Nutritional quality assessment of traditional sheep products from the northern Spain (Cantabrian area)

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Lipids in Ruminants
PhD project presentation

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Grupo de Investigación
Lactiker
Research Group

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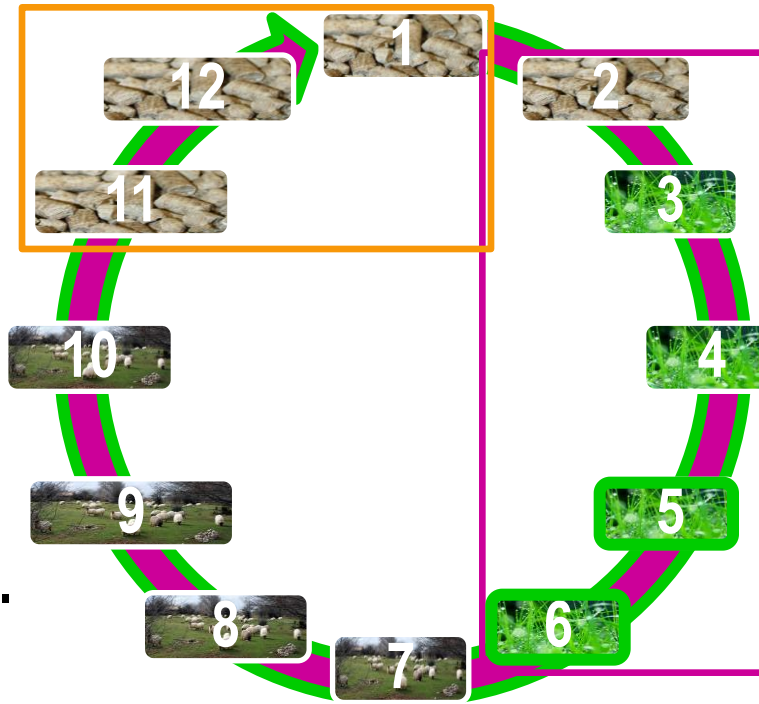Universidad del País Vasco
Euskal Herriko Unibertsitatea

NAZIOARTEKO
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EXCELENCIA
INTERNACIONAL

Latxa autochthonous dairy sheep → Semi-extensive production system.

Winter → fed by concentrates and conserved forages → lambs are born.

Milking period → February - late June (late lactation).

Grass availability increases → Gradual incorporation to pastures → by May on → almost completely grass fed.

CHEESE

The milk is almost exclusively used to make Idiazabal P.D.O. cheese

LAMB

The lambs are slaughtered and commercialized at early age

The characterization and differentiation of the nutritional and sensory quality of locally produced animal foods will contribute to the sustainability of local breeds and extensive production systems.

Quality assesment of

i)   Latxa milk and 'Idiazabal' cheese extensively produced at different altitudes (valley & mountain grasslands)

ii) lamb commercialized in Basque region (northern Spain)

i) Dairy products

- Milk and cheese fatty acid (FA) profile as affected by pasture composition

- Sensory analysis of cheese

ii) Lamb

- Assesment of the variability of FA composition (Bravo-Lamas et al., 2016)

- Sensory analysis

- Volatiles & odour analysis

i) Dairy products

• Milk and cheese fatty acid (FA) profile as affected by pasture composition

• Sensory analysis of cheese

ii) Lamb

• Assesment of the variability of FA composition (Bravo-Lamas et al., 2016)

• Sensory analysis

• Volatiles & odour analysis

Milk   **6 flocks x 3 collections (bulk milk) x 2 sampling months (May & June)** → **n=36**

Pastures (valley/mountain)

Botanical sp. were collected

in 2 samplings

(May & June)

3 flocks grazed on mountain pastures

3 flocks grazed on valley pastures

Aralar Natural Park

Freeze-dried

Lipid extraction

Direct methylation of lipids
(Alves *et al.,* 2008)

Methylation of lipids
(Aldai et al., 2013)

SP-2560, 100m
  GC (175ºC) - total FAME

(Kramer *et al.*, 2008)

GC-FID

SP-2560, 100m
  GC (175ºC) - total FAME
  GC (150ºC) - *trans*-18:1
(Kramer et al., 2008)
SLB-IL111, 100m
  GC – CLA & others

(Delmonte et al., 2012)

y = Pasture type + Sampling month + P*S

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- **PASTURE:** Estimated FA composition (g/100g total FAMEs)

	Valley		Mountain			Sign.		
	May	June	May	June	SEM	P	S	P*S
SFA	29.9	25.0	24.2	24.5	1.35	ns	ns	ns
16:0	20.7	18.0	16.7	16.2	1.02	ns	ns	ns
18:0	2.41	2.10	1.91	2.25	0.11	ns	ns	ns
MUFA	6.42	7.13	5.88	6.18	0.27	ns	*	ns
3*t*-16:1	1.80	2.34	1.60	1.72	0.16	ns	*	ns
9*c*-18:1	3.34	3.59	3.19	3.20	0.09	ns	ns	ns
PUFA	59.4	63.1	65.1	63.0	1.44	*	ns	ns
18:2n-6	18.2	16.6	17.1	17.0	0.33	ns	ns	ns
18:3n-3	40.9	46.1	47.5	45.5	1.44	*	ns	ns

SEM, standard error of the mean; ns, not significant; *, $P \leq 0.05$; P, pasture type (valley, mountain); S, sampling month (May, June); P*S, interaction term; FA, fatty acid; SFA, saturated fatty acids; MUFA, monounsaturated FA; PUFA, polyunsaturated FA; *t*, *trans*; *c*, *cis*.
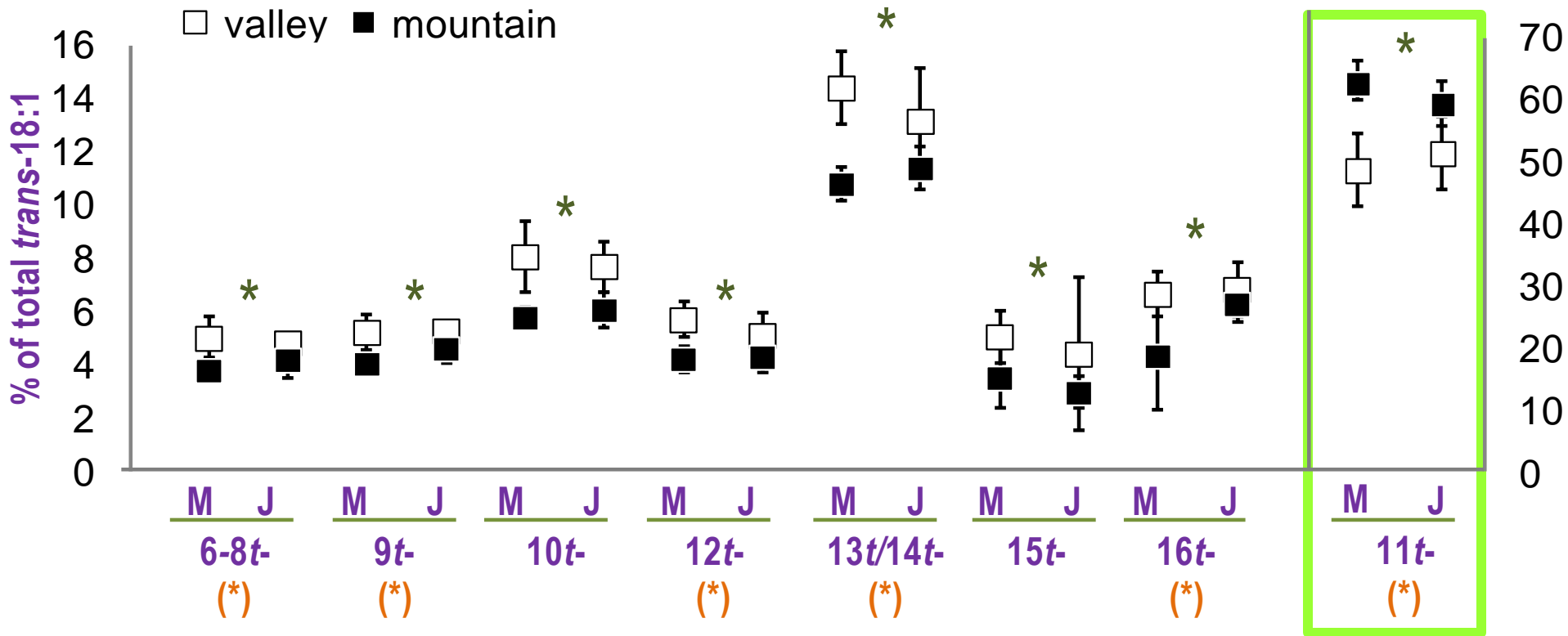
- **MILK:** Fat (%) and fatty acid composition (g/100g fat)

	Valley		Mountain			Sign.		
	May	June	May	June	SEM	P	S	P*S
Fat	7.43	7.96	8.34	8.55	0.09	*	*	ns
SFA	62.5	58.7	56.4	55.1	0.38	*	*	*
MUFA	26.1	29.4	29.6	31.1	0.27	*	*	*
t-MUFA	5.58	6.18	7.95	7.21	0.10	*	ns	*
10t-18:1	0.39	0.41	0.40	0.38	0.01	ns	ns	*
11t-18:1	2.44	2.79	4.39	3.74	0.09	*	*	*
10t-/11t-	0.17	0.15	0.09	0.10	0.01	*	ns	*
nc-dienes	1.31	1.45	1.77	1.71	0.03	*	ns	*
nc-trienes	0.29	0.27	0.41	0.38	0.01	*	*	ns

SEM, standard error of the mean; P, pasture type (valley, mountain); S, sampling month (May, June); P*S, interaction term; SFA, saturated fatty acid; MUFA, monounsaturated fatty acid; nc-, non conjugated. *, $P \leq 0,05$; ns, not significant

- **MILK:** *Trans*-18:1 isomers (%) relative to the total *trans*-18:1 content
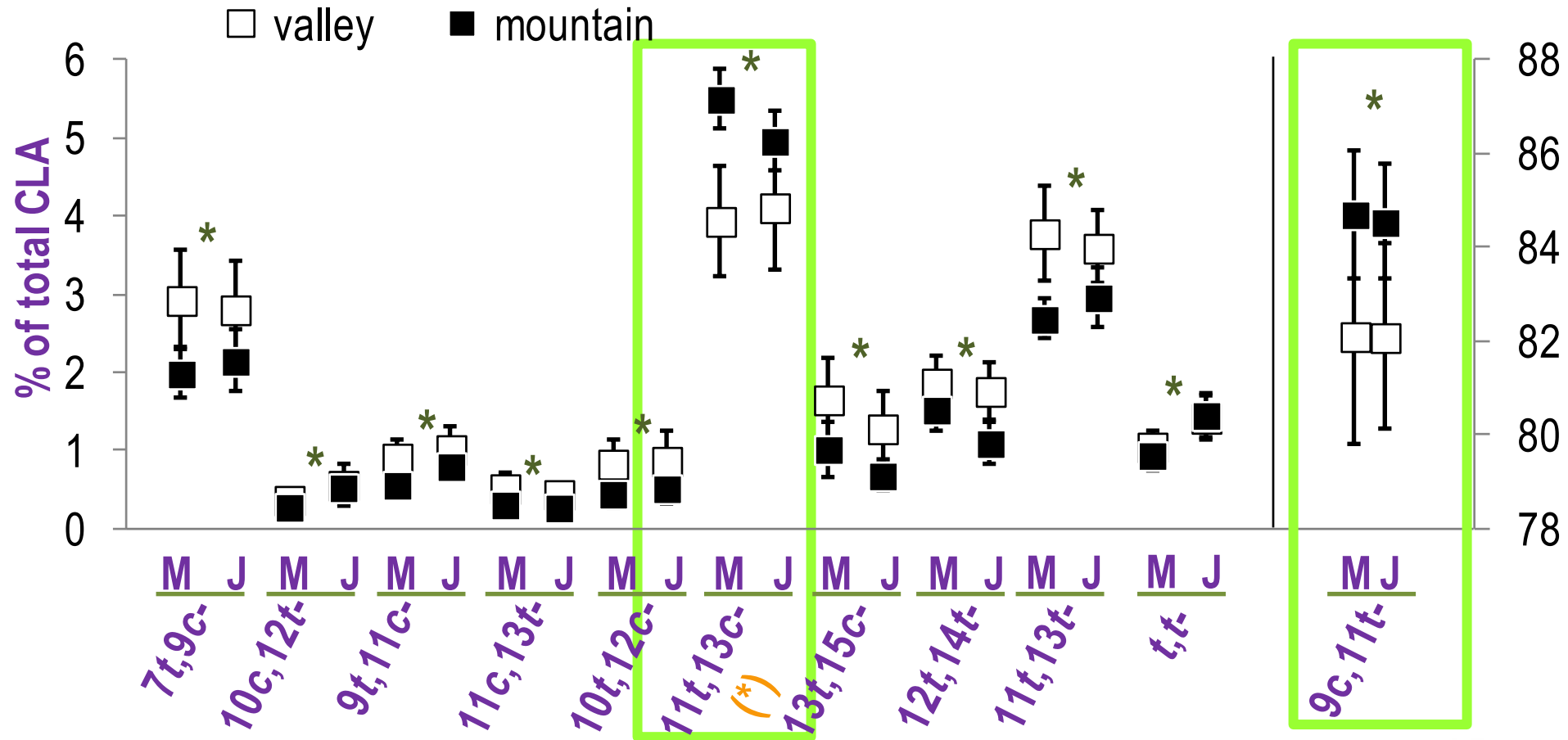

*, $P \leq 0{,}05$; M, may; J, june.

- **MILK:** Fatty acid composition (g/100g fat)

n=36	Valley		Mountain			Sign.		
	May	June	May	June	SEM	P	S	P*S
PUFA	3.32	3.45	4.02	4.22	0.05	*	*	ns
n-6	2.17	2.25	2.18	2.31	0.027	ns	*	ns
18:2n-6	1.72	1.70	1.69	1.81	0.024	ns	ns	*
n-3	1.15	1.20	1.84	1.91	0.030	*	ns	ns
18:3n-3	0.82	0.83	1.36	1.43	0.023	*	ns	ns
CLA	1.69	2.04	2.81	2.62	0.06	*	ns	*

SEM, standard error of the mean; P, pasture type (valley, mountain); S, sampling month (May, June); P*S, interaction term; PUFA, polyunsaturated fatty acid; CLA, conjugated of linolenic acid. *, *P*≤0,05; ns, not significant.

- **MILK:** CLA isomers (%) relative to the total CLA content

*, P≤0,05; M, may; J, june.

SPECIFIC CONCLUSION

- Milk from ewes reared in **mountain pastures** provided a higher fat content with a **healthier fatty acid profile**, with a characteristic **biohydrogenation** products from **linolenic acid**.

Ph.D. GENERAL CONCLUSION

- The results from this ph.D. Project will contribute to the **added-value of animal foods with "quality labels"** produced from **local breeds** and **extensive production systems.**

Acknowledgments:

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Thank you