



# EFFECT OF REDUCED DIGESTIBLE PROTEIN AND AMINO ACID SUPPLY IMPOSED IN THE GROWER AND FINISHER PERIOD OR SOLELY IN THE FINISHER PERIOD ON GROWTH PERFORMANCE AND CARCASS COMPOSITION

G. Bee, G. Maikoff, C. Kasper

Swine Research Unit, Agroscope Posieux, 1725 Posieux, Switzerland

TAP TO RETURN  
TO KIOSK MENU

Introduction

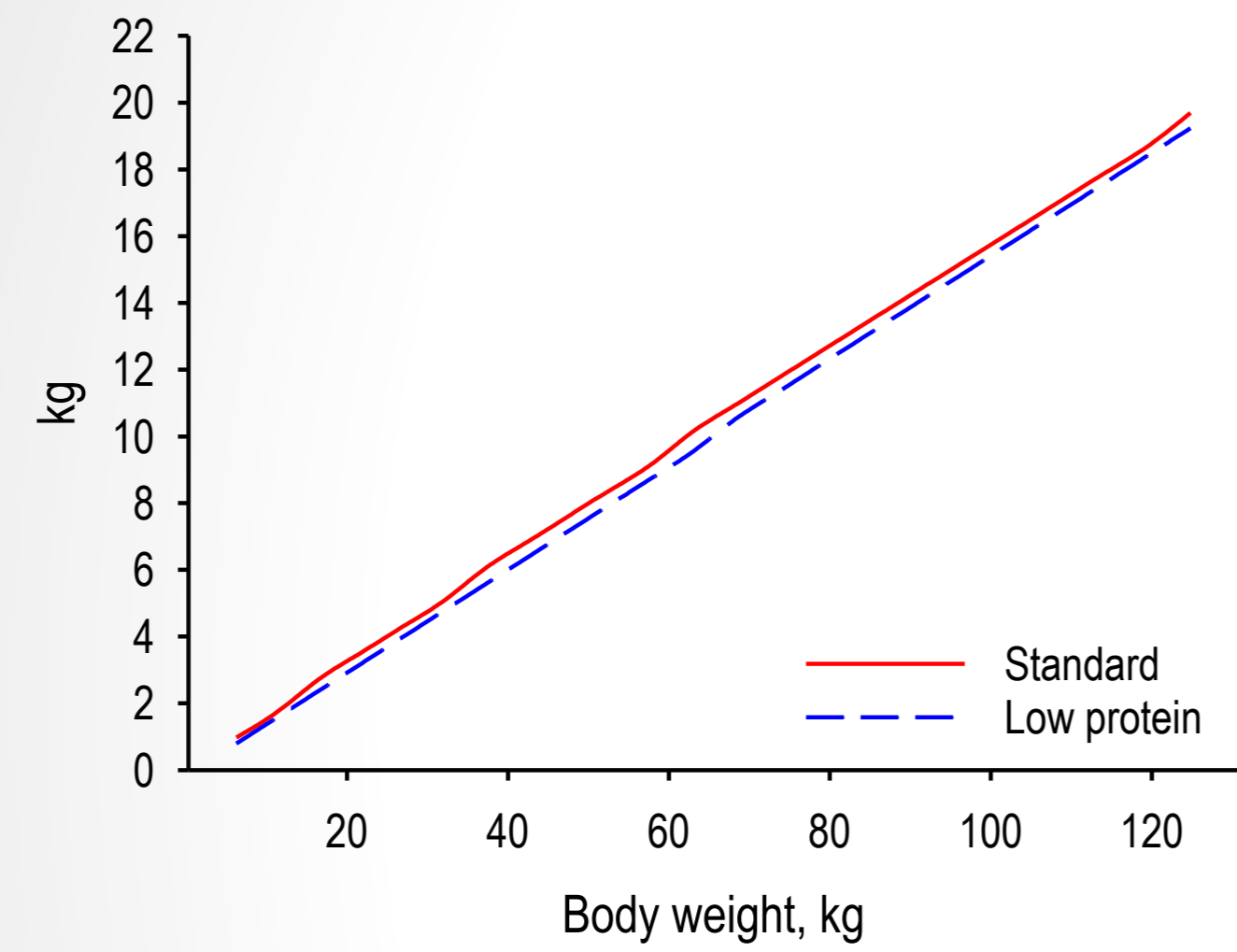
Methods

Above 65 kg empty body weight (BW), protein deposition is greater in pigs fed protein-restricted compared to standard diets (Ruiz-Ascacibar et al. 2017, Ruiz-Ascacibar et al. 2019)

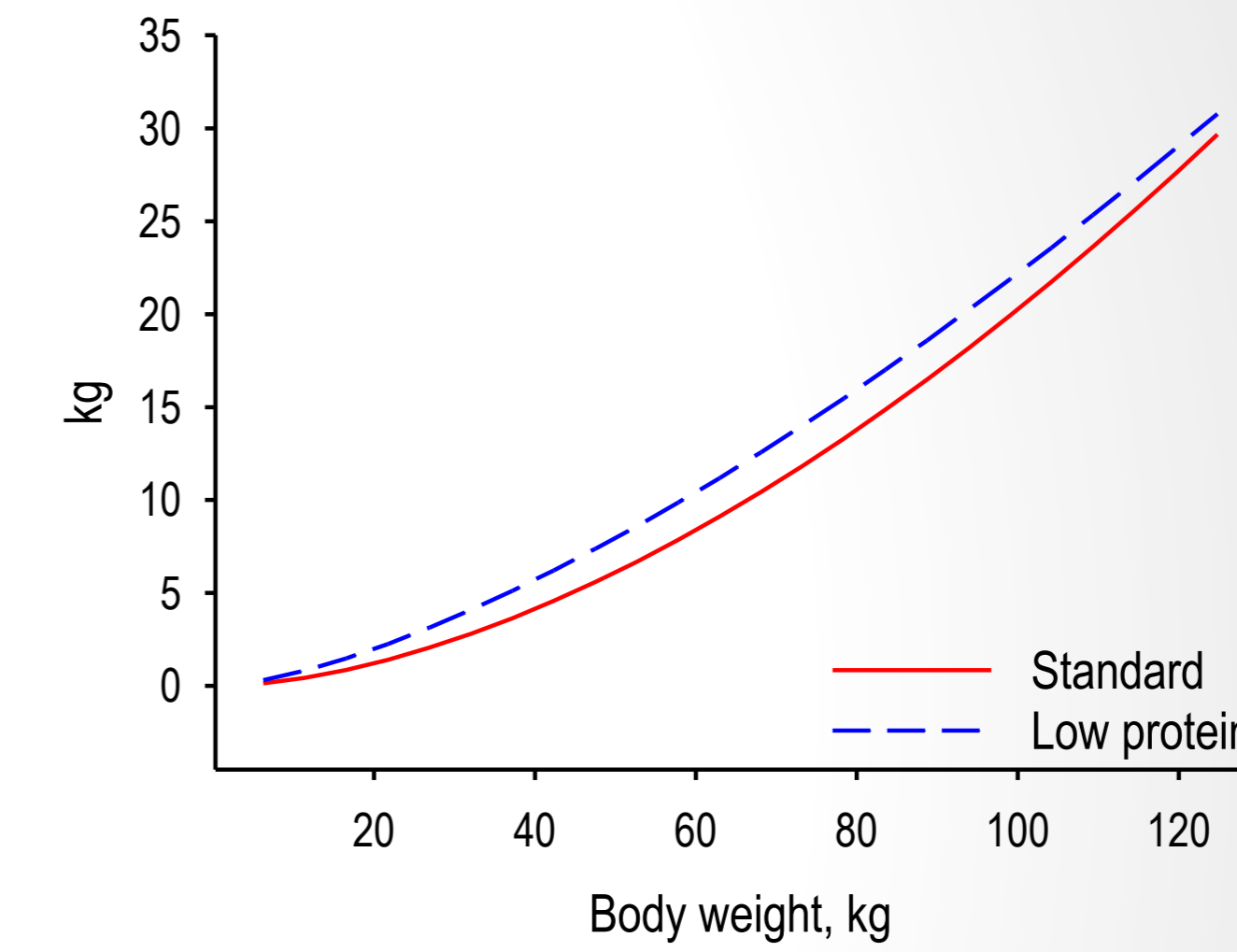
Results

Discussion

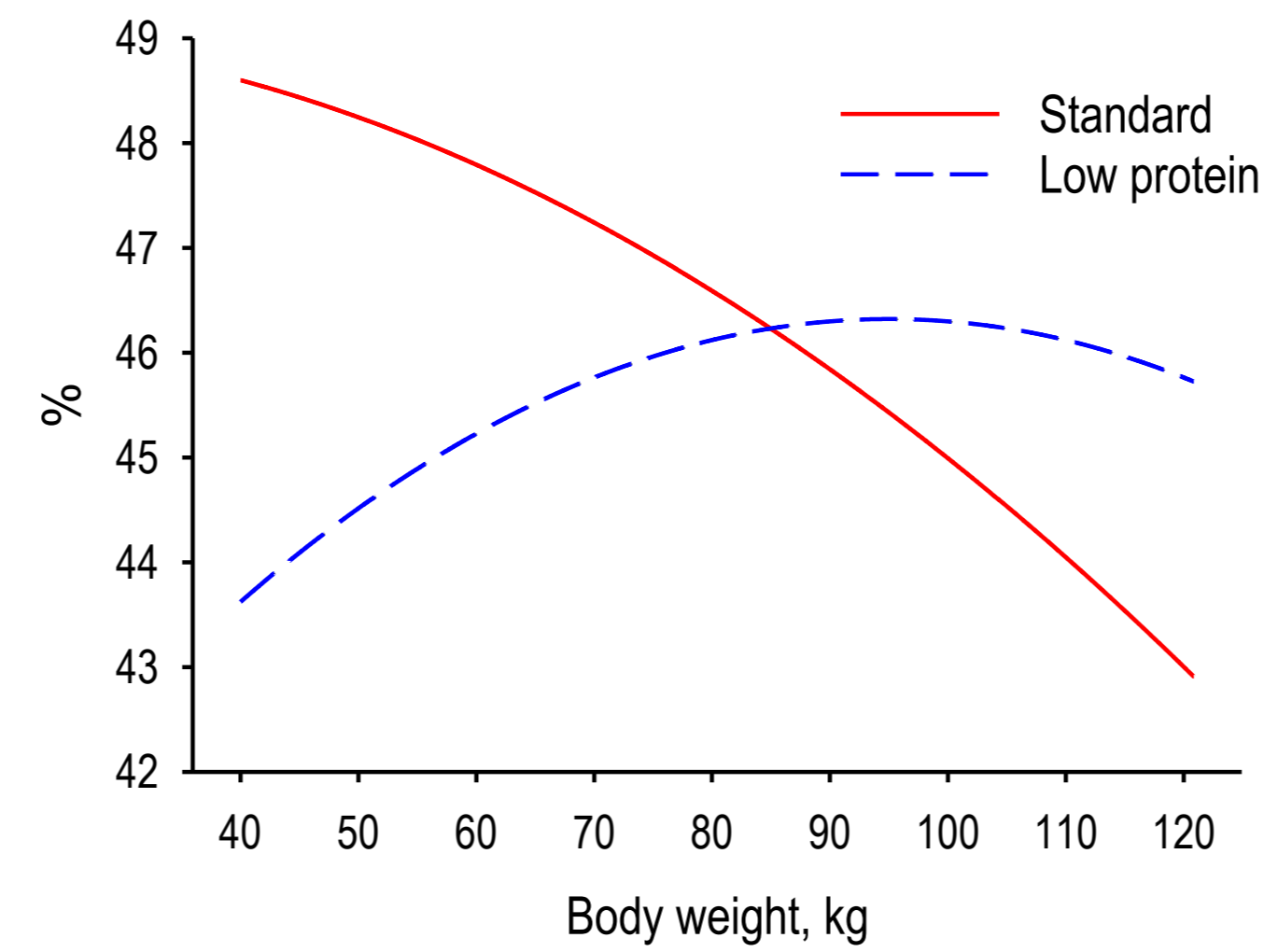
Protein content of the empty body depending on the dietary protein content



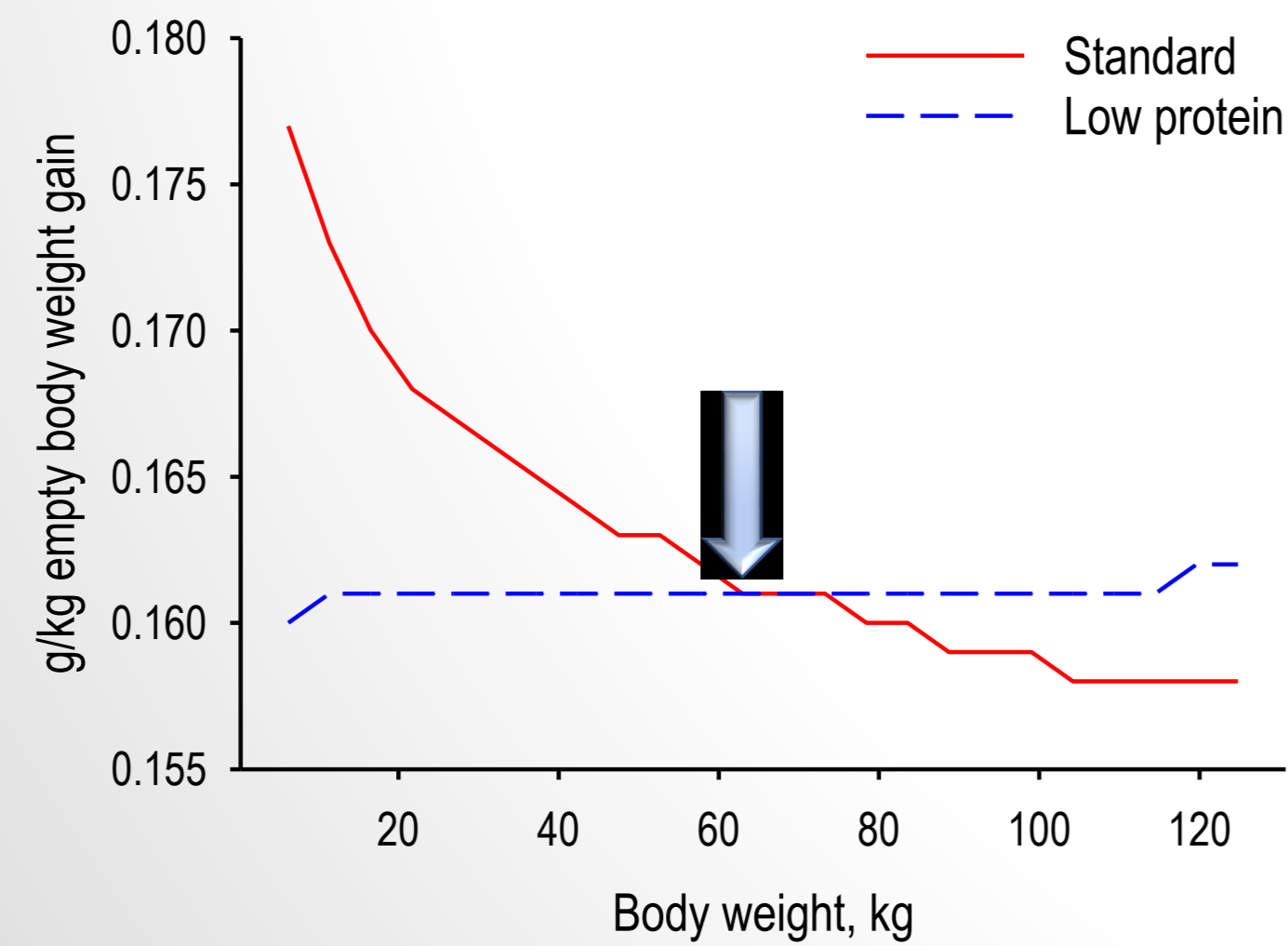
Fat content of the empty body depending on the dietary protein content



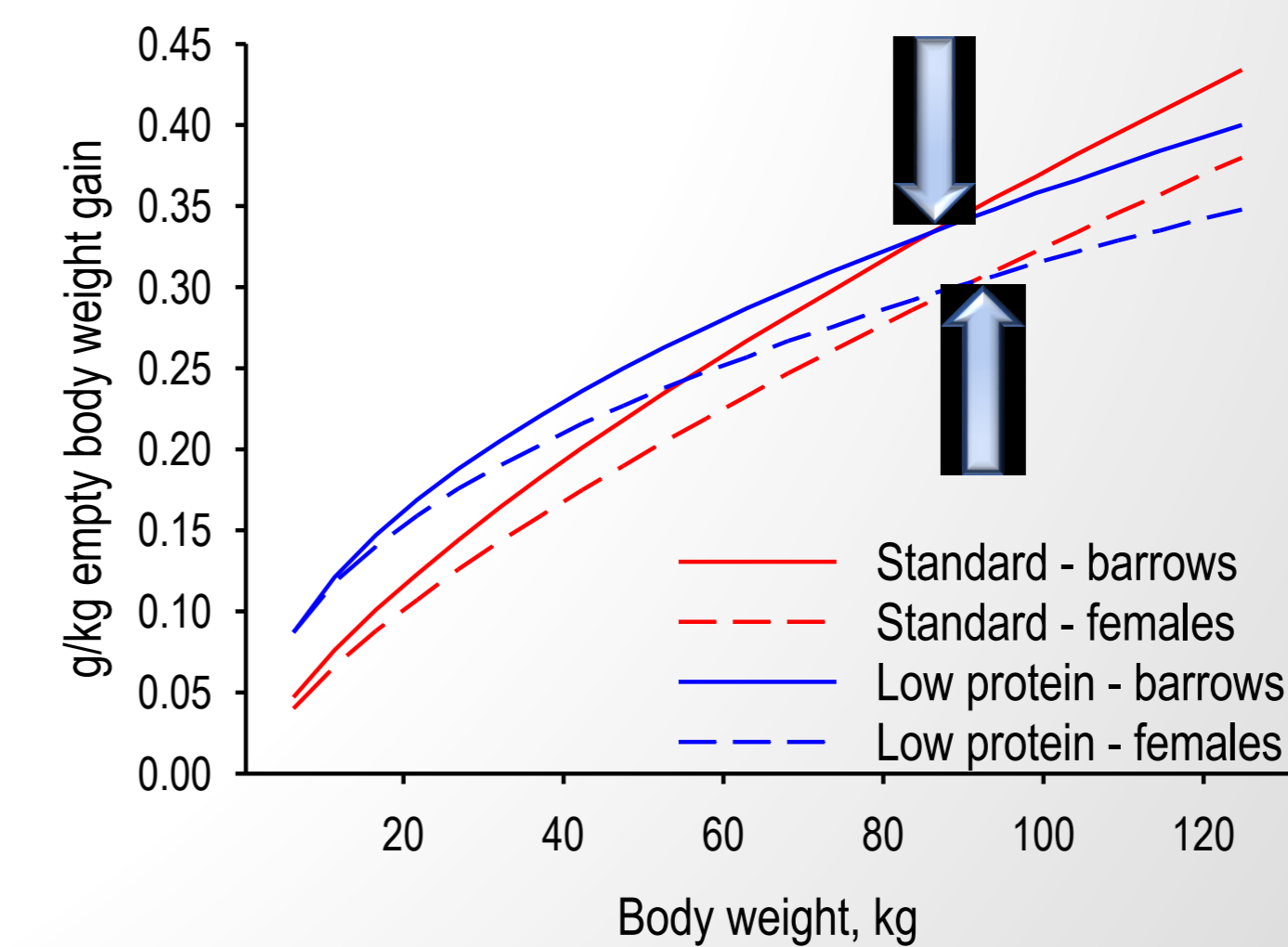
Protein efficiency



Protein deposition rate



Fat deposition rate



References

Ruiz-Ascacibar, I., P. Stoll, M. Kreuzer, and G. Bee. 2019. Dietary crude protein and amino acid restriction has a different impact on the dynamic of protein, amino acid and fat deposition in entire male, castrated and female pigs. *Animal* 13(1):74-82.  
Ruiz-Ascacibar, I., P. Stoll, M. Kreuzer, V. Boillat, P. Spring, and G. Bee. 2017. Impact of amino acid and CP restriction from 20 to 140 kg BW on performance and dynamics in empty body protein and lipid deposition of entire male, castrated and female pigs. *Animal* 11(3):394-404.



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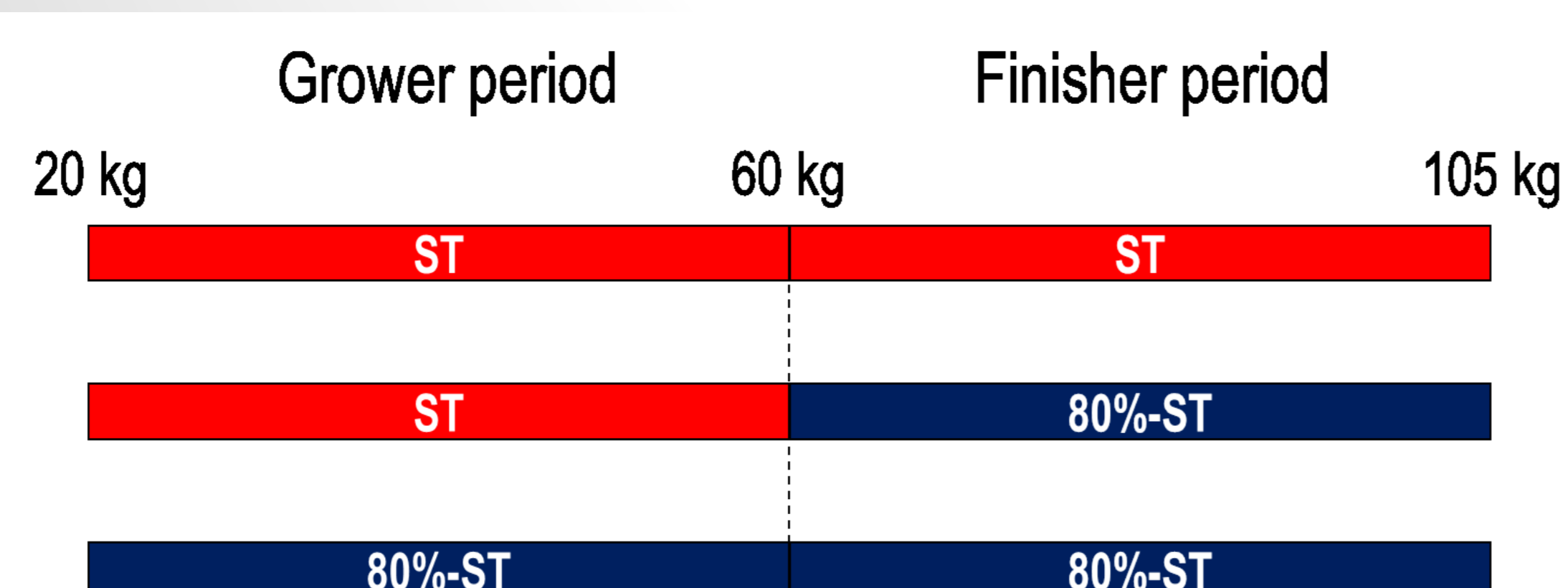
## ANIMALS AND DIETS

**BREED:** 48 Swiss Large White pigs from 12 litters  
**BW RANGE:** 22 to 110 kg  
**HOUSING:** 1 large pen equipped with 8 automatic feeders and individual pig recognition system  
**FEEDING:** *Ad libitum* access to the grower and finisher diets

Analyzed composition (g or MJ/kg as-fed) of the standard and reduced protein (80% of standard) grower and finisher diet

	Grower diets		Finisher diets	
	ST	80%-ST	ST	80%-ST
Dry matter	898	894	894	895
Crude protein	165	132	151	121
Crude fat	24	25	21	21
Crude fiber	39	42	37	37
Lysine	10.2	8.2	8.0	6.5
Methionine + Cystine	5.6	4.9	5.1	4.2
Threonine	6.6	2.7	5.3	4.4
Tryptophan	2.0	1.5	1.9	1.5
Calculated energy content				
DE (MJ/kg)	13.2	13.2	13.2	13.2
Crude protein/DE	12.4	9.9	11.4	9.1

## EXPERIMENTAL DESIGN



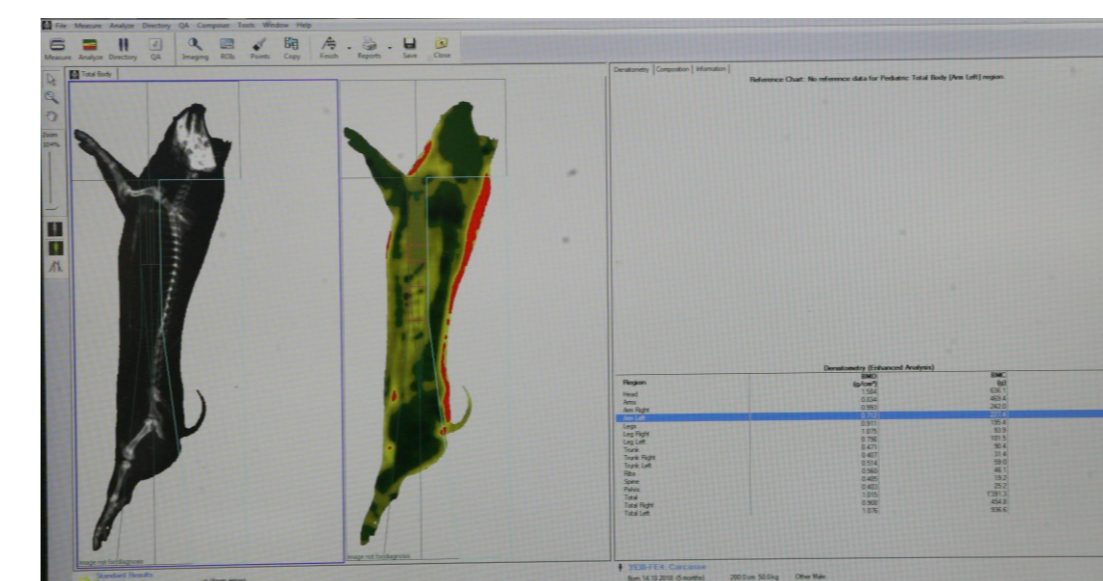
## TRAITS OF INTEREST

### GROWTH PERFORMANCE

- Average daily gain
- Average daily feed intake
- Protein intake

### CARCASS COMPOSITION (DUAL-X-RAY-ABSORPTIOMETRY)

- Hot carcass weight
- Carcass yield
- Nutrient composition of the carcass
  - at 22 kg BW
  - at slaughter



### NUTRIENT DEPOSITION AND DEPOSITION EFFICIENCY

- Daily deposition rate of carcass protein and fat
- N-deposition efficiency

### BASIS TO CALCULATE THE PROTEIN AND FAT CONTENT OF THE CARCASSES

- at 22 kg BW  
based on data of Ruiz-Ascacibar et al. (2019)
  - Protein: 153 g/kg BW
  - Fat: 96 g/kg BW
- at slaughter  
using DXA-data and the formula of Mitchell et al. (1998)
  - Protein:  $-1.062 + 0.22 \times \text{DXA-lean mass}$
  - Fat:  $\text{DXA-fat mass}$

### REFERENCES

Ruiz-Ascacibar, I., P. Stoll, M. Kreuzer, and G. Bee. 2019. Dietary crude protein and amino acid restriction has a different impact on the dynamic of protein, amino acid and fat deposition in entire male, castrated and female pigs. *Animal* 13(1):74-82.  
 Mitchell, A., A. Scholz, and J. Conway. 1998. Body composition analysis of pigs from 5 to 97 kg by dual-energy x-ray absorptiometry. *Appl. Radiat. Isot.* 49(5-6):521-523.



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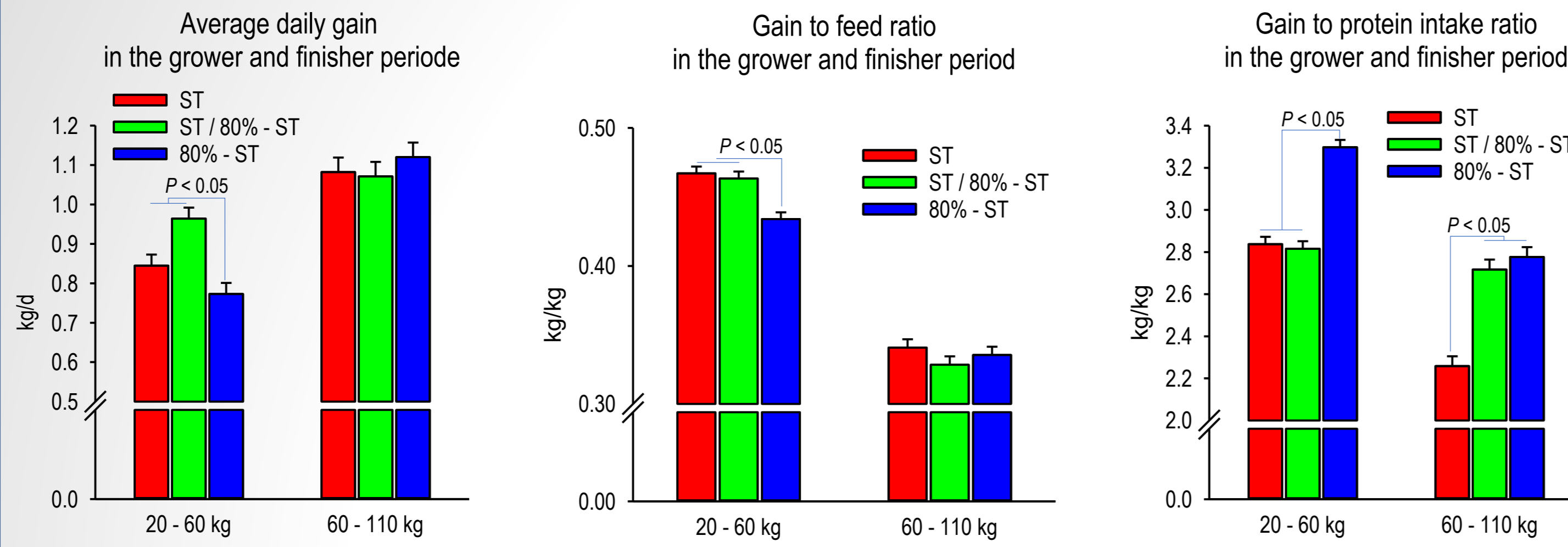
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## Growth performance



### Overall growth performance

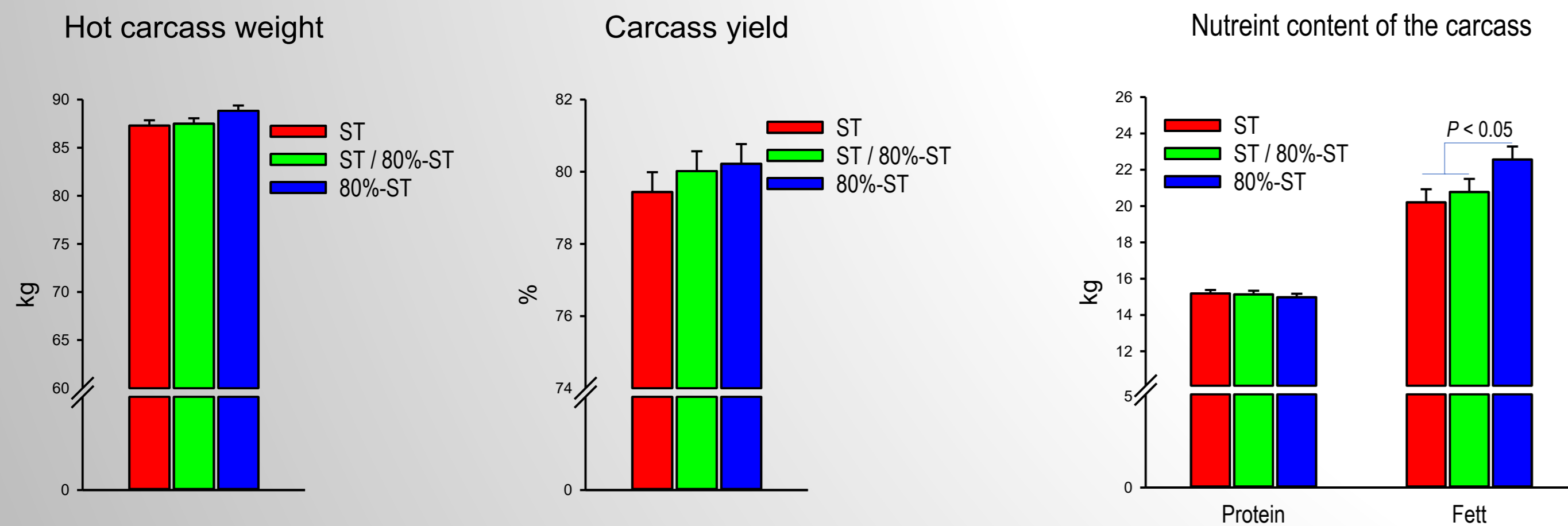
	Experimental treatments			P-value
	ST	ST / 80%-ST	80%-ST	
Body weight (kg)				
Start	22.1	22.2	21.9	0.78
End	109.9	109.3	110.7	0.29
Average daily gain (g/d)	954	959	925	0.16
Average daily feed intake (kg/d)	2.43	2.50	2.45	0.41
Gain-to-feed (kg/kg)	0.32 <sup>b</sup>	0.38 <sup>ab</sup>	0.38 <sup>a</sup>	0.02
Total crude protein intake (kg)	35.1 <sup>c</sup>	31.5 <sup>b</sup>	29.6 <sup>a</sup>	< 0.01
Days on feed (d)	93 <sup>a</sup>	92 <sup>a</sup>	97 <sup>b</sup>	0.01
Age at slaughter (d)	161	160	165	0.07

<sup>a,b,c</sup>Values within a row with different superscripts differ significantly at P < 0.05.

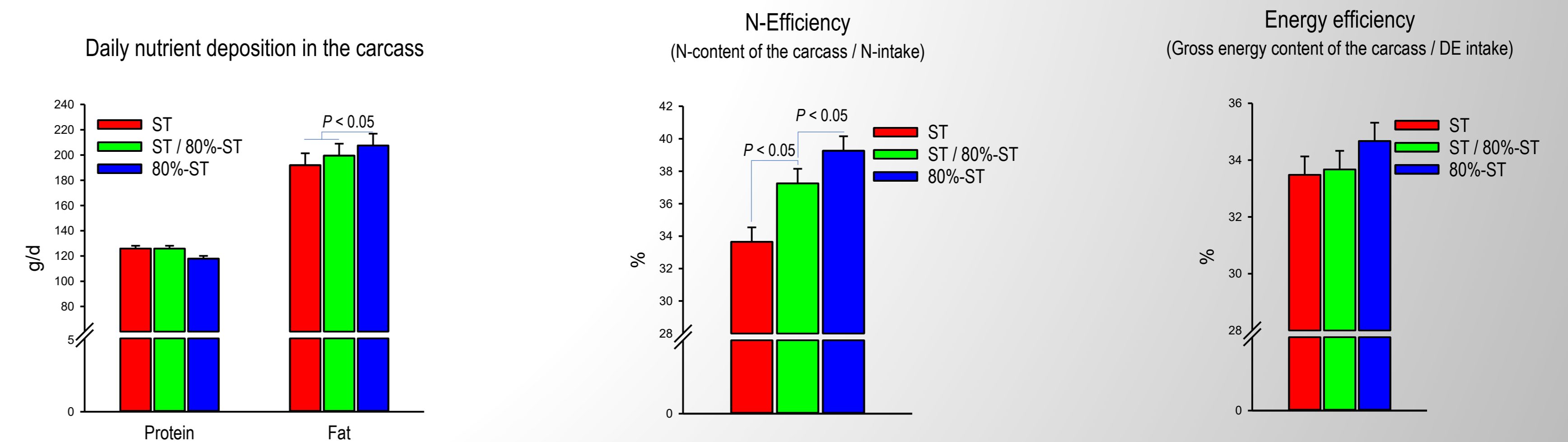
Results

Discussion

## Carcass composition



## Nutrient deposition and nutrient deposition efficiency





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## Compared to the STANDARD (RED LINE)

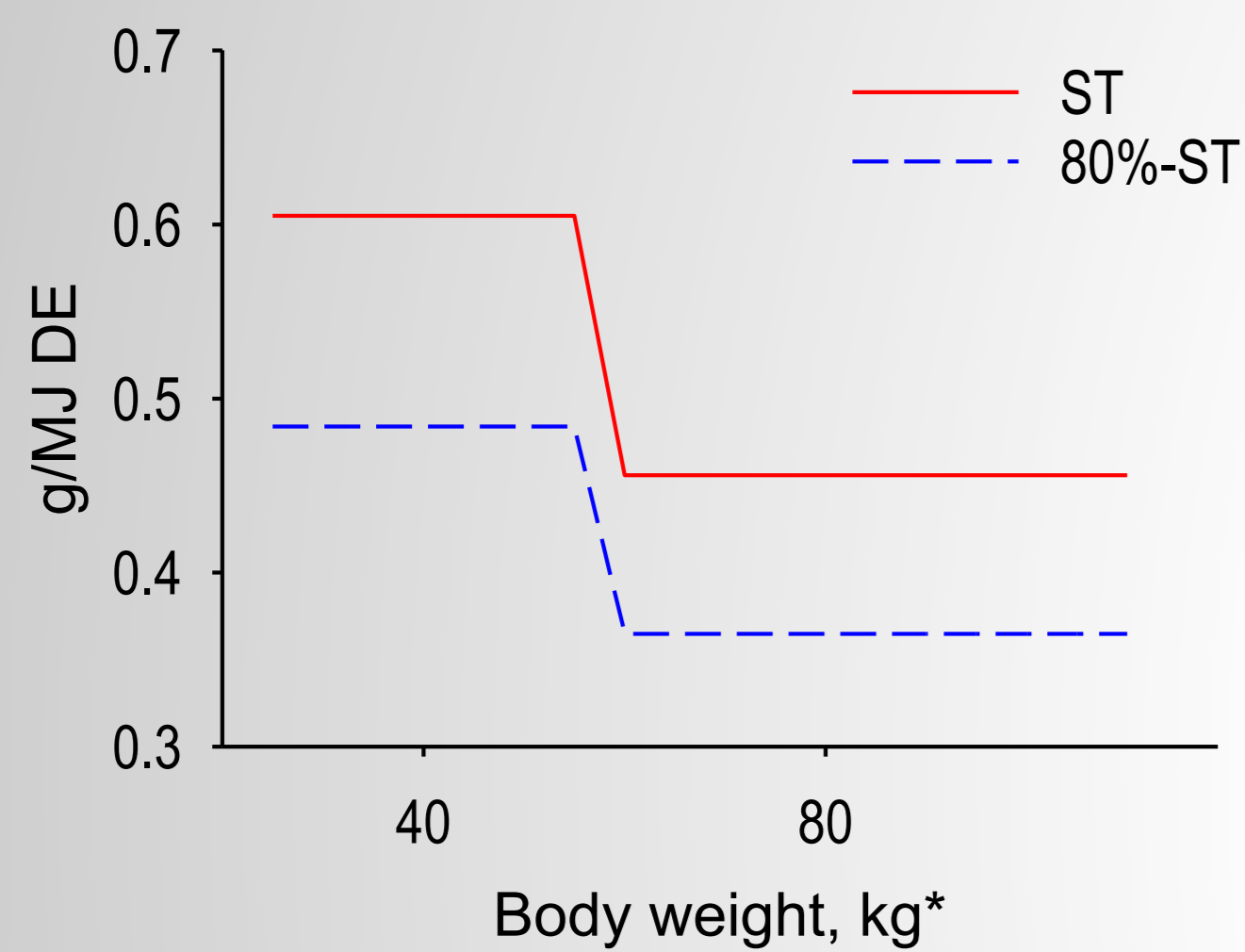
reducing the digestible essential amino acid content of the grower and finisher diet (blue line).

- has hardly any effects on the overall growth rate
- **but** impaired feed efficiency
- **but** markedly improved N-efficiency and thus should decrease the N-losses via feces and urine

reducing the digestible essential amino acid content **only** in the finisher diet (green line)

- had **no effect** on overall growth rate
- has **no effect** on feed efficiency
- improved the N-efficiency and thus should decrease the N-losses via feces and urine

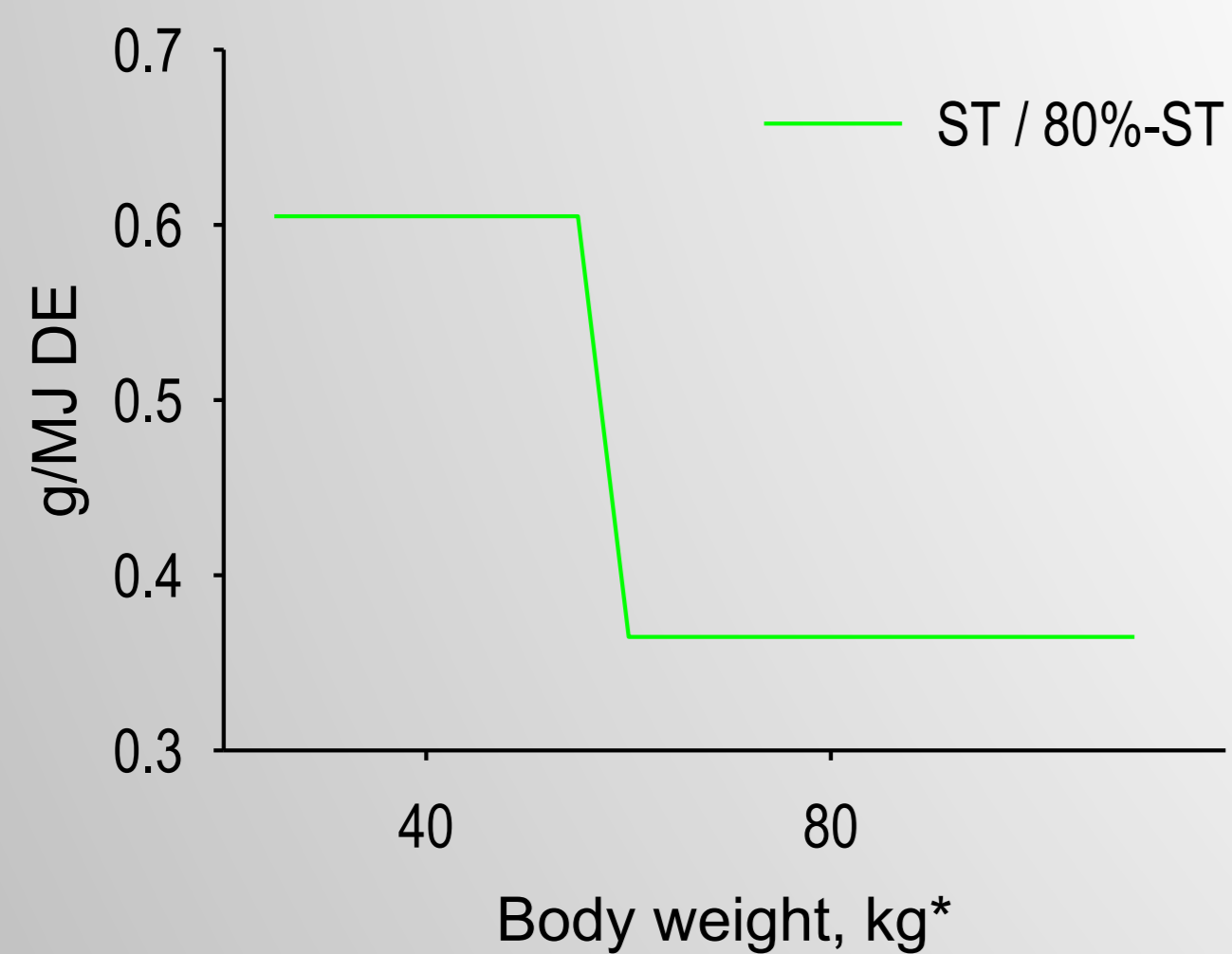
Digestible lysine recommendations



\* Body weight used to define d-lysine recommendation

$$d\text{-lysine (g/MJ DE)} = 0.895 - 0.913 \times (BW/100) + 0.491 \times (BW/100)^2 - 0.045 \times (BW/100)^3$$

Digestible lysine recommendations



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