



UNIVERSITÀ
DEGLI STUDI DI BARI
ALDO MORO

Ensiled artichoke bracts in beef cattle diet: meat quality during dry aging

Forte L.¹, Seccia A.¹, Greco R.¹, Giannico F.¹, Natrella G.², Maggiolino A.¹

¹University of Bari, Department of Veterinary Medicine, S.P. Per Casamassima km 3, 70010, Italy

²University of Bari Aldo Moro, Department of Soil, Plant and Food Science (DiSSPA), Via Amendola 165/a,
70126 Bari, Italy



The 75th EAAP Annual Meeting
1/5 September 2024 - Florence, Italy



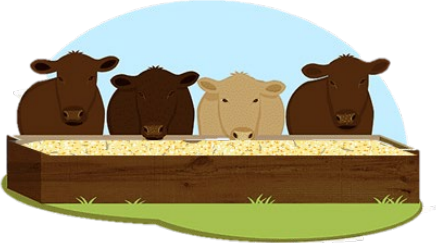
Introduction



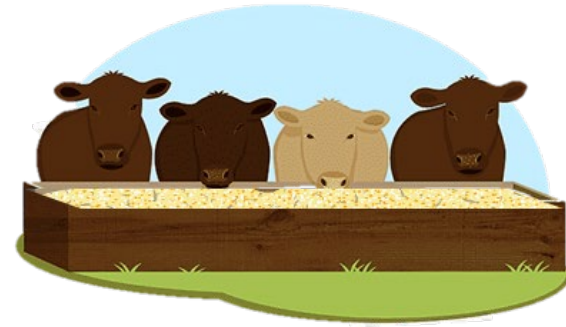
Agricultural food waste/by-product



Animal feed



Aim



How do we stabilize them?

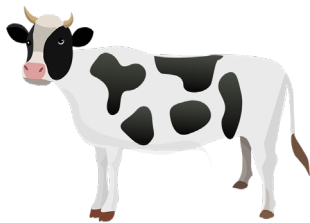


ENSILING



Experimental design

Ingredients	g/kg on DM
Wheat straw	150
Ground maize	440
Soybean meal solvent 44% protein	140
Ground barley	125
Wheat bran	110
Hydrogenated triacylglyceride from palm oil	10
Mineral/vitamin supplement	25
Nutrient Composition	
Dry matter	867.3
Organic matter	852.2
Crude protein	159.2
Crude fiber	92.2
NDF	256.1
ADF	101.3
ADL	26.3
Ether extract	39.4
Ash	40.1

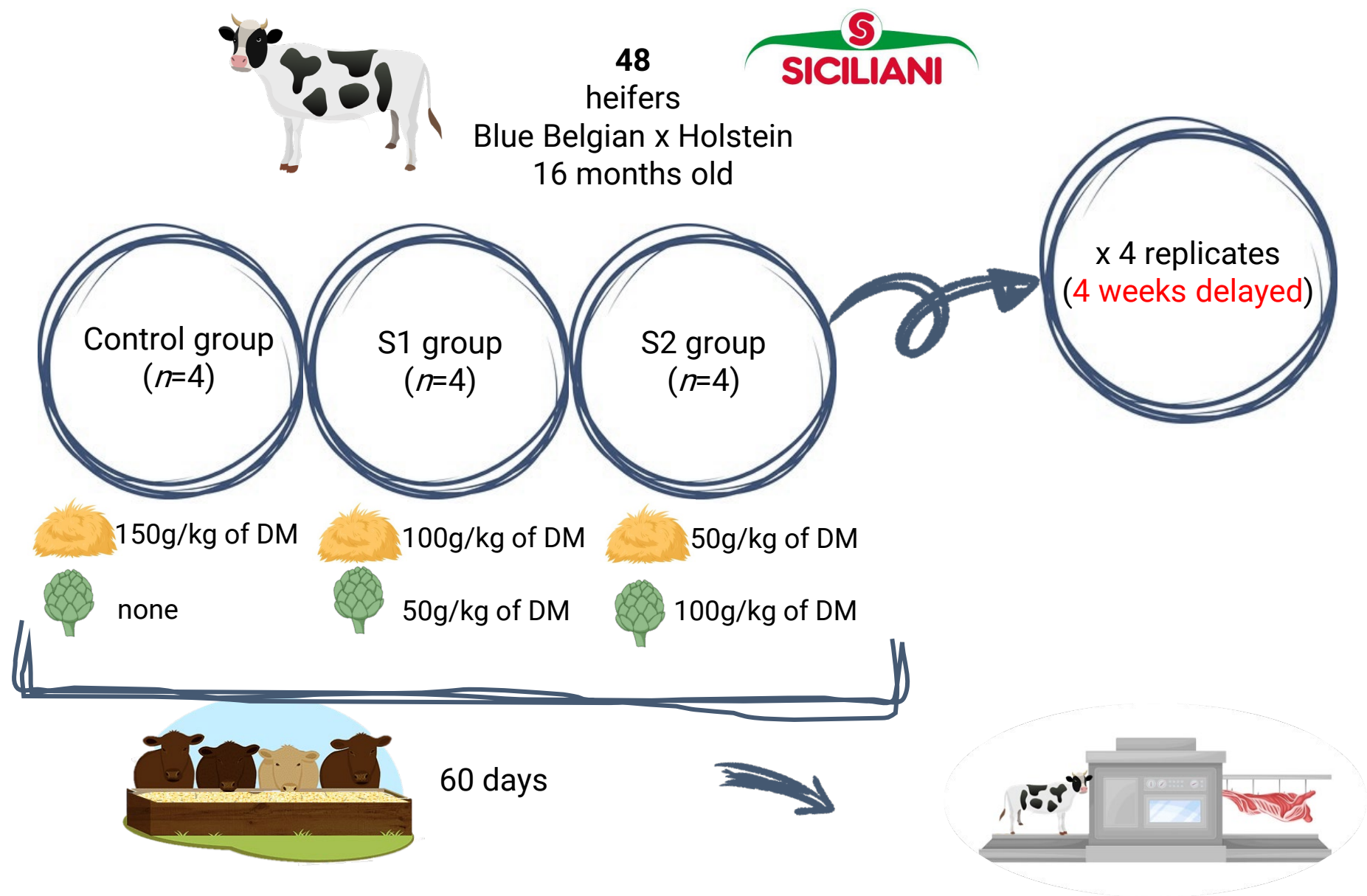


48
heifers
Blue Belgian x Holstein
16 months old



4% of Crude protein on DM
Isoenergetic and isoproteic

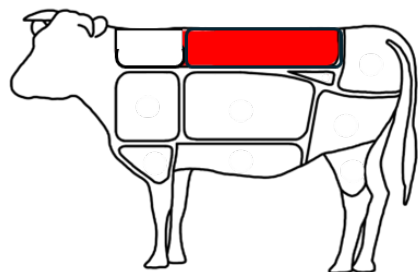
Experimental design





Experimental design

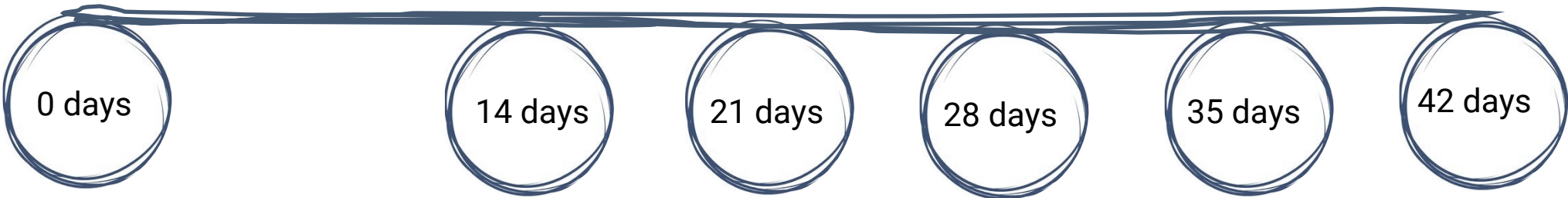
Left bone-in strip loin
from T13 to L6
48h after slaughter



42 days dry aging
2°C
82% humidity
0,4 m/s ventilation



at least 30mm bone-in strip steak from each
bone-in strip loin at each time point



Materials & Methods



Yield

(Cho et al., 2018)



pH

(Maggiolino et al., 2019)



Chemical composition

(ISO, 1978; ISO, 1997; ISO, 1998)



Color parameters: L^* , a^* , b^*

(Maggiolino et al., 2024)



Water-Holding Capacity and Cooking Loss

(De Palo et al., 2016)



Oxidative profile:

- Thiobarbituric acid reactive substances (TBARS)
- protein carbonyls
- ferric reducing antioxidant power (FRAP) assay

(Dinardo et al., 2022)



Materials & Methods



Shear force – Texture Profile Analysis

(De Angelis et al., 2020)



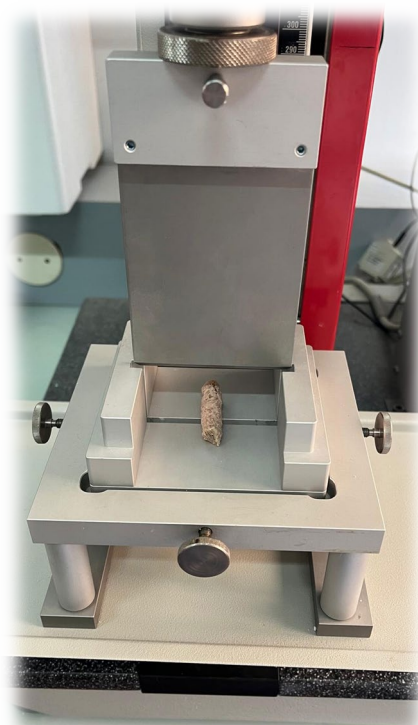
Fatty acids profile

(Maggiolino et al., 2020)



Volatile compounds profile

(Forte et al., 2024)



Statistical analysis

1. Shapiro-Wilk's test
2. Analysis of variance (ANOVA)

$$y_{ijk} = \mu + \alpha_i + G_j + T_k + (G \times T)_{jk} + \varepsilon_{ijkl}$$

y_{ijk} = parameters (dependent variable)

μ = mean

α_i = single block random effect

G = effect of the group ($j = 1, 2, 3$)

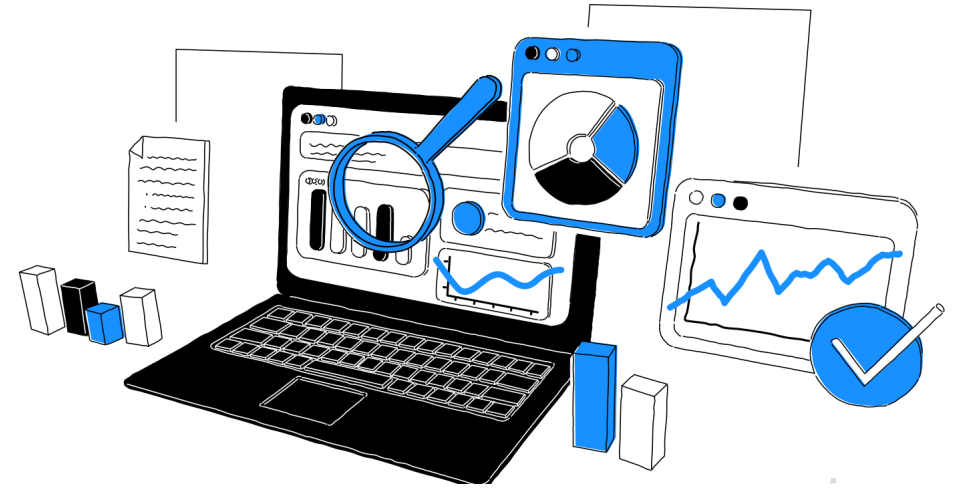
T = effect of aging time ($k = 1, \dots, 6$)

$G \times T$ = effect of the binary interaction between the two independent variables ($_{jk} = 1, \dots, 18$)

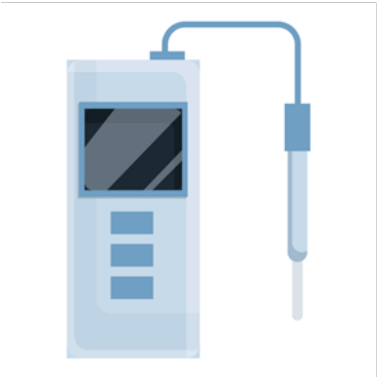
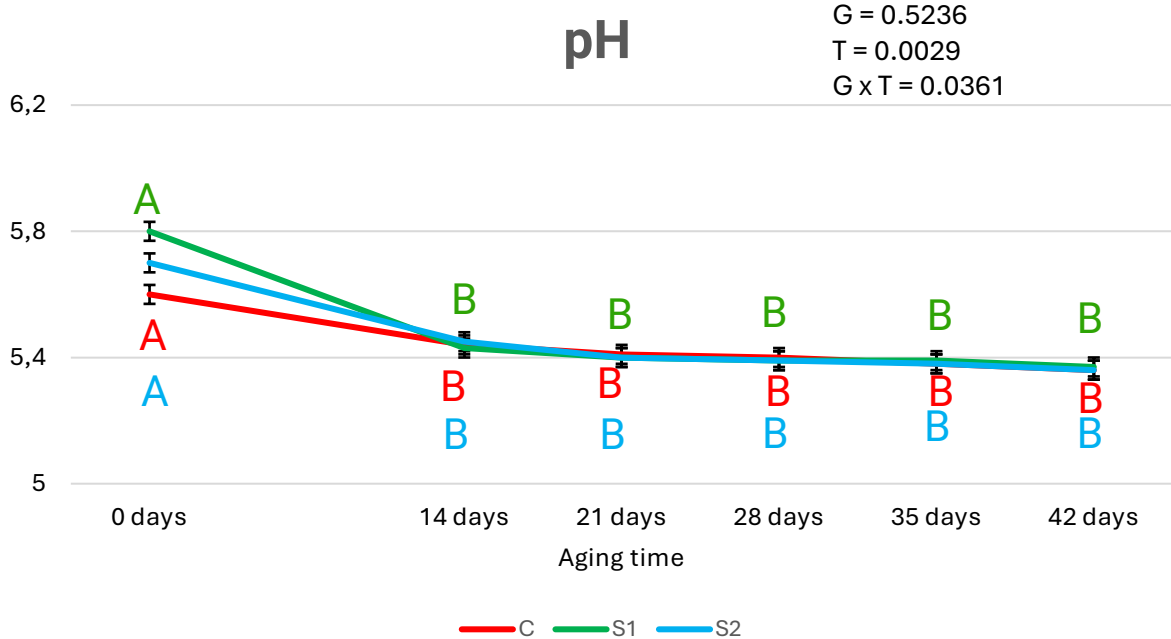
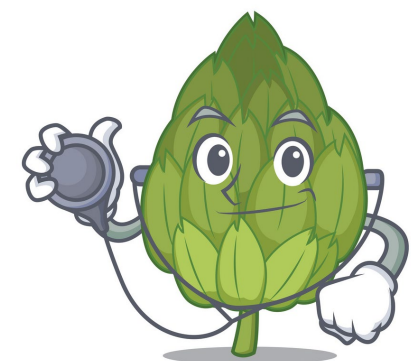
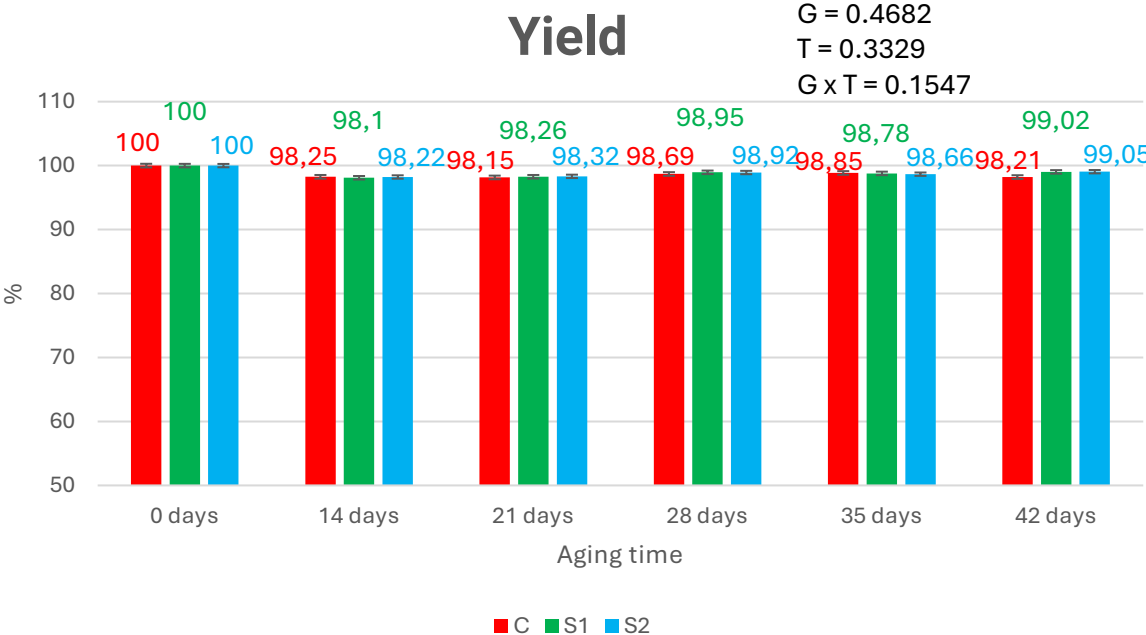
ε_{ijkl} = error

3. Tukey test for repeated measures

4. Significance $P < 0.05$

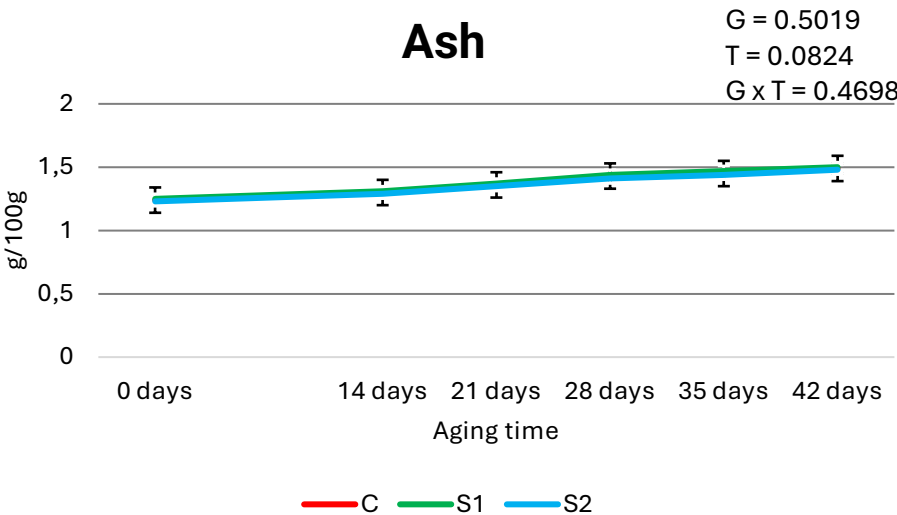
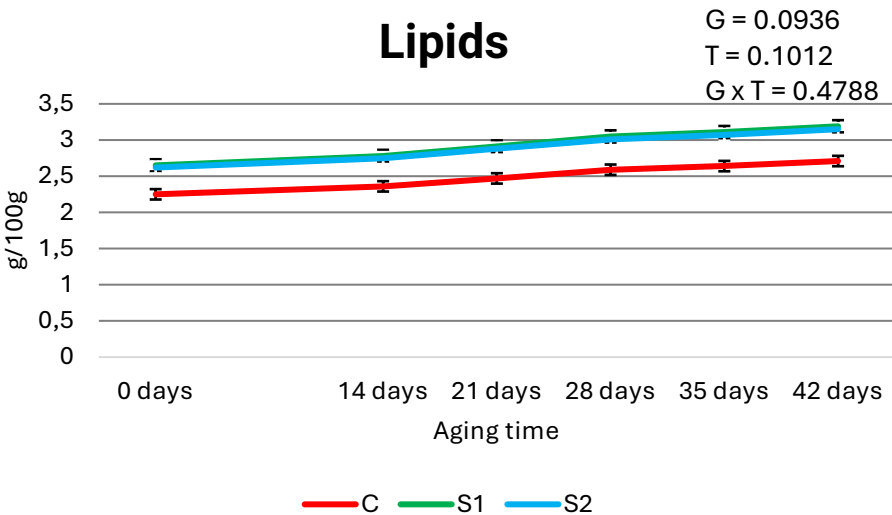
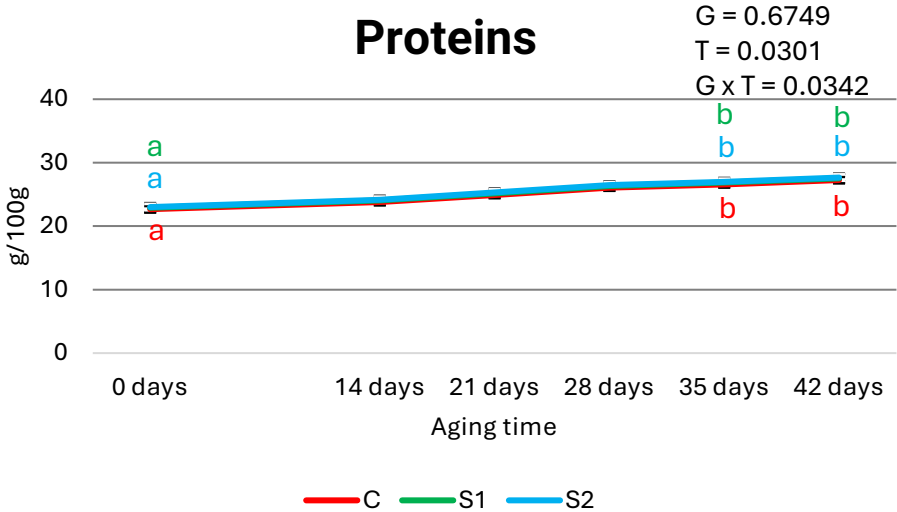
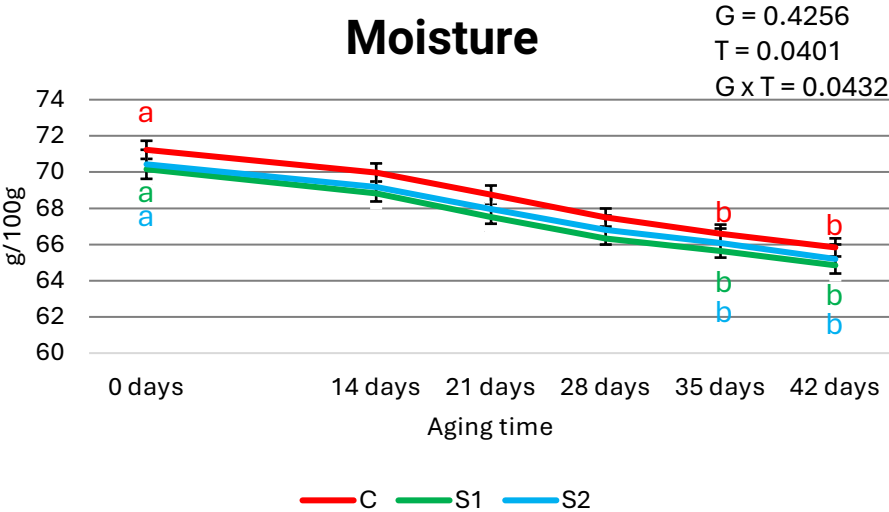


Yield and pH



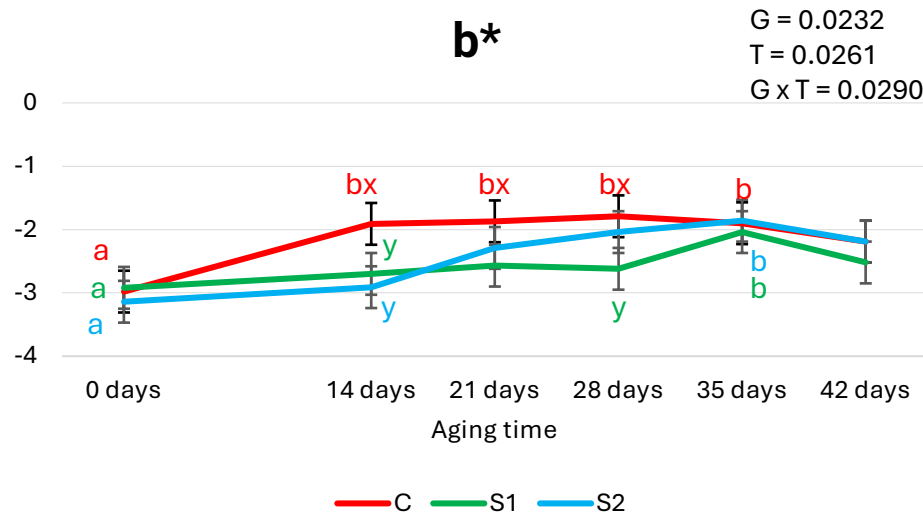
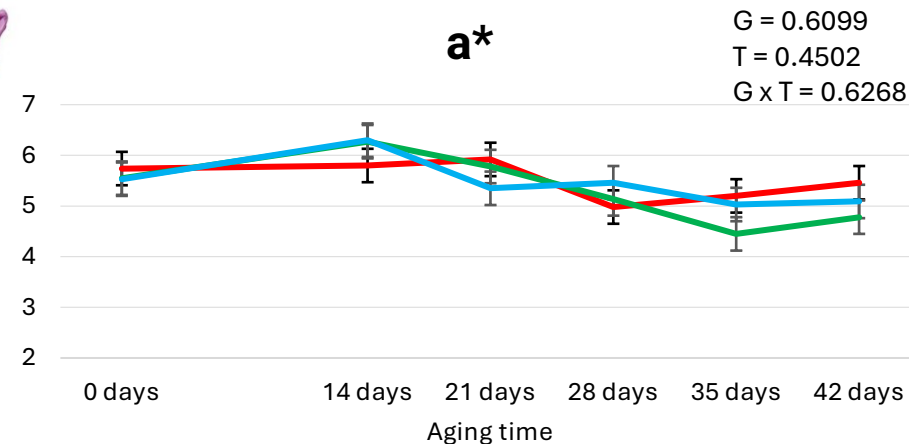
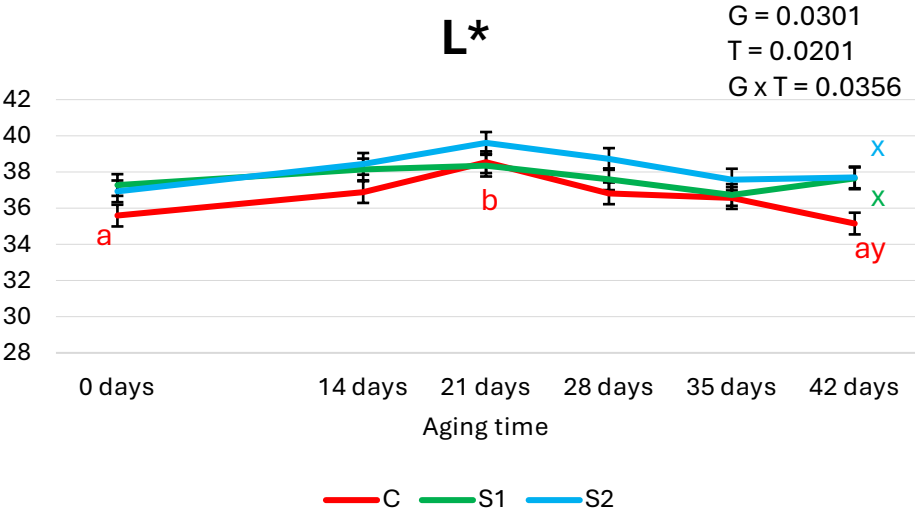
Different letters of the same color show statistical differences among aging times in the same group: A, B = P < 0.01

Chemical composition



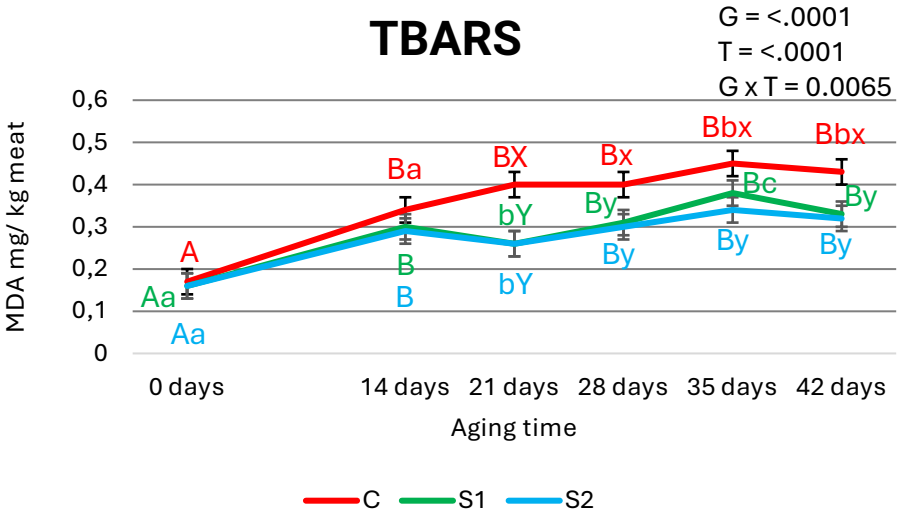
Different letters of the same color show statistical differences among aging times in the same group: a, b = P < 0.05

Colour parameters



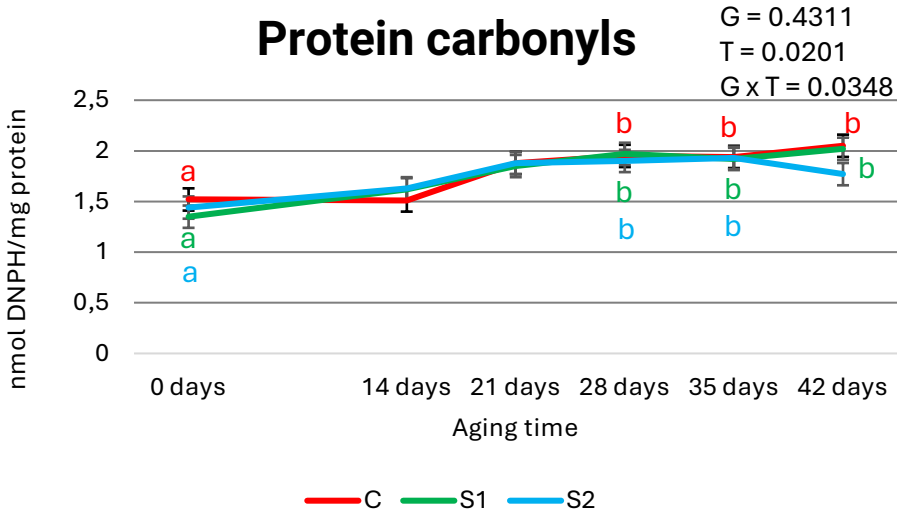
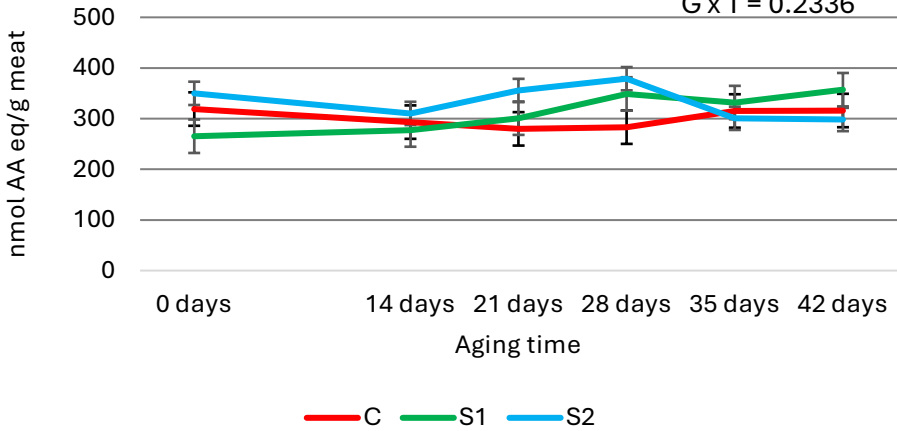
Different letters of the same color show statistical differences among aging times in the same group: a, b = $P < 0.05$
 Different letters of different color show statistical differences among groups within the same aging time. x, y = $P < 0.05$

Oxidative parameters



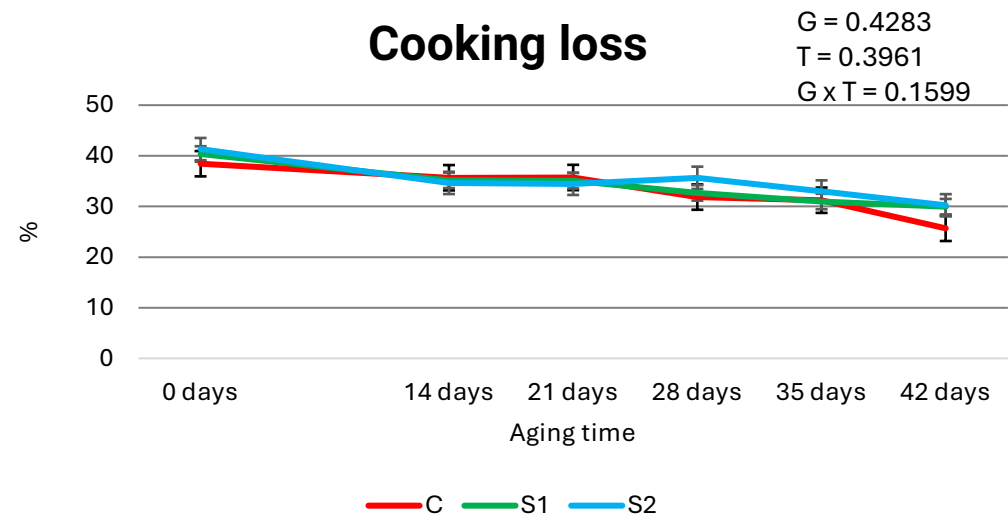
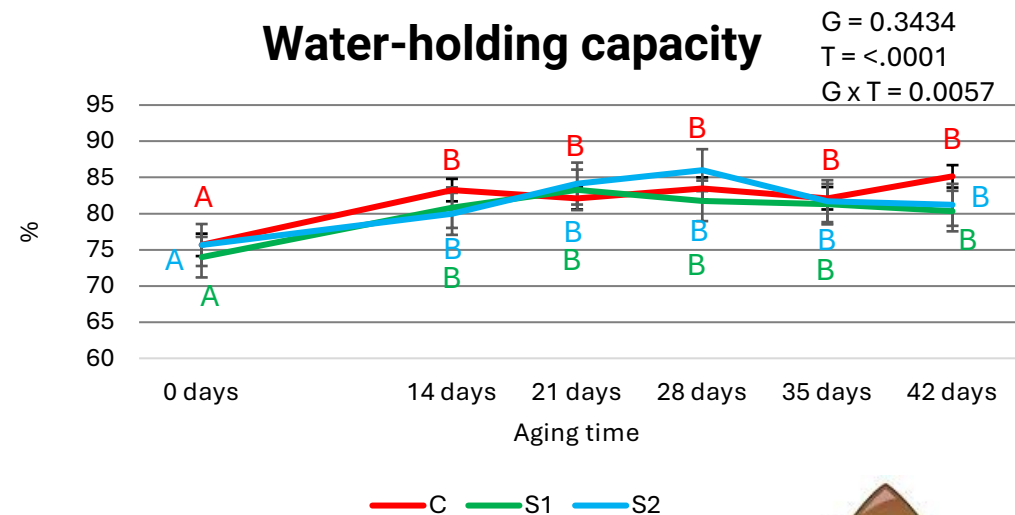
FRAP

G = 0.4172
T = 0.6811
G x T = 0.2336



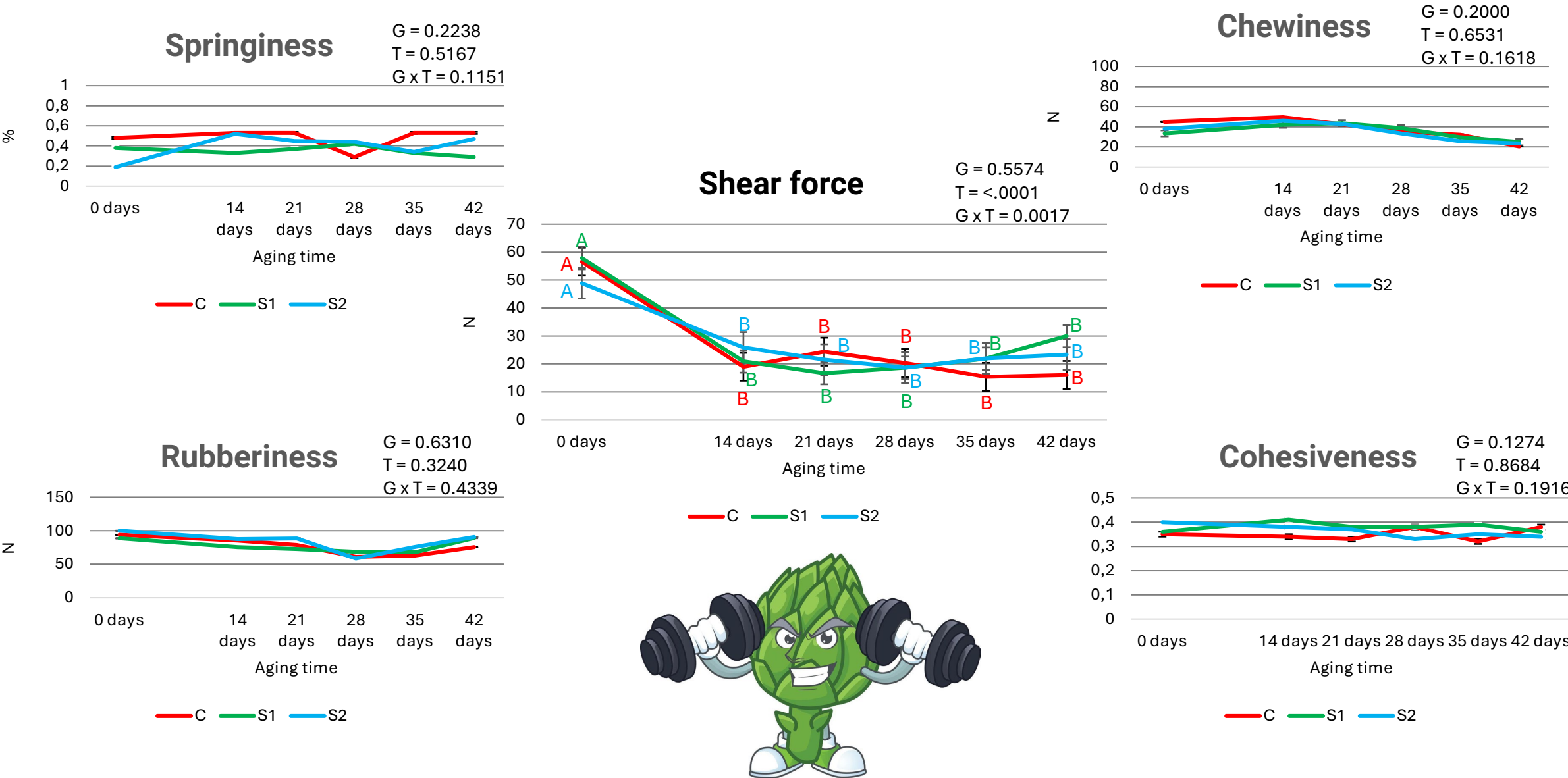
Different letters of the same color show statistical differences among aging times in the same group: A, B = P < 0.01; a, b = P < 0.05
 Different letters of different color show statistical differences among groups within the same aging time: X, Y = P < 0.01; x, y = P < 0.05

WHC and cooking loss

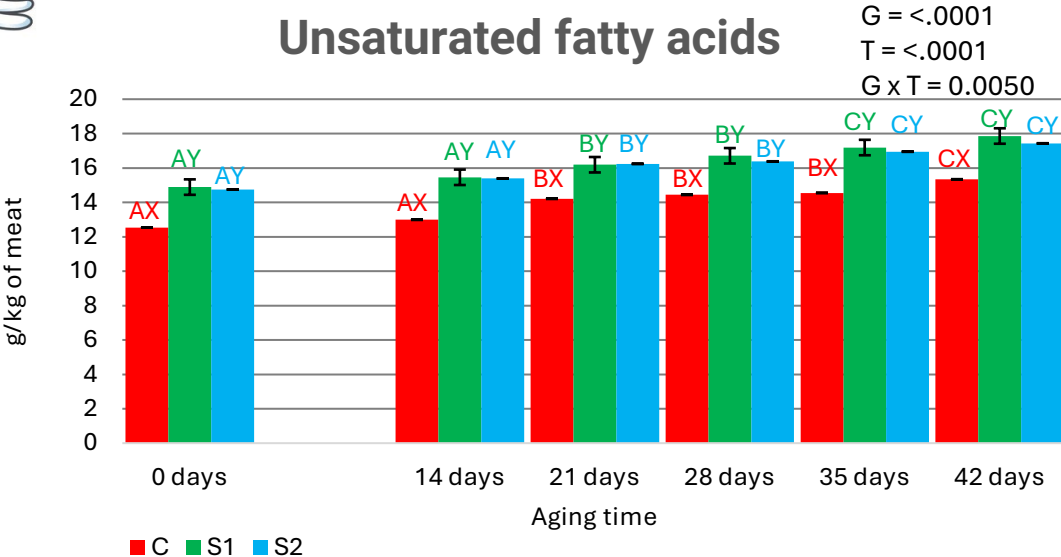
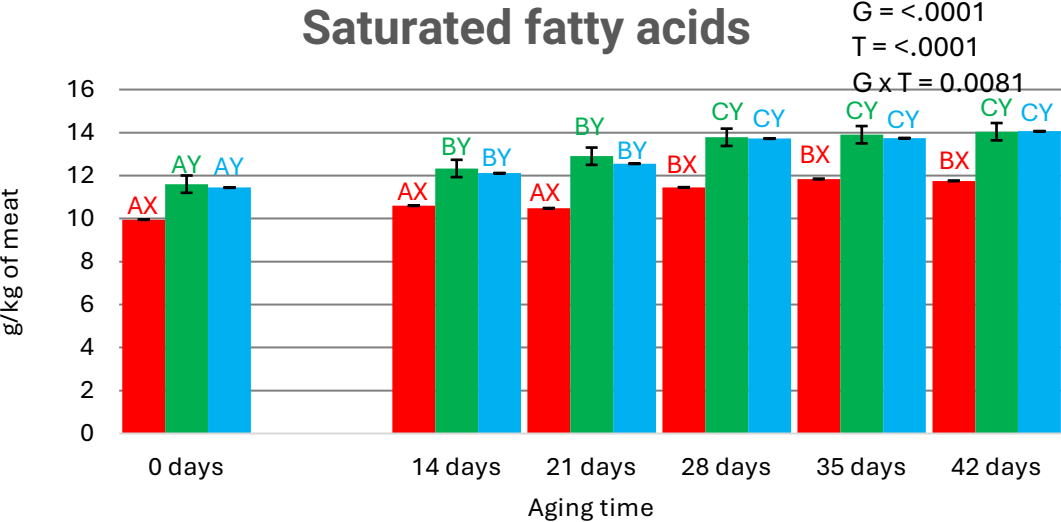
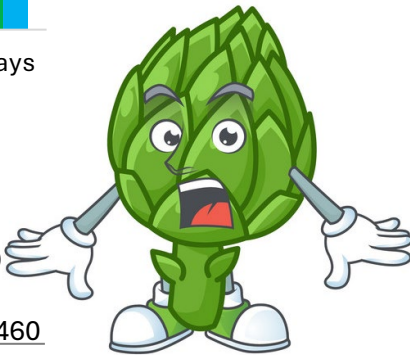
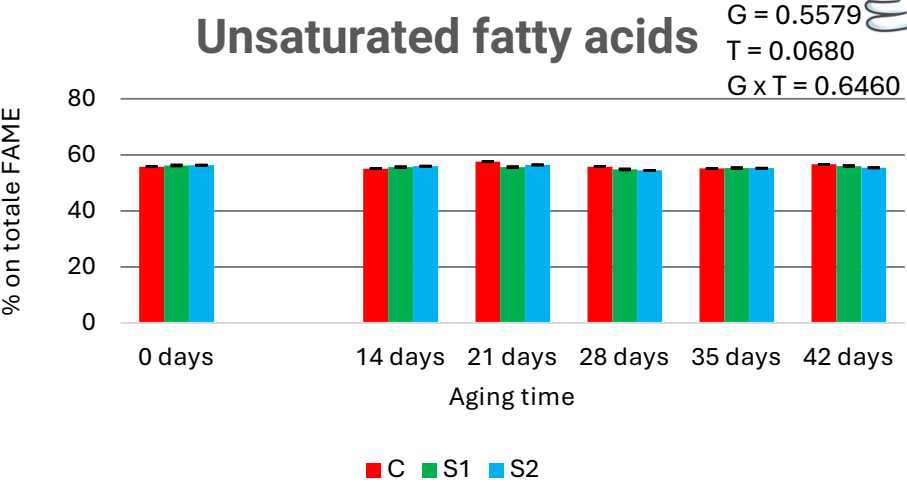
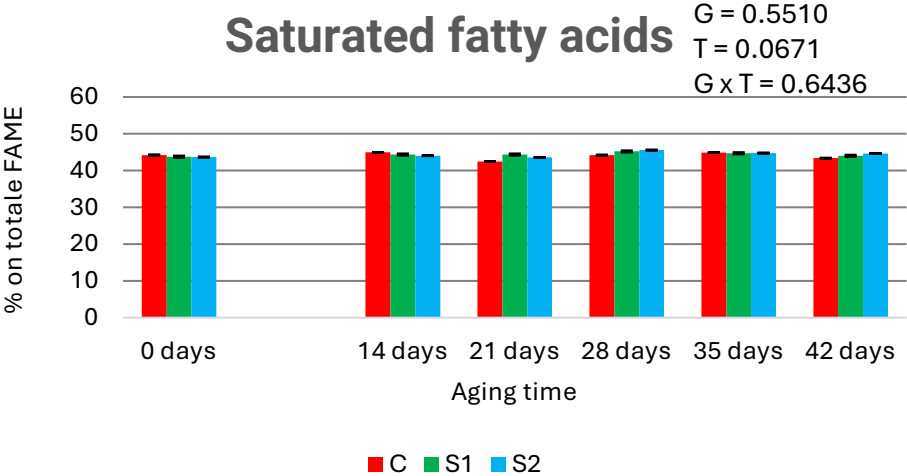


Different letters of the same color show statistical differences among aging times in the same group: A, B = P < 0.01

Texture and shear force

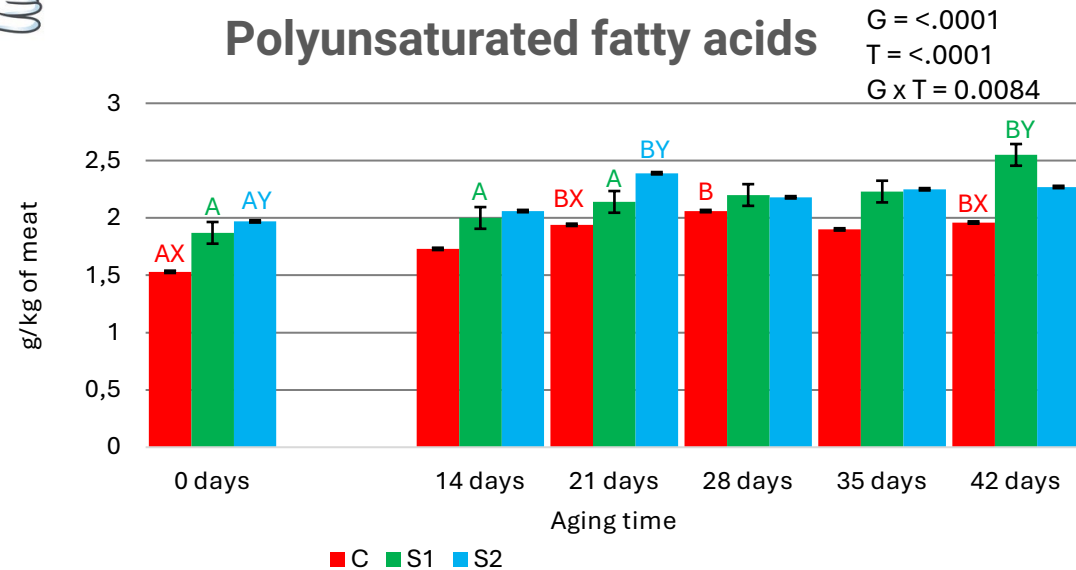
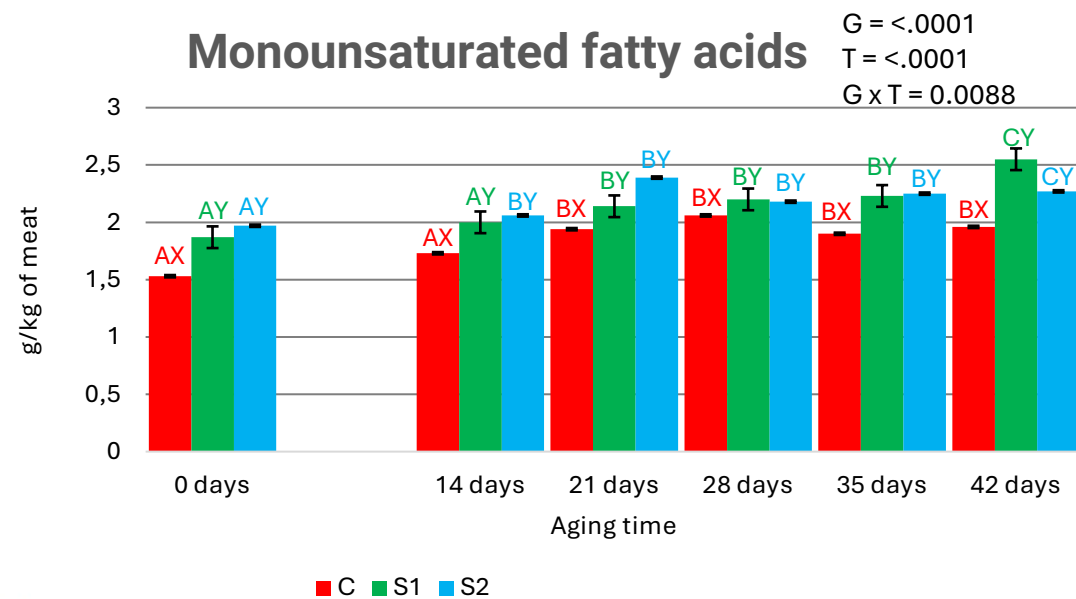
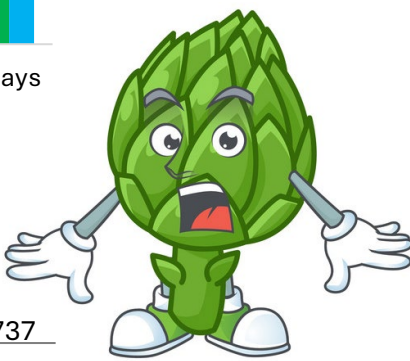
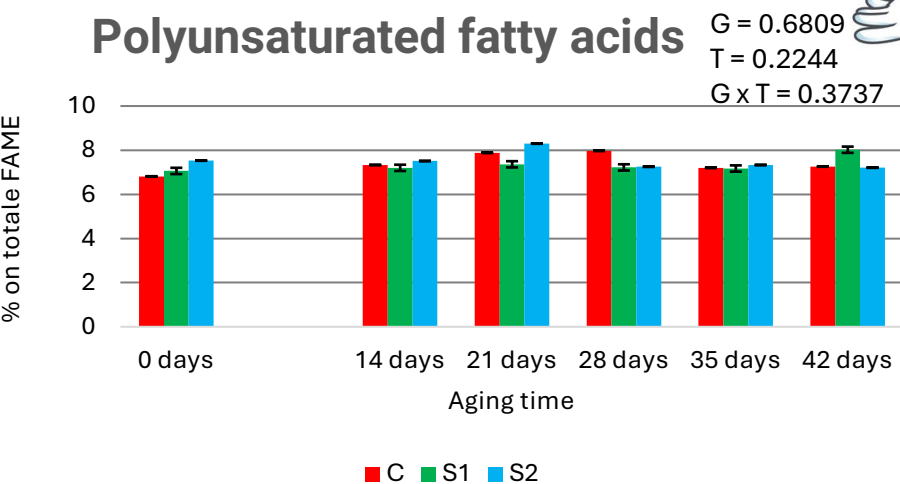
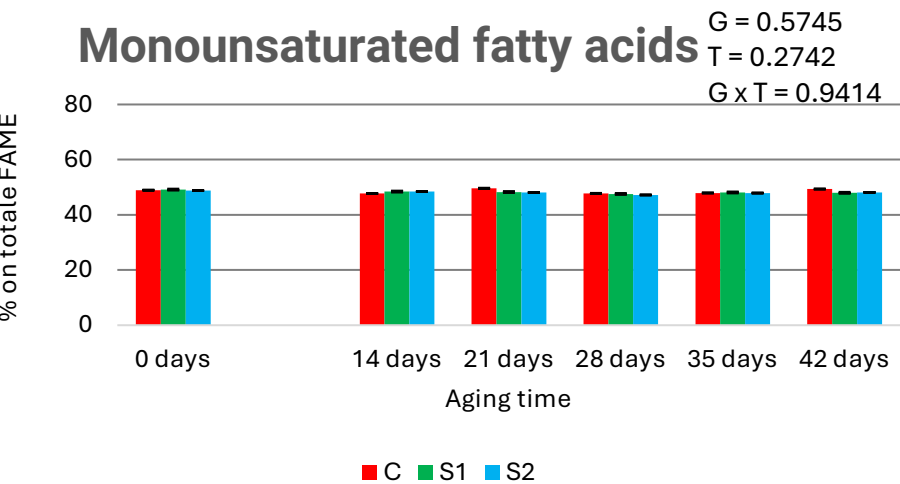


Fatty acids profile



Different letters of the same color show statistical differences among aging times in the same group: A, B, C = P < 0.01
Different letters of different color show statistical differences among groups within the same aging time: X, Y = P < 0.01

Fatty acids profile



Different letters of the same color show statistical differences among aging times in the same group: A, B, C = P < 0.01
Different letters of different color show statistical differences among groups within the same aging time: X, Y = P < 0.01

Volatile compounds profile



35
compounds

Aldehydes

Alcohols

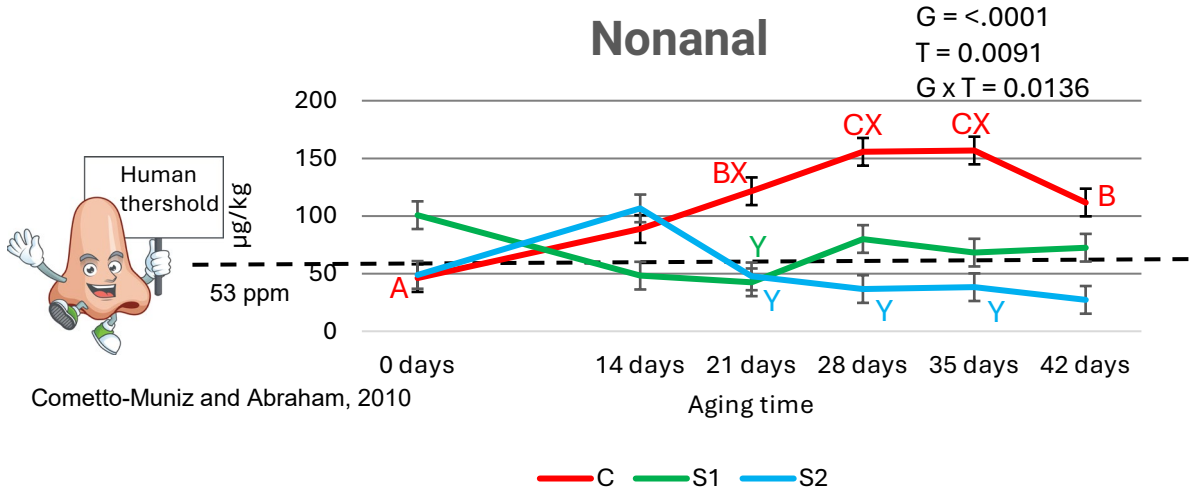
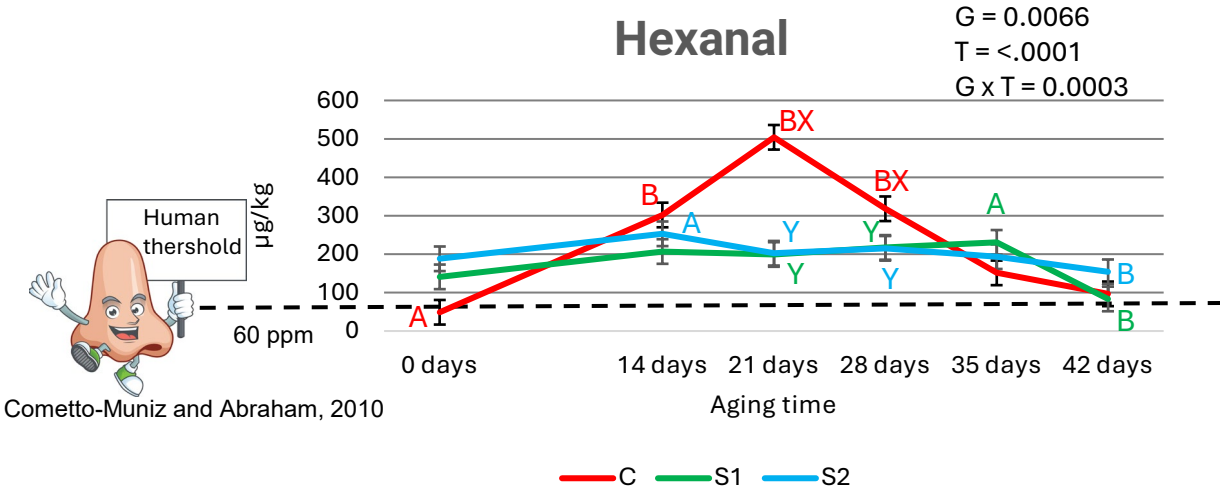
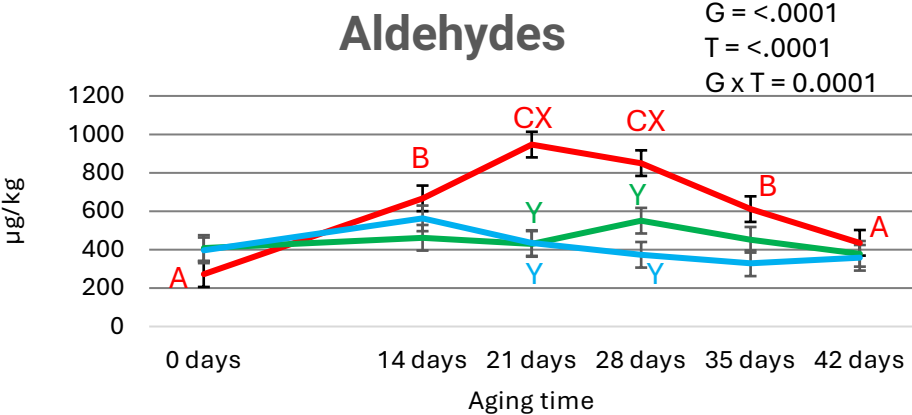
Ketones

Hydrocarbons

Aromatic
hydrocarbons

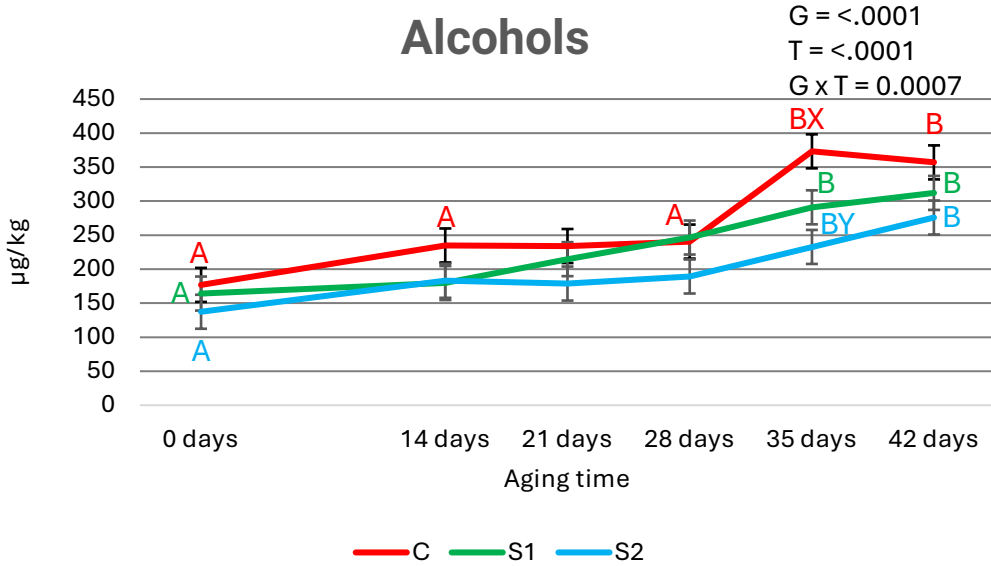
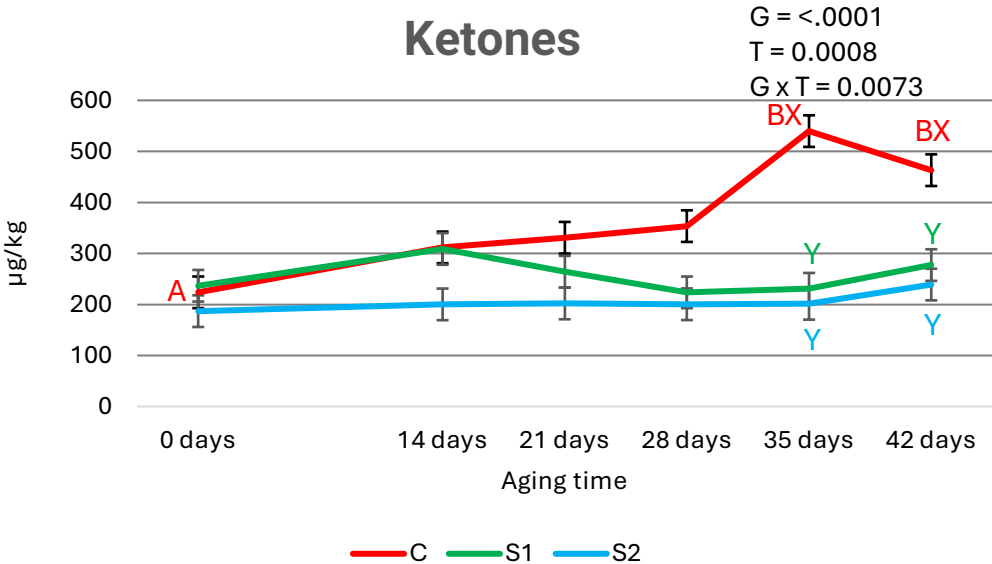
Pyrazines

Volatile compounds profile



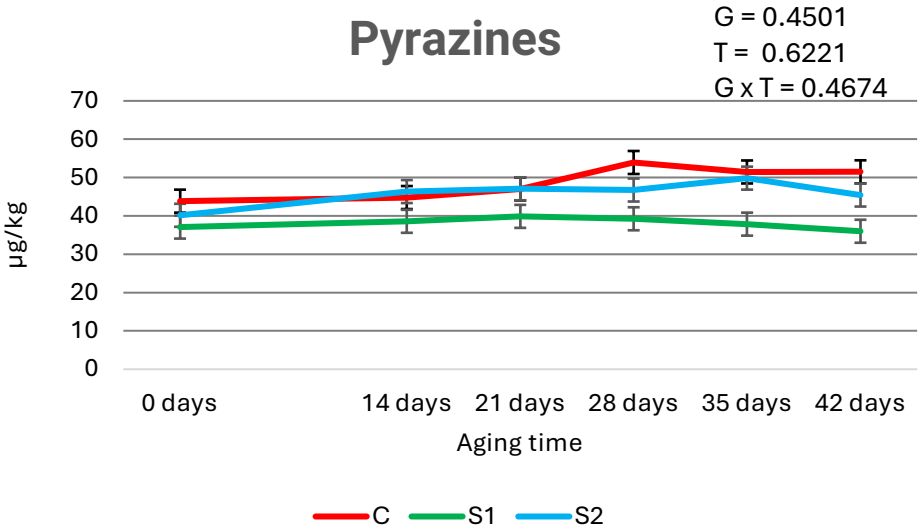
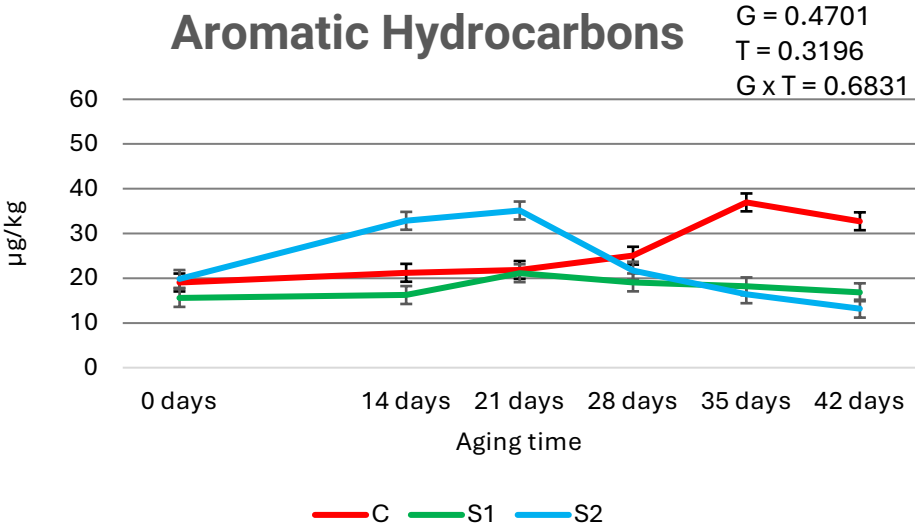
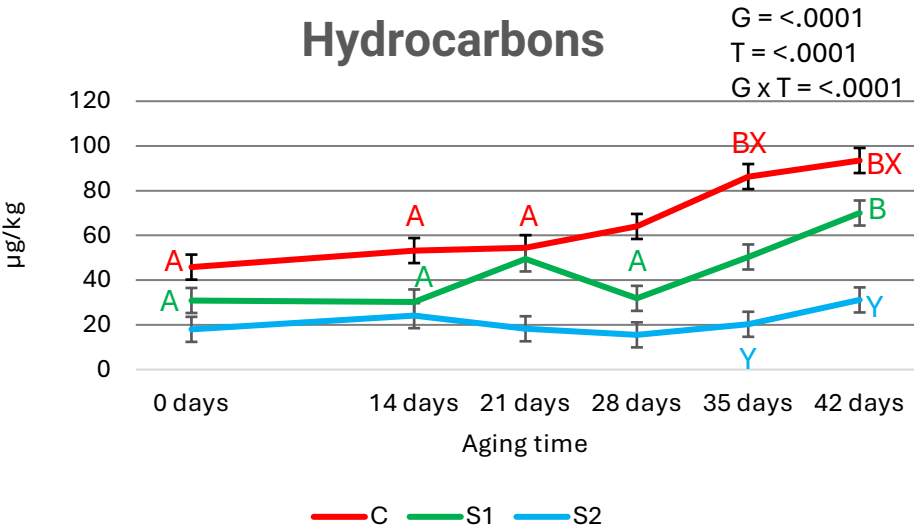
Different letters of the same color show statistical differences among aging times in the same group: A, B, C = $P < 0.01$
 Different letters of different color show statistical differences among groups within the same aging time: X, Y = $P < 0.01$

Volatile compounds profile



Different letters of the same color show statistical differences among aging times in the same group: A, B, C = P < 0.01
Different letters of different color show statistical differences among groups within the same aging time: X, Y = P < 0.01

Volatile compounds profile



Different letters of the same color show statistical differences among aging times in the same group: A, B, C = $P < 0.01$
 Different letters of different color show statistical differences among groups within the same aging time: X, Y = $P < 0.01$

Concluding

The primary goal of the producer was not to alter the product



Lower and slower oxidation



No differences in TPA



No differences in colour variation (almost greater stability)



More fat?



Lower VOC production



Not enough...

Goal zero was to avoid incurring additional expenses



In vivo performances?



At slaughter performances?





UNIVERSITÀ
DEGLI STUDI DI BARI
ALDO MORO

Thank you for your attention

Acknowledgements



The 75th EAAP Annual Meeting
1/5 September 2024 - Florence, Italy

