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An alternative beef production system in mountain areas of northern Spain: genotype effect

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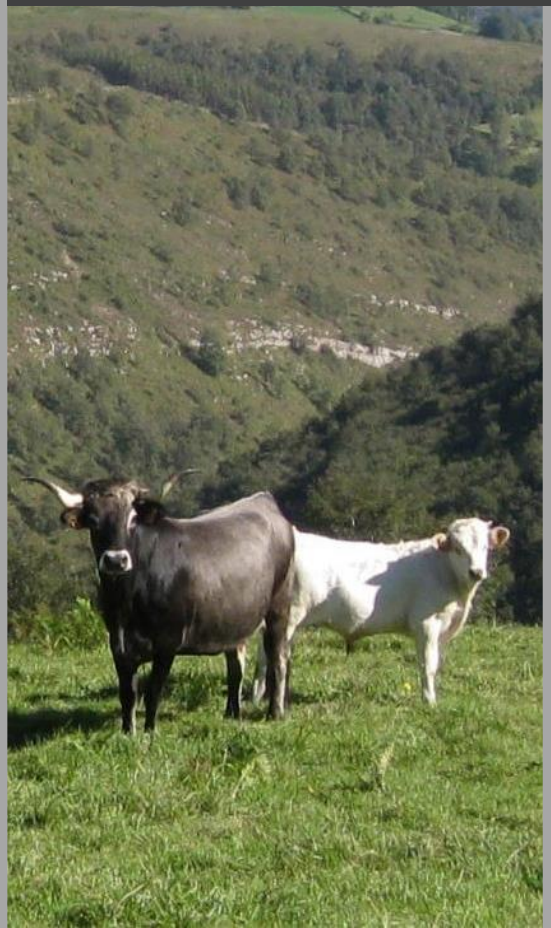
Specific collaboration agreement

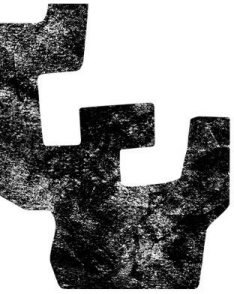
FUNDACIÓN BOTÍN

MARCELINO BOTÍN FOUNDATION

CSIC



An alternative beef production and commercialization system in Nansa and Peñarrubia valley (northern Spain)

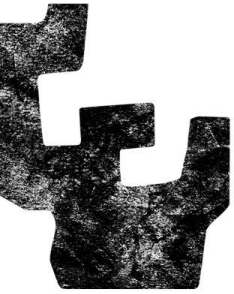


520-580 m
above the sea level

Nansa Valley,
northern Spain

- Traditionally dedicated to **beef production**
- High breed diversity
- Primarly **local** breeds

PRODUCTION SYSTEMS



TRADITIONAL : Calf production

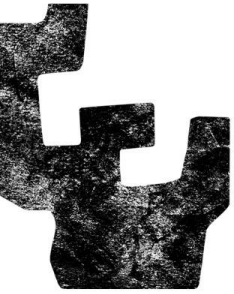
- Sent to bigger fedlots for intensive fattening
- Limited income for local farmers

Sold at 5-6 months

ALTERNATIVE : Local veal production

- Reared outdoors on local pastures until 6-7 months
- Locally supplemented

- ✓ Sustainability
- ✓ Multi-funcionality
- ✓ Quality veal



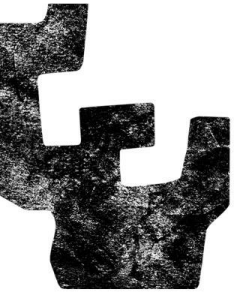
Comparison of carcass and meat quality characteristics of **3 genotypes** under this **alternative system** with special emphasis on the fatty acid **(FA) profile**

Asturiana de los Valles
(AV, n=7)

Tudanca
(TUD, n=6)

Tudanca x Limousin
(TUDxLIM, n=6)

19 male calves from three local farms in Nansa Valley (Cantabria)



Birth

Outdoor **grazing suckling** calves

Free access to **concentrate** (no access for mothers)

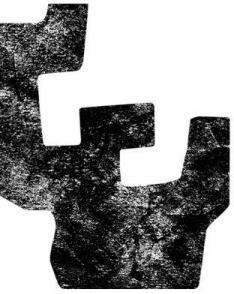
Supplemented with medium quality **grass hay** and *ad libitum* access to **concentrate**

Weaning (6-7 moths)

Slaughter (9-12 months)

Concentrate composition:

40% corn, 45% barley, 10% soybean, 2% fat, 3% vit+min.



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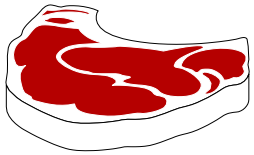


longissimus thoracis et lumborum

11 d ageing

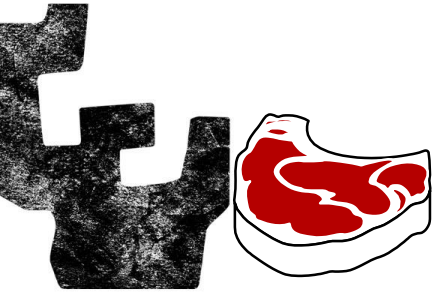
Carcass measurements

- Carcass weight
- Conformation (SEUROP 1-18)
- Fat cover degree (1-5)

Meat quality

- Chemical composition
- FA profile

FA PROFILE



Extraction

2:1 $CHCl_3$:CH_3OH

+ I.S. (23:0ME)

Derivatization

Acid (CH_3OH HCl)

Basic ($NaOCH_3$)

GC (175ºC)

Total FA

GC (150ºC)

***trans*-18:1 isomers**

(SP-2560, 100m)

(Cruz-Hernandez *et al.*, 2004; Kramer *et al.*, 2008)

Ionic column

CLA (conjugated linoleic acid) isomers

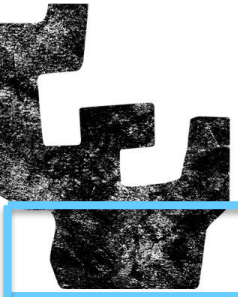
(SLB-IL111, 100m)

(Delmonte *et al.*, 2011)

BREED EFFECT ON CARCASS MEASUREMENTS AND CHEMICAL COMPOSITION OF MEAT

	AV	TUD	TUDxLIM	s.e.m	Sign
Slaughter age (days)	273 ^{b}	355 ^{a}	337 ^{a}	9.00	***
Cold carcass weight (kg)	205	203	209	6.62	ns
Conformation (1-18)	9.57 ^{a}	6.00 ^{b}	6.67 ^{b}	0.52	**
Fat cover degree (1-15)	3.00 ^{b}	5.00 ^{a}	5.00 ^{a}	0.36	*
Moisture (%)	75.76	75.21	74.80	0.24	ns
Crude protein (%)	21.52	21.02	20.67	0.17	ns
Total fat (%)	1.76 ^{b}	2.90 ^{a}	2.56 ^{ab}	0.20	*
Ash (%)	1.72 ^{a}	1.05 ^{b}	1.02 ^{b}	0.01	**

Sign, significance +p<0.1; *p<0.05; **p<0.01; ***p<0.001

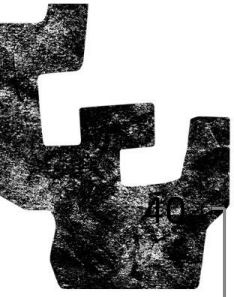


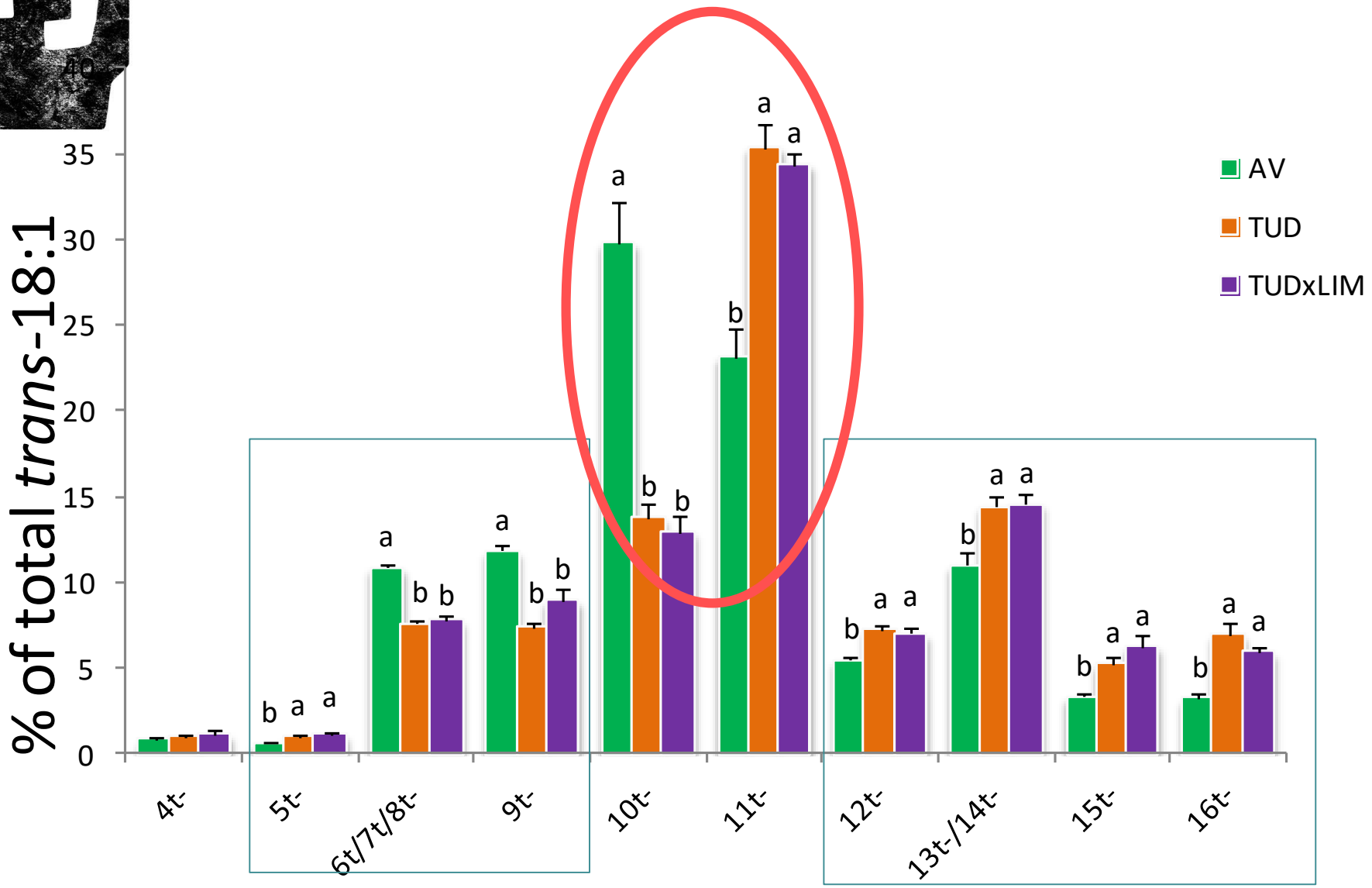
FATTY ACID COMPOSITION (%)

	AV	TUD	TUDxLIM	s.e.m	Sign
SFA	45.76	45.22	46.83	0.50	ns
BCFA	1.607 ^{b}	2.35 ^{a}	1.91 ^{ab}	0.12	*
MUFA	40.00	43.70	42.48	0.78	ns
***cis* -MUFA**	33.65	36.45	37.20	0.84	ns
***trans* -MUFA**	6.35 ^{ab}	7.24 ^{a}	5.28 ^{b}	0.31	*
10*t* -18:1	0.97 ^{a}	0.49 ^{b}	0.34 ^{b}	0.09	**
11*t* -18:1	0.72 ^{b}	1.27 ^{a}	0.90 ^{b}	0.07	***
10t/11t-18:1	1.35 ^{a}	0.38 ^{b}	0.37 ^{b}	0.24	***
CLA	0.43 ^{b}	0.51 ^{a}	0.40 ^{b}	0.02	*$_{L}$

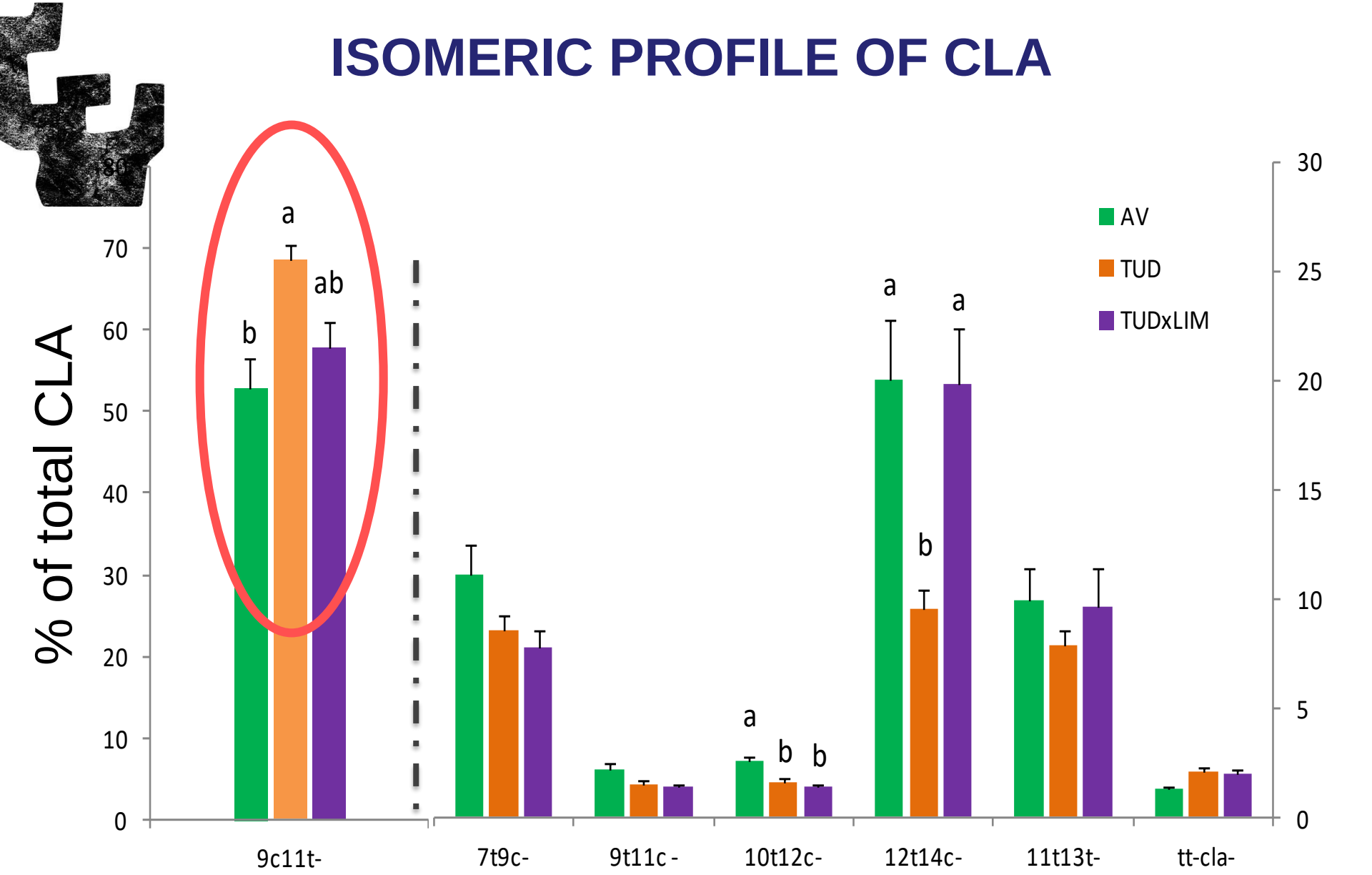
Sign, significance +p<0.1; *p<0.05; **p<0.01; ***p<0.001

trans-18:1 ISOMERIC PROFILE





ISOMERIC PROFILE OF CLA

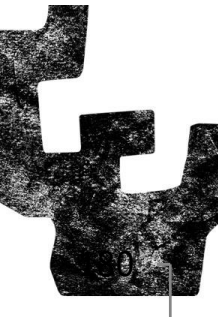


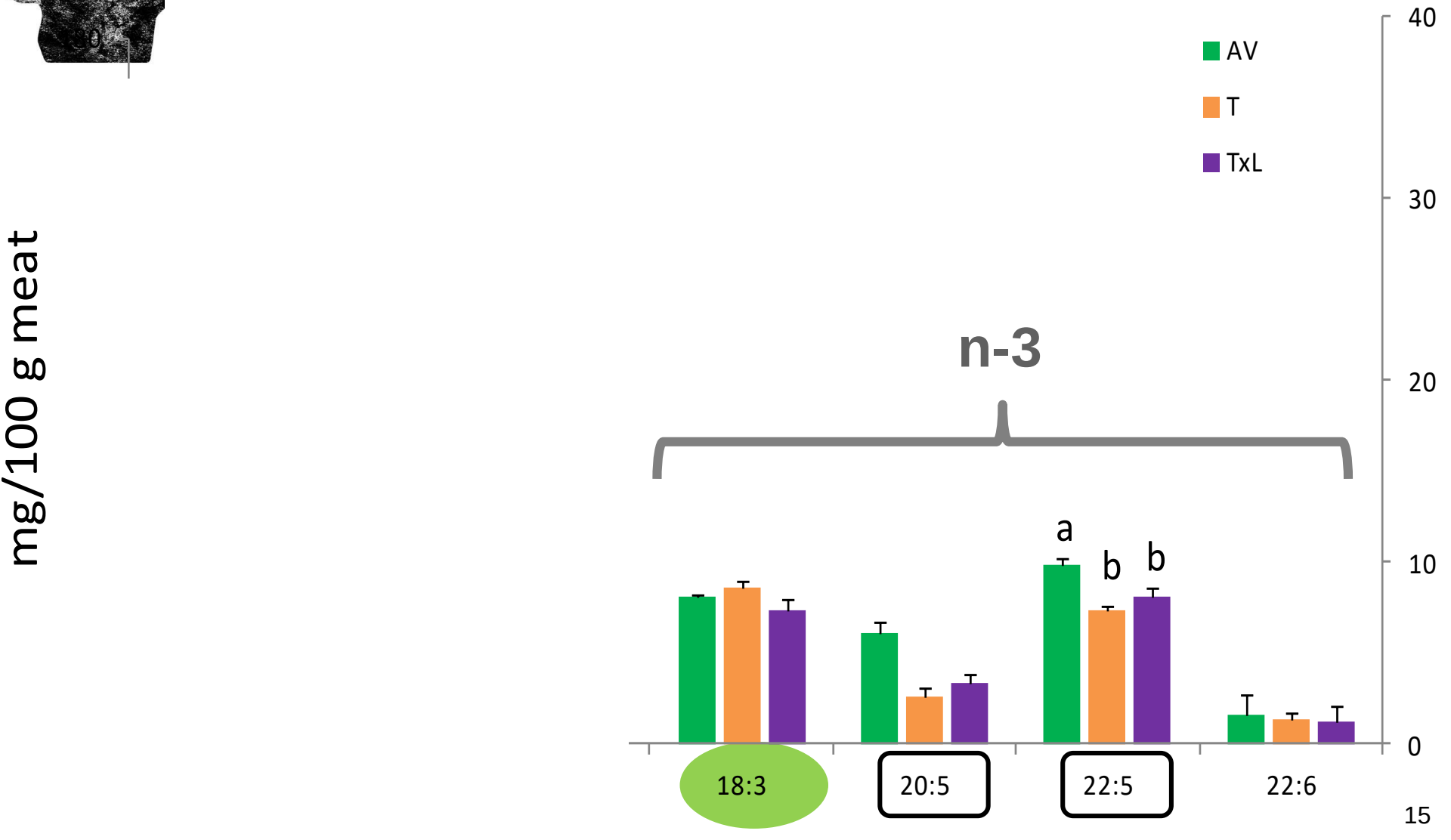
FATTY ACID COMPOSITION (mg/100 g meat)

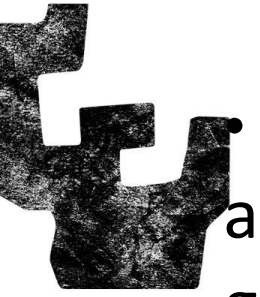
	AV	TUD	TUDxLIM	s.e.m	Sign
PUFA	164.28 ^{b}	233.77 ^{a}	183.52 ^{b}	9.33	**
n-6	135.53 ^{b}	210.15 ^{a}	160.06 ^{b}	9.61	***
18:2n-6	100.51 ^{b}	163.1 ^{a}	116.19 ^{b}	8.14	***
20:4n-6	24.02 ^{b}	32.46 ^{a}	28.48 ^{ab}	1.23	*
n-3	26.46 ^{a}	21.09 ^{b}	20.75 ^{b}	1.00	*
18:3n-3	8.09	8.64	7.33	0.32	ns
20:5n-3	6.14 ^{a}	2.65 ^{b}	3.34 ^{b}	0.42	***
22:5n-3	9.88	7.41	8.13	0.54	ns

Sign, significance +p<0.1; *p<0.05; **p<0.01; ***p<0.001

PUFA PROFILE (mg/100g meat)







- **AV genotype** showed **better carcass conformation** and leaner carcass and meat compared to the other genotypes.

- **T genotype** had a higher muscle fat content with a **healthier *trans*-18:1** and **CLA profiles** than **AV**, while **TxL** presented intermediate values.

- Meat from **AV** genotype provided the **highest values of n-3 long chain PUFA**, that could be related to a better elongation and desaturation capacity than **T** and **TxL** genotypes and a **healthier n-3 profile.**

- **In general, the improved nutritional quality of meat produced under this alternative could provide an added benefit to local beef producers and consumers.**

THANK YOU!

Acknowledgements:

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