Technological quality traits of meat from Slovenian indigenous Krškopolje pigs in enriched environment

Marjeta Žemva, Milena Kovač, Špela Malovrh

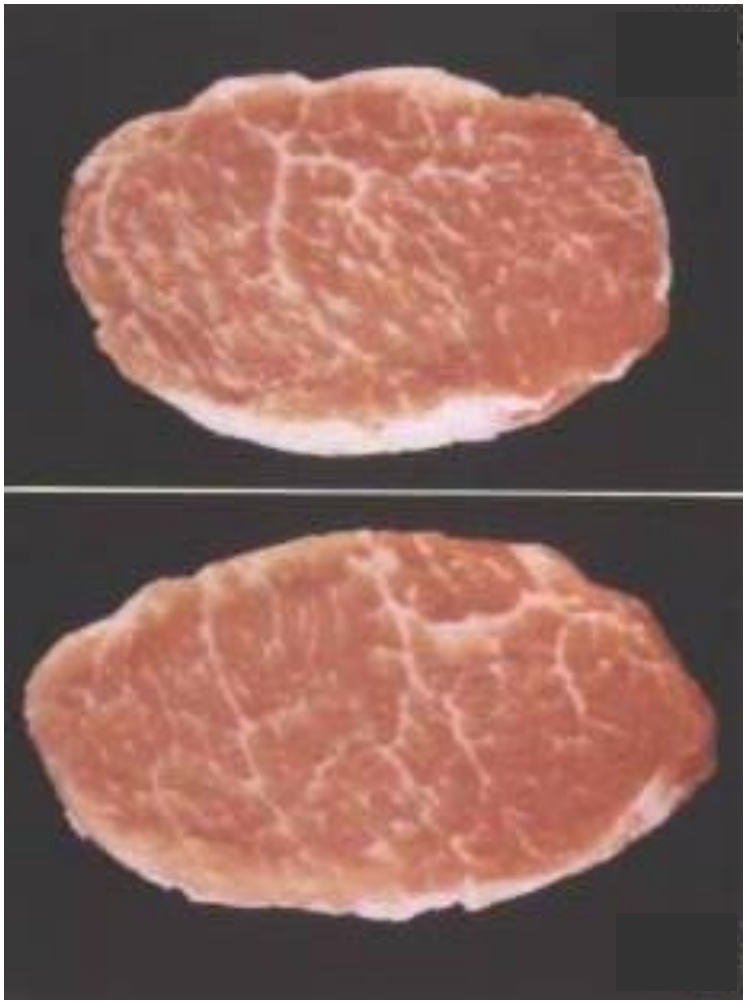
University of Ljubljana, Biotechnical Faculty,
Department of Animal Science

Krškopolje pig

- Indigenous breed
- Fatty pigs
- Large amount of subcutaneous and intramuscular fat tissue
- Good meat quality

Intramuscular fat content

- Effect on sensorial traits
  - juciness
  - tenderness
  - colour
- In relation with technological quality traits



http://web.bf.uni-lj.si/zt/meso/praktikum%201/barva%20uvod_files/image004.jpg

Technological quality traits

- Important for meat processing
- pH value, conductivity, colour, drip loss
- Meat quality
  - pale, soft and exudative (PSE)
  - dark, firm and dry (DFD)
  - normal meat

Goal

To investigate the effects of

sex, **weight group** and **age** at slaughter on

- intramuscular fat content
- technological quality traits and

of Krškopolje pigs

Material – rearing conditions

- 42 Krškopolje pigs
  - 19 barrows
  - 23 gilts
- Straw bedded pen (3.75 m^2/pig)
- Grind cereals
- Good quality hay (*ad libitum*)

Material – slaughter

- Four slaughter days – by 10 or 12 animals
- Each slaughter – two weight groups
  - 125 kg
  - 155 kg
- Age at slaughter 236 – 364 days

Methods

- pH value (45 min, 24 hrs; LD, SM; Mettler Toledo LE 413)
- Conductivity (45 min, 24 hrs; LD, SM; LF/PT-STAR)

- Colour (24 hrs; LD)
  - Instrumental colour (L*, a*, b*, c*, h*; Minolta CR-300)
  - Visual colour (24 hrs; Nakai et al., 1975)

- Drip loss (24 hrs, 48 hrs; LD; Honikel, 1998)

Methods

- Laboratory analysis

  Intramuscular fat content, IMF
  (Weibull and Stoldt; AOAC, 1997)

- Statistical model

$$y_{ijk} = \mu + S_i + G_j + b(x_{ijk} - \bar{x}) + e_{ijk}$$

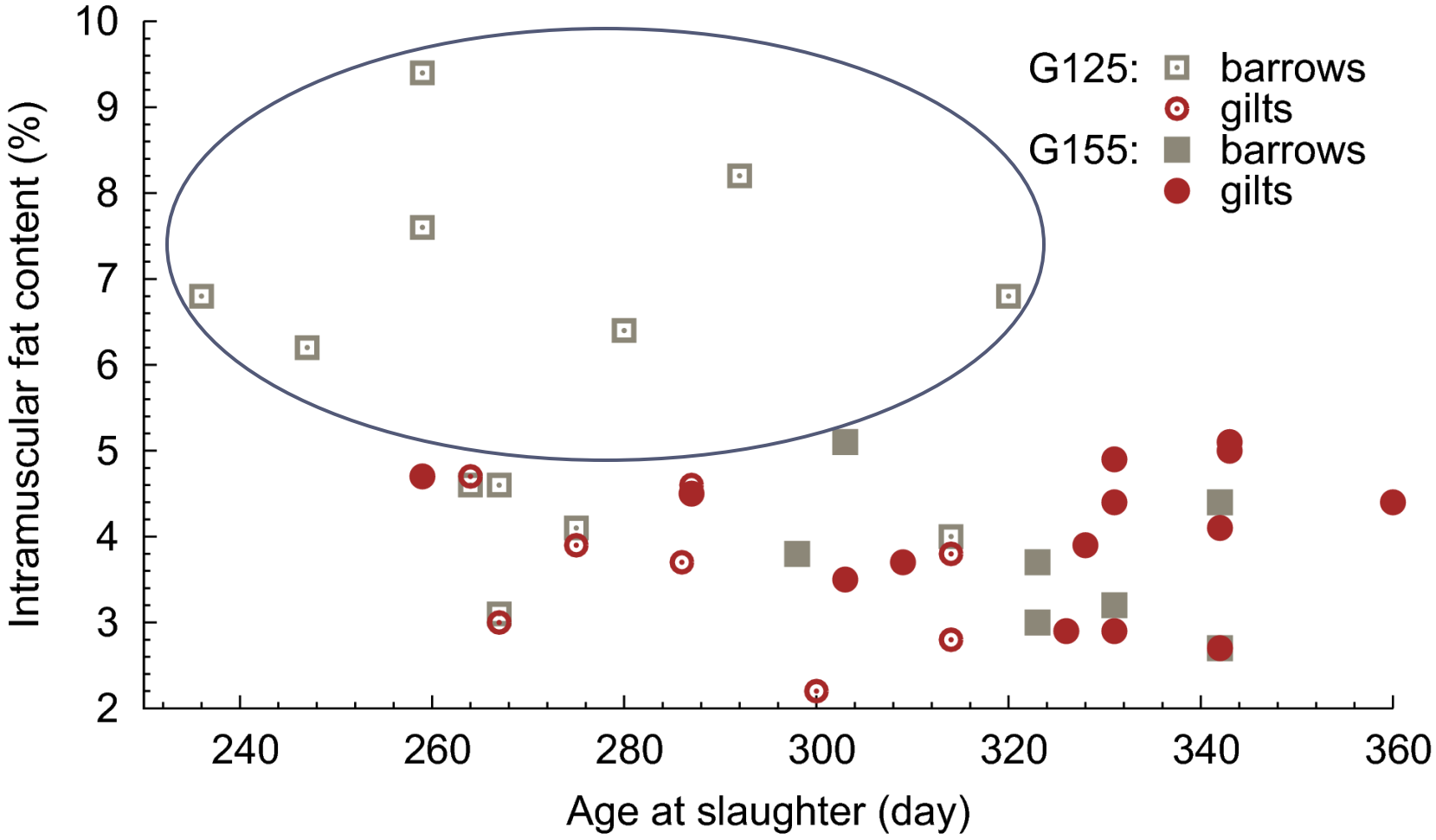
effect of sex, weight group, and age at slaughter

GLM procedure (SAS Inst. Inc., 2008)

Results – Intramuscular fat content (IMF)

Effects		IMF (%)	p-value
Sex	Barrows	4.98±0.33	**0.0484**
	Gilts	4.04±0.31	
Weight group	G125	4.62±3.85	0.7119
	G155	4.39±3.64	
Age at slaughter		-0.01±0.01	0.1721

IMF content


Intramuscular fat content (%)
10
9
8
7
6
5
4
3
2
240
260
280
300
320
340
360
Age at slaughter (day)
G125:
barrows
gilts
G155:
barrows
gilts

Results – effect of sex

Traits	Barrows	Gilts	p-value
$Cond_{45}$LD (mS/cm)	4.52±0.18	4.23±0.17	0.2620
$Cond_{45}$SM (mS/cm)	3.94±0.16	3.66±0.15	0.2120
$Cond_{24}$LD (mS/cm)	8.61±0.54	9.39±0.49	0.2991
$Cond_{24}$SM (mS/cm)	7.56±0.56	6.43±0.50	0.1482
b*	5.44±0.22	5.79±0.20	0.2482
h*	0.47±0.01	0.49±0.01	0.1478

Cond – conductivity; $_{45}$ – 45 min after slaughter; $_{24}$ – 24 hrs after slaughter; LD – *m. longissimus dorsi*; SM – *m. semimembranosus*

Results – effect of weight group

Traits	WG125	WG155	p-value
$pH_{45}LD$	5.91±0.05	6.09±0.05	**0.0166**
Drip $loss_{24}$ (%)	3.05±0.27	2.47±0.28	0.1755
Drip $loss_{48}$ (%)	4.61±0.33	3.90±0.34	0.1690
L *	49.53±0.65	48.37±0.69	0.2590

G125, G155 – weight group slaughter at 125 kg, 155 kg; $_{45}$ – 45 min after slaughter; LD – *m. longissimus dorsi*; $_{24}$ – after 24 hrs; $_{48}$ – after 48 hrs

Results – effect of age (I.)

Traits	b (unit/day)*10^{-3} ± SE	p-value
$pH_{45}SM$	-2.99 ± 1.49	0.0543
$pH_{24}LD$	-0.62 ± 0.35	0.0858
$pH_{24}SM$	-2.20 ± 0.42	**<0.0001**
$Cond_{45}LD$ (mS/cm)	14.89 ± 4.31	**0.0014**
$Cond_{24}LD$ (mS/cm)	39.34 ± 12.64	**0.0035**

b – regression coefficient; SE – standard error; $_{45}$ – 45 min after slaughter; $_{24}$ – 24 hrs after slaughter; LD – *m. longissimus dorsi*; SM – *m. semimembranosus;* Cond – conductivity

Results – effect of age (II.)

Traits	b (unit/day)*10^{-3} ± SE	p-value
Drip $loss_{24}$ (%)	13.02 ± 6.58	0.0556
Drip $loss_{48}$ (%)	19.23 ± 8.02	**0.0219**
a*	14.82 ± 7.07	**0.0430**
c*	16.66 ± 8.28	0.0519
Colour (1–6)	6.84 ± 2.76	**0.0178**

b – regression coefficient; SE – standard error; $_{24}$ – after 24 hours; $_{48}$ – after 48 hours; Colour – visual evaluated colour on the scale from 1 to 6

Conclusions

- Intramuscular fat content:
  - Barrows more IMF than gilts
  - Weight group and age at slaughter: no effect
- Technological quality tratis:
  - Sex: no effect
  - Weight group: lighter pigs had lower $pH_{45}LD$
  - Age: Older pigs had
    - ↑ conductivity on LD
    - ↑ drip loss
    - ↑ red colour
    - ↑ visual score