Effect of dietary oil and seed addition on pork subcutaneous and intramuscular fatty acid profile

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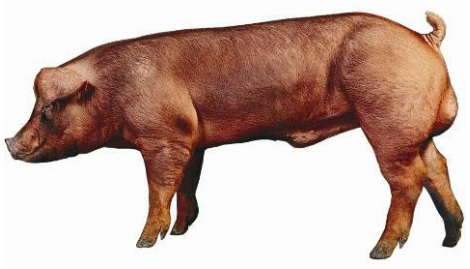
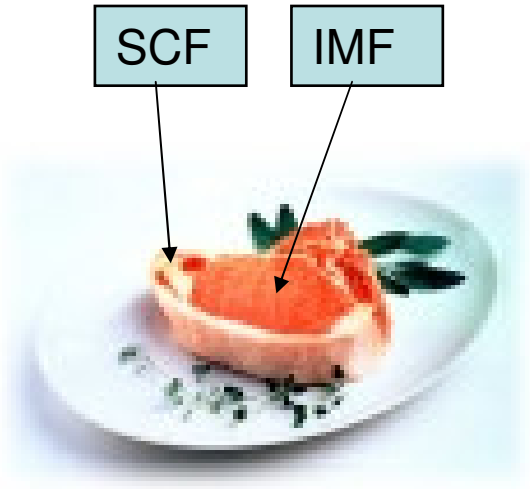
Introduction

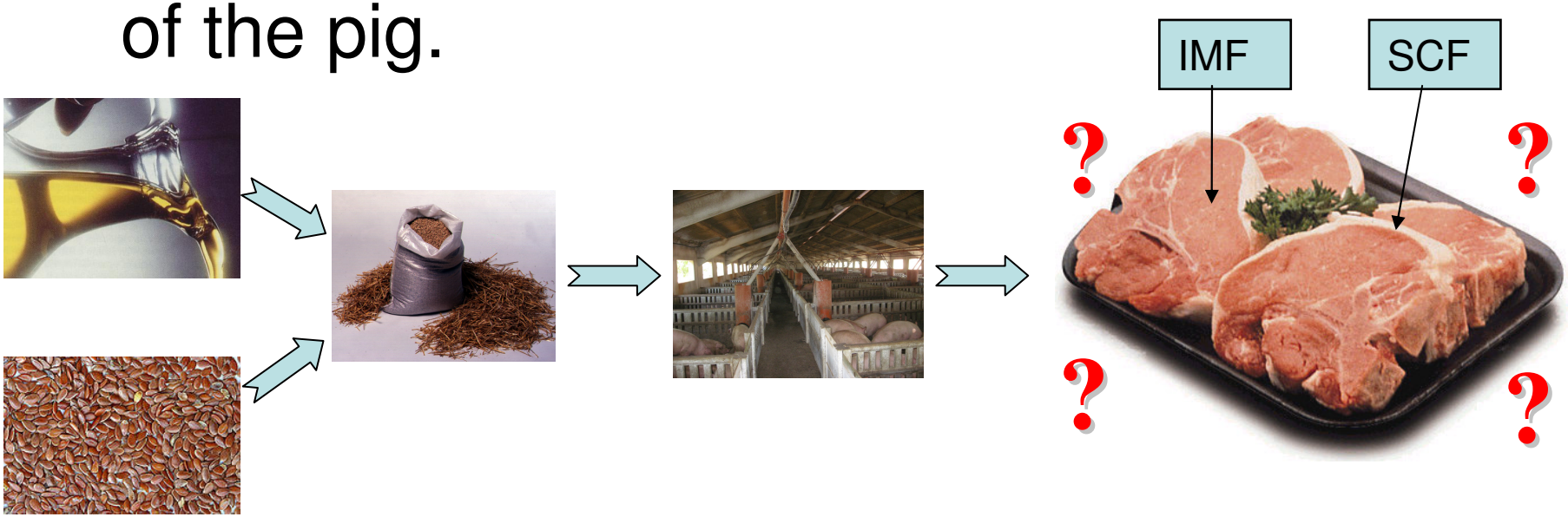


- Duroc crosses are commonly used to improve meat quality of pork.
- Duroc brings high subcutaneous (SCF) and intramuscular (IMF) fat.
- There is a scarcity of papers dealing with fatty acid (FA) deposition in the two most important fat compartments in slaughter pigs: SCF & IMF.
- ω 3 FA enriched products are increasingly present in human diets.
  - Reduce cardiovascular diseases.
  - Precursor of anti-inflammatory eicosanoids.
  - Major fatty acid in brain and retina phospholipids,
  - Reduce neuropsychiatric conditions.
  - Two critical human population segments
    - Infants.
    - Elderly.
- Terrestrial and marine FA sources commonly used.



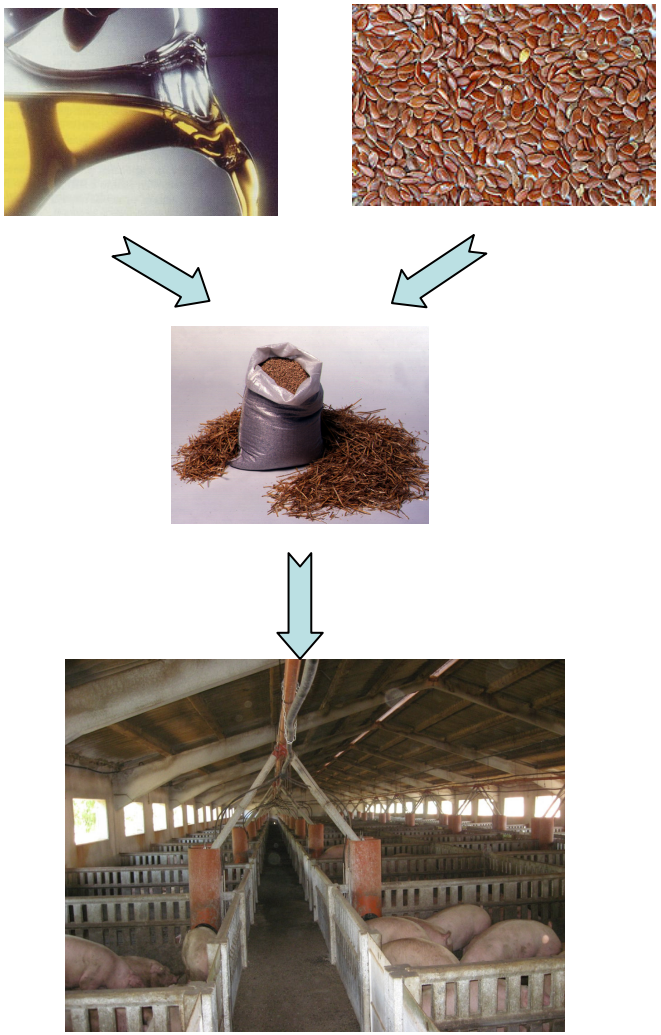
Objective

- Find out differences in FA profile in pork subcutaneous and intramuscular fat compartments after dietary oil and seed addition during the finishing growth phase of the pig.



Material and Methods
Dietary Treatments

- Dietary Treatments:
  - Control Diet:
    - Ingredients: Barley, Wheat, SBM, Lard
    - Energy and Nutrients:
      - Gilts: 2425 Kcal NE & 0,51 % Dig Lys
      - Barrows: 2400 kcal NE & 0,47 Dig Lys
  - Oil Blend with 1.5 % Inclusion Rate (80 % Linseed + 20 % Fish Oil)
  - Seed Blend with 4 % Inclusion Rate (70 % Extruded Linseed + 30 % Wheat Middling).
- Feed and water was provided ad-libitum.



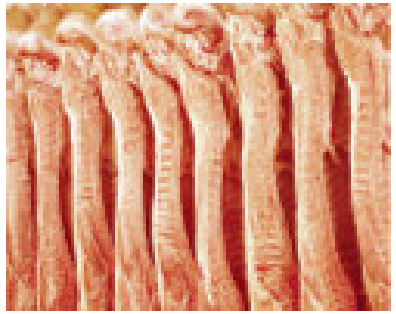
Material and Methods
Facilities, Animals & Timing

- 165 Crossbreed Barrows and Gilts
  - PIC280 Duroc sire
  - Landrace x Large White dam
- 12 pen under commercial conditions.
- Four Pens / Dietary Treatment
  - 13 to 15 Pigs / Pen
- Experimental period:
  - From 83 kg to 114 kg LW.
  - For 35 days.

Material and Methods

- **Growth and carcass .**
- **Meat Quality** collected 24 and 48h after slaughter.
- Fatty Acids:
  - Analyzed by gas chromatography.
  - Random carcasses identified for FA analysis.
    - Samples: 82 samples
    - IMF & SCF samples collected form selected carcasses.
- Statistical Analyses
  - SAS PROC MIXED.
  - Fixed Effects for Dietary Treatment and Gender.

Growth & Carcass



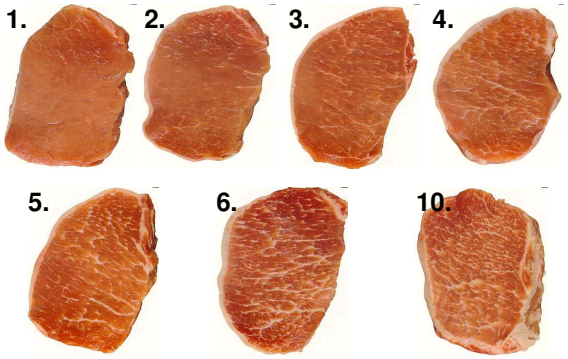
	Treatment		
Trait[a]	**Control**	**Oil Blend**	**Seed Blend**
On-test Wt., kg	82.3 ± 2.44	83.0 ± 2.44	85.8 ± 2.44
Market Wt., kg	113.9 ±2.36	112.9±2.36	115.1±2.36
Hot Carcass Wt., kg	86.3 ±1.37	88.0 ±1.26	86.8 ±1.38
Carcass loin depth[b], mm	61.7 ±0.99	61.9 ±0.91	60.5 ±1.0

[a] Number of observations for:
On test and market weight: Control = 4; Oil blend = 4, and Seed blend = 4.
Carcass traits: Control = 40; Oil blend = 47, and Seed blend = 39.

[b] Trait was adjusted to 87.11 kg hot carcass weight.

No significant differences.

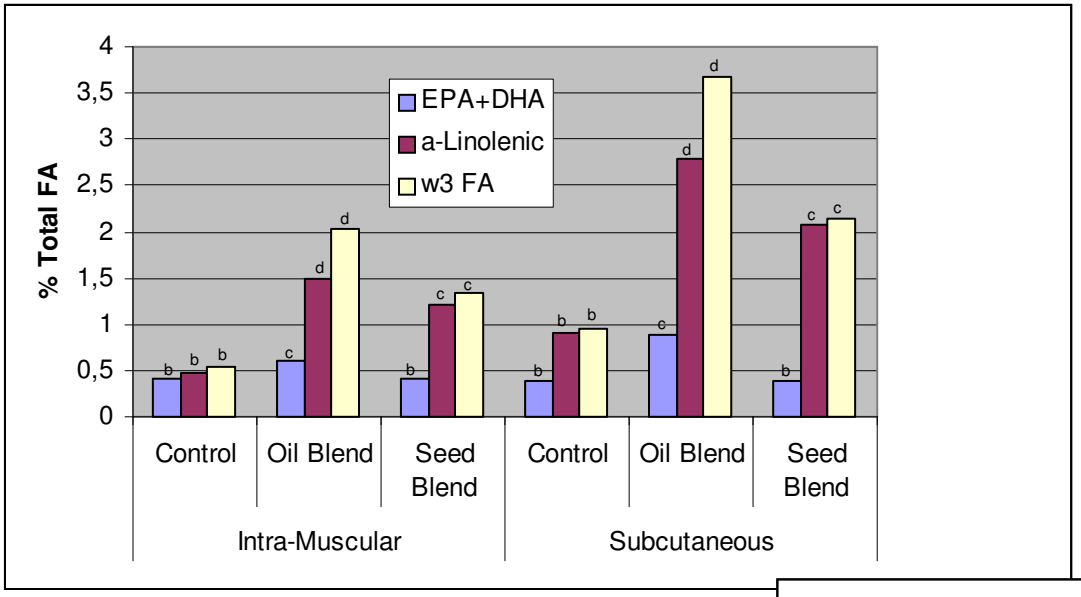
Meat Quality



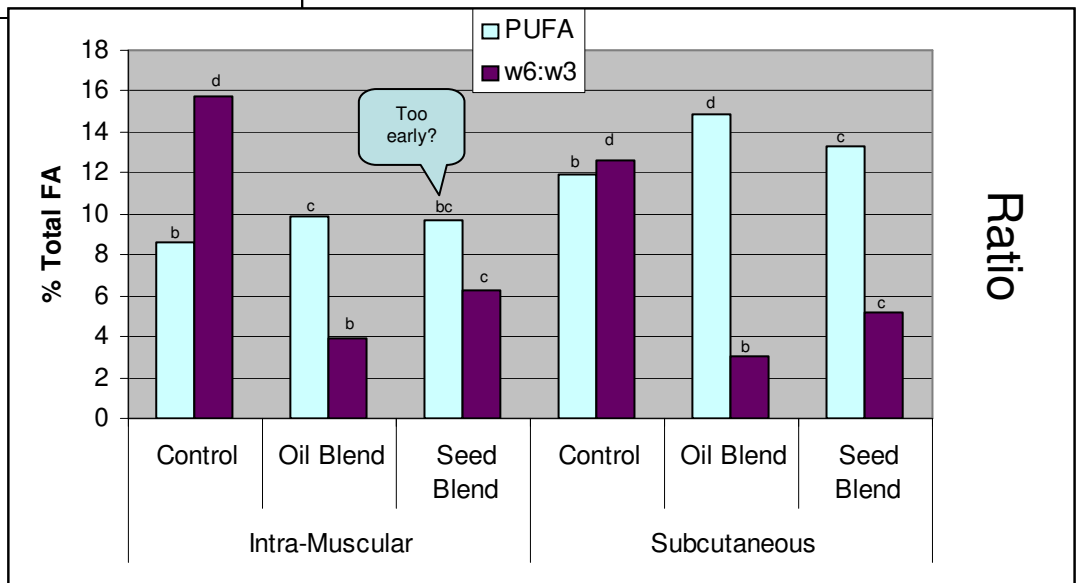
	Treatment		
Trait[a]	**Control**	**Oil Blend**	**Seed Blend**
Japanese color score, (1 to 6)	3.26 ±0.14	3.14±0.14	3.13±0.12
Loin marbling score, (1 to 10)	2.64±0.13	2.79±0.13	2.56±0.12
Loin pH 24 hr. post-mortem	5.69±0.027	5.68±0.024	5.69±0.027
Drip loss at 48 Hr., %	3.45±0.41	4.36±0.41	4.55±0.37

[a] Number of observations:
Japanese color score and loin marbling score: Control = 13; Oil blend = 13, and Seed blend = 15.
Loin pH 24 hr. post-mortem: Control = 35; Oil blend = 43, and Seed blend = 35.
Drip loss at at 48 hr.: Control = 13; Oil blend = 13, and Seed blend = 15.
No significant differences.

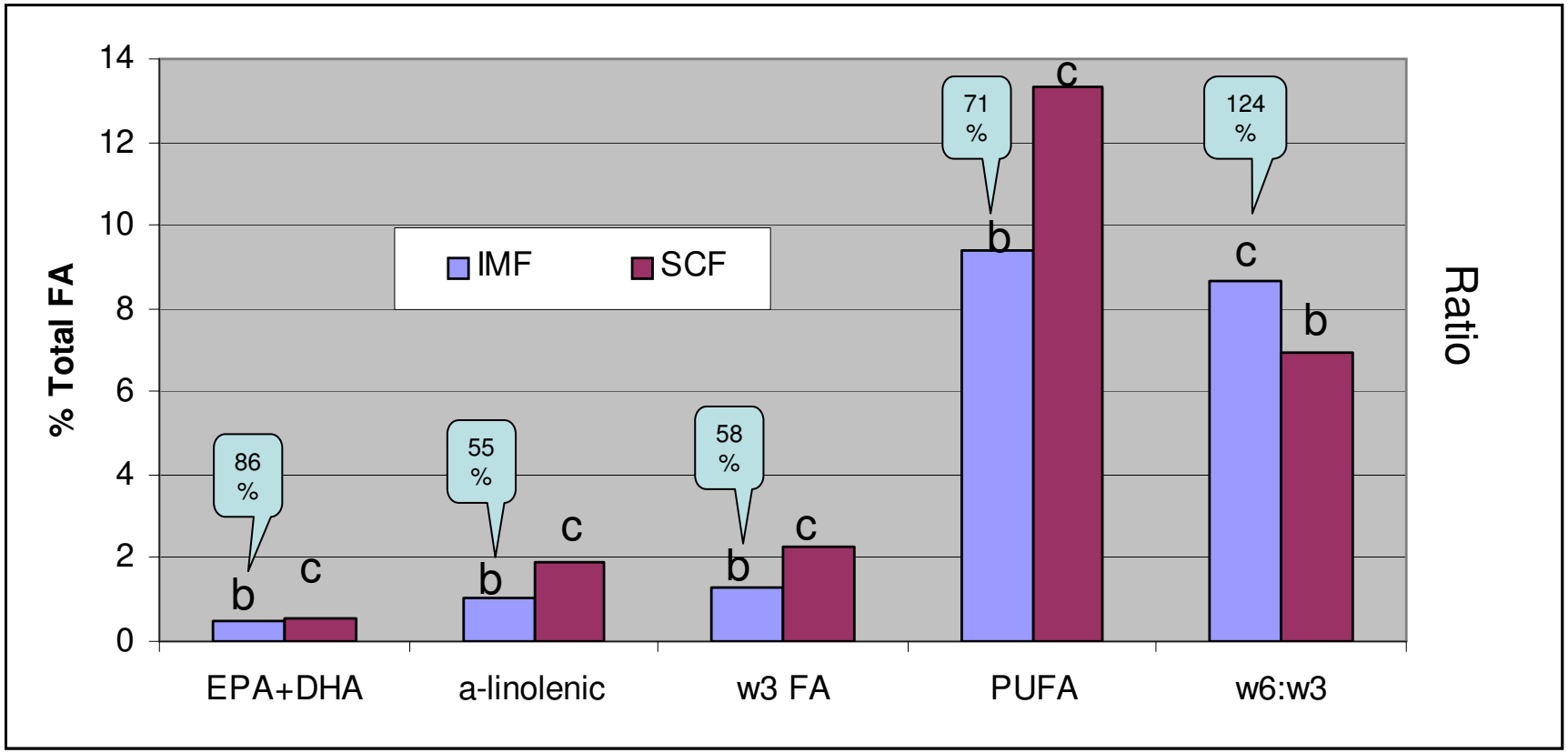
Fatty Acid Response
Treatment & Sampling Location



[a] Number of observations: Intra-muscular fat (IMF) = 41 and Subcutaneous fat (SCF) = 41.
[b, c, d] bars with different superscripts within fat compartment are statistically different at P < 0,05.



Fatty Acid Profile by Sampling Location

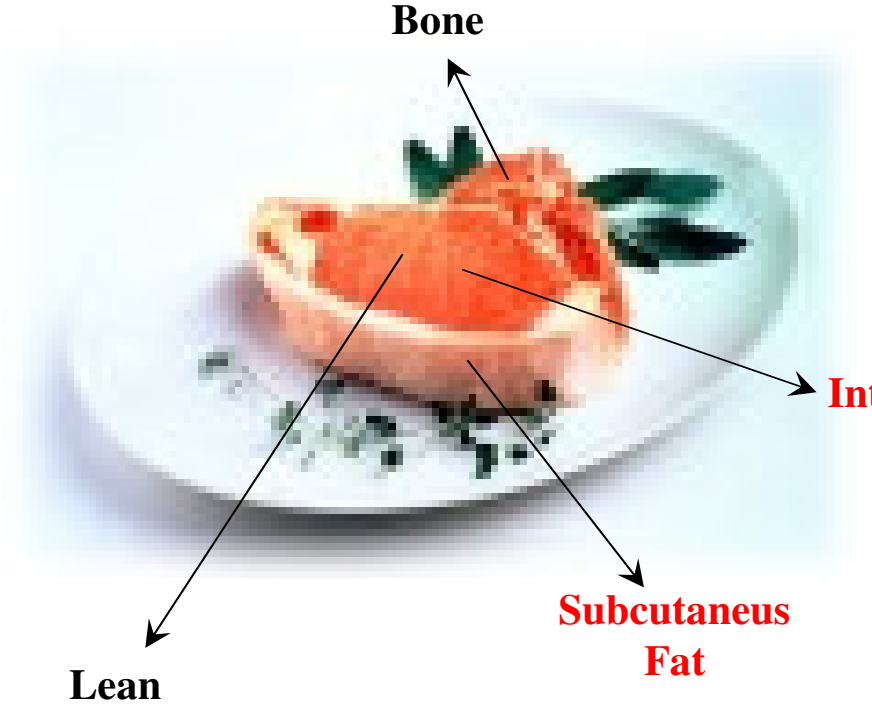


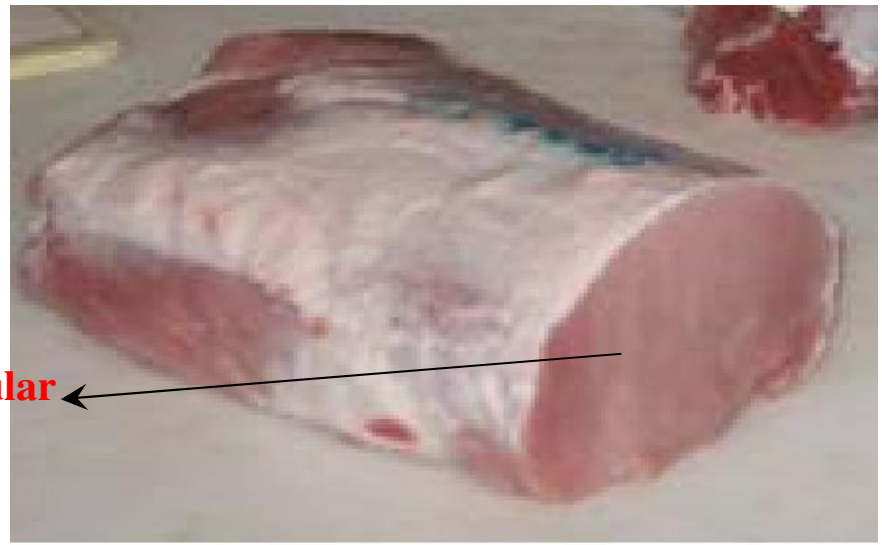
[a] Number of observations: Intra-muscular fat (IMF) = 41 and Subcutaneous fat (SCF) = 41.
[b,c] bars with different superscripts are statistically different at P < .05.

Loin Composition

Is the FA composition the same?

Will the FA intake by humans be the same?





LOIN CHOP

TRIMMED LOIN

PIC

INTIA
Tecnologías e Infraestructuras Agroalimentarias

GRANJA LOS ALECOS

Conclusions

- ✓ **General changes**
  - ✓ No effect on growth, carcass and meat quality traits.
  - ✓ FA profile in pork changes with fat sources in feed.
  - ✓ Dietary treatments show same effects on FA profile, but with different magnitude, depending on where samples are collected (IMF vs SCF).
- ✓ **Specific changes for** selected FA:
  - ✓ **Linolenic acid and ω 3 FA** increases with both (Oil and Seed) blends in both (IMF and SCF) fat compartments.
  - ✓ **EPA+DHA** increases only with the Oil Blend in both (IMF and SCF) fat compartments.
  - ✓ **ω 6: ω 3 ratio** decreases with both (Oil and Seed) Blends in both (IMF and SCF) fat compartments.
- ✓ **Implications**
  - ✓ We can not estimate FA composition of pork fat based only on SCF.
  - ✓ We can not estimate FA intake by humans based only on SCF.
  - ✓ we need to consider both fat compartments (SCF & IMF).