GC



MATERIAL AND METHODS

Statistical analysis

- Data were analysed using the JMP Pro 11 Statistical software (SAS. USA).
- Carcass parameters, pH, IMF composition were analysed with general linear model (GLM procedure) with treatment as fixed effect.
- Colour attributes were analysed with a linear mixed model including as well the effect of storage day.
- The level of significance was set at 0,05. assessed using the Tukey test.



RESULTS AND DISCUSSION

Growth data

	Control	Supplement	P value
Final weight (kg)	109.8	107.7	0.48
Average daily gain (g)	689	739	0.42
Carcass weight (kg)	75.5	83.1	0.45
Backfat depth 3rd-4th last rib (mm)	22.8	24.6	<0.05
Backfat depth last lumbar vertebrae (mm)	10.9	12.5	<0.05

The final weight, daily gain and carcass weight did not differ between groups.

Linseed supplement increased backfat depth

RESULTS AND DISCUSSION

Meat Quality traits

	Control	Supplement	P-value
WB Shear force (kg)	5.73±0.16	5.69±0.18	0.99
Cooking loss (%)	17.0±0.97	16.3±1.15	0.63
Moisture (%)	72.9±0.36	72.9±0.42	0.93
Crude protein (%)	21.5±0.26	21.8±0.30	0.48
IMF (%)	2.33±0.17	2.69±0.36	0.32

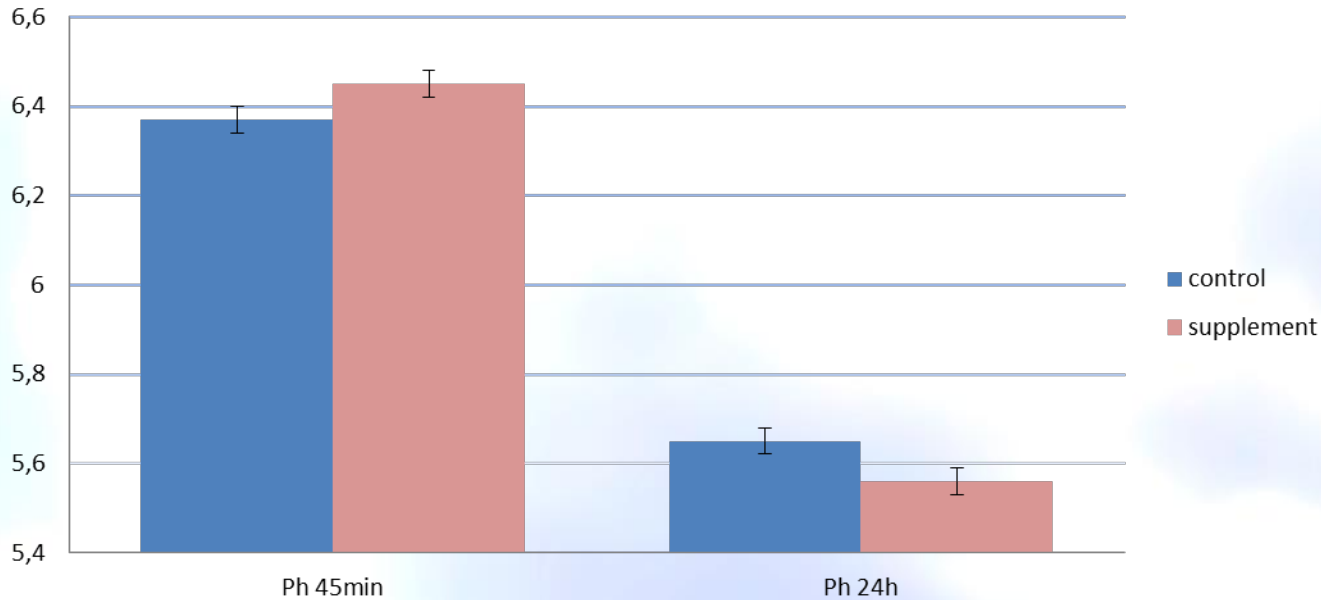
The WB Shear force, cooking loss, moisture, crude protein and did not differ between groups.

RESULTS AND DISCUSSION

pH



Development pH at 45min and 24h

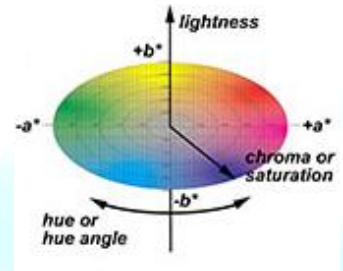
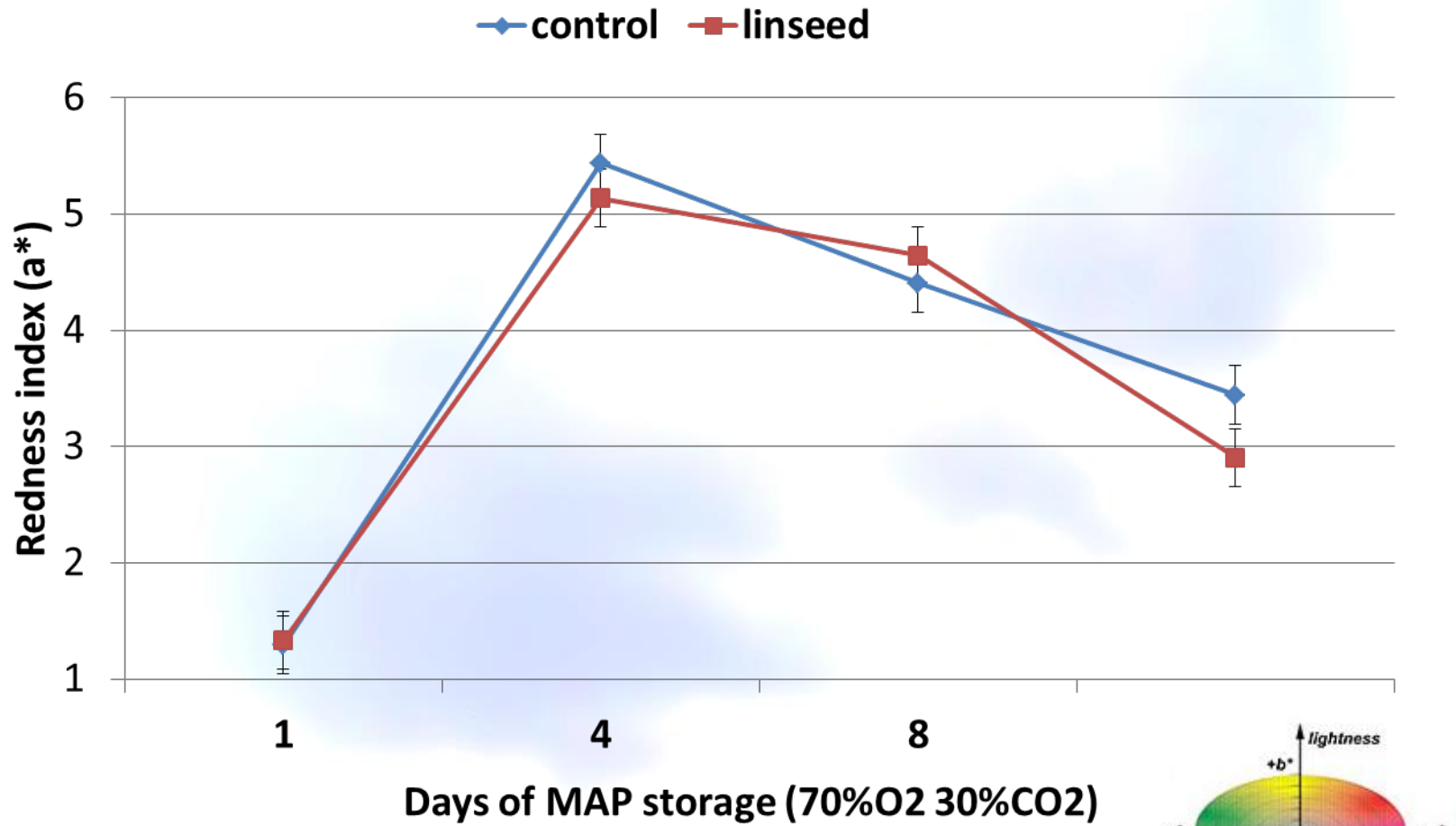


There are no differences in pH between groups.

	pH 45min	pH 24h	P value
Control	6.37±0.07	5.65±0.03	0.48
Supplement	6.45±0.08	5.56±0.03	0.19

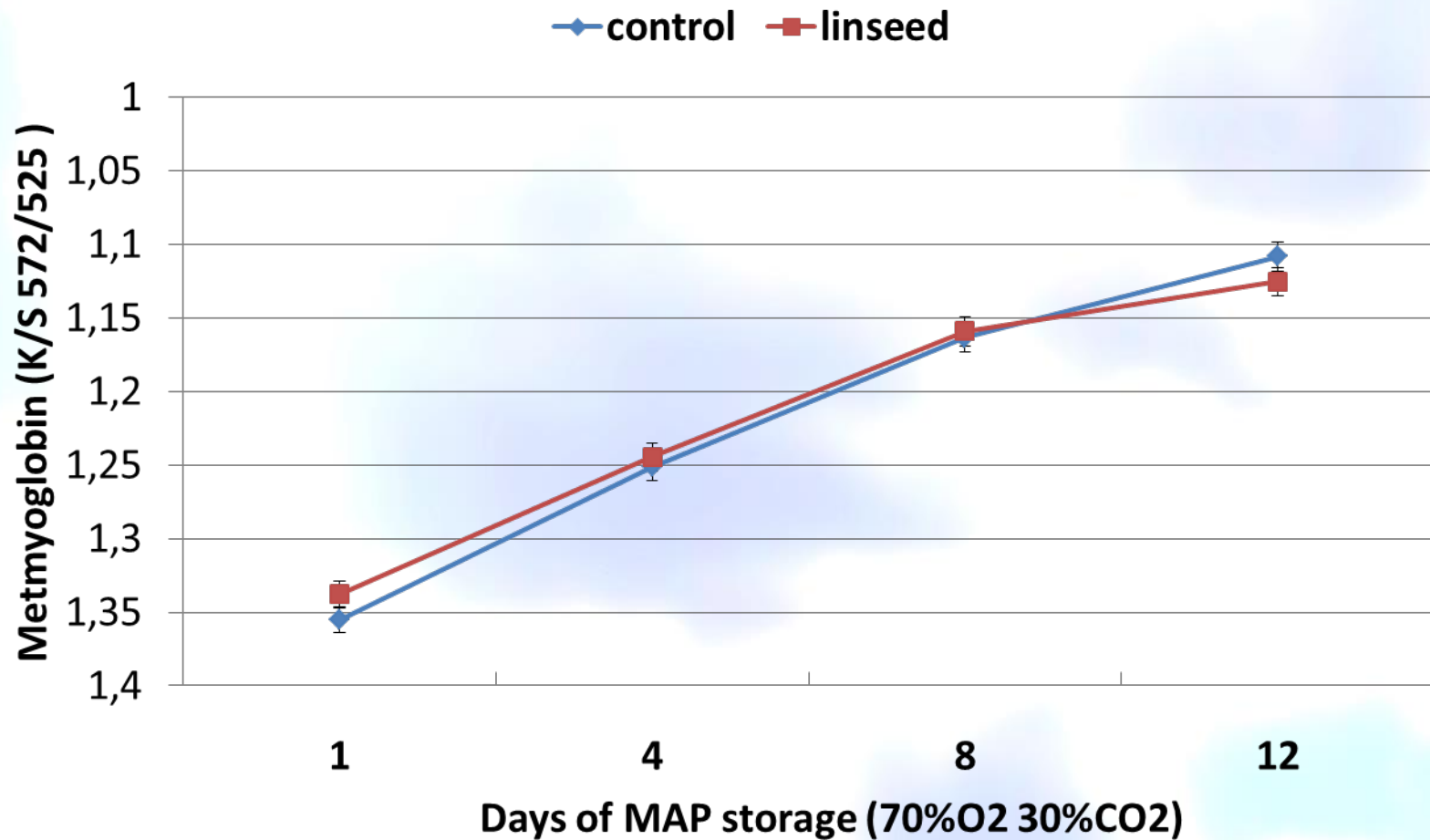
RESULTS AND DISCUSSION

Colour score



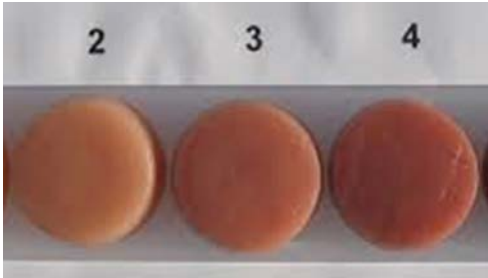
RESULTS AND DISCUSSION

Map Storage

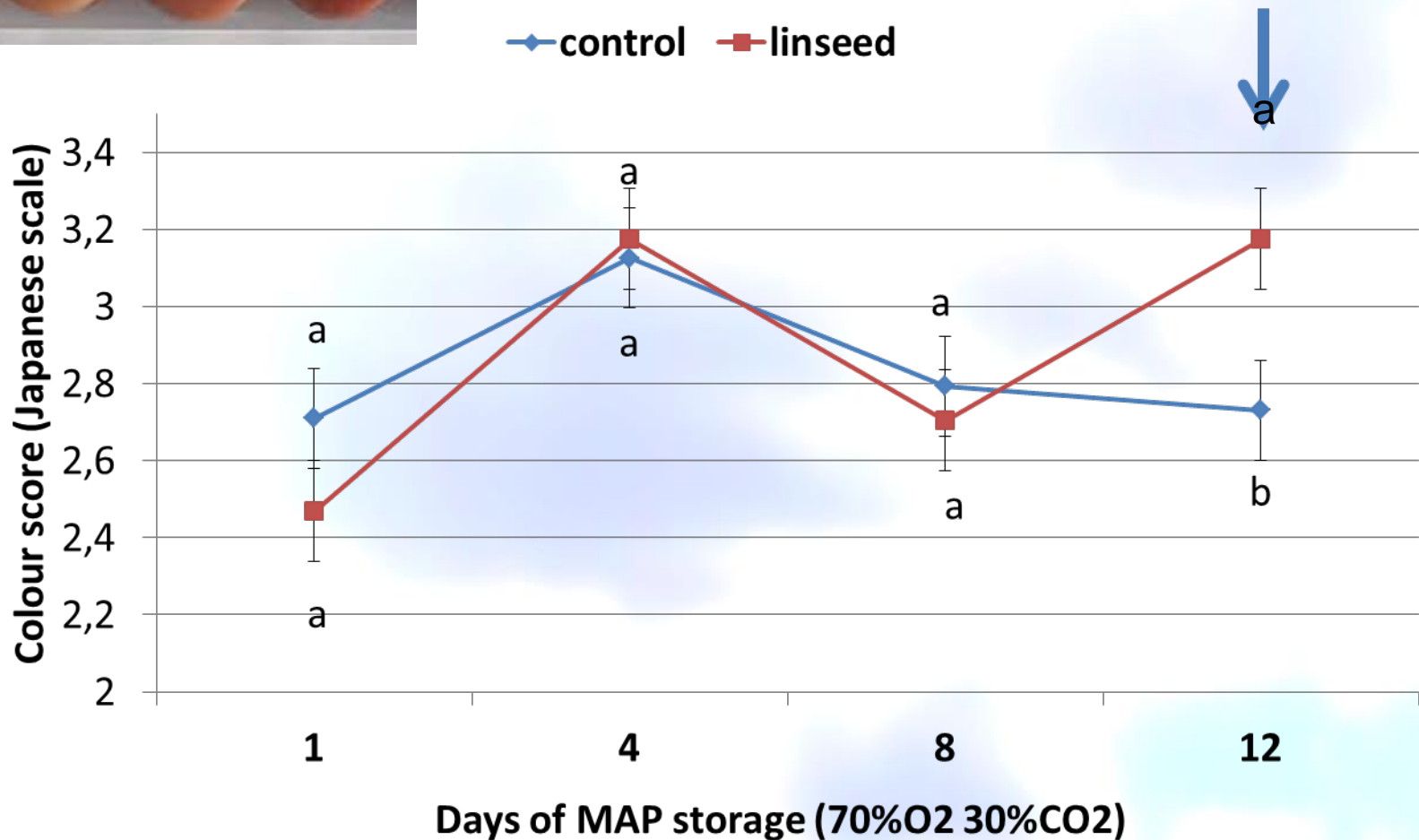


RESULTS AND DISCUSSION

Japanese Colour score

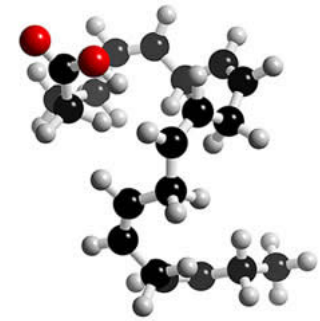


—◆— control —■— linseed



RESULTS AND DISCUSSION

Profile fatty acids

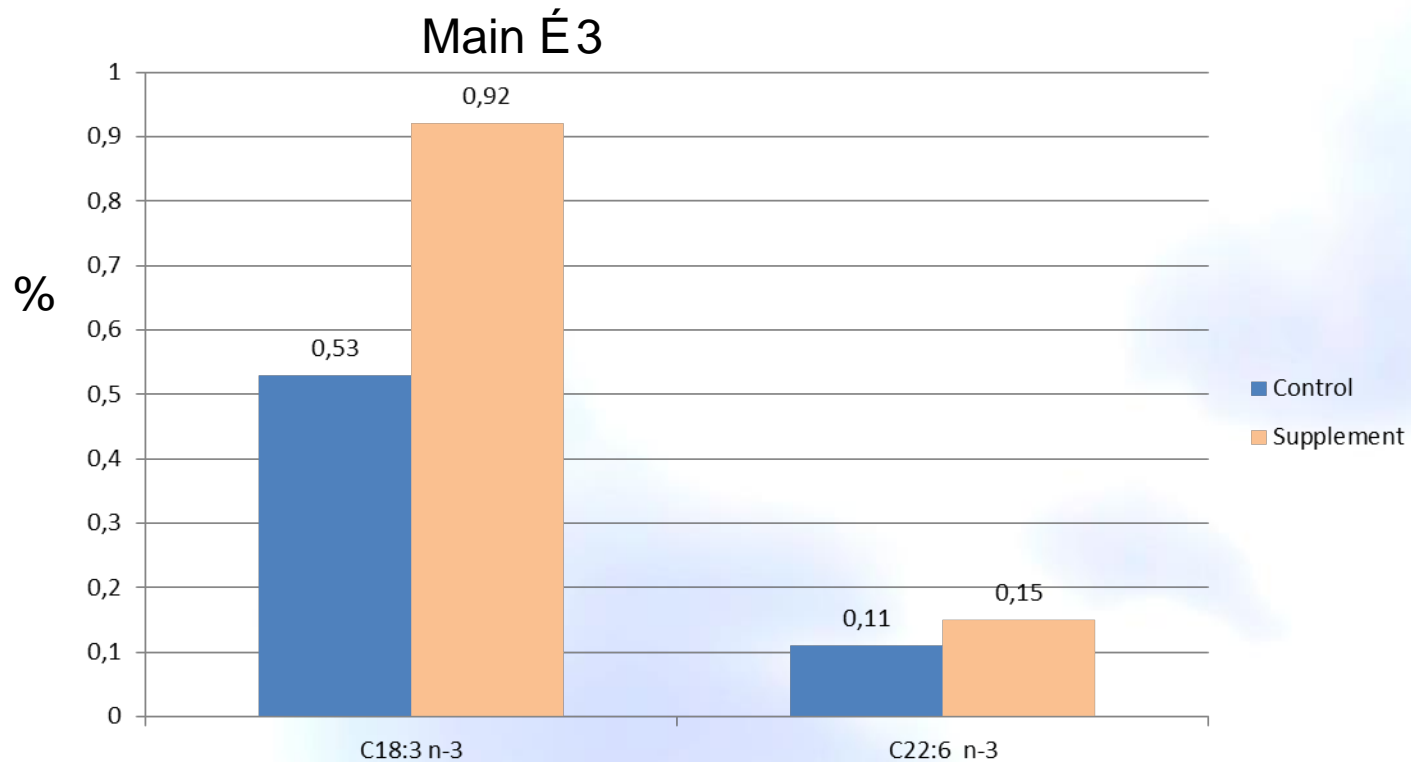


Item	Control	Linseed Supplementation	P-value
SFA (%)	26.09±0.21	25.39±0.23	0.04*
MUFA (%)	45.77±0.69	44.53±0.84	0.26
PUFA (%)	17.18±0.79	19.37±1.02	0.09
Omega 6 (%)	12.57±0.49	13.72±0.62	0.15
Omega 3(%)	0.77±0.04	1.37±0.10	<0.001*

There were differences in SFA and ©-3 contents

RESULTS AND DISCUSSION

Profile fatty acids



	Control	Linseed Supplementation	P value
C18:3 n-3	0.53±0.02	0.92±0.07	<0.001*
C22:6 n-3	0.11±0.01	0.15±0.01	0.023*

CONCLUSIONS

A top-dressed linseed supplement (15% of diet inclusion during the last 21 days of fattening):

- Increased carcass adiposity without negatively affecting the muscle pH, shear force, cooking loss or meat colour.
- Did not affect visual appearance of loin slices during at least 8 days of display storage.
- Did not increase IMF significantly but it modified the FA composition by increasing PUFA n-3 content.



ONGOING RESEARCH

Technological quality traits and PUFA n-3 content is maintained in cooked and MAP stored meat from pigs fed n-3 rich sources? → studies to assess the effect of **cooking** and **storage in MAP** on the fatty acid profile



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Thank you for attention!

