75th Annual Meeting of The European Federation of Animal Science
Florence - Italy

Poster Number: 62.20

Effects of dietary supplementation of oregano essential oil to feedlot cattle on their meat quality and muscle fiber histomorphometry

ARISTOTLE UNIVERSITY OF THESSALONIKI

S. Dokou[1*], A. Tsitsos[2], I. Stylianaki[3], T. Chatzimanou[4], V. Economou[2], I. Giannenas[1], M. Filippitzi[5], G. Arsenos[6]

[1]Laboratory of Nutrition, Faculty of Veterinary Medicine, Aristotle University, 54124 Thessaloniki, Greece
[2]Laboratory of Animal Food Products Hygiene – Veterinary Public Health, School of Veterinary Medicine, Aristotle University 54124, Thessaloniki, Greece
[3]Laboratory of Pathology, Faculty of Veterinary Medicine, Aristotle University, 54124, Thessaloniki, Greece
[4]Laboratory of Anatomy, Histology and Embryology, School of Veterinary Medicine, Aristotle University 54124, Thessaloniki, Greece
[5]Laboratory of Animal Health Economics, School of Veterinary Medicine, Aristotle University 54124, Thessaloniki, Greece
[6]Laboratory of Animal Husbandry, Faculty of Veterinary Medicine, Aristotle University, 54124 Thessaloniki, Greece

*Corresponding author: Stella Dokou. E-mail: dokoustella@vet.auth.gr

Introduction

Oregano essential oil (OEO) and its potential uses has been the focus of scientific research across and beyond disciplines. The latter contributed significantly to the evolution of knowledge regarding its application particularly in livestock production with monogastrics being the dominant species of experimentation.

Objective

To investigate the role of dietary supplementation of encapsulated oregano essential oil in the quality of meat produced by Limousin bulls.

Materials & Methods

- **Animals**: Total 68 Limousin bulls (16 ± 1.5 months old), allocated in two equal groups (n=34) with 5 pens each as replicates (4 pens with 7 bulls and 1 with 6 bulls)
- **Location**: Feedlot unit, Veria, Greece
- **Diets/Groups**:
  - Basal diet was offered in TMR form
  - Basal diet + Oregano Essential Oil (OEO) in microencapsulated form
  - **CON group**: basal diet
  - **OREG group**: basal diet + 50 mg OEO/kg DM
- **Experiment duration**: 90 days
- **Sampling:** 68 Steaks (13th rib)
- **Evaluated parameters:**
  - Meat color, pH & texture
  - Meat chemical composition
  - Meat fatty acids & amino acids profile
  - Meat oxidative status
  - Muscle fiber minimum feret diameter
- **Statistical analysis:** Independent samples T-test

Results

Table 1. Evolution of effects of OEO dietary inclusion on pH, color and tenderness of Limousin cattle steaks.

	Treatments			
	CON	**OREG**	**SEM²**	**P-value**
pH				
Day 1	6.09	6.14	0.120	0.318
Day 15	6.32	6.29	0.141	0.671
L*				
Day 1	39.91	39.37	0.261	0.306
Day 15	43.04	43.34	0.334	0.657
a*				
Day 1	21.01	20.28	0.259	0.164
Day 15	18.96	19.22	0.180	0.467
b*				
Day 1	7.04	7.08	0.194	0.921
Day 15	9.56	10.17	0.271	0.264
Chroma				
Day 1	22.25	21.55	0.253	0.167
Day 15	21.30	21.80	0.264	0.344
Hue angle				
Day 1	18.60	19.34	0.548	0.509
Day 15	26.47	27.54	0.521	0.307

Table 2. Effect of OEO dietary inclusion on the fatty acid composition (%) of Limousin cattle steaks.

	Treatments			
	CON	**OREG**	**SEM²**	**P-value**
Myristic acid (C14:0)	3.30	3.52	0.206	0.657
Myristoleic acid (C14:1)	0.34	0.42	0.105	0.742
Pentadecanoic acid (C15:0)	0.52	0.47	0.022	0.284
Palmitoleic acid (C16:1)	3.09	3.64	0.220	0.239
Heptadecanoic acid (C17:0)	1.23	0.88	0.099	0.058
Cis-10-Heptadecenoic acid (C17:1)	0.55	0.41	0.042	0.107
Elaidic acid (C18:1n9t)	3.88[a]	1.84[b]	0.531	0.029
Oleic acid (C18:1n9c)	35.61	36.68	0.809	0.568
Linoleic acid (C18:2n6c)	2.36	2.29	0.074	0.656
Arachidic acid (C20:0)	0.10	0.09	0.031	0.954
Cis-11-Eicosenoic (C20:1)	0.14	0.18	0.066	0.778
Linolenic acid (C18:3n3)	0.07	0.16	0.053	0.476
Palmitic acid (C16:0)	27.63	29.68	0.614	0.089
Stearic acid (C18:0)	20.88	19.31	0.950	0.474
SFA	53.76	54.13	1.010	0.877
MUFA	43.66	43.27	0.978	0.868
PUFA	2.53	2.61	0.102	0.771

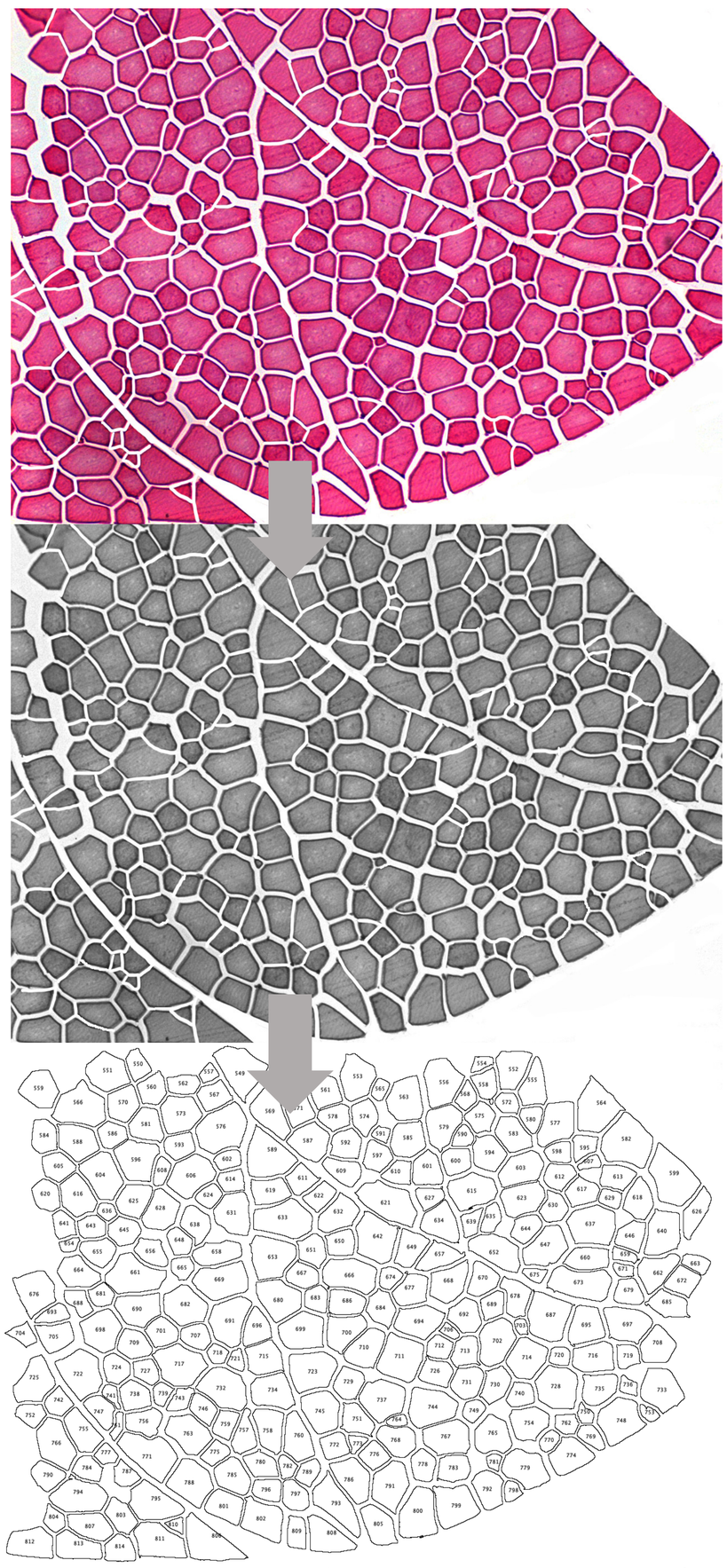

Figure 1. Microscopic image of the muscle in cross-section: 1) Hematoxylin-Eosin staining, magnification x10; 2) The same image, after digital processing, using the Image J software, showing the final form of the images used for histomorphometric analysis; 3) Particle analysis.

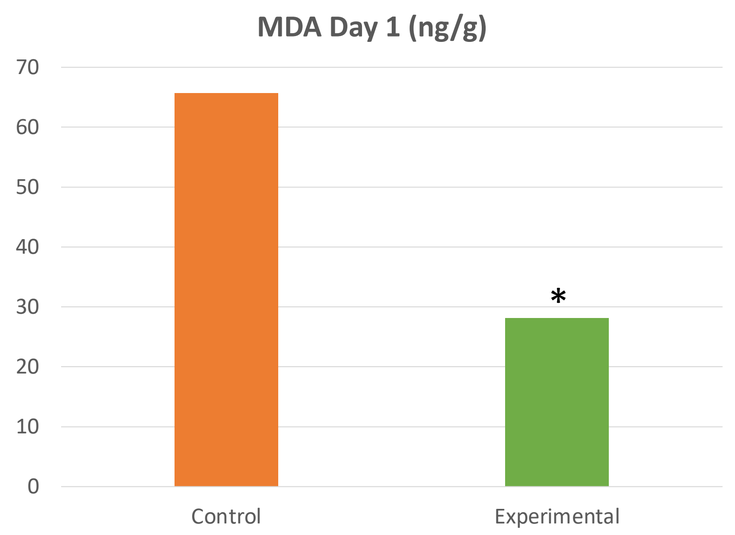

Figure 2. Lipid oxidation in meat: Malondialdehyde levels on day 1 post-slaughter.

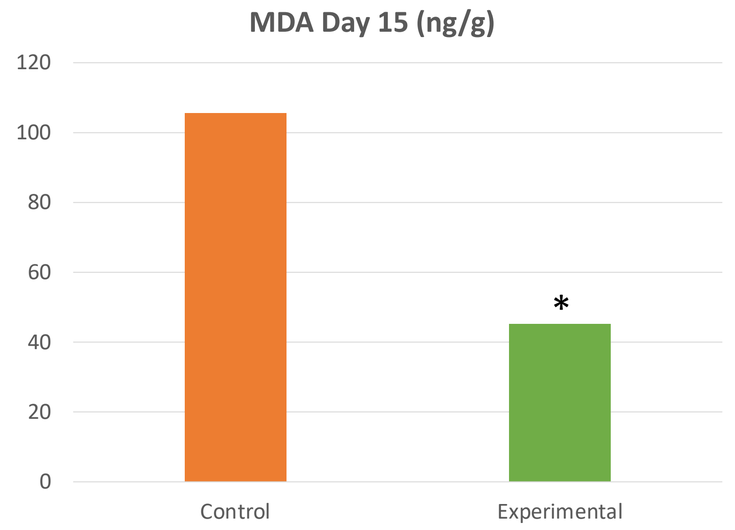

Figure 3. Lipid oxidation in meat: Malondialdehyde levels on day 15 post-slaughter.

Conclusion:

Inclusion of 50 mg/kg DM OEO in the diet of bulls, improved meat oxidative stability and increased Elaidic acid concentration, enhancing overall meat quality.

ACKNOWLEDGEMENTS

The study was co-financed by the European Regional Development Fund and Greek National Funds through the Operational Program Central Macedonia 2021-2027 (project code: KMP6-0280294, MIS: 5136538, BQM).

Co-funded by the European Union

ΕΣΠΑ 2021-2027
Βιώσιμη Ανάπτυξη για Όλους
Partnership Agreement 2021-2027