The effect of lysine restriction in grower phase on carcass and meat quality of heavy pigs

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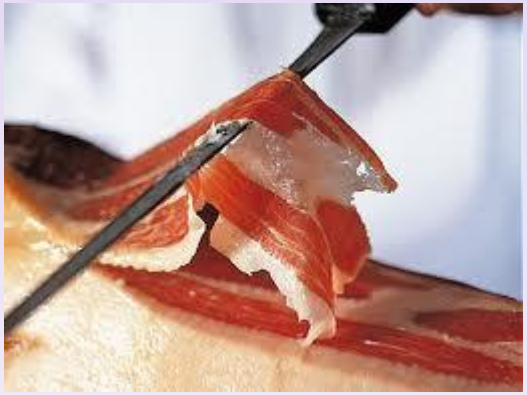
Importance of dry-cured products in Spain

A 20% of pigs is intended for dry-cured products and its economical value reach around 15%

Dry-cured ham is the most important one (5 PDO)



Requirements for Dry-cured ham production

Genetic breed

Iberian, Duroc and fatty lines

Slaughter weight > 100 kg of body weight

Nutrition (ingredients and nutrients)

↑ Fattiness in carcass and in meat

Current situation

A high lean deposition → Higher needs of protein

Especially during growing period

Consequences in posterior periods

To study the effect of lysine restriction in grower phase on carcass and meat quality of heavy pigs

Experimental Conditions

- **Animals: 200 Duroc x (Landrace x Large White) pigs**
  - ½ Barrows y ½ Gilts
  - Beginning: 26.3 ± 0.5 kg BW (blocks by sex and BW)
  - Final: 123.0 ± 2.35 kg BW
- **Diets:**

  Four during growing period (45 days):

  3.26 Mcal ME/kg, Total Lys: 1.1; 0.91; 0.78; 0.52 %

  A common diet during finishing period (until the slaughter)

  3.26 Mcal ME/kg and 0.91 % Lys

- **Five replicates (5 Barrows and 5 Gilts) of 5 animals/treatment**

Experimental Feeds: ingredients

	Growing diets				Finishing diet
	1.1	0.91	0.78	0.52	
Corn	24	24	24	24	24
Wheat	22	22	22	22	22
Barley	8.2	16.7	25.0	33.3	16.7
Soybean meal 44 CP	31.2	22.6	14.3	6.0	22.6
Bakery meal	6.0	6.0	6.0	6.0	6.0
Rapeseed meal	3.0	3.0	3.0	3.0	3.0
Blended fat	3.0	3.0	3.0	3.0	3.0
Macrominerals	2.37	2.37	2.37	2.37	2.37
Vitamin-mineral premix[1]	0.3	0.3	0.3	0.3	0.3

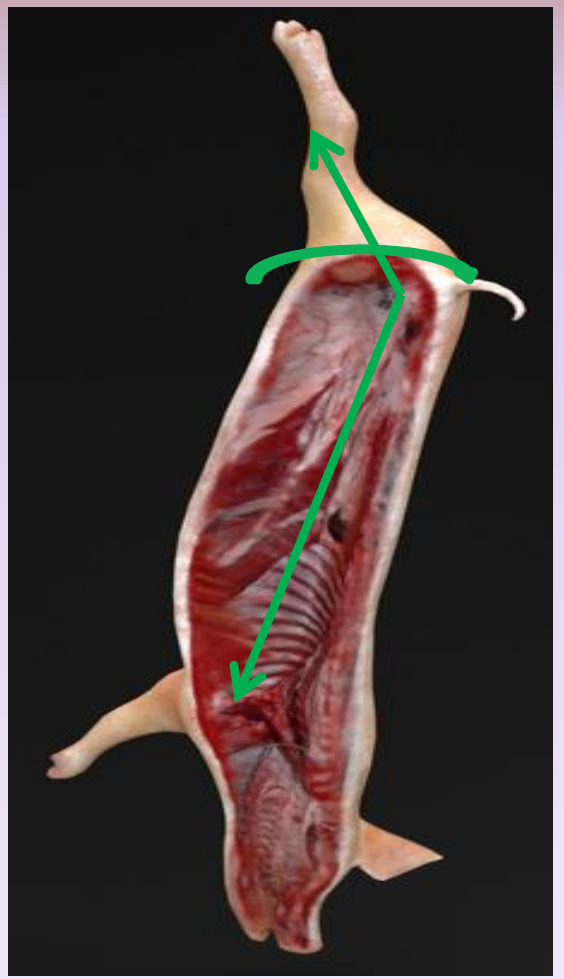
[1]Provided the following (per kilogram of complete diet): 7,000 IU Vitamin A; 1,300 IU Vitamin D^3; 10 IU Vitamin E; 0.4 mg Vitamin K^3; 0.8 mg Vitamin B^1; 3 mg Vitamin B^2; 1 mg Vitamin B^6; 15 µg Vitamin B^{12}; 12 mg nicotinic acid; 8 mg calcium pantothenate; 10 mg choline chloride; 1 µg Biotine; 15 mg Cu (copper sulfate); 80 mg Fe (ferrous carbonate); 35 mg Mn (manganese sulphate); 80 mg Zn (zinc oxide); 0.1 mg Co (cobalt carbonate); 0.3 mg Se (sodium selenite); and 0.3 mg I (potassium iodate).

Experimental Feeds: nutrients

	Growing diets				Finishing diet
	1.1	0.91	0.78	0.52	
ME, Kcal/kg	3260	3260	3260	3260	3260
Crude Protein, %	**24.0**	**19.3**	**16.2**	**14.9**	**19.3**
NDF, %	12	12	12	13	12
Ether Extract, %	2.41	4.15	4.45	4.30	4.15
Starch, %	34.8	36.8	40.5	43.8	36.8
Total lysine, %	**1.1**	**0.91**	**0.78**	**0.52**	**0.91**

Carcass Characteristics

- **Carcass size**
  - Carcass length
  - Ham length
  - Ham circumference
- **Proportion of main trimmed lean cuts** (ham, shoulder and loin)
- **Fat thickness at 3rd-4th ribs**



Meat Quality

- **Warner Bratzler shear force**

- **Chemical composition**
  - Moisture
  - Protein
  - Intramuscular fat

Statistical Analyze

Statistical package: SAS v 9.2 (2002)

- **Factorial model 2 (sexes) x 4 (diets in based on Lys content)**
  - **Procedure GLM**

	Sex			Level of Lysine (%)					Signification	
	Barrows	Gilts	SEM	1.1	0.91	0.78	0.52	SEM	p-sex	p-lys
FCR (g/g)	2.71	2.76	0.027	2.66^{b}	2.66^{b}	2.80^{a}	2.83^{a}	0.038	NS	$L^{0.001}$
Growing-finishing time (days)	109	117	1.2	110^{b}	108^{b}	115^{a}	119^{a}	1.7	<0.0001	$L^{<0.0001}$ $Q^{0.07}$
	Barrows	**Gilts**	**SEM**	**1.1**	**0.91**	**0.78**	**0.52**	**SEM**	**p-sex**	**p-lys**
Carcass weight (kg)	94.2	95.2	0.78	94.3	94.8	94.8	94.9	1.11	NS	NS
Carcass length (cm)	85.1	86.9	0.26	86.1	85.7	85.8	86.2	0.37	<0.0001	NS
Ham length (cm)	39.1	39.2	0.11	39.2	39.0	39.1	39.3	0.17	NS	NS
Ham circumference (cm)	75.1	75.1	0.26	75.3	75.6	75.1	74.6	0.37	NS	NS
Backfat at 3-4 ribs (mm)	40.5	38.2	0.62	37.7^{b}	39.4^{ab}	39.6^{ab}	40.7^{a}	1.73	0.008	$L^{0.02}$

Proportion of main trimmed lean cuts (%)

	Sex			Level of Lysine (%)					Signification	
	Barrows	Gilts	SEM	1.1	0.91	0.78	0.52	SEM	p-sex	p-lys
Ham	13.05	13.12	0.047	13.08	13.19	13.05	13.02	0.067	NS	NS
Shoulder	7.26	7.27	0.054	7.41^{a}	7.34^{a}	7.18^{b}	7.14^{b}	0.039	NS	$L^{0.03}$
Loin	3.06	3.25	0.043	3.16	3.15	3.20	3.10	0.060	0.009	NS
Total	24.6	24.9	0.10	25.0^{a}	25.0^{a}	24.6^{b}	24.5^{b}	0.08	NS	$L^{0.02}$

Meat Quality

	Sex			Level of Lysine (%)					Signification	
	Barrows	Gilts	SEM	1.1	0.91	0.78	0.52	SEM	p-sex	p-lys
Warner Bratzler shear force (kg/cm)	2.00	2.14	0.063	2.18	2.07	1.99	2.03	0.089	NS	NS
Chemical Composition (%)										
Moisture	70.4	70.4	0.263	70.3	70.2	70.5	70.6	0.37	NS	NS
Protein	23.3	23.6	0.153	23.8^{a}	23.5^{ab}	23.4^{ab}	23.1^{b}	0.21	NS	$L^{0.02}$
Intramuscular Fat	3.89	3.65	0.155	3.50	3.61	3.86	4.11	0.220	NS	$L^{0.073}$

CONCLUSIONS

A decrease of dietary Lys content from 1.1 to 0.52% during the growing period

improved some carcass and meat characteristics which are desirable in pigs intended for dry-cured ham production.

Thank you for your attention