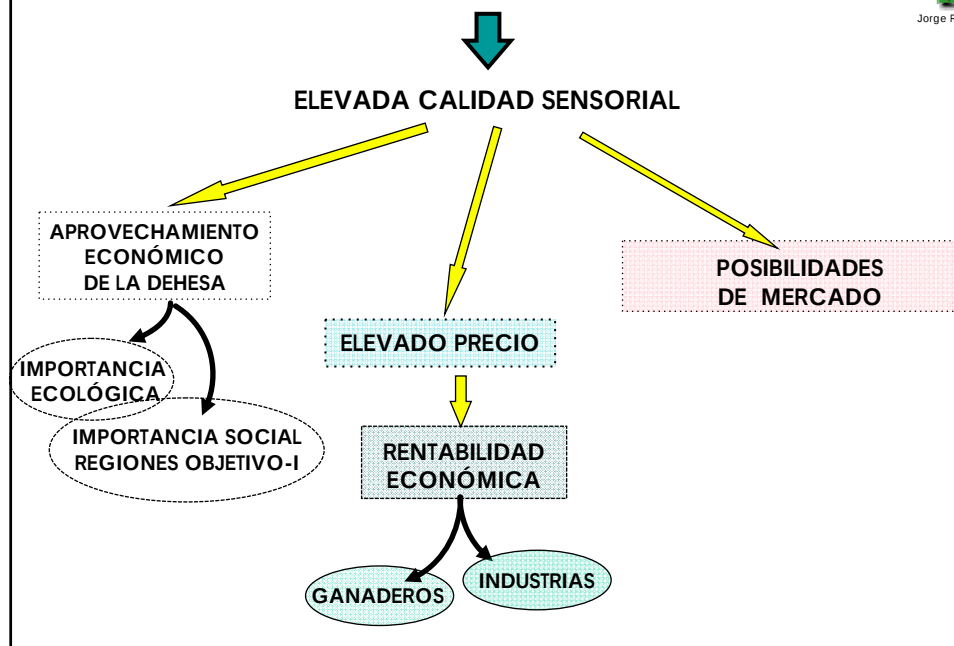


Calidad de los productos del cerdo ibérico

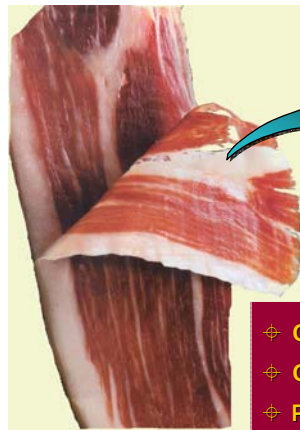
Usos culinarios tradicionales y novedosos

JORGE RUIZ
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FACULTAD DE VETERINARIA UEX
CÁCERES
SPAIN
jruiz@unex.es
<http://www.lamargaritaseagita.com>

PRODUCTOS DEL CERDO IBÉRICO

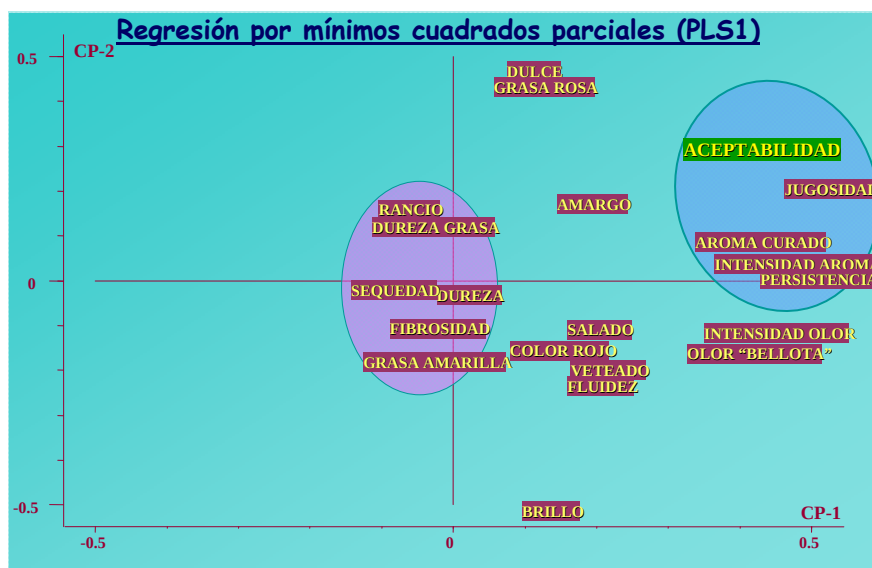


CALIDAD DE LOS PRODUCTOS DEL CERDO IBÉRICO



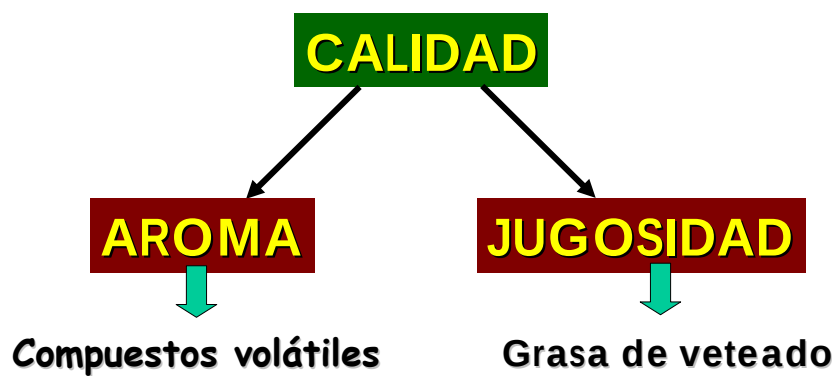
- ✦ Contenido en grasa y humedad
- ✦ Características y composición de la grasa
- ✦ Presencia de compuestos sápidos
- ✦ Índices de oxidación
- ✦ Compuestos volátiles
- ✦

CALIDAD DE LOS PRODUCTOS DEL CERDO IBÉRICO

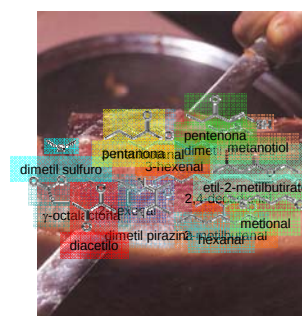
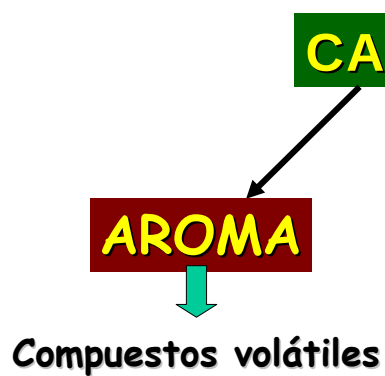


J. Ruiz et al. / Meat Science 61 (2002) 347-354

CALIDAD DE LOS PRODUCTOS DEL CERDO IBÉRICO



CALIDAD DE LOS PRODUCTOS DEL CERDO IBÉRICO

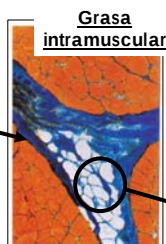
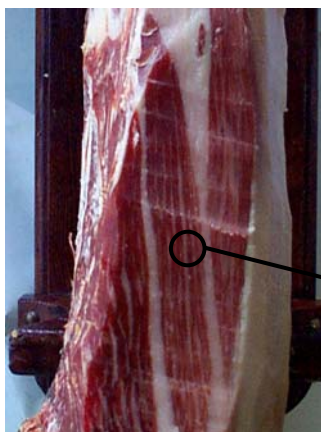


CALIDAD DE LOS PRODUCTOS DEL CERDO IBÉRICO



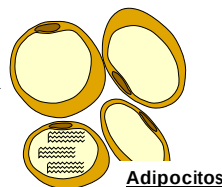
Jorge Ruiz

CALIDAD

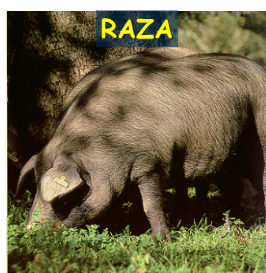


JUGOSIDAD

Grasa de veteado



Adipocitos



RAZA



CRÍA

CALIDAD DE LOS PRODUCTOS DEL CERDO IBÉRICO



Procesado



CONSUMO



Jorge Ruiz

Raza Ibérica



- ✓ Raza autóctona no seleccionada
- ✓ Adaptada al medio
- ✓ Malas características productivas

- ✓ ↑ acumulación de grasa
- ✓ Veteado abundante y fino

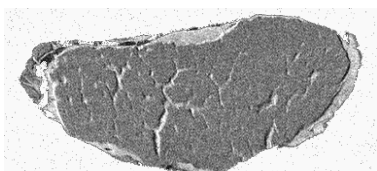
Raza Ibérica



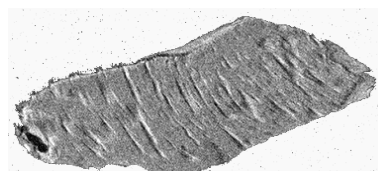
Raza Ibérica



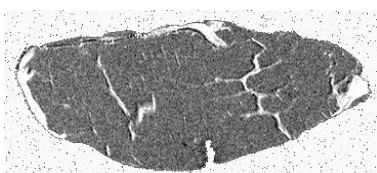
Torbiscal



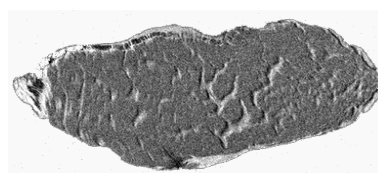
Entrepelado



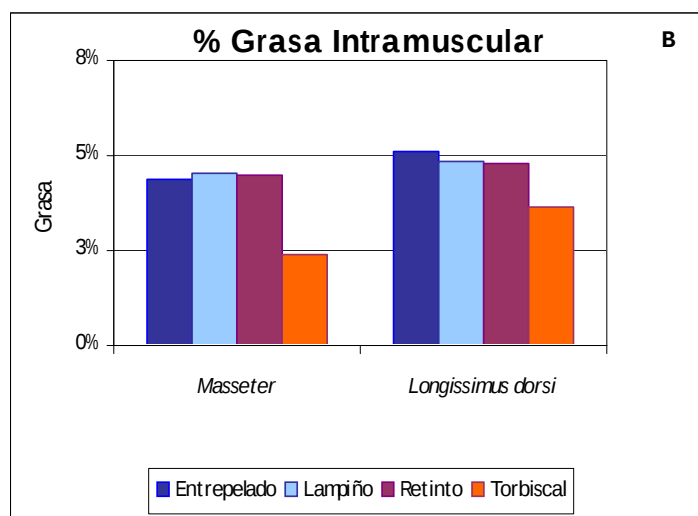
Lampiño



Retinto



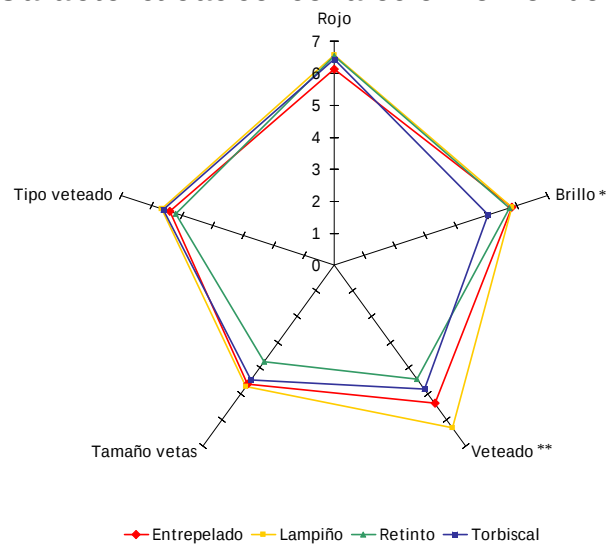
Raza Ibérica



Muriel (2004)

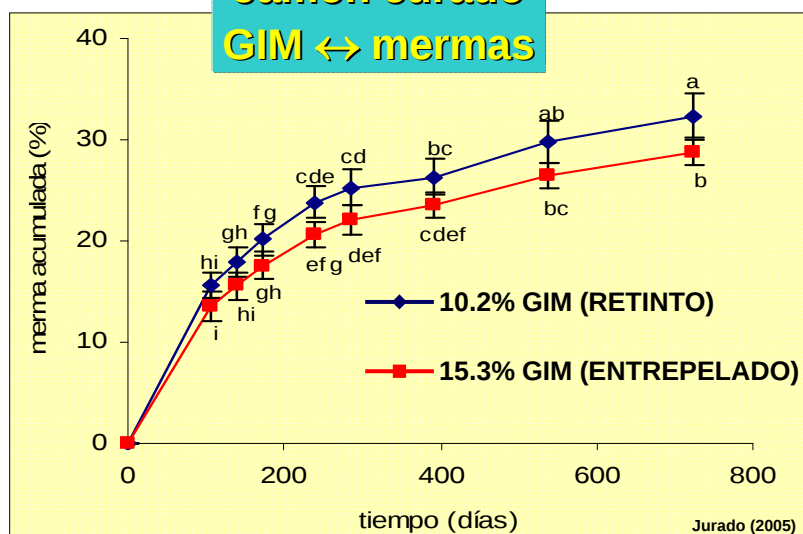
Raza Ibérica

Características sensoriales en lomo Ibérico



Raza Ibérica

Jamón curado GIM ↔ mermas

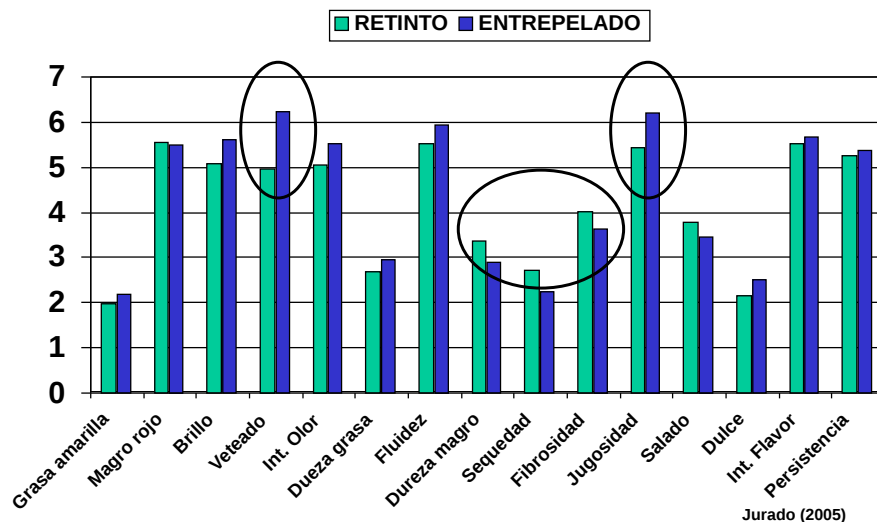


Raza Ibérica



Jorge Ruiz

Características sensoriales en jamón Ibérico

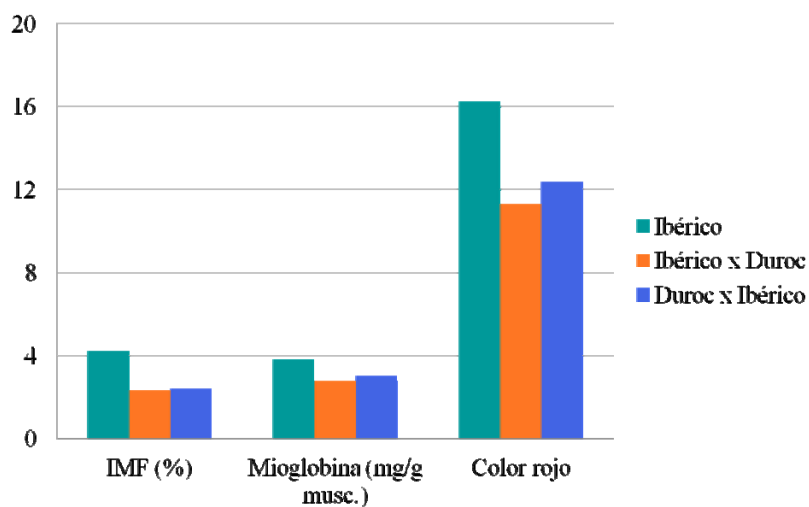


Raza Ibérica



Jorge Ruiz

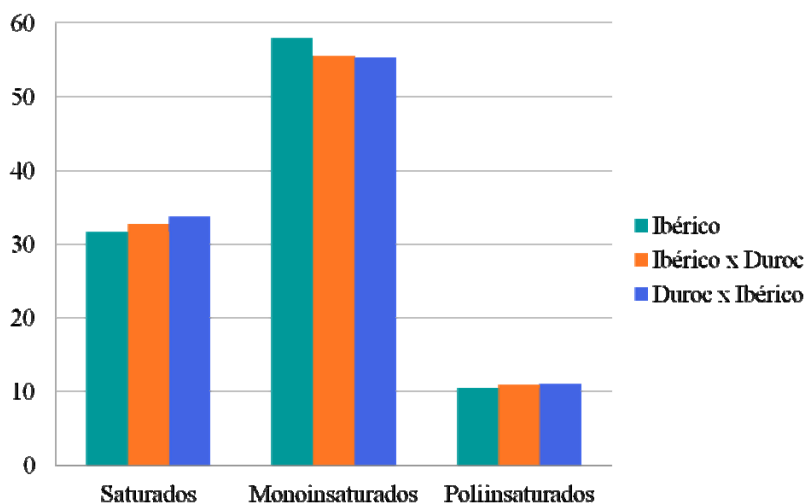
Ibérico vs Ib x Duroc



Raza Ibérica



Ibérico vs Ib x Duroc



Moisture, intramuscular fat (IMF) and protein contents (g/100 g), haem pigments (mg/kg) pH, drip loss (%DL) cook loss (% CL) and instrumental colour of the LD and BF muscles									
	Genotype			Sex		SEM	Significance		
	GEN1	GEN2	GEN3	♂	♀		Genotype	Sex	Interaction
pH ₄₅ LD	5.7	5.8	5.8	5.7	5.8	0.05	ns	ns	ns
pH ₄₅ BF	5.8a	5.9a	5.6b	5.7	5.7	0.05	**	ns	ns
pH ₁₀ LD	5.7a	5.5ab	5.1b	5.4	5.4	0.07	*	ns	ns
pH ₁₀ BF	5.8a	5.7a	5.2b	5.5	5.6	0.06	***	ns	ns
<i>Drip and cook loss</i>									
DL LD (%)	4.0b	4.3b	6.0a	4.8	4.8	0.30	**	ns	ns
DL BF (%)	3.4b	4.0ab	5.1a	3.9	4.4	0.28	*	ns	ns
CL LD (%)	6.0b	6.5b	10.4a	8.1	7.3	0.54	***	ns	ns
CL BF (%)	9.7	11.0	11.6	10.9	10.7	0.35	ns	ns	ns
<i>Instrumental colour</i>									
Cie L* LD	48.9b	53.1a	52.8a	51.8	51.6	0.52	***	ns	ns
Cie L* BF	41.9b	42.4b	46.8a	44.7	42.9	0.74	*	ns	ns
Cie a* LD	10.2	10.0	9.9	9.9	10.2	0.26	ns	ns	ns
Cie a* BF	18.3	17.4	17.9	17.2	18.5	0.31	ns	*	ns
Cie b* LD	4.3	4.9	5.0	4.7	4.8	0.17	ns	ns	ns
Cie b* BF	6.2	6.2	7.2	6.7	6.4	0.23	ns	ns	ns
<i>Haem pigments</i>									
Hematin LD (mg/kg)	48.7a	38.3b	37.9b	41.0	41.7	1.42	**	ns	ns
Hematin BF (mg/kg)	93.1	86.8	82.4	80.6	93.4	2.26	ns	***	**
<i>Chemical composition</i>									
Moisture LD (g/100 g)	71.4ab	70.3b	71.7a	71.0	71.2	0.24	*	ns	ns
Moisture BF (g/100 g)	74.1a	73.3 b	73.6b	73.6	73.5	0.16	*	ns	ns
Protein LD (g/100 g)	23.4a	21.3b	21.3b	22.2	21.7	0.34	*	ns	ns
Protein BF (g/100 g)	19.2b	19.3b	20.5a	19.9	19.5	0.23	*	ns	ns
IMF LD (g/100 g)	3.8b	5.9a	3.5b	4.4	4.4	0.28	***	ns	ns
IMF BF (g/100 g)	3.4	3.7	3.0	3.4	3.4	0.17	ns	ns	ns

GEN1: IB×DU1; GEN2: DU1×IB; GEN3: DU2×IB.
 LD: *Longissimus dorsi*; BF: *Biceps femoris*.
 DL drip loss, CL cook loss.
 ns: non significant; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.
 a,b: Different letters in the same row indicate significant statistical differences (Tukey's test, $p < 0.05$).

Factores determinantes de la calidad de los productos del cerdo Ibérico



Producción



Producción



Producción



- ✓ Cebados en libertad en la dehesa, con bellotas y hierba
- ✓ Sacrificados a un peso y edad elevados (150 Kg/14-18 meses)

Producción



Cría en libertad con bellotas y hierba



↑ **Ácido oleico (C18:1 n-9)**

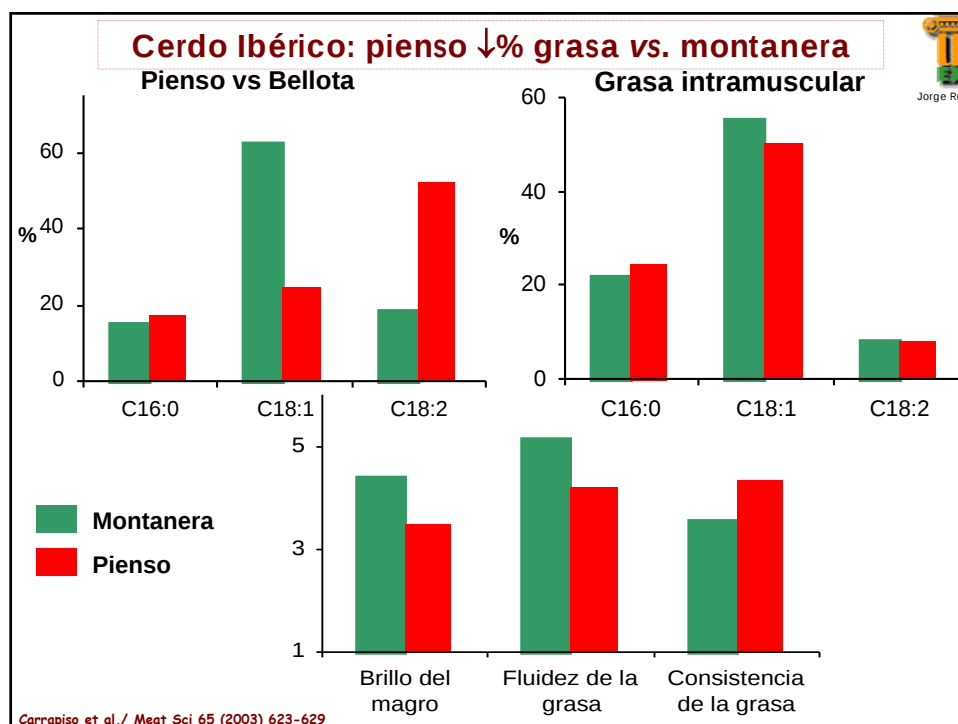
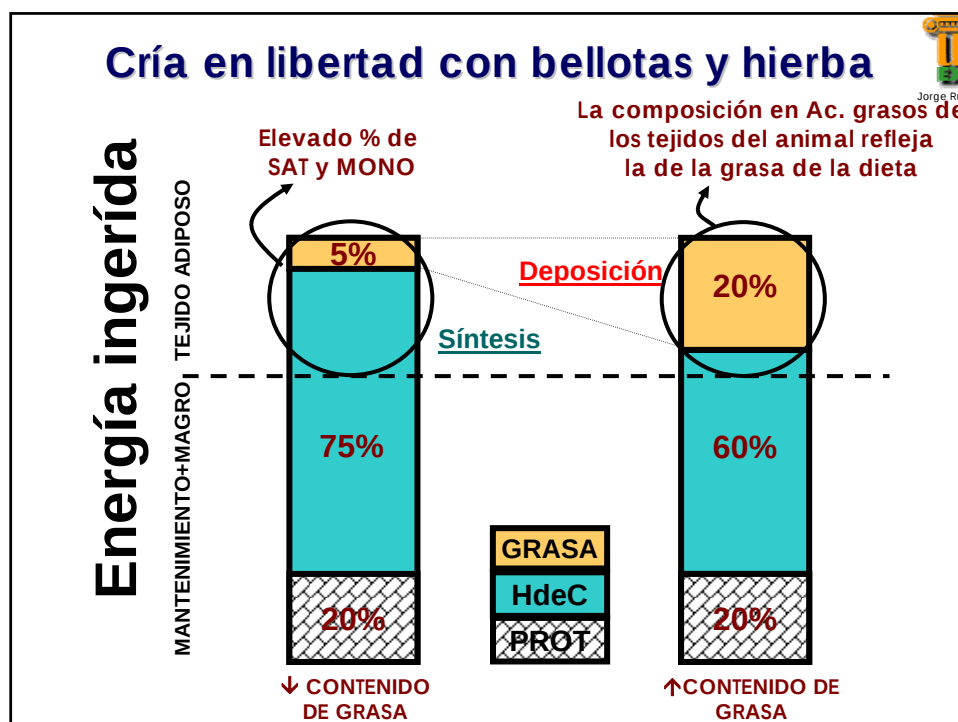
Los cerdos apenas modifican la grasa que comen



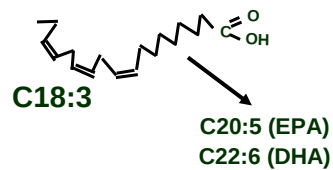
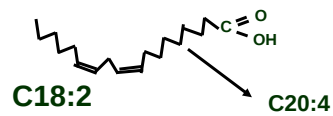
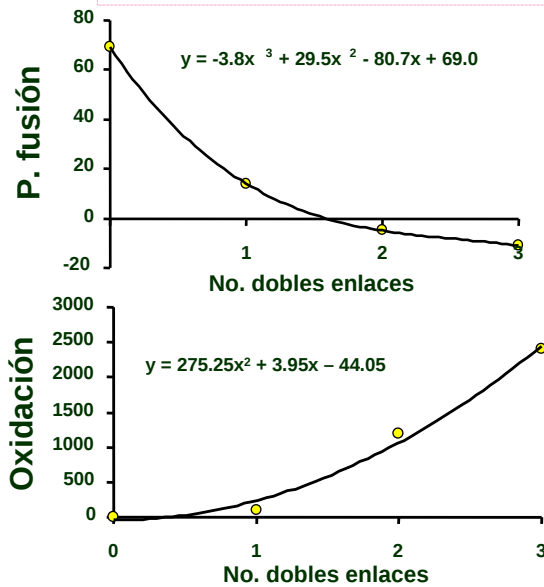
Acumulación de ac.oleico
en la grasa de los cerdos

Grasa fluida

Aroma



Ácidos grasos: aroma y fluidez



Ácidos grasos: fluidez



Ácidos grasos: aroma

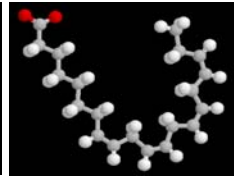
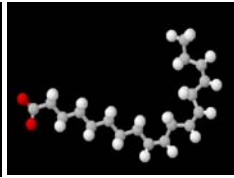
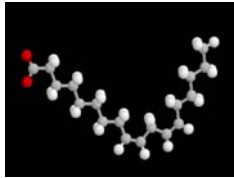
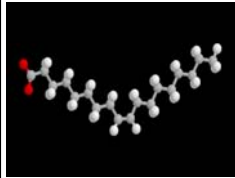


A. oleico
(C18:1)

A. Linoleico
(C18:2)

A. Linolenico
(C18:3)

A. Araquidónico
(C20:4)



Octanal
Nonanal
Decenal
Undecenal

Hexanal
Heptenal
Octenal
Nonadienal

Pentenal
Hexenal
Heptadienal
Nonadienal

Hexanal
Heptenal
Octenal
Nonenal
Nonadienal
Decadienal

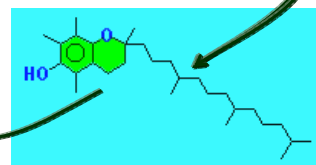
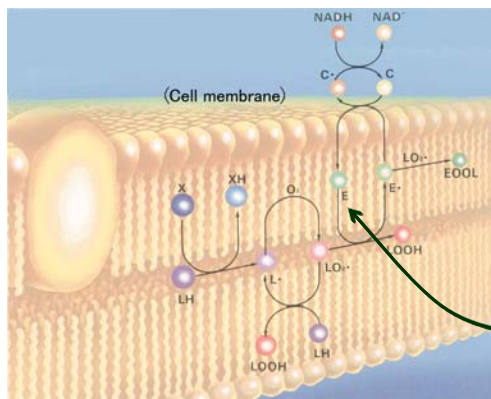
Cría en libertad con bellotas y hierba

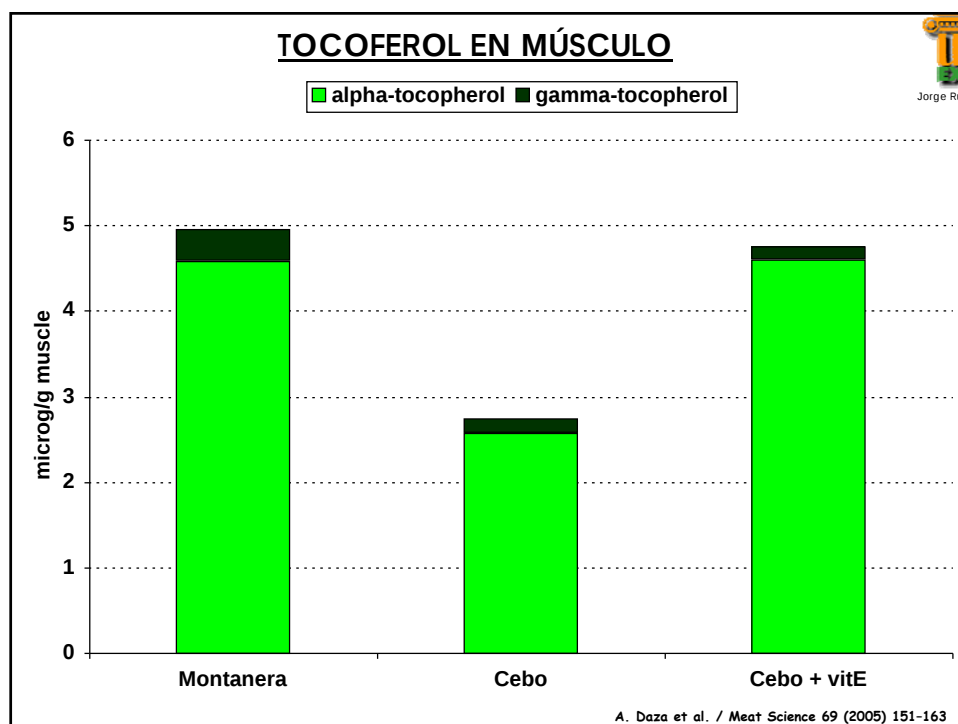
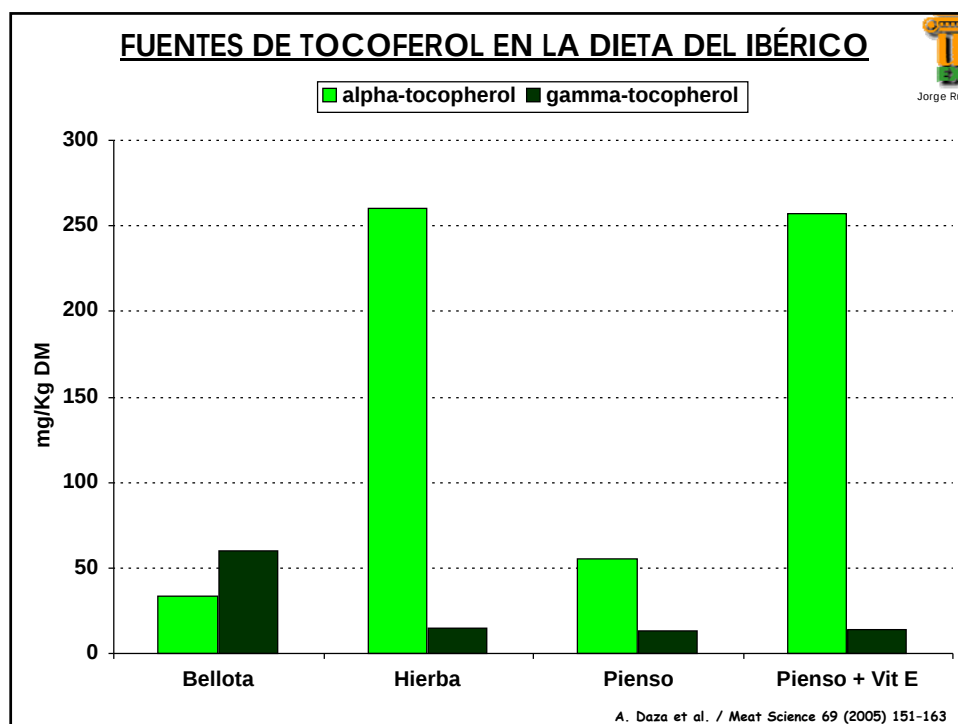


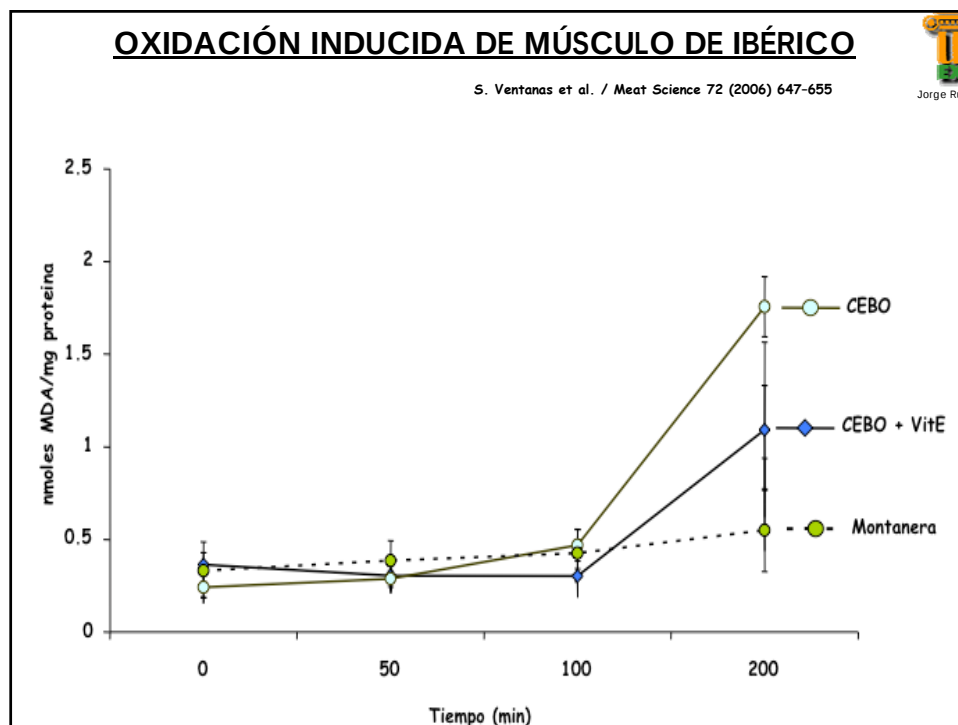
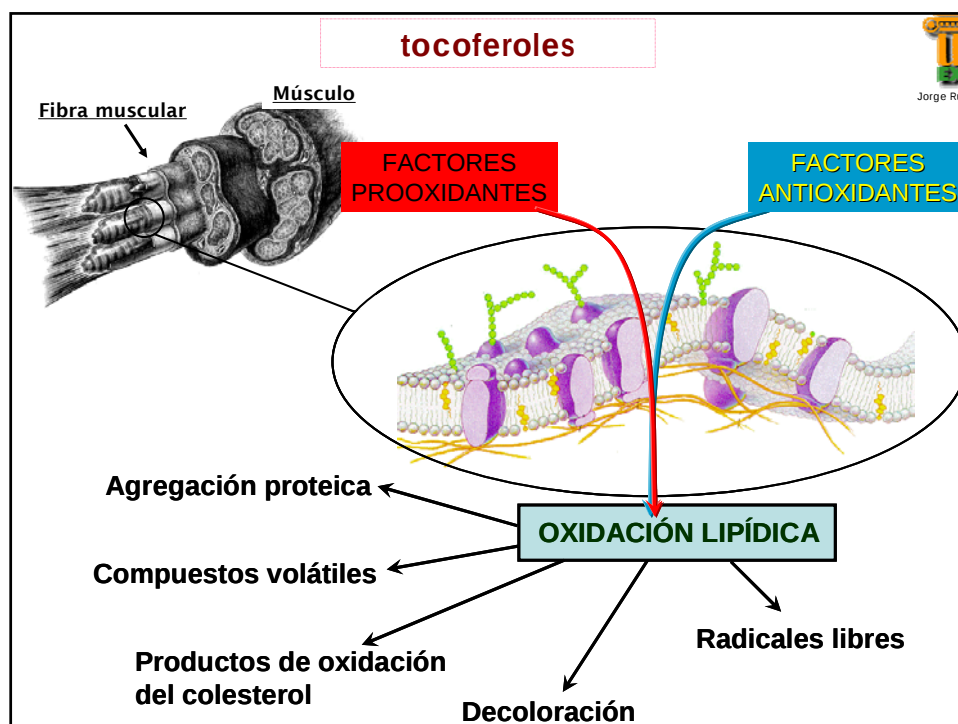
ANTIOXIDANTES

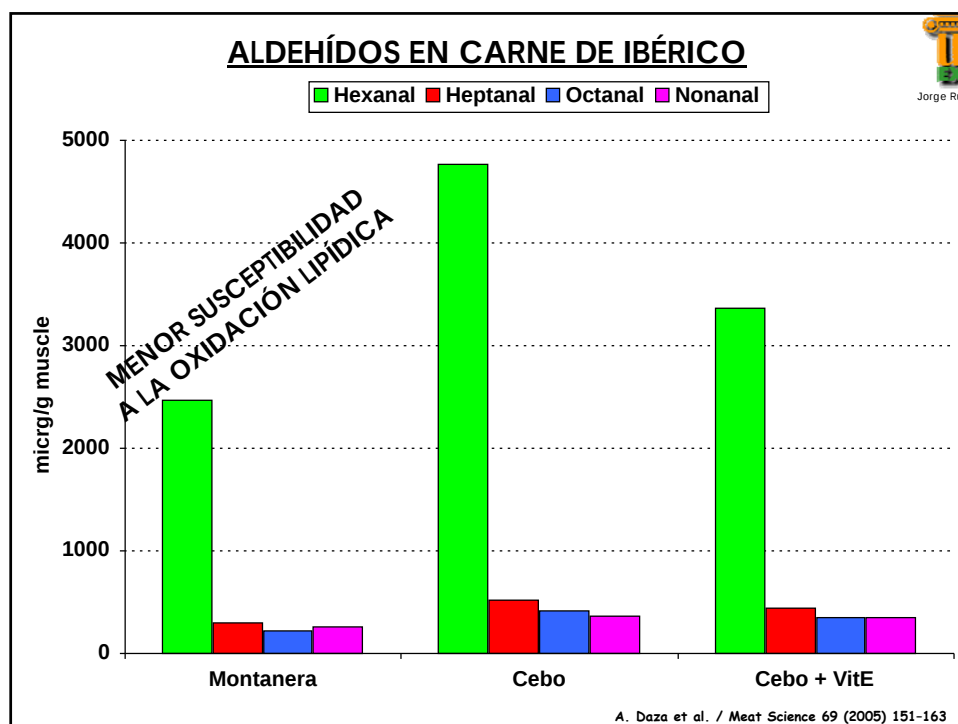
α -tocoferol

γ -tocoferol









CICLO PRODUCTIVO



Jorge Ruiz

GRASA DORSAL E INTRAMUSCULAR

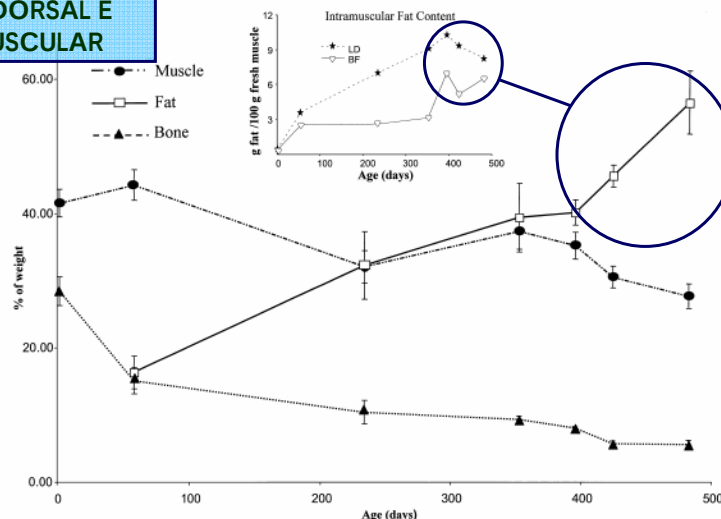


Fig. 1. Means of percentage ($\pm$ SD) of weight of muscle, dissectable fat and bone in left hemicarcass throughout lifetime. The inset shows intramuscular fat content (IFC) (g fat/100 g fresh muscle) throughout lifetime.

Mayoral et al. (1999) Meat Science 52: 315-324

CICLO PRODUCTIVO



Jorge Ruiz

GRASA INTRAMUSCULAR

Proteína en la dieta

A. Daza et al. / Meat Science 69 (2005) 151-163

153

Table 1

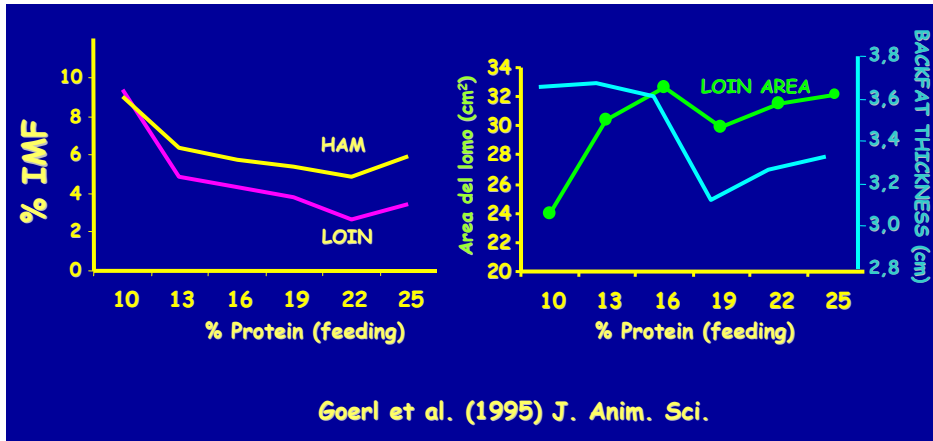
Chemical composition (g/kg DM), α - and γ -tocopherol concentrations (mg/kg DM) and major fatty acids (g/100 g fatty acids) of the experimental diets^a

Chemical composition	Free-range		Mono ^b		Medium ^c		Poly ^d	
	Acorns	Grass	Basal	Basal + E	Basal	Basal + E	Basal	Basal + E
Dry matter (DM, g/kg feed)	627.3	244.0	888.0	891.0	892.0	895.0	888.6	890.6
Crude protein (g/kg DM)	49.9	148.3	135.5	133.0	136.6	136.9	133.7	135.3
Crude fat (g/kg DM)	88.1	66.5	68.8	71.3	71.9	68.4	68.1	68.0
Crude fiber (g/kg DM)	57.5	210.0	50.8	49.0	49.0	43.0	48.0	47.0
Ash (g/kg DM)	17.0	73.0	56.6	60.0	59.0	63.0	62.0	59.0
Nitrogen free extractives (g/kg DM)	787.6	502.3	688.3	686.7	683.5	688.7	688.2	690.7
γ -tocopherol (mg/kg DM)	60.2	14.9	12.6	9.8	15.1	17.1	11.7	20.6
α -tocopherol (mg/kg DM)	33.5	260.5	39.8	255.0	60.0	256.3	66.7	260.4
Fatty acids (g/100 g fatty acids)								
C14:0	0.14	0.47	0.38	0.43	0.47	0.37	0.49	0.57
C16:0	10.61	4.57	10.08	9.73	10.20	10.07	10.05	10.16
C16:1(n-7)	0.12	0.30	0.48	0.51	0.07	0.06	0.46	0.52
C18:0	3.61	1.58	3.08	2.82	2.97	3.03	3.03	3.09
C18:1(n-9)	52.22	1.21	20.91	21.84	16.68	15.95	13.97	14.23
C18:1(n-7)	0.32	0.36	0.92	1.03	0.86	0.83	0.80	0.89
C18:2(n-6)	14.11	3.33	9.92	9.85	14.85	15.35	18.9	18.74
C18:3(n-3)	0.70	14.78	1.35	1.42	1.43	1.15	1.26	1.25
C20:0	0.32	0.08	0.15	0.18	0.20	0.16	0.22	0.26

CICLO PRODUCTIVO

GRASA
INTRAMUSCULAR

Proteína en la dieta



Factores determinantes de la calidad de los productos del cerdo Ibérico

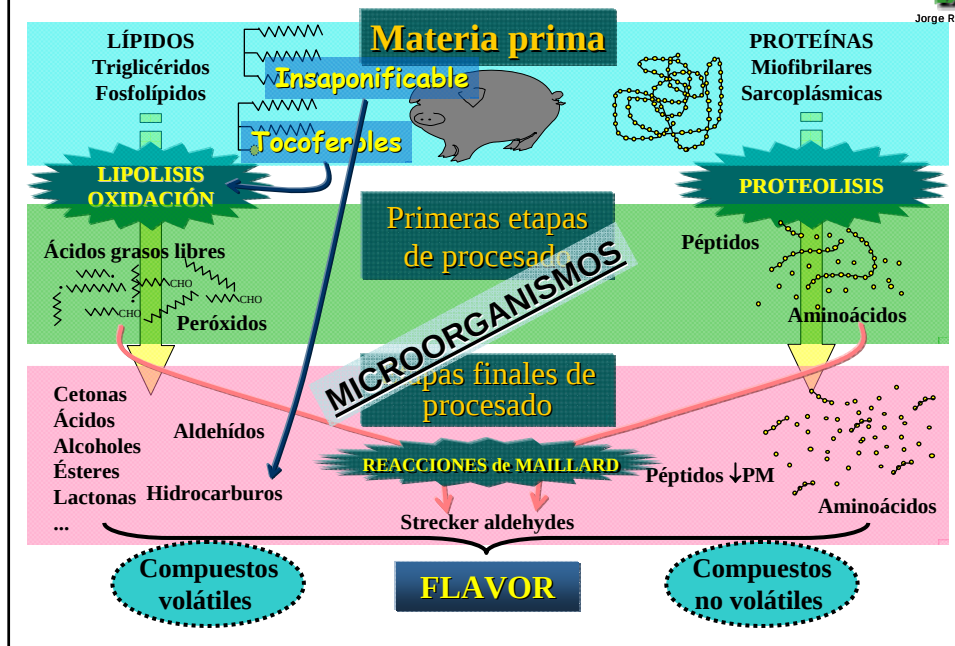
Procesado

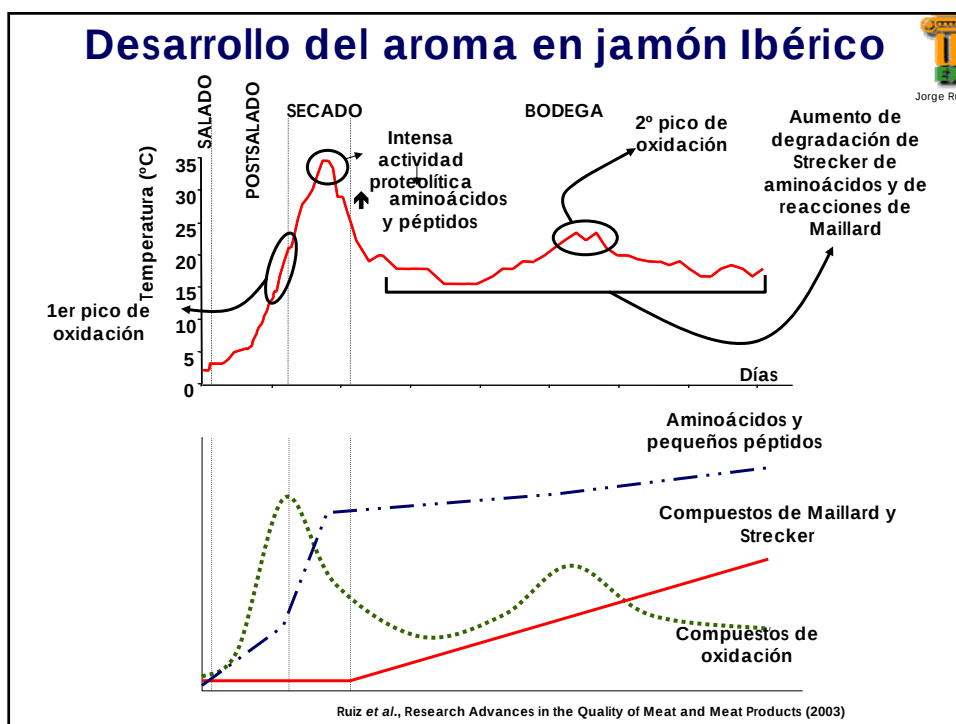
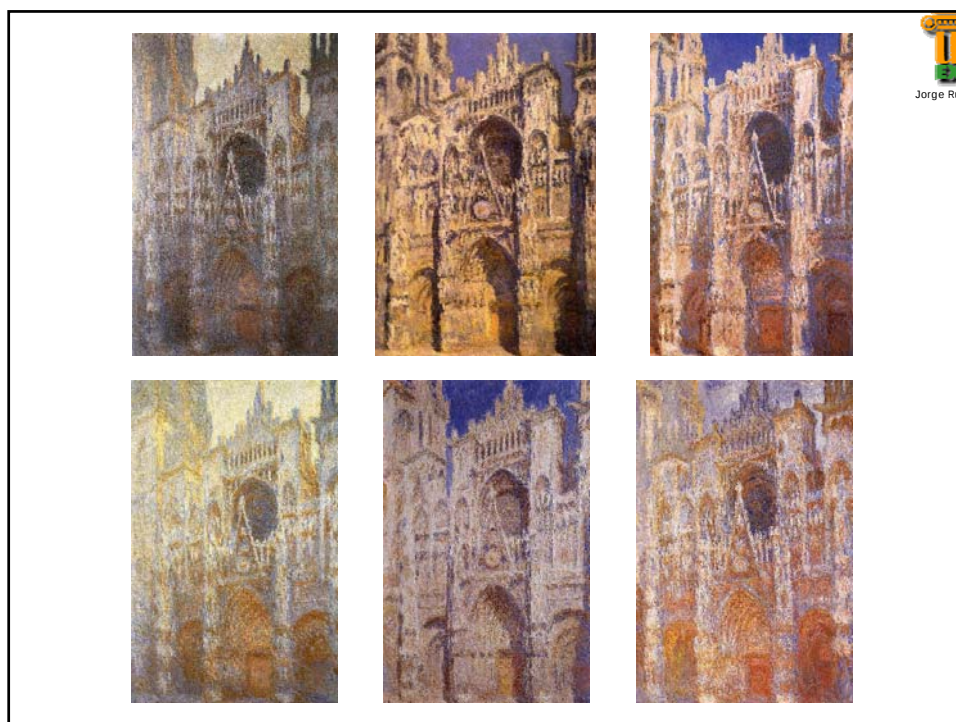


Producción de jamón Ibérico

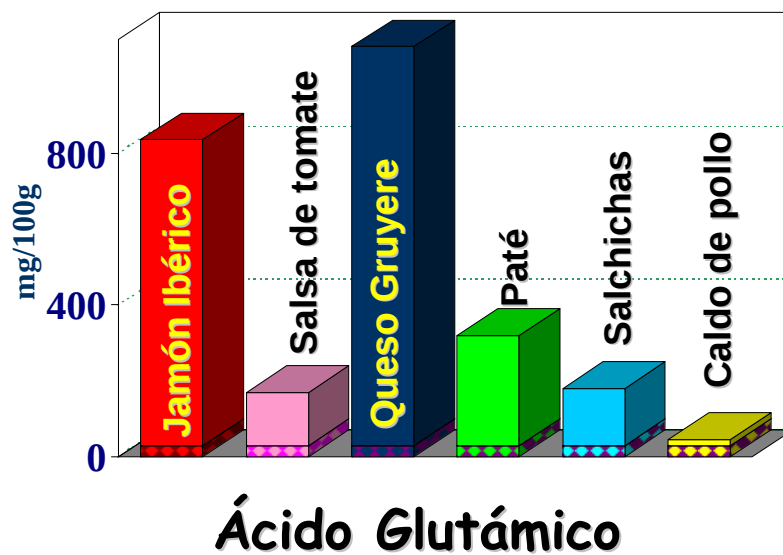


Desarrollo del aroma

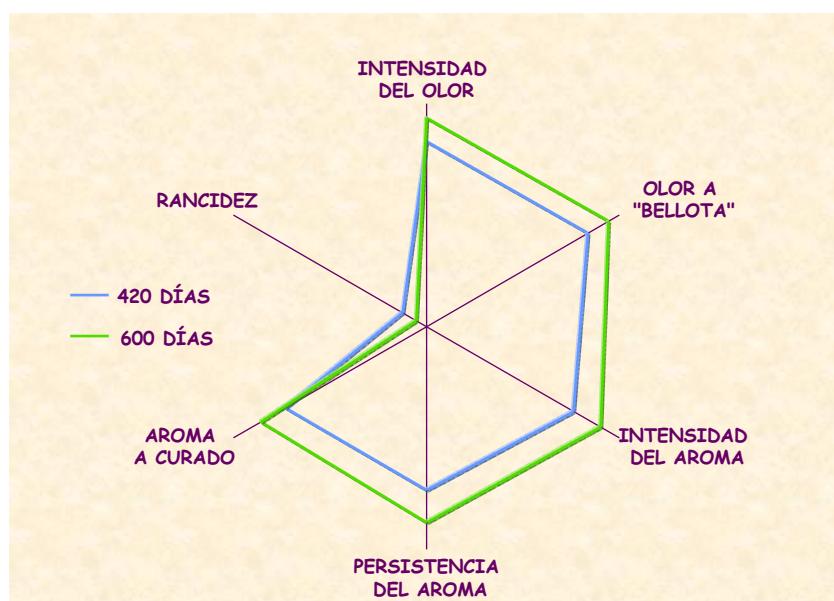




Aminoácidos libres en jamón Ibérico



Desarrollo del aroma en jamón Ibérico



Ruiz et al., Food Res. Int. 31: 53 (1998)

Factores determinantes de la calidad de los productos del cerdo Ibérico



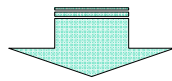
Jorge Ruiz



Jorge Ruiz

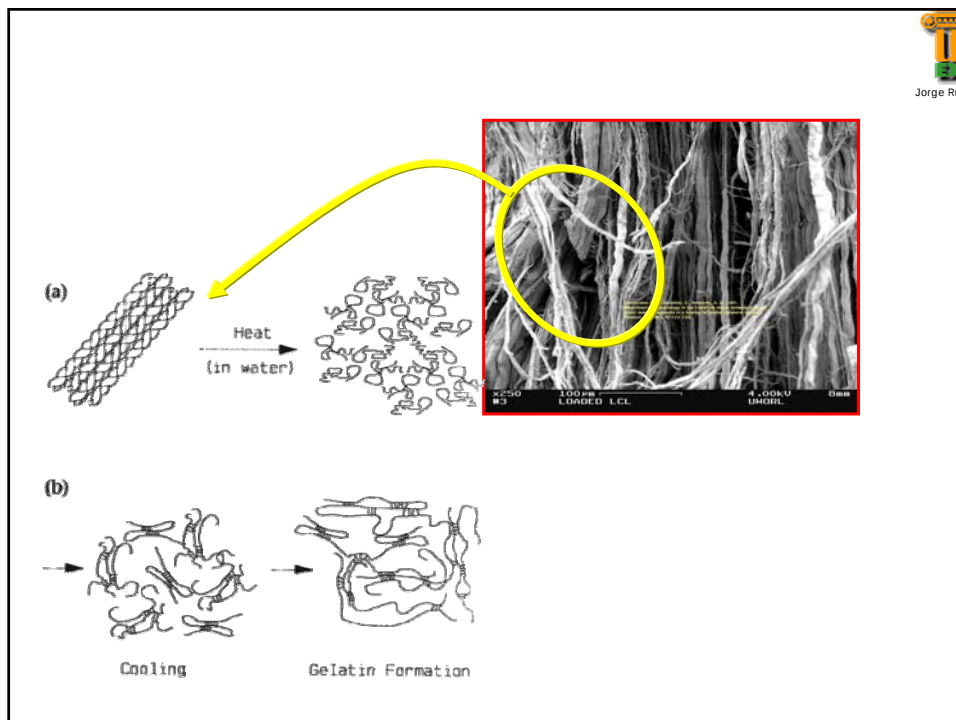
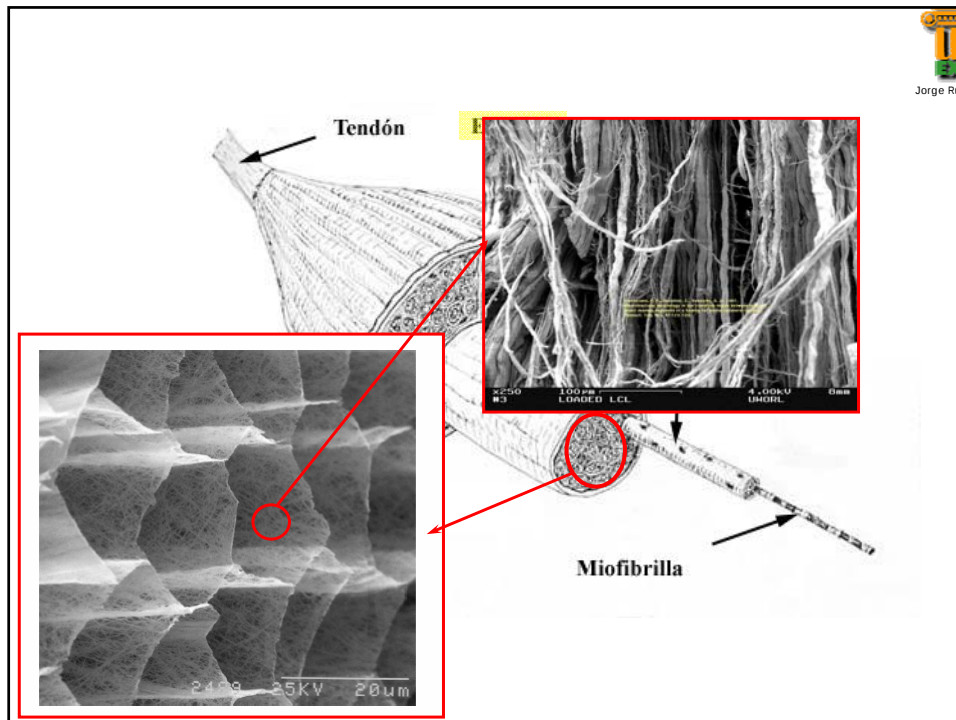
Cocina al vacío

TÉCNICA DE COCINADO EN LA QUE EL CALENTAMIENTO (NORMALMENTE A TEMPERATURAS MODERADAS O BAJAS) SE LLEVA A CABO MANTENIENDO EL ALIMENTO A PRESIONES REDUCIDAS (VACÍO), NORMALMENTE ENVASADO EN BOLSAS (AUNQUE EXISTEN TAMBIÉN OLLAS A VACÍO)



- ✚ AUSENCIA DE OXÍGENO
- ✚ TEMPERATURAS $<70^{\circ}\text{C}$
- ✚ TIEMPOS MUY LARGOS





LA QUÍMICA DE LA CARNE: TEXTURA

TEXTURA DE LA CARNE

CANTIDAD Y NATURALEZA
DEL TEJIDO CONECTIVO
(COLÁGENO)

FORMACIÓN DE GELATINA
DURANTE EL COCINADO:
DISMINUCIÓN DE DUREZA

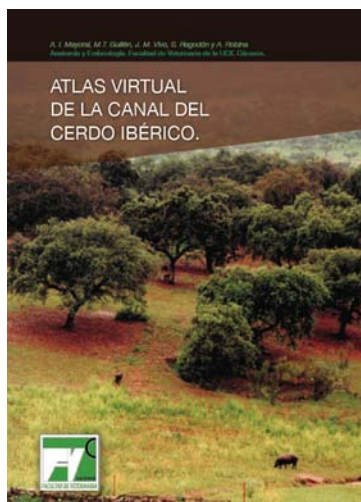
>65°C
> CON EL TIEMPO

RETRACCIÓN DE LAS
PROTEÍNAS MIOFIBRILARES:
AUMENTO DE LA DUREZA

>70°C

Piezas del cerdo Ibérico

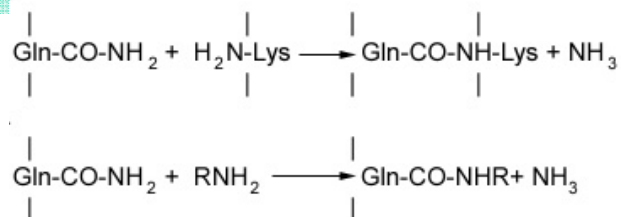
<http://veterinaria.unex.es/Unidades/cde/index.html>



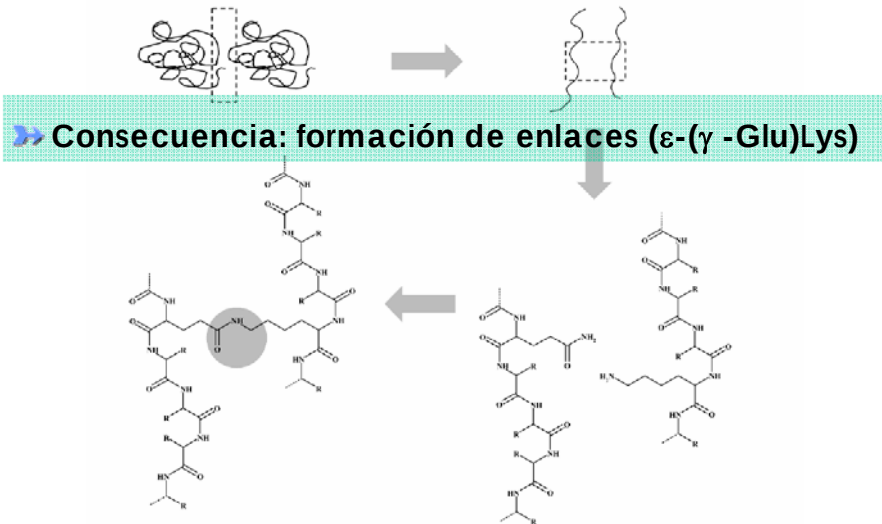
TRANSGLUTAMINASA

TRANSGLUTAMINASA

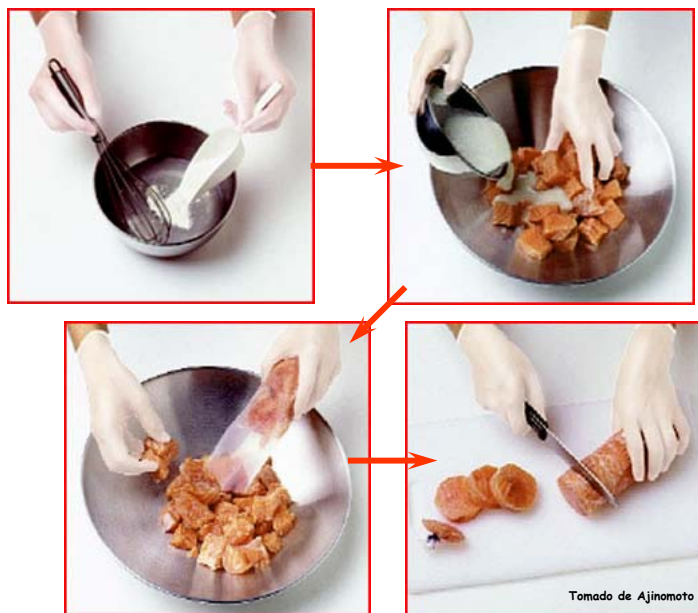
- Protein-glutamina γ -glutamyltransferasa (EC 2.3.2.13) (la de *Streptoverticillium* sp. no es dependiente del Ca^{++})
- Cataliza una reacción de transferencia de grupos acilo entre el grupo γ -carboxiamida de un residuo de glutamina y un grupo amino libre (p.ej, el de la cadena lateral de Lys)



TRANSGLUTAMINASA



TRANSGLUTAMINASA



TRANSGLUTAMINASA



Jorge Ruiz



TRANSGLUTAMINASA



Jorge Ruiz



TRANSGLUTAMINASA



Jorge Ruiz

MANITAS DE CERDO RELLENAS DE FOIE Y BOLETUS



Toño Pérez

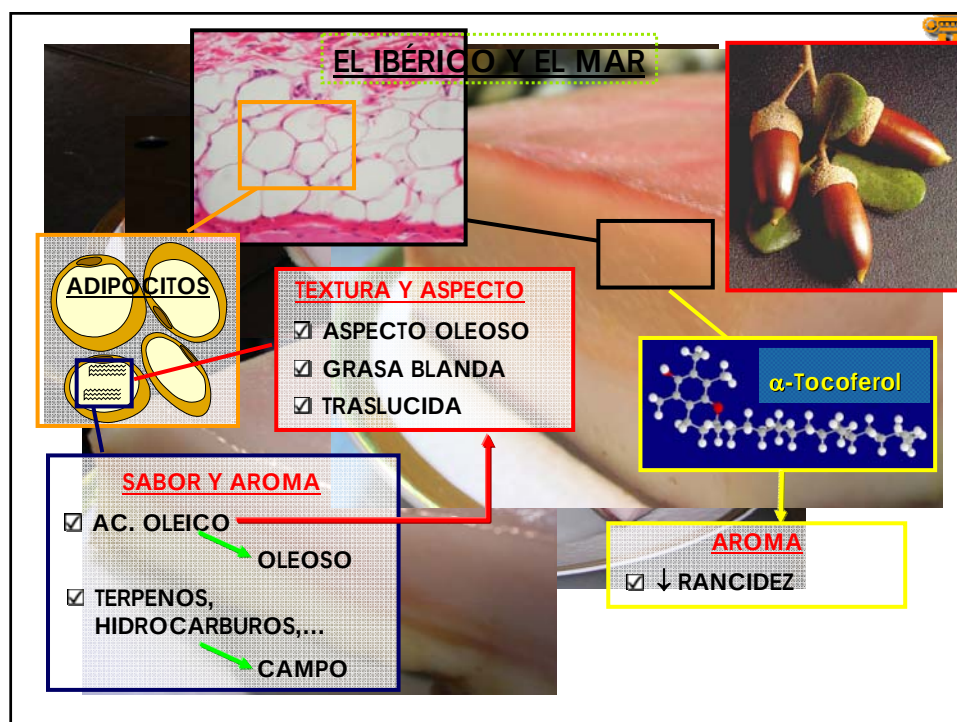
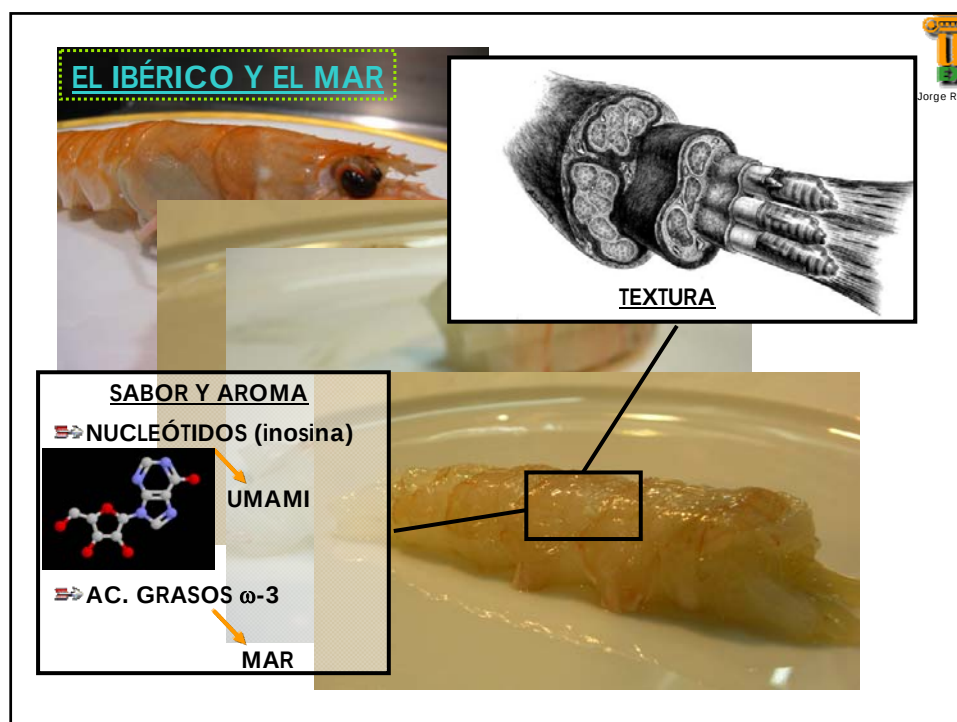
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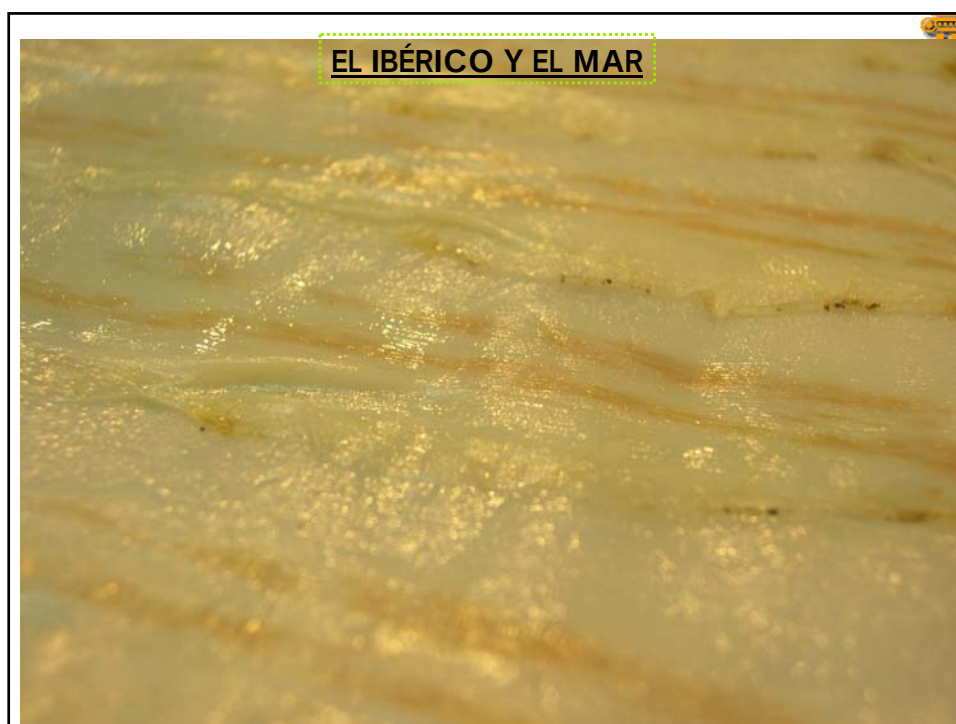
EL IBÉRICO Y EL MAR

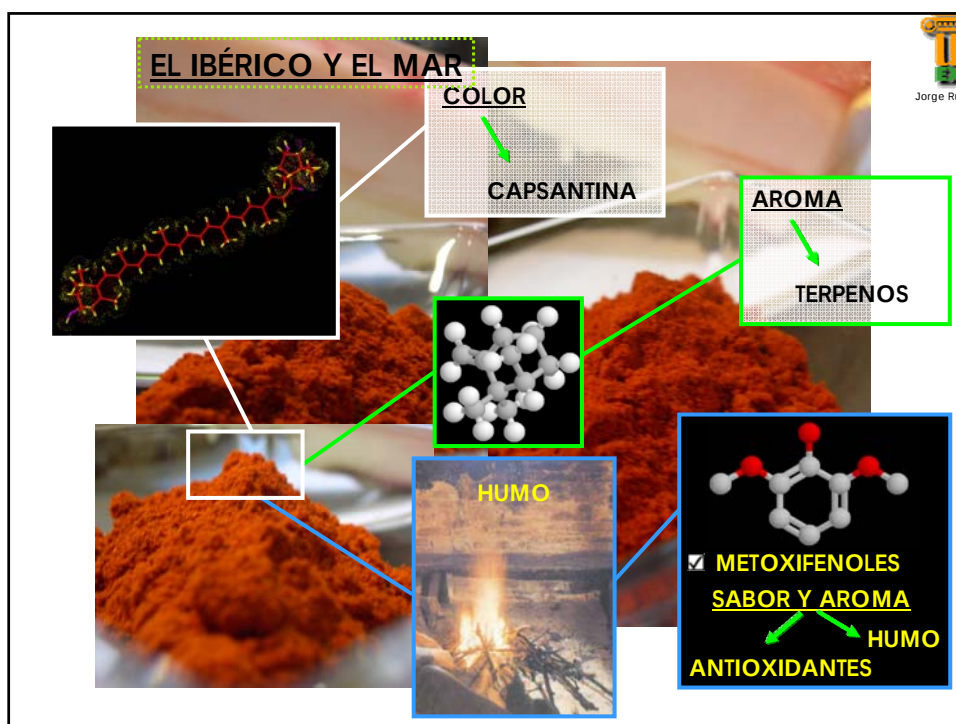


Ruiz









GRACIAS POR SU ATENCIÓN

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The slide features a decorative header with a row of green fork icons. The main text is 'GRACIAS POR SU ATENCIÓN' in a large, bold, black font. Below this is the website 'http://www.lamargaritaseagita.com' and the email 'jruiz@unex.es'. The footer contains the 'Indaga' logo and a black box with the name 'JORGE RUIZ', the 'UNIVERSIDAD DE EXTREMADURA' logo, and the email 'jruiz@unex.es'.