VLAIO HBC.2019.2877

FACULTEIT DIERGENEESKUNDE [1] accredited by EAEVE

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Coolpigs

ANTIOXIDANT-ENRICHED OR ENERGY-DENSE DIET IN HEAT STRESSED FATTENING PIGS

L. De Prekel[1,2], D. Maes[1], A. Van den Broeke[2], M. Aluwé[2]

FEEDING STRATEGIES

- additives and composition -

FEEDING STRATEGIES

Antioxidants or altered feed composition

Control

Enriched

Extra antioxidants & osmolytes
→ decreasing osmotic stress

E-dense

Low protein & high fat
→ decreasing heat production

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FEEDING STRATEGIES

Antioxidants or altered feed composition

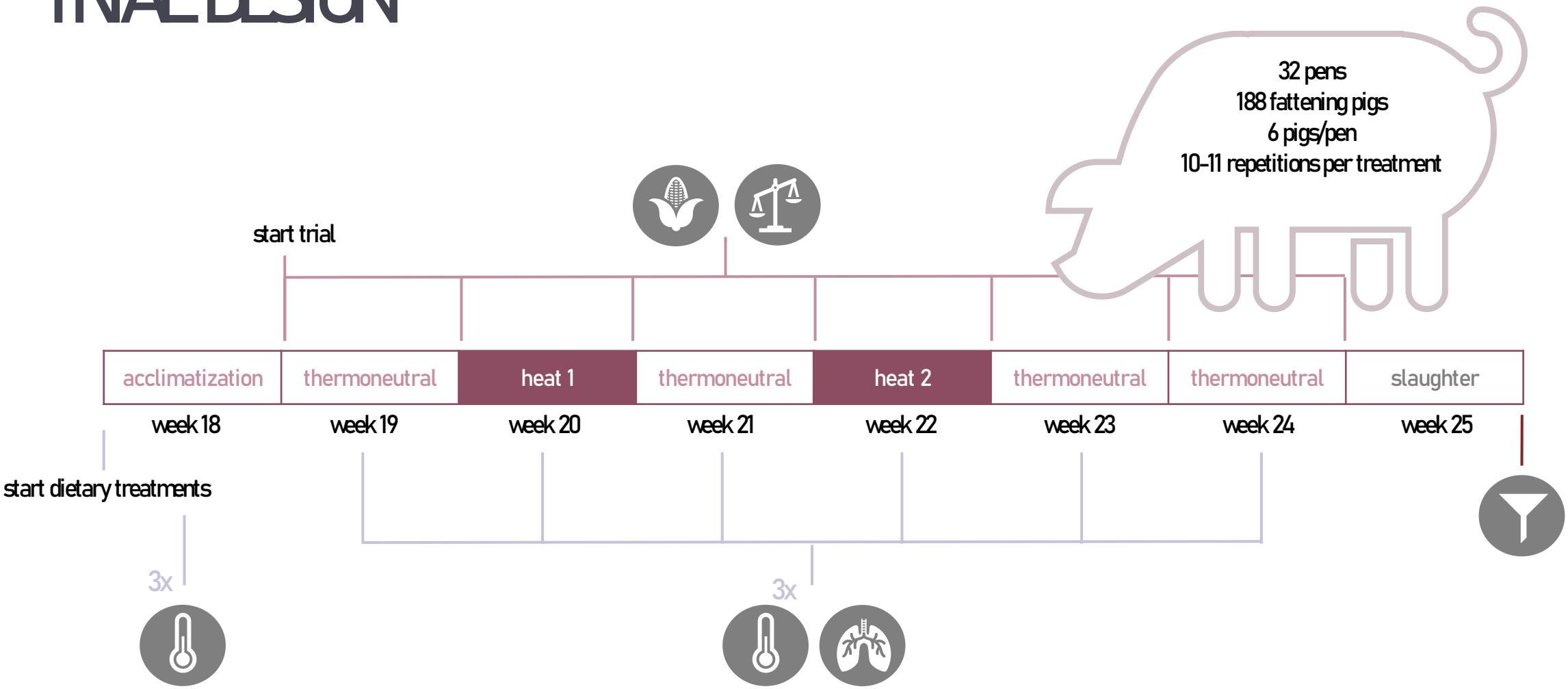
Control

Enriched

E-dense

Crude protein [%]	15
Crude fat [%]	3.5
Net Energy [MJ/kg]	9.1
SID Lysine [g/kg]	7.8
SID Lys: NE ratio	0.86
Additives (premix)	
Vitamin E [ppm]	100
Vitamin C [ppm]	0
Betaine [ppm]	0
Inorganic Se [ppm]	0.4
Organic Se [ppm]	0

TRIAL DESIGN



TRIAL DESIGN

Physiological parameters

Respiration rate [breaths/min]

Counting number of flank movements for 30sec x 2

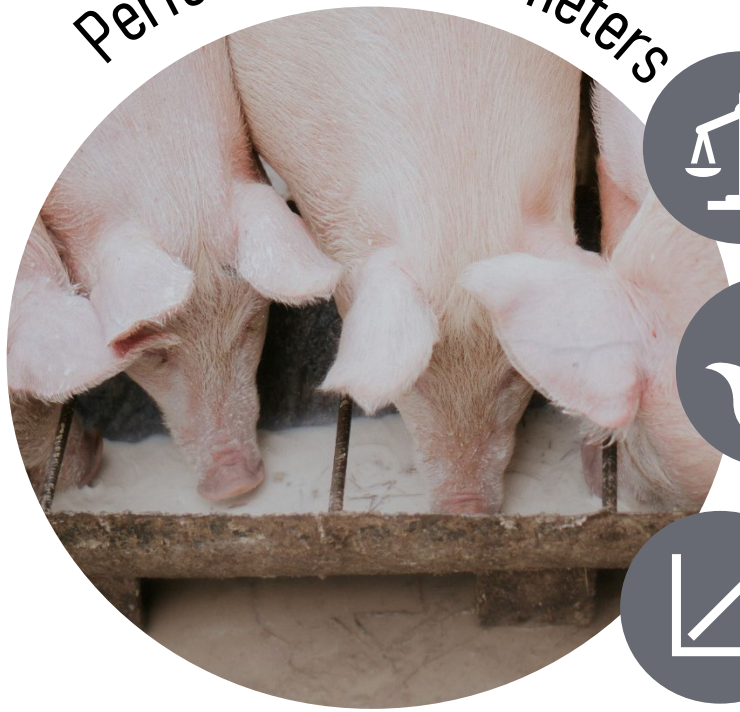
Rectal temperature [°C]

Digital thermometer

TRIAL DESIGN

Physiological parameters

Performance parameters

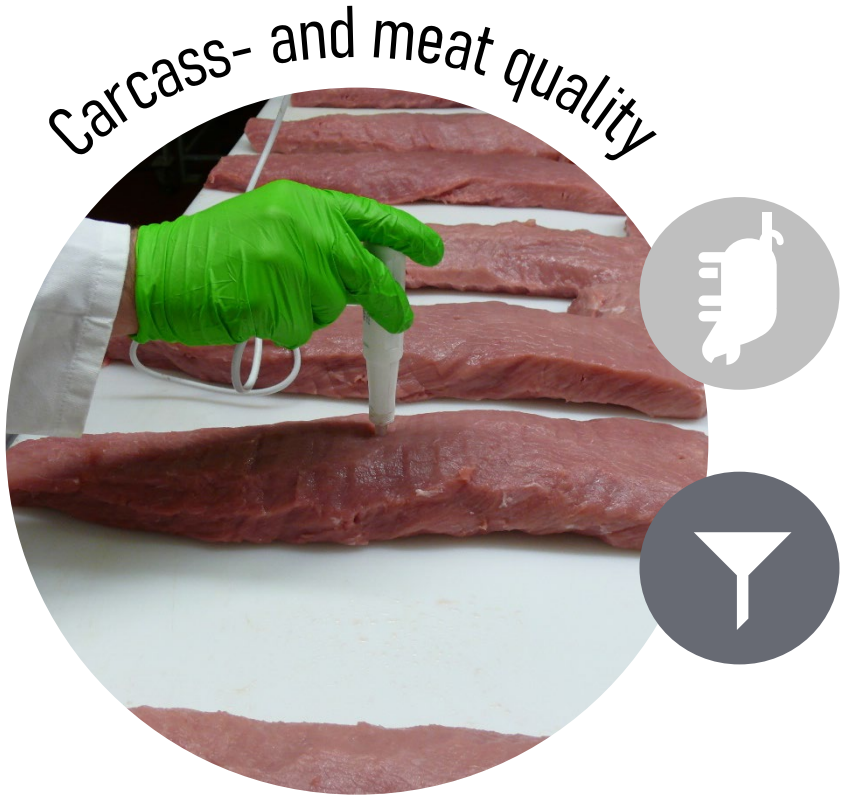


Average daily gain [g/day]
Weekly individual weighing

Average daily feed intake [g/day]
Weekly feeder weighing

Feed conversion ratio [g/g]
Feed intake/daily gain

TRIAL DESIGN



Carcass quality
Warm carcass weight, fat thickness, muscle thickness, carcass lean meat content, ham fat thickness and ham meat thickness

Meat quality
pH_1, pH_u, drip loss, cooking loss, total fluid loss, shear force, intramuscular fat, color, vitamin E and selenium content

CLIMATE CONTROL

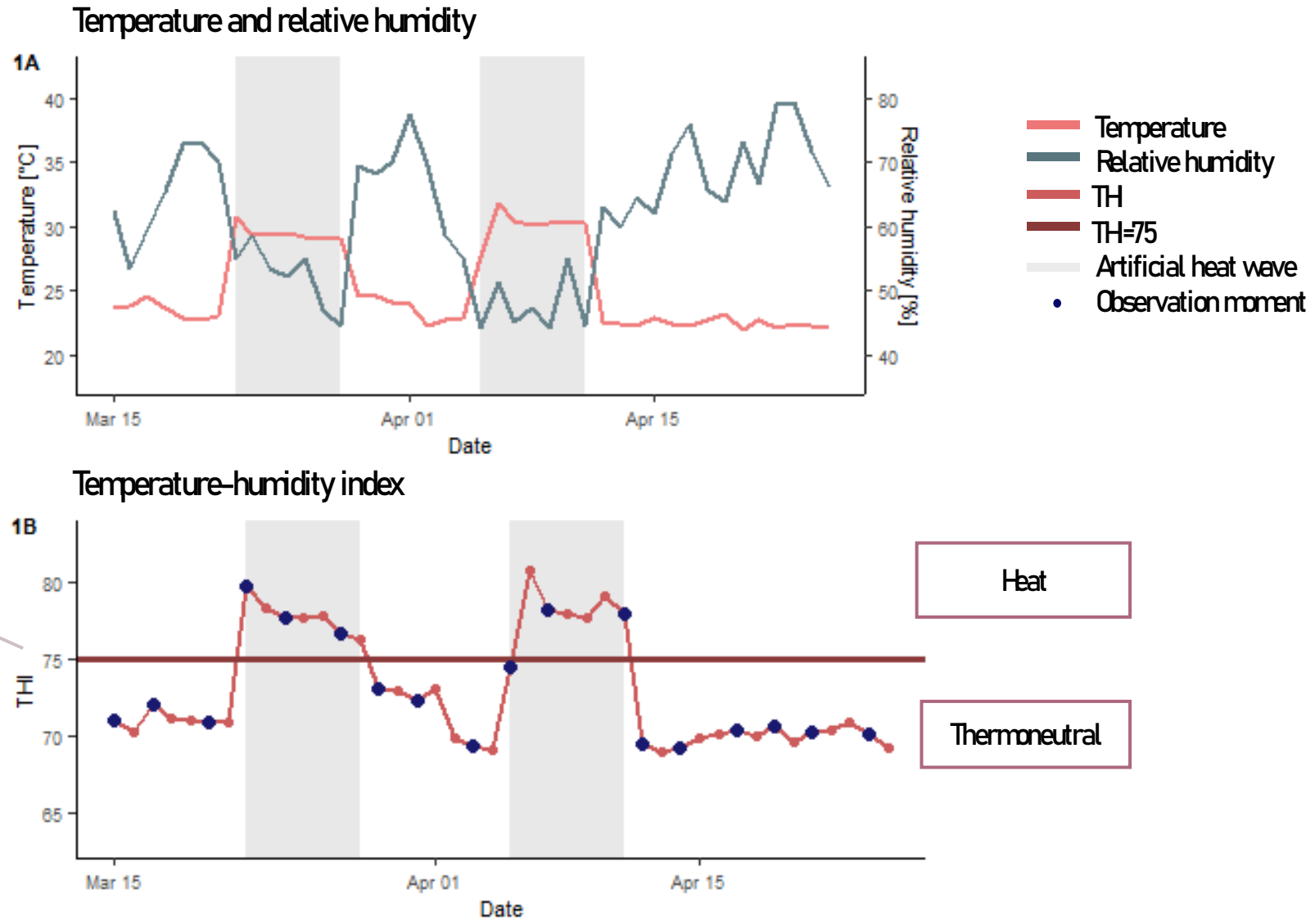
Outlet combustion gasses

Fuel tank

Heating device

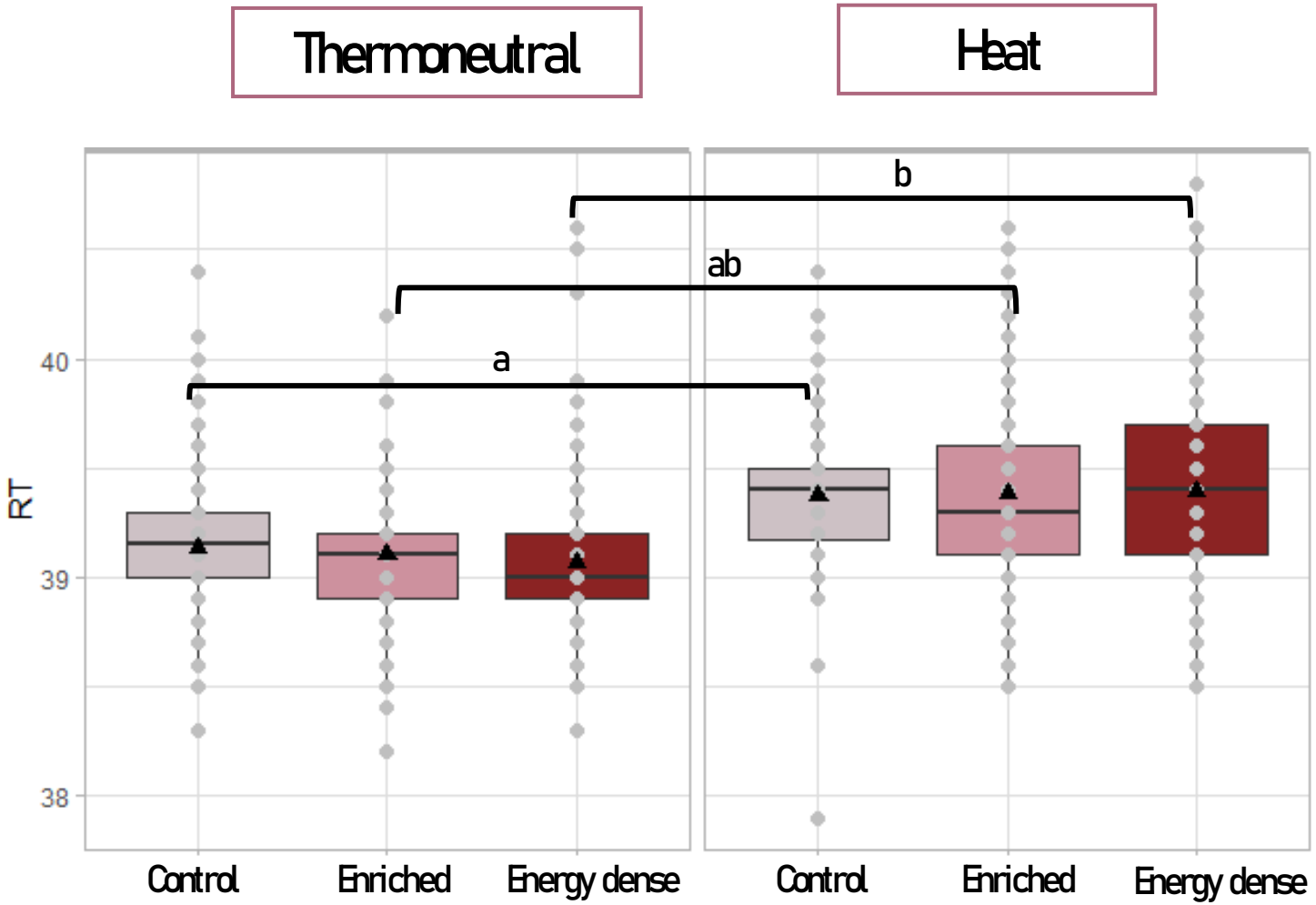
Air inlet of compartment

CLIMATE CONTROL

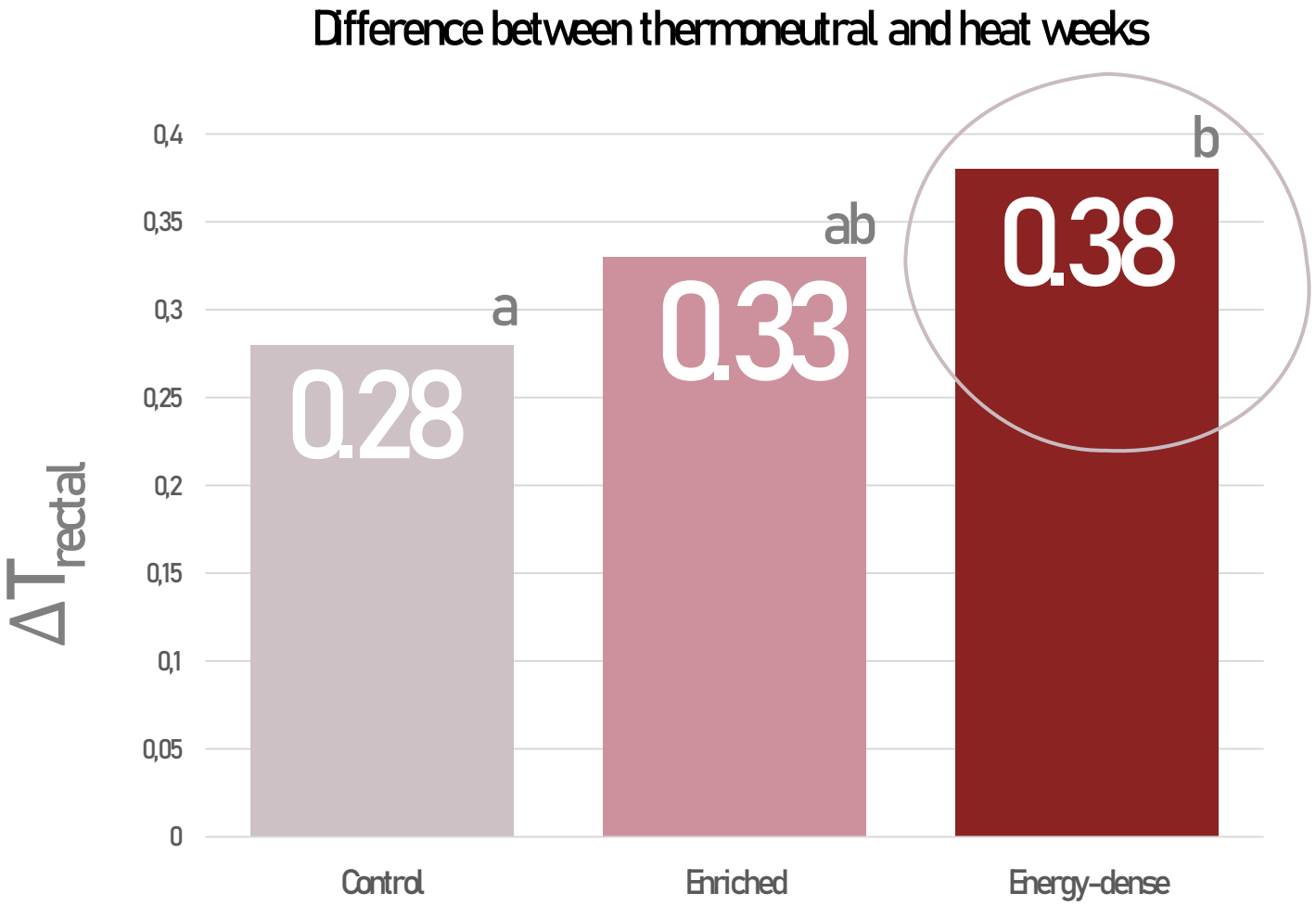


RESULTS | PHYSIOLOGY

Rectal temperature

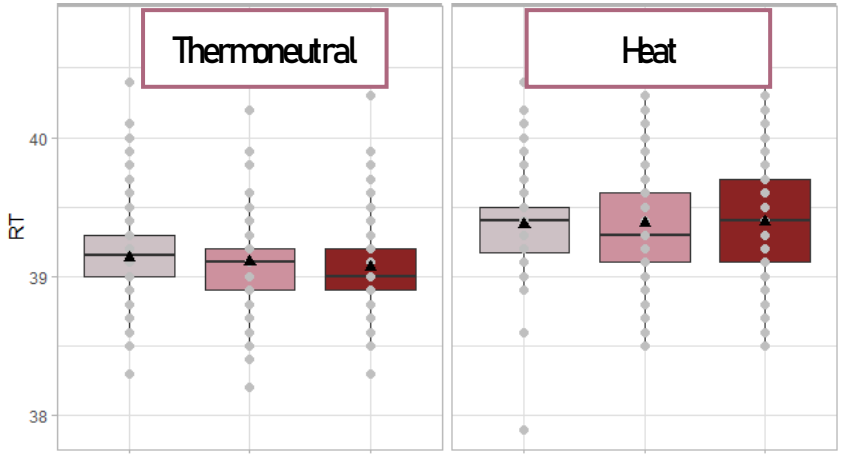


RESULTS | PHYSIOLOGY



Hgher Δrectal temperature, due to

- lower rectal temperature during thermoneutral weeks
  - Effect of lower crude protein and lower general heat production?
- equal rectal temperature during heat waves



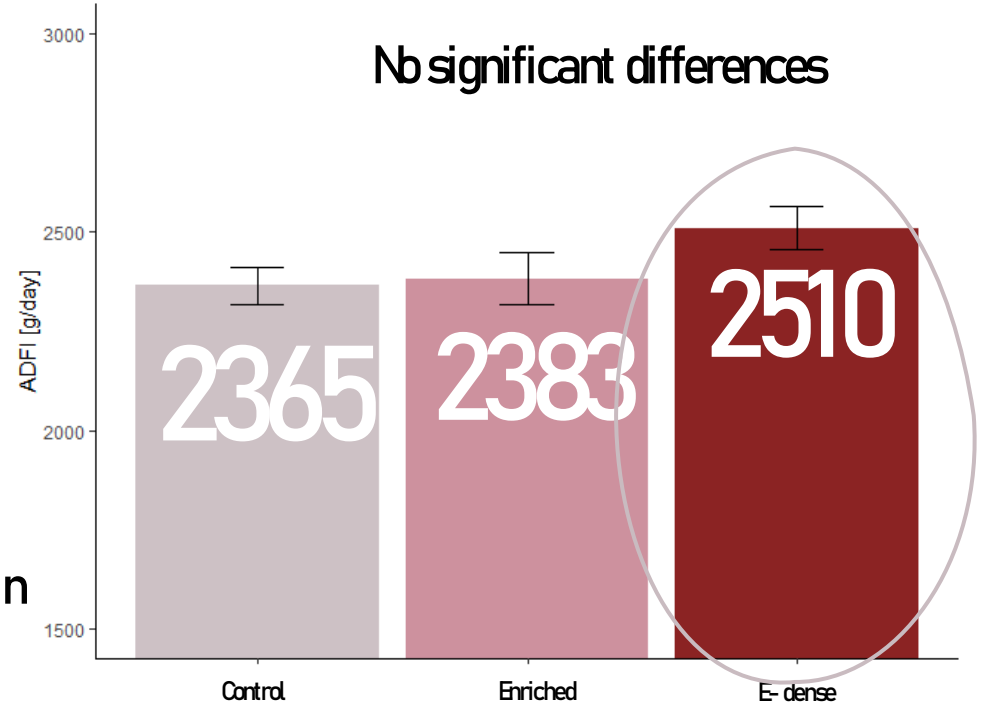
RESULTS | PERFORMANCE

Daily gain

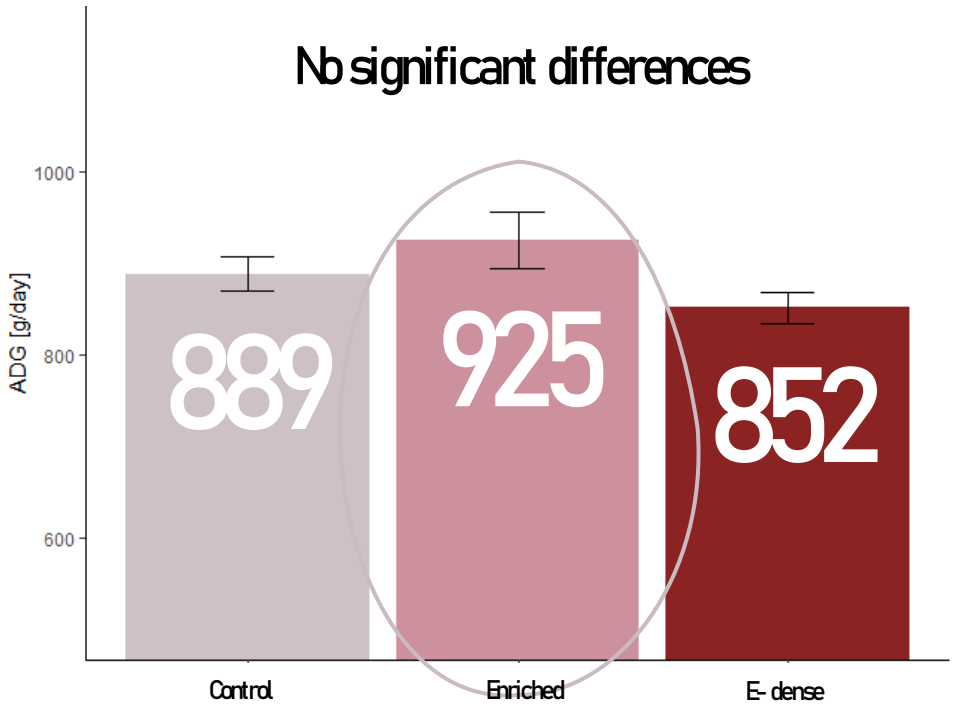
Daily feed intake

Arithmetic means

Daily feed intake (last 6 weeks)

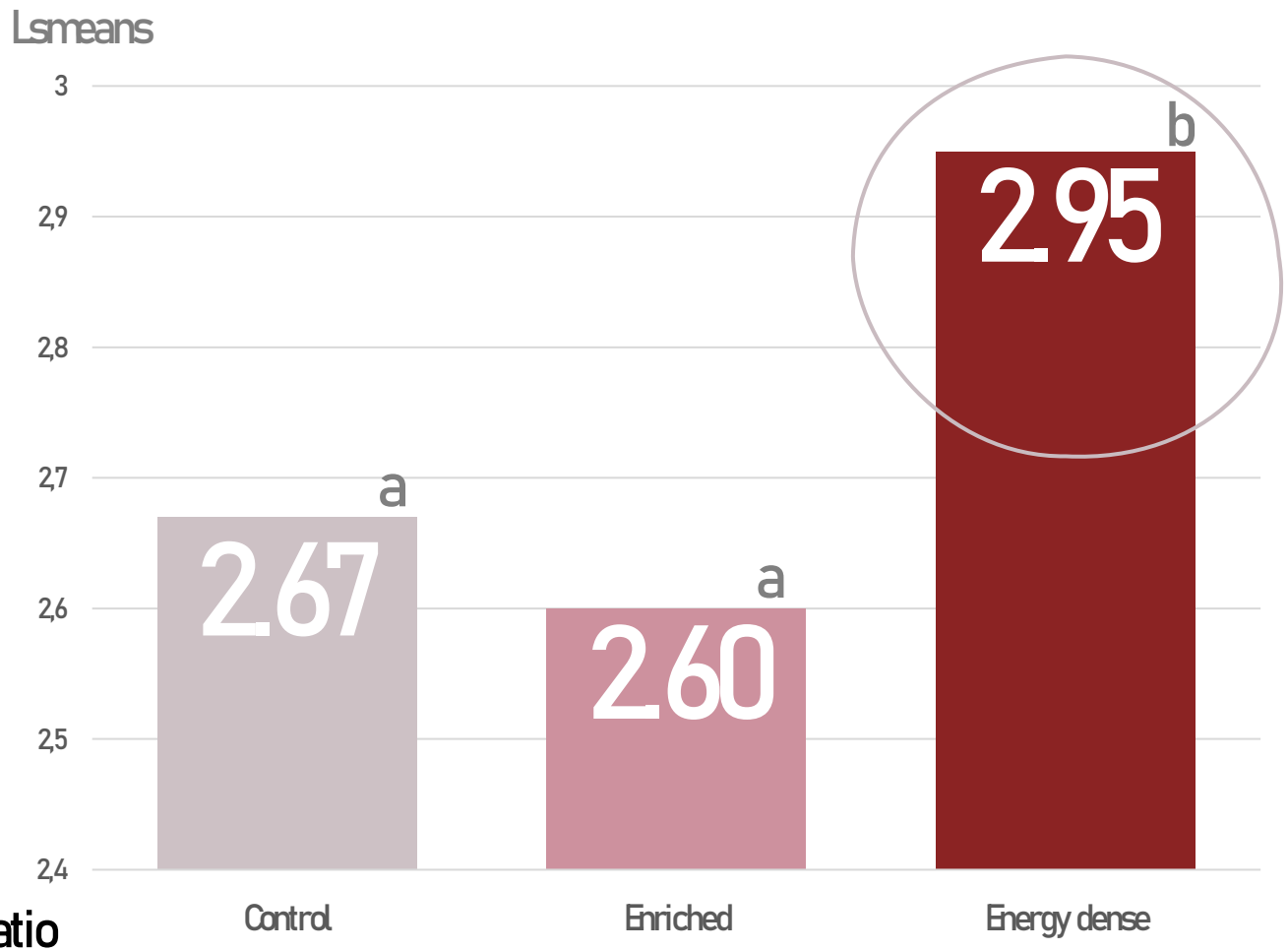


Daily gain (last 6 weeks)



RESULTS | PERFORMANCE

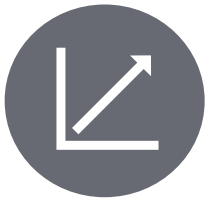
Feed conversion ratio



Hgher feed intake, but less efficient growth

- Hgher lysine and energy addition (same lys:energy ratio) should "cover for" protein reduction
- Decreased performance because the availability of synthetic amino acids is not in sync with energy availability?

RESULTS | PERFORMANCE



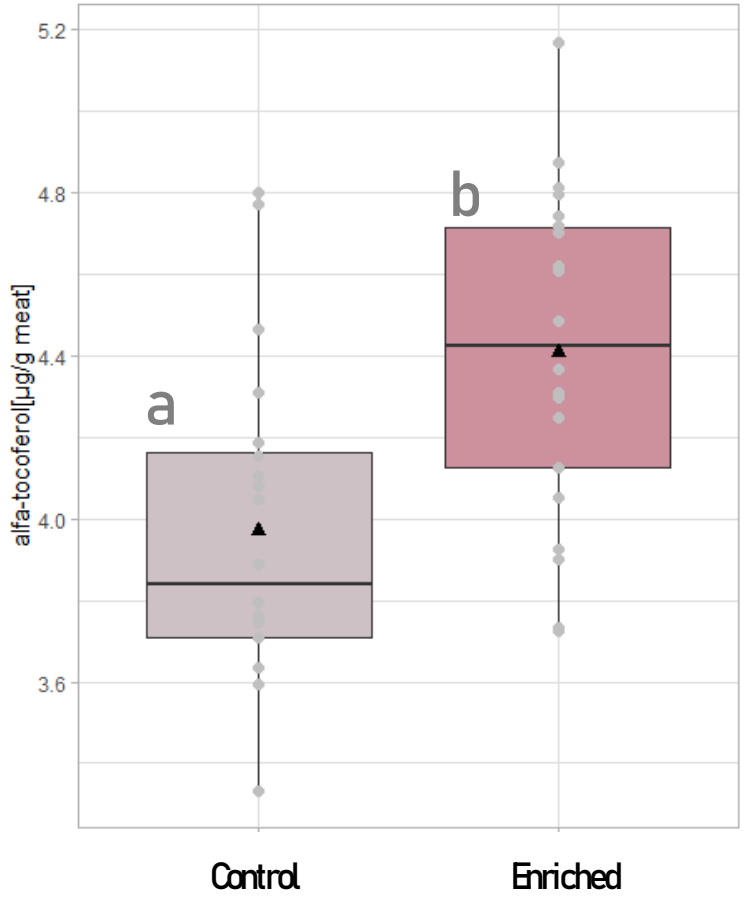
Feed conversion ratio

Lsmeans	 Control	 Enriched	 E-dense
19 (thermoneutral)	2.46	2.43	2.91
20 (heat 1)	3.23	2.96	3.62
21 (thermoneutral)	3.14	2.72	2.87
22 (heat 2)	5.06	3.81	4.62
23 (thermoneutral)	2.66	2.63	2.49
24 (thermoneutral)	3.20	3.35	3.89

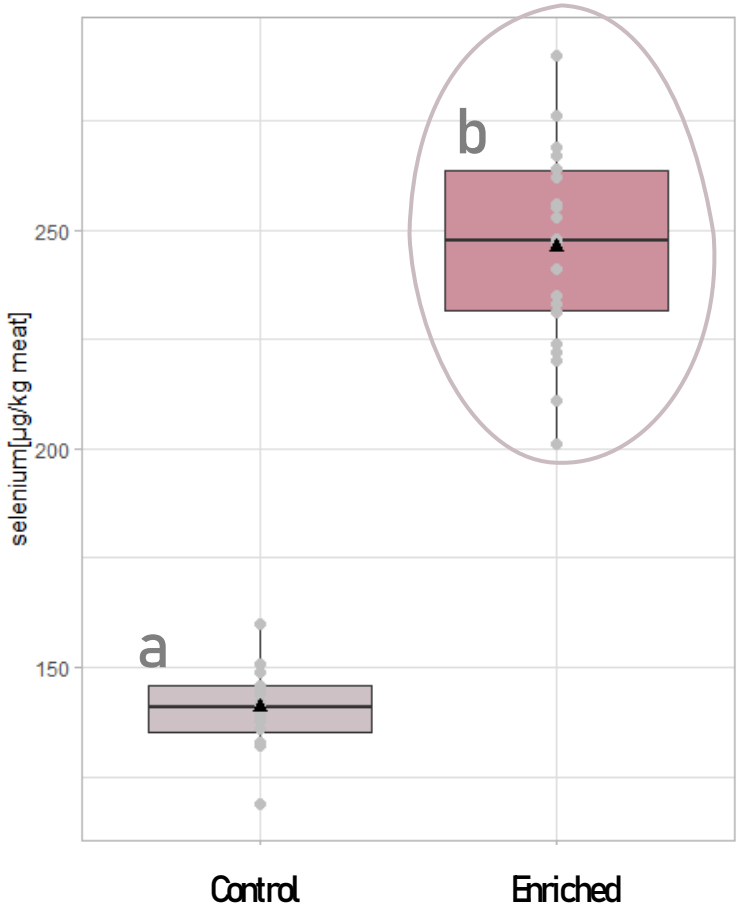
Lower FCR during heat waves, but $P>0.05$

RESULTS | MEAT QUALITY

Vitamin E



Selenium



Hgher antioxidant levels

- Both groups received the same amount of total selenium
- Hgher selenium levels due to the greater bioavailability of the organic selenium source as compared to the inorganic variant

- Reference value intake Se for humans: ±70 µg/day
- Average intake Se in Europe: ±40 µg/day
- 100g meat with organic form: +25µg/100g

CONCLUSION

Parameters	Enriched	E-dense
Physiologic		Hgher increase in rectal temperature during heat
Performance	Better feed conversion ratio during heat	Hgher total feed conversion ratio
Carcass quality		(More fat)
Meat quality	Hgher content of selenium and vitamin E	(Hgher intramuscular fat)

Effects of feeding strategies tested for controlling heat stress in pigs are limited




THANKS TO




THANK YOU FOR YOUR ATTENTION

I'm happy to answer your questions

lotte.deprekel@ugent.be

lotte.deprekel@ilvo.vlaanderen.be

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RESULTS| CARCASS

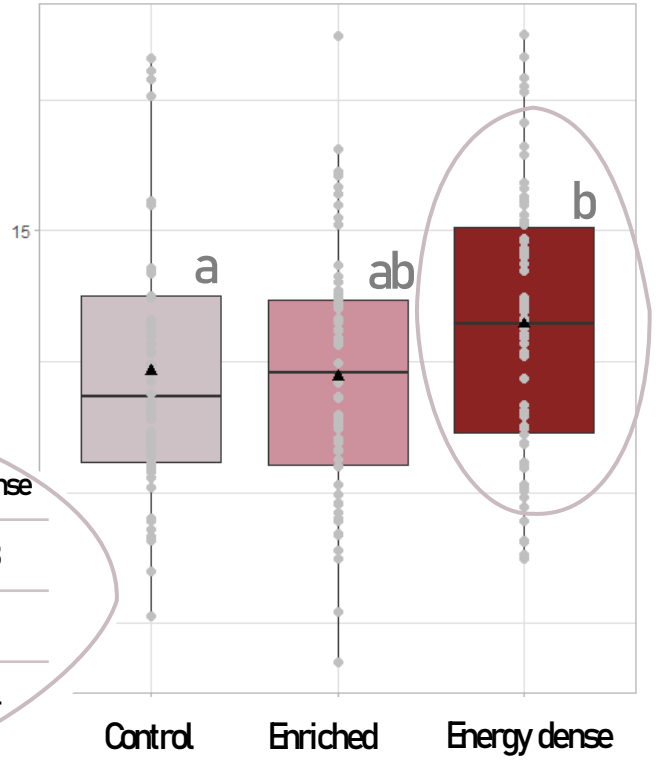
Carcass quality

Hgher meat fat thickness and lower lean meat content

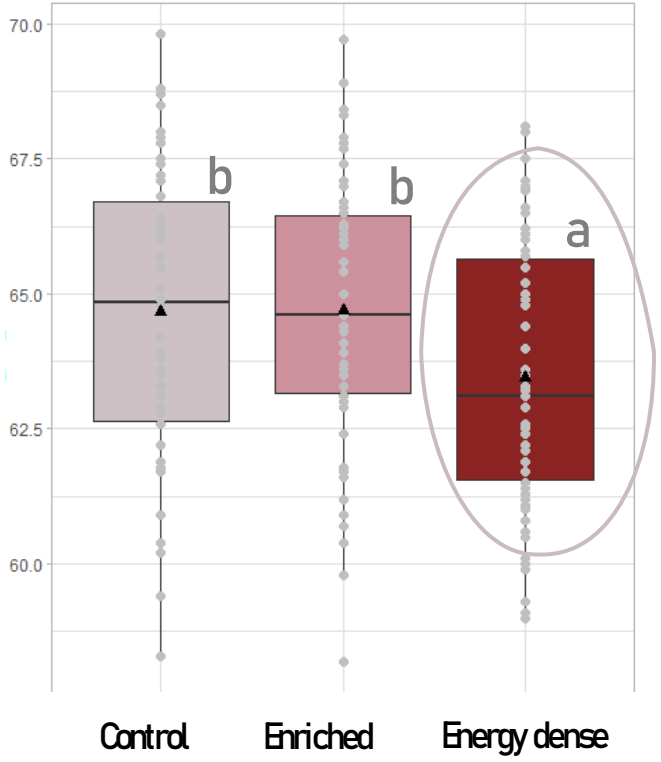
- In line with lower muscle gain

	Control	Enriched	E-dense
Start weight (wl0) [kg]	23	23	23
Start weight (wl8) [kg]	81	78	81
Warm carcass weight [kg]	94	92	94

Fat thickness [mm]



Lean meat content [%]



RESULTS | MEAT

Meat quality

	 Control	 Enriched	 E-dense	*P*-value
pH (after 35min)	6.5	6.5	6.4	0.265
pHu (after 22h)	5.6^{x}	5.6^{xy}	5.5^{y}	0.021
Drip loss [%]	6.2	6.0	6.1	0.871
Cooking loss [%]	33.6^{xy}	34.1^{y}	33.2^{x}	0.051
Total fluid loss [%]	44.5^{xy}	44.7^{y}	43.6^{x}	0.039
Shear force [N]	30.9	32.0	32.1	0.574
Intramuscular fat [%]	1.8^{x}	1.9^{xy}	2.1^{y}	0.031

Lower pH, but still within acceptable value

Hgher IMF can be linked to higher fat thickness and lower lean meat content