

# Nutritional and sensory characterization of semi-intensively and intensively grown beef

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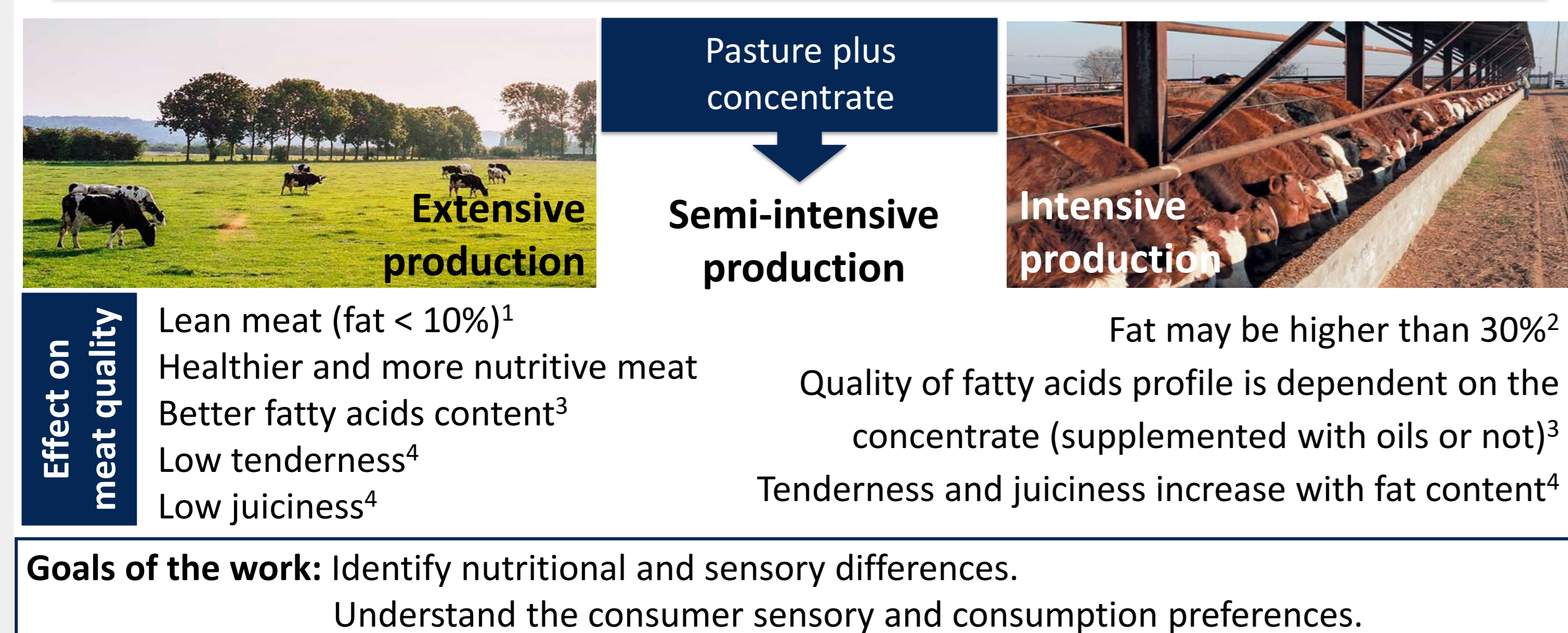
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## Introduction and Objectives



## Methods

### Sampling:

**Animals:** 41 young steers or heifers meat were analyzed  
**Extensively grown beef:** one producer from Alentejo (E)  
**Semi-intensively grown beef:** three producers from Alentejo (SI1, SI2, SI3)  
**Intensively grown meat:** from Spain and Poland (I1 and I2)  
**Traceability** was assured by Clube de Produtores SONAE.

### Nutritional analysis:

**200 g steak** → **Meat mincer homogenization**

**Total fat content:** Soxhlet (NP1613-1979)  
**Moisture:** NP1614-1:2009  
**Fatty acids profile:** Transesterification to FAMES and GC-FID using internal standard  
**Ash:** NP1615:2002  
**Total protein:** Kjeldhal (NP1612:2006)

### Sensory evaluation

**Consumer in-home evaluation**  
 - 113 consumers prepared the meat at home as usual  
 - Steaks: E and SI2  
 - Liking (9-point hedonic scale) and paired preference

**Trained panel beef characterization**  
 - 10 panellists  
 - Generic descriptive analysis

### Consumer online study:

Questionnaire using a 7-point Likert-type scale to score the consumer agreement regarding beef quality, animal welfare and purchase choices.

## Results

### Nutritional characterization

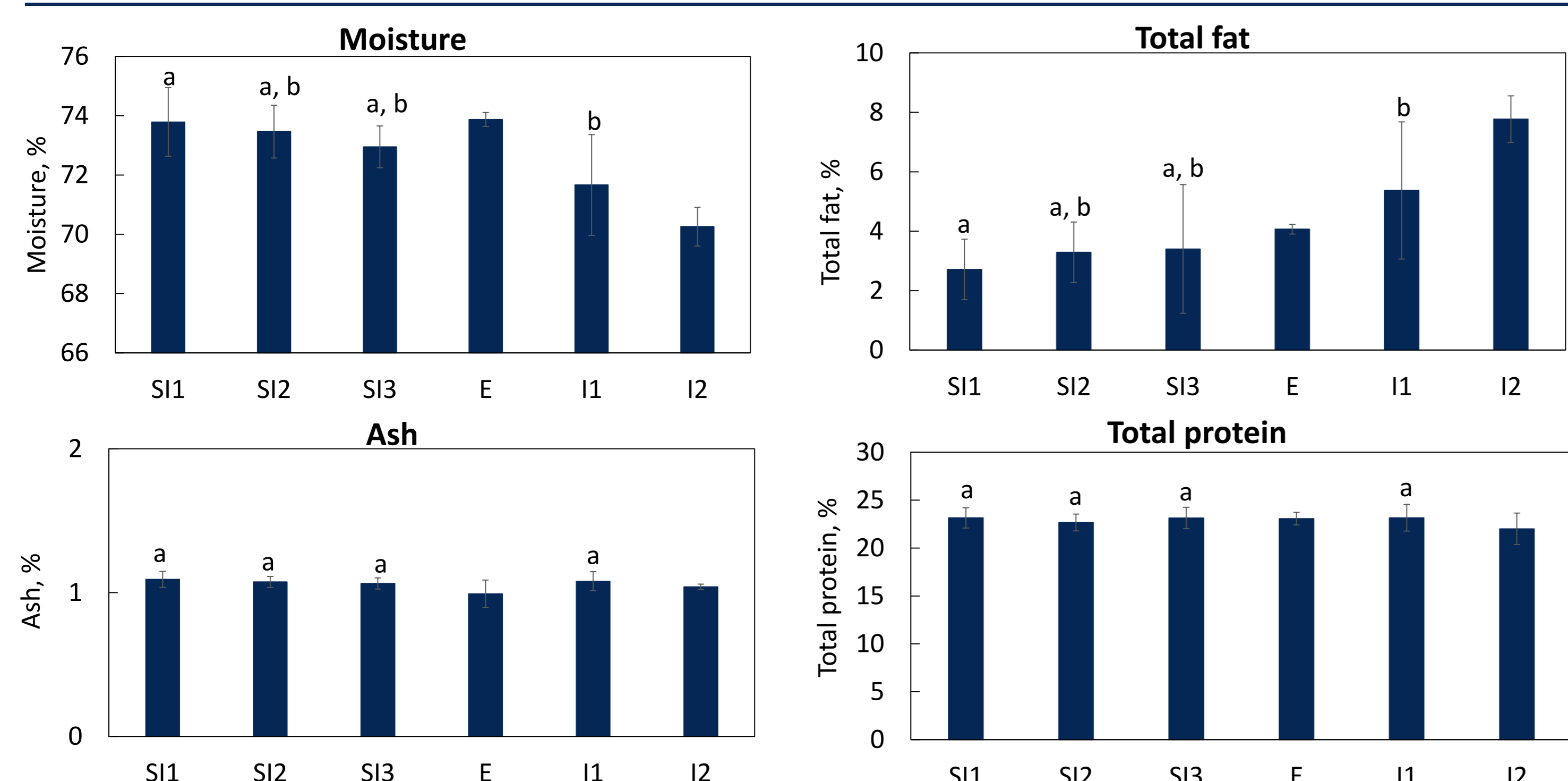


Figure 1. Moisture, total fat content, ash and total protein content mean values for all producers. Means having no letters in common differ ( $P < 0.05$ ). SI1:  $n=14$ , SI2:  $n=7$ , SI3:  $n=3$ ; E:  $n=1$ ; I1:  $n=14$ ; I2:  $n=2$ .

Table 1. Comparison of fatty acids composition of semi-intensively, intensively and extensively grown beef. Means in the same column having no letters in common differ ( $P < 0.05$ ). SFA: Saturated fatty acids; MUFA: Monounsaturated fatty acids; PUFA: polyunsaturated FA.

Sample	ΣSFA		ΣMUFA		ΣPUFA		Total n-6		Total n-3		n-6/n-3 ratio		PUFA+MUFA/SFA ratio	
	%	DP	%	DP	%	DP	%	DP	%	DP	%	DP	%	DP
SI1 (n=12)	49.03 a	2.44	38.75 a	3.79	11.52 a	4.63	10.03 a	3.66	0.81 a	1.08	18.23 a	6.76	1.03 a	0.11
SI2 (n=6)	43.98 b	2.69	46.08 b	4.09	10.11 a	2.40	8.75 a	2.07	0.50 a	0.18	18.77 a	5.56	1.29 b	0.12
SI3 (n=1)	44.87	1.586	44.22	0.915	10.92	2.242	9.88	1.966	0.71	0.185	14.09	1.02	1.23	0.08
E (n=1)	46.60	0.65	42.20	0.60	11.19	1.24	10.32	1.14	0.65	0.09	15.86	1.26	1.15	0.03
I1 (n=14)	48.67 a	2.54	43.30 b	3.77	8.04 a	3.53	7.17 a	3.29	0.40 a	0.17	19.65 a	8.05	1.06 a	0.11
I2 (n=2)	47.27	0.41	47.13	1.31	5.60	0.90	4.56	0.53	0.87	0.35	6.21	0.70	1.12	0.02

### Sensory evaluation - Consumer in-home test

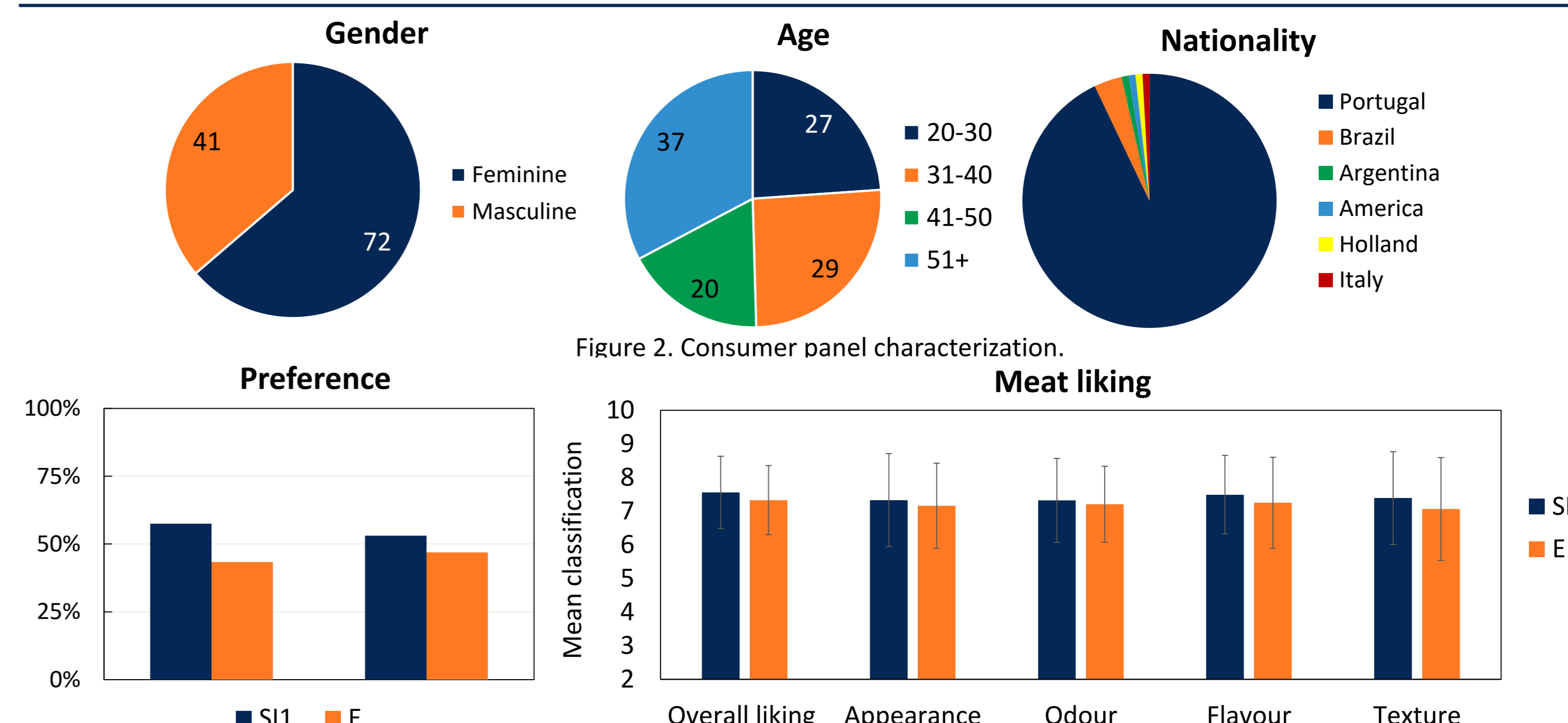
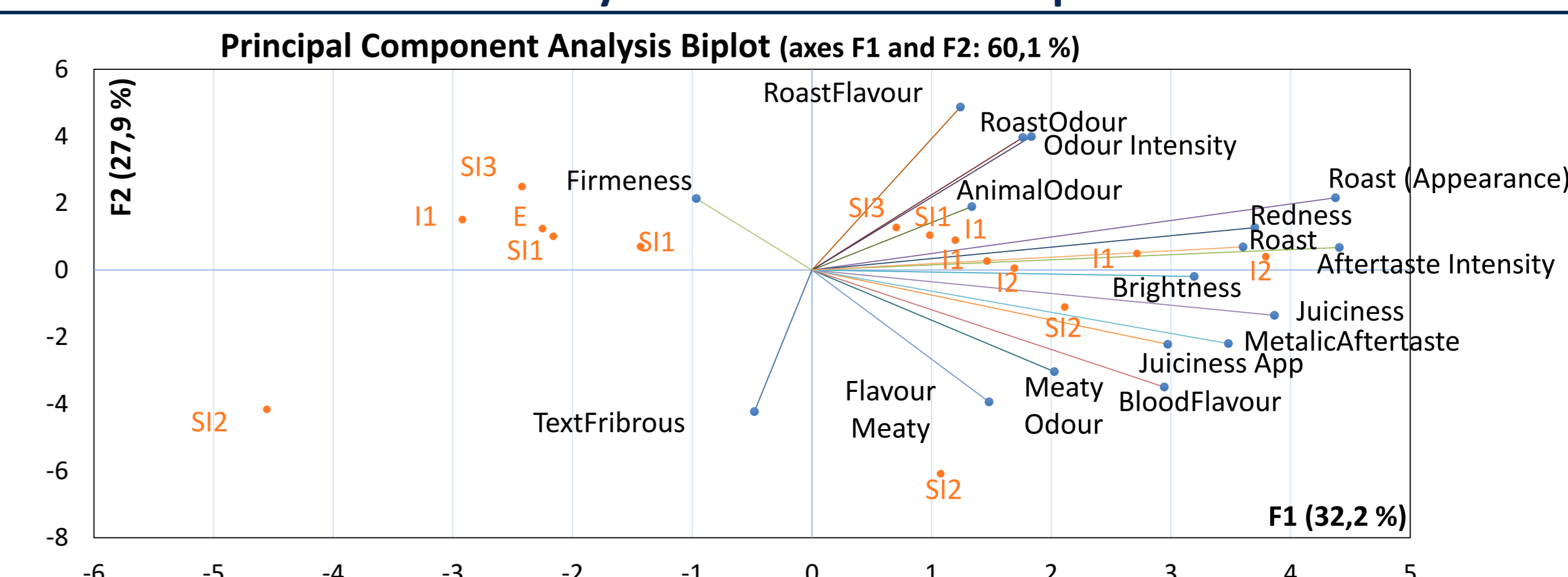
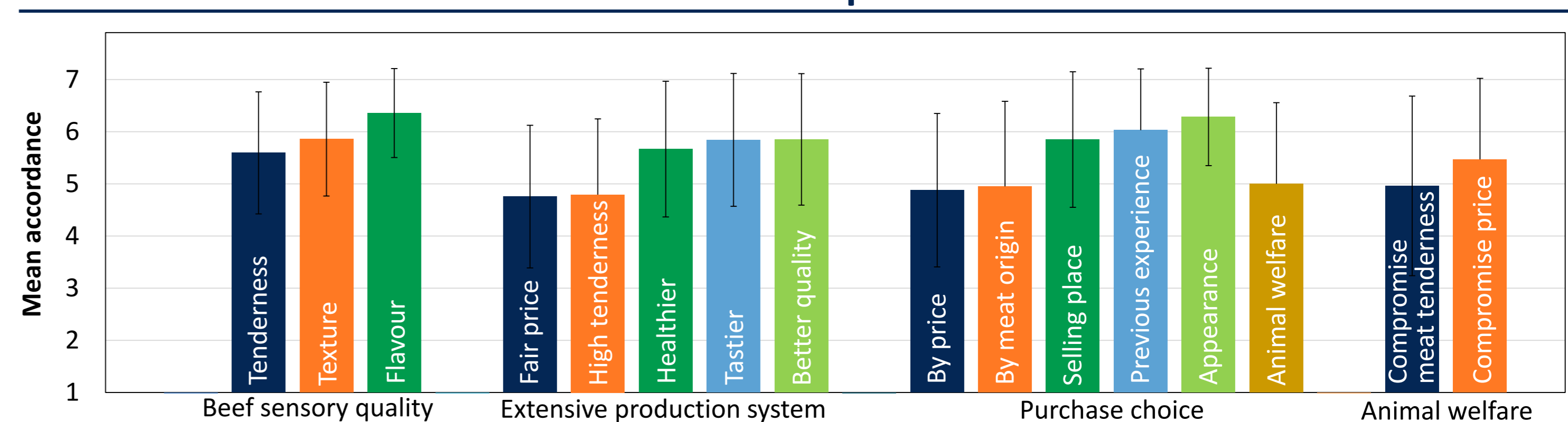


Figure 2. Consumer panel characterization.

### Sensory evaluation – Trained panel



### Consumer online questionnaire



## Conclusions

- The production system influenced moisture and total fat content. Pasture fed animals resulted in leaner meat with higher moisture content than concentrate fed animals.
- No differences were found on ash and protein content values.
- Semi-intensively and extensively grown beef have better fatty acids profile: higher amount PUFA and lower amount of SFA as well as lower n-6/n-3 ratio than intensively grown beef.
- Consumer sensory evaluation demonstrated that the preference and liking do not differ ( $p > 0.05$ ) between SI1 and E samples.
- Trained panel sensory evaluation demonstrated that SI sample may be more fibrous and have more intense flavour. SI and E samples had lower tenderness than I samples, as expected.
- Consumer online questionnaire indicated that taste was the most important factor for quality beef. In moment of purchase, the appearance and the previously knowledge about the meat were the most important choice factors. The lowest score was observed relatively to fair price of extensively grown beef.

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## Acknowledgements

This work was supported by Fundo Europeu de Desenvolvimento Regional (FEDER), through the Programa Operacional Competitividade e Internacionalização (POCI) under the project **ModelMeat .: Modelo de Optimização de Ambiente e Qualidade do Produto para Serviços de Apoio à Competitividade dos Agentes da Fileira da Produção Animal Extensiva (POCI-01-0247-FEDER-017630)**. We would also like to thank the scientific collaboration under the FCT project UID/Multi/50016/2019 and Clube de Produtores – Sonae.

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