



EFFECT OF SURGICAL OR IMMUNOCASTRATION ON POSTPRANDIAL NUTRIENT PROFILES IN MALE PIGS*

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CONTEXT OF THE STUDY

- **Alternatives to early surgical castration of male pigs : rearing entire males and immunocastration**
- **Advantages of rearing entire and immunocastrated male pigs**
 - **Higher feed efficiency**
 - **↘ Fat deposition and ↗ muscle deposition**
- **Metabolic mechanisms underlying the difference in feed efficiency have been slightly investigated**

OBJECTIVES

Hypothesis : Better feed efficiency in entire males may be explained by different postprandial nutrient utilisation

Strategy : Comparison of postprandial nutrient kinetics in unchallenged and fed

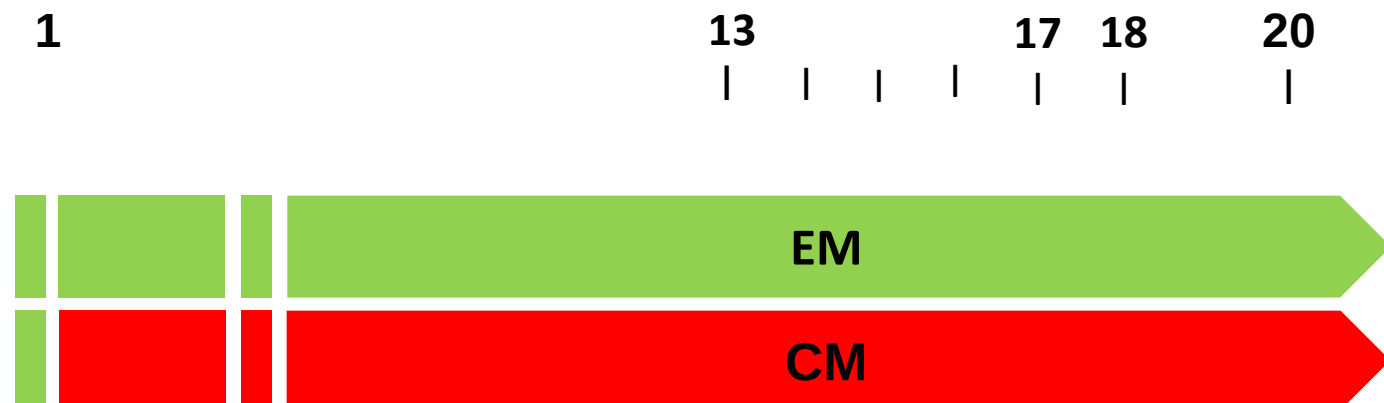
Entire Males (EM)

Castrated Males (CM)

ImmunoCastrated males (IC)

ales Piétrain

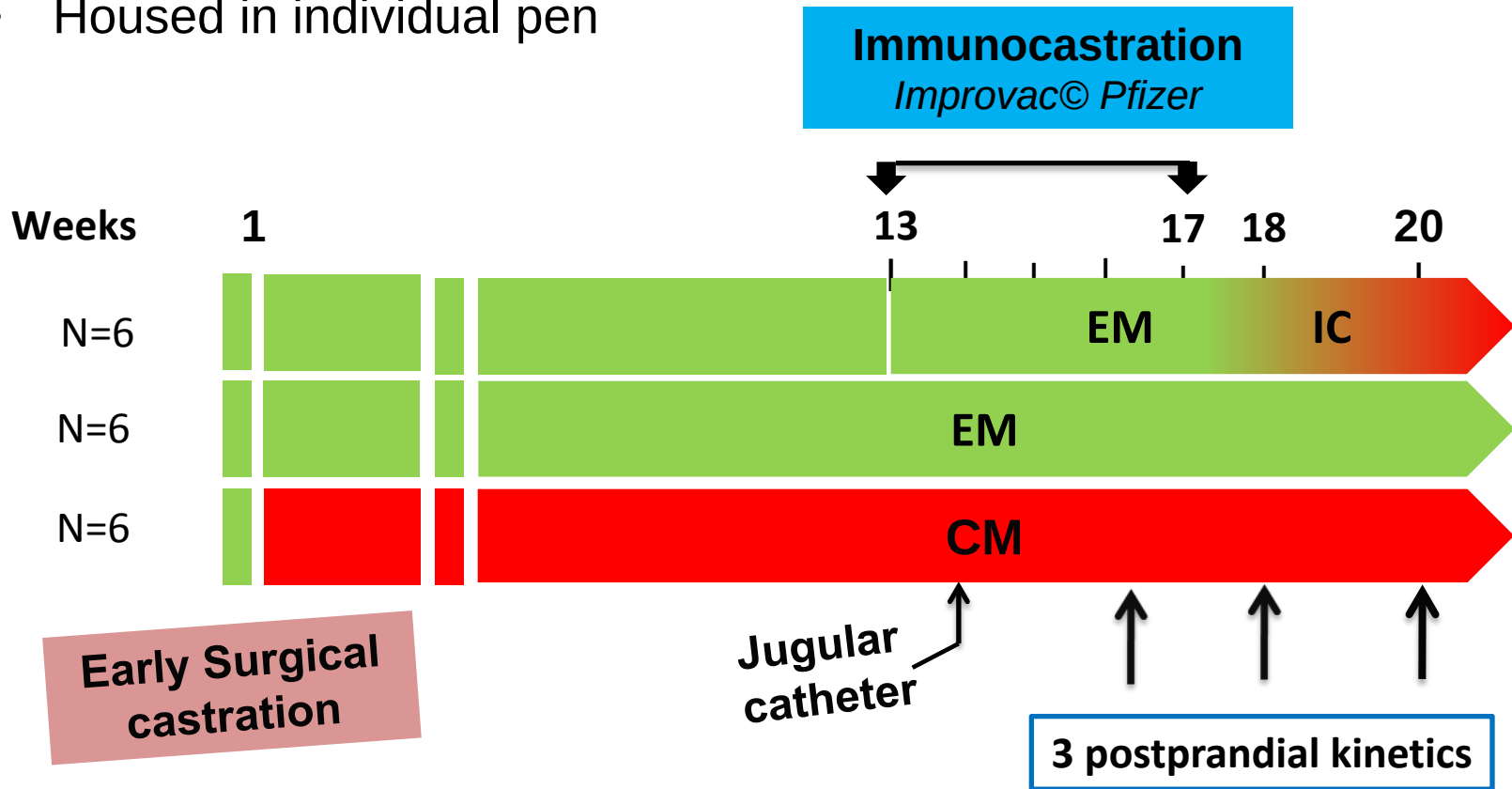
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Early Surgical castration

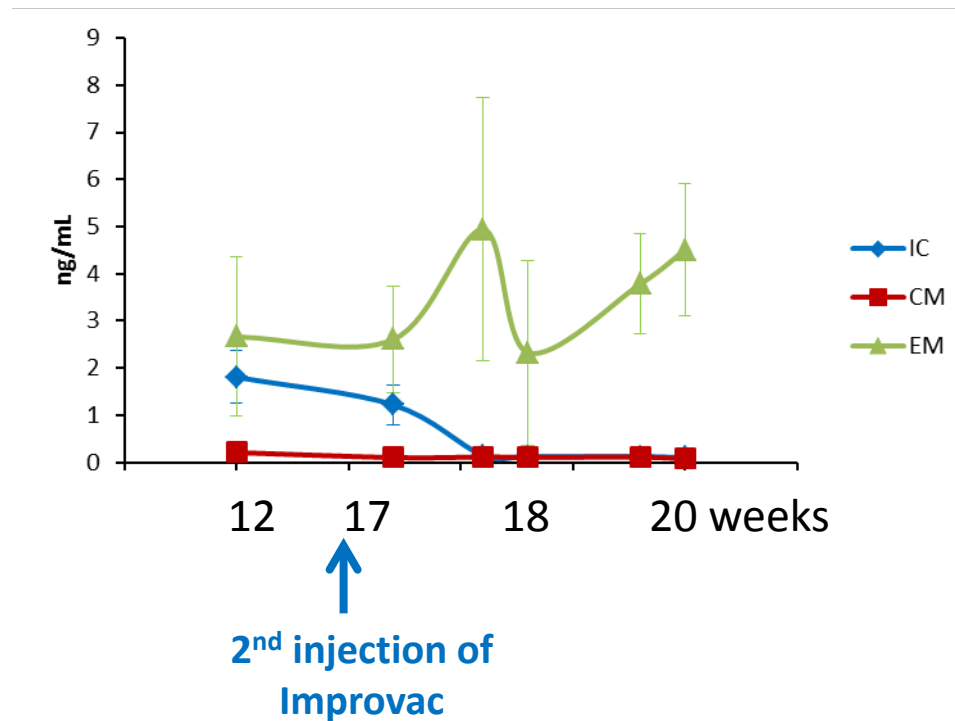
MATERIALS AND METHODS (1)

- 18 males Piétrain x (Large White x Landrace) fed ad libitum (except for meal tests) : 6 experimental groups
- Standard growing feed : CP 16,5%, NE 9670 kJ/kg, Lys dig 8,4%
- Housed in individual pen



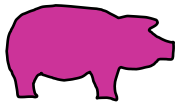
MATERIALS AND METHODS (2)

- body weight and feed intake : weekly recorded
- Blood sampling : once a week for plasma testosterone measurement



MATERIALS AND METHODS (3)

- Postprandial kinetics :
 - before immunocastration (16 wks) $\approx$ 63 kg BW
 - the week following the 2nd injection of Improvac (18 wks) $\approx$ 79 kg BW
 - 2 to 3 wks after the 2nd injection of Improvac (20 wks) $\approx$ 87 kg BW

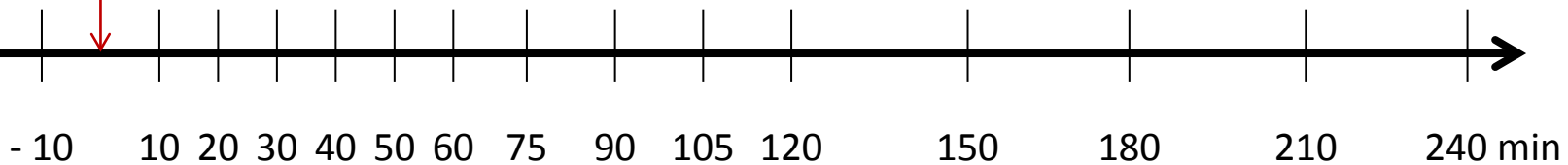


Pigs fasted overnight



400 g of feed

*Serial blood
sampling*



Glucose, urea, AA ...

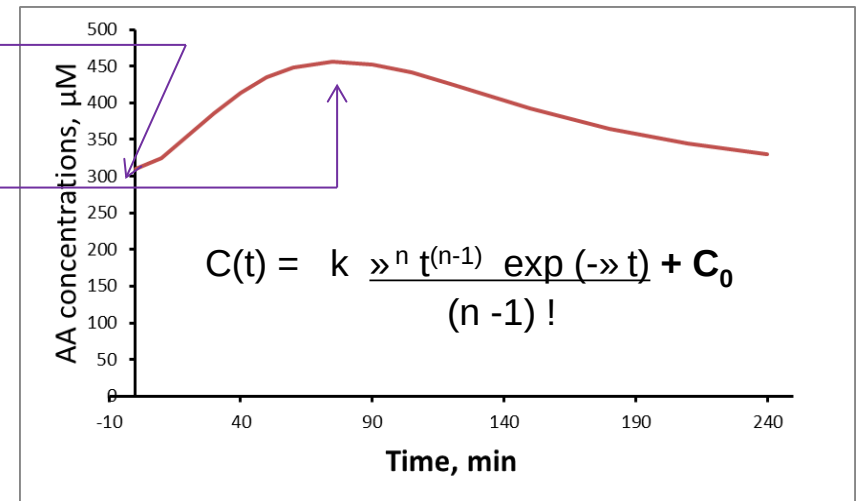
DATA ANALYSIS

- Nutrient kinetics : ANOVA on repeated measures (PROC MIXED, SAS)
Effects of Time (after the meal), Period, Sex, and corresponding interactions
- AA : modeling of individual profiles using a 1-compartment model with an Erlang distribution of residence times (PROC NLIN, SAS)

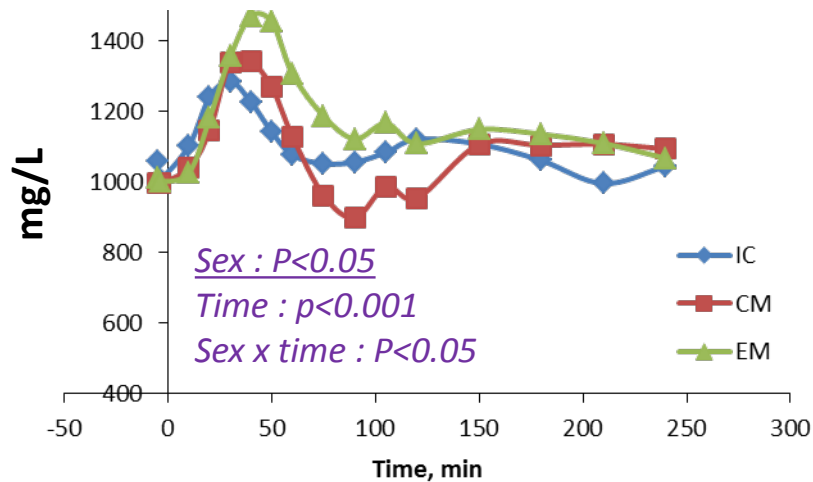
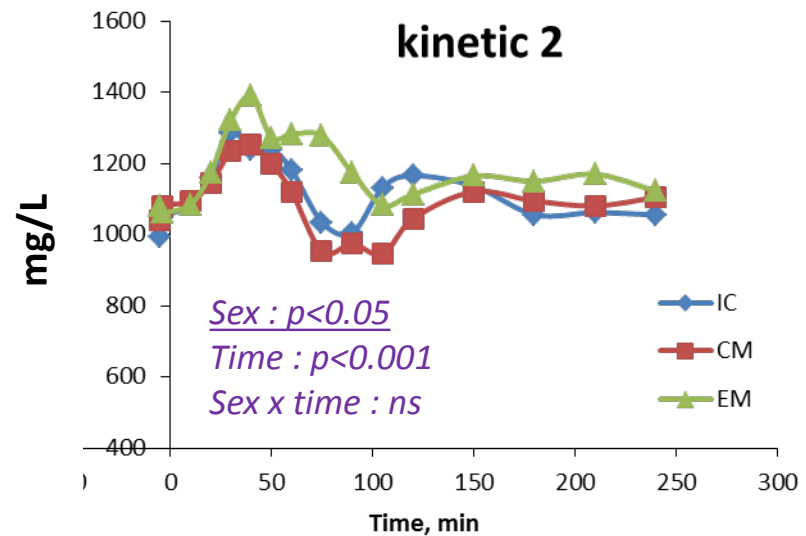
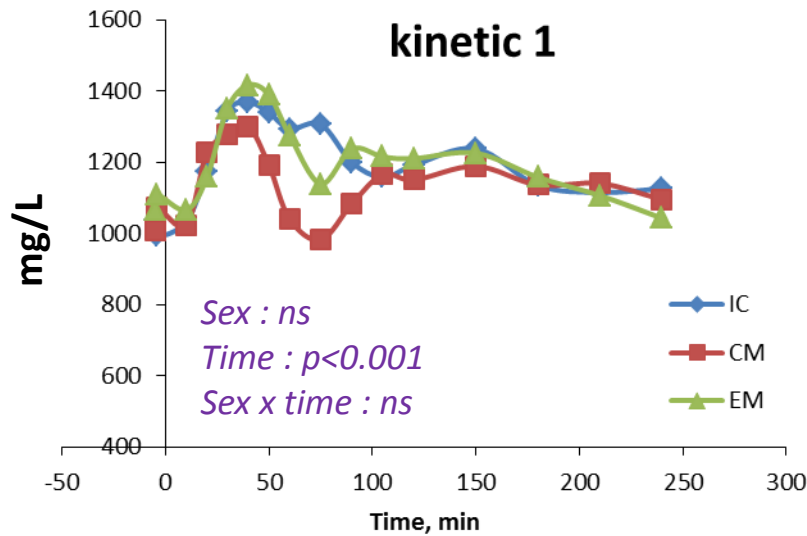
C₀ : initial concentration

C_{max} : maximum concentration

M_{tt} : mean residence time or average time a nutrient/metabolite spends in the compartment (derived from AUC)



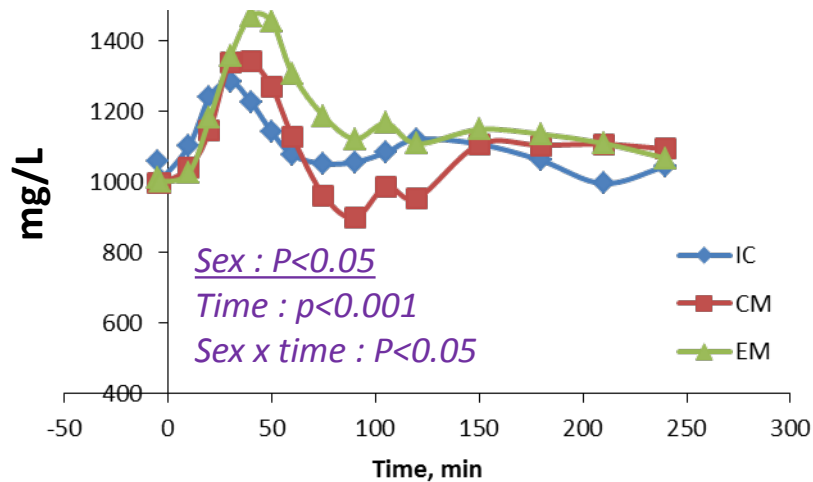
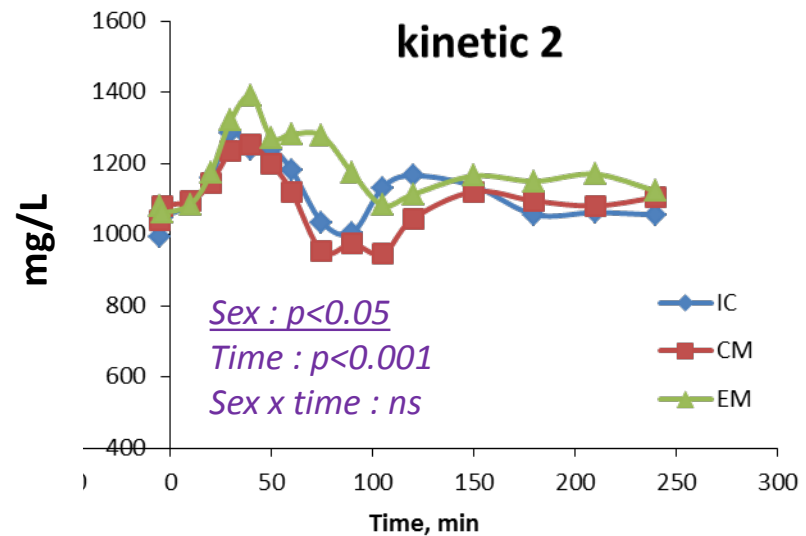
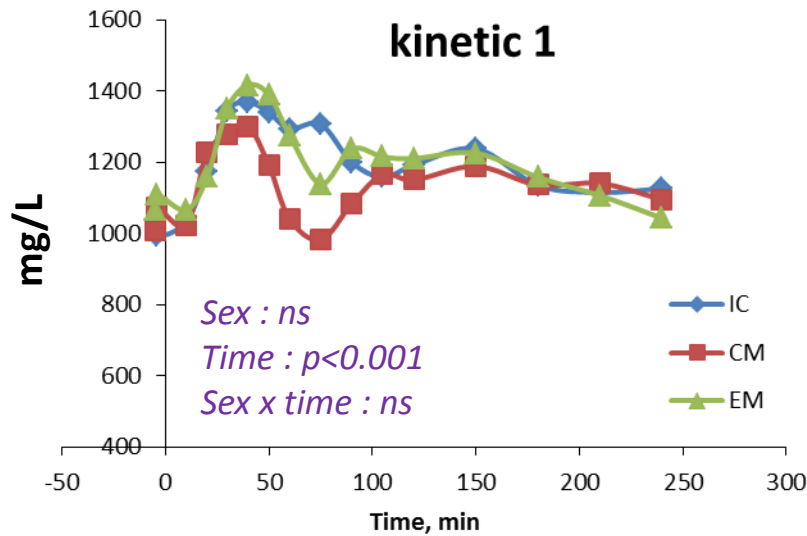
Glucose kinetics



To summarize :

- Faster glucose clearance in IC and CM pigs

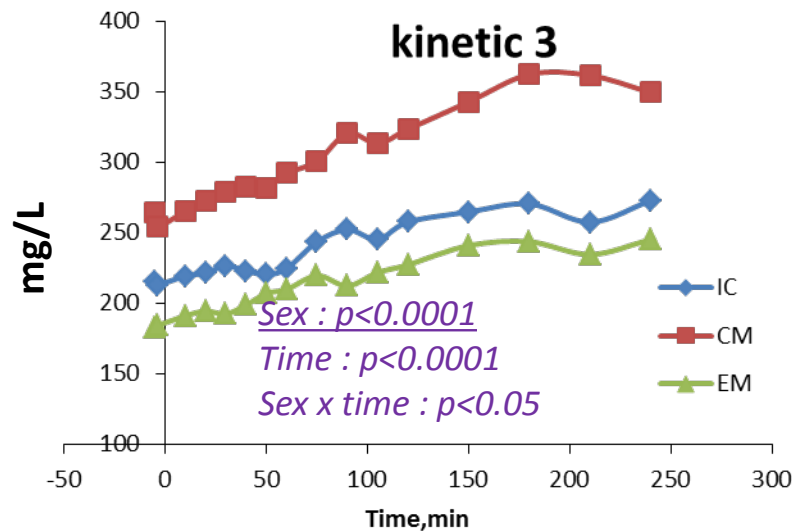
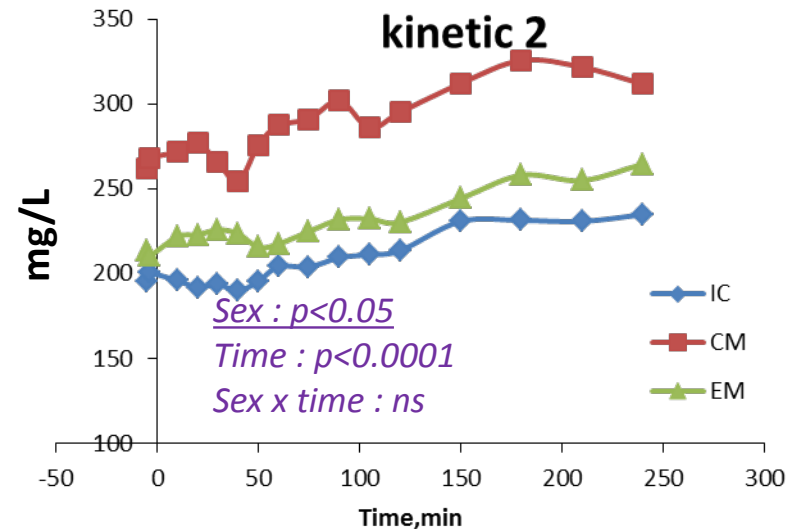
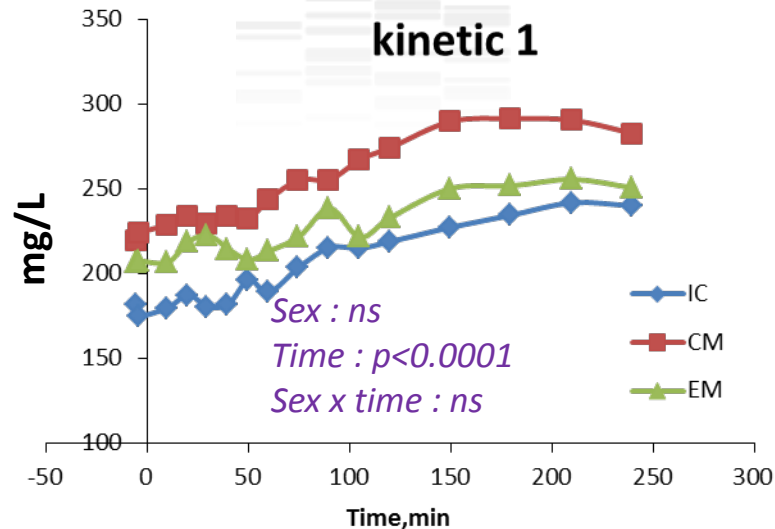
Glucose kinetics



To summarize :

- Faster glucose clearance in IC and CM pigs
- IC pigs did not differ from CM from the kinetic 2

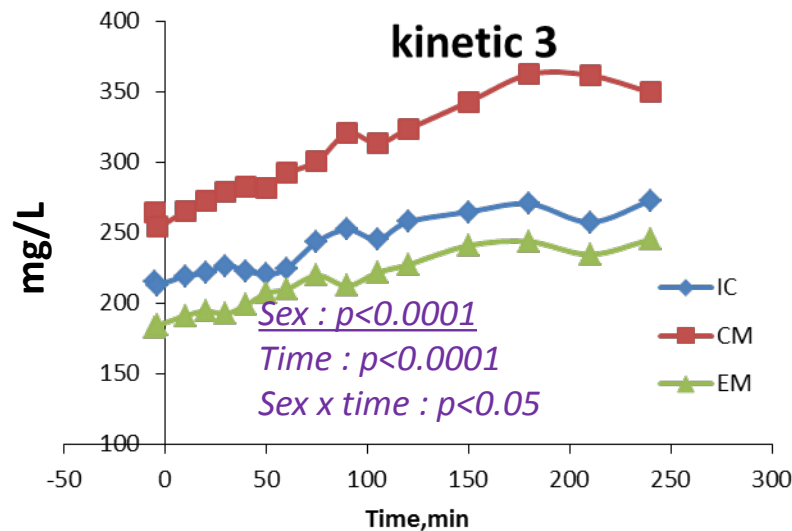
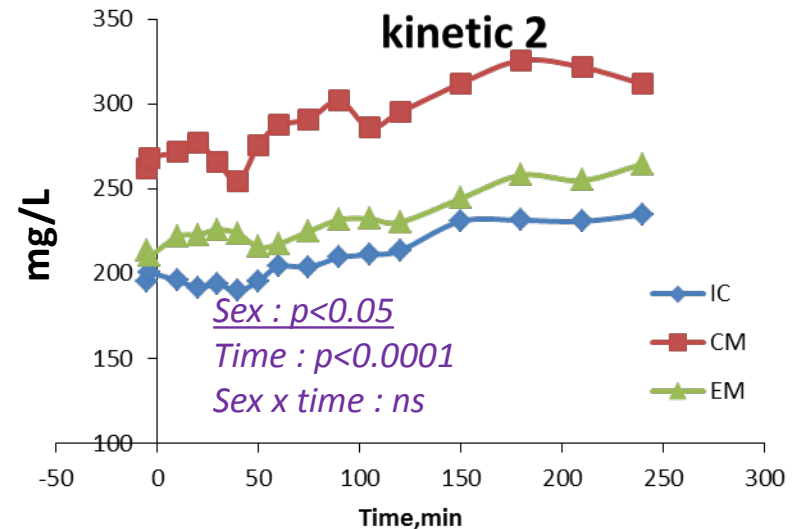
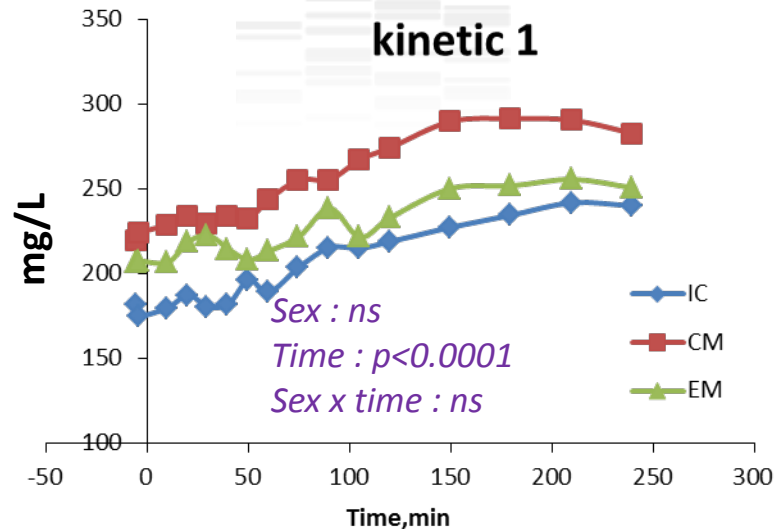
Urea kinetics



To summarize :

- Lower urea in IC and EM pigs

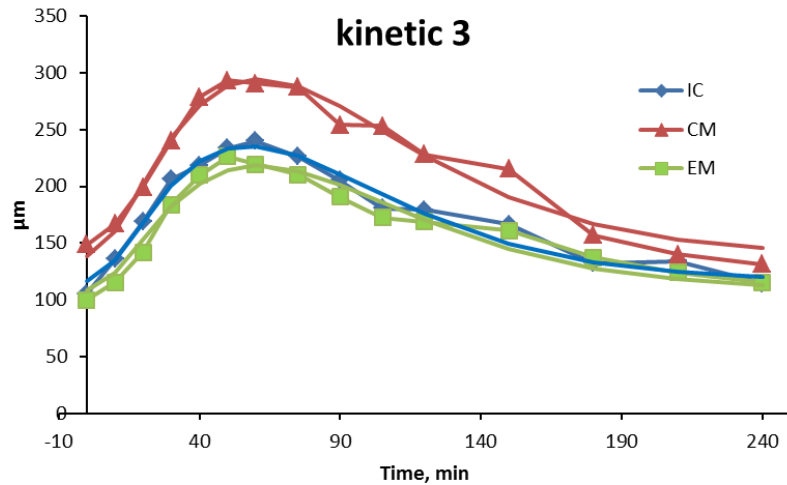
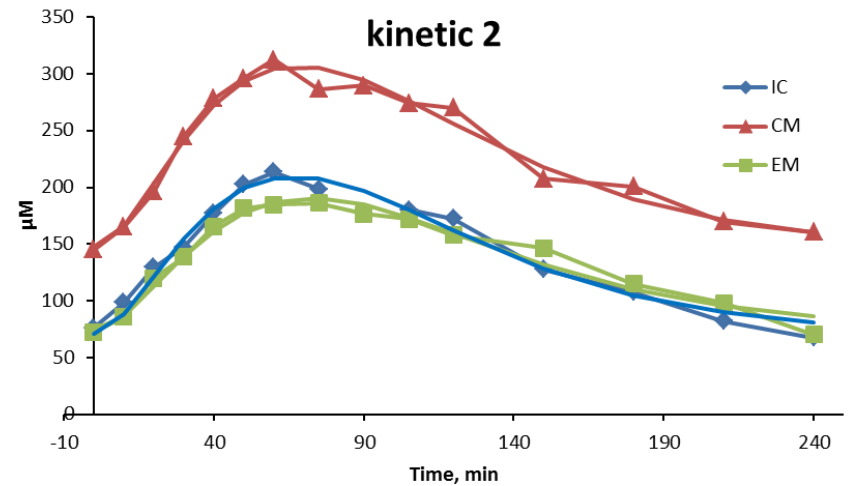
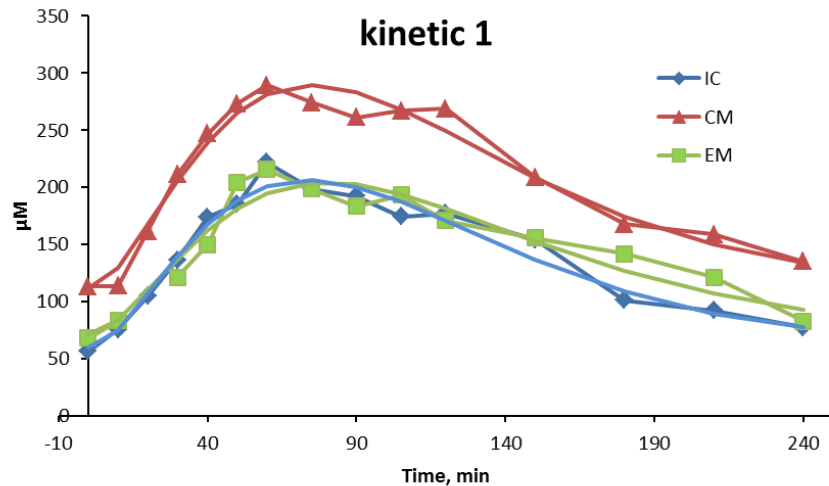
Urea kinetics



To summarize :

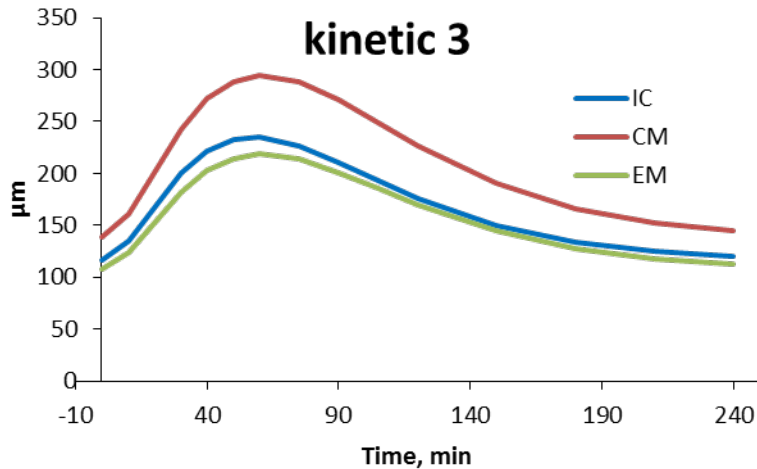
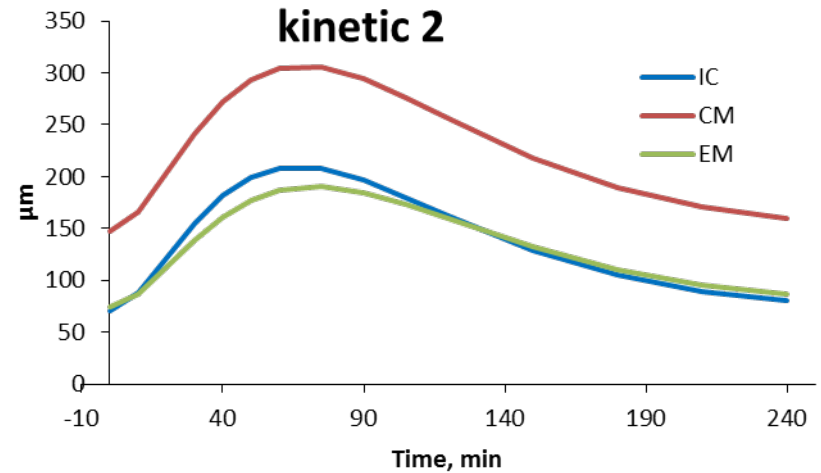
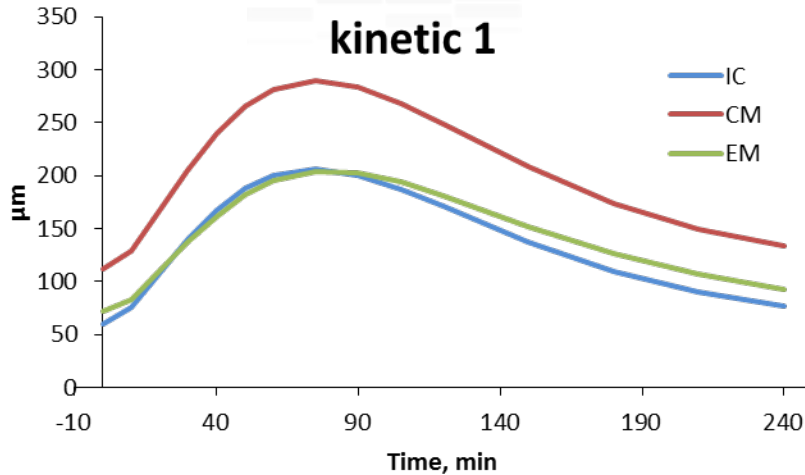
- Lower urea in IC and EM pigs
- IC did not differ from EM pigs

Lysine kinetics



Modelised curves match well with the average measured concentrations

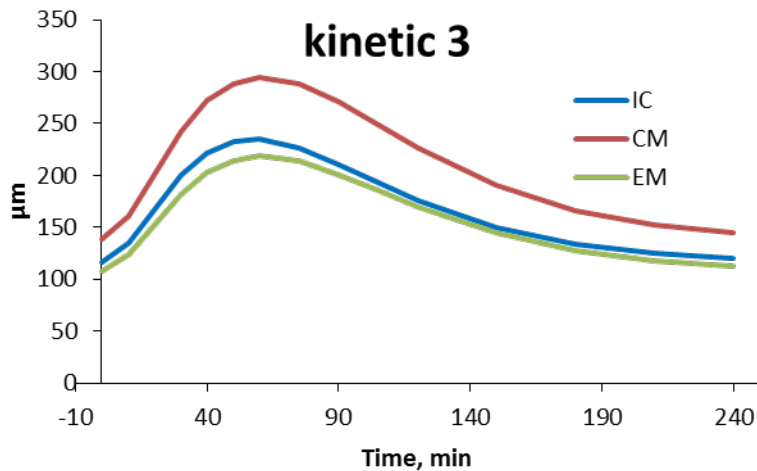
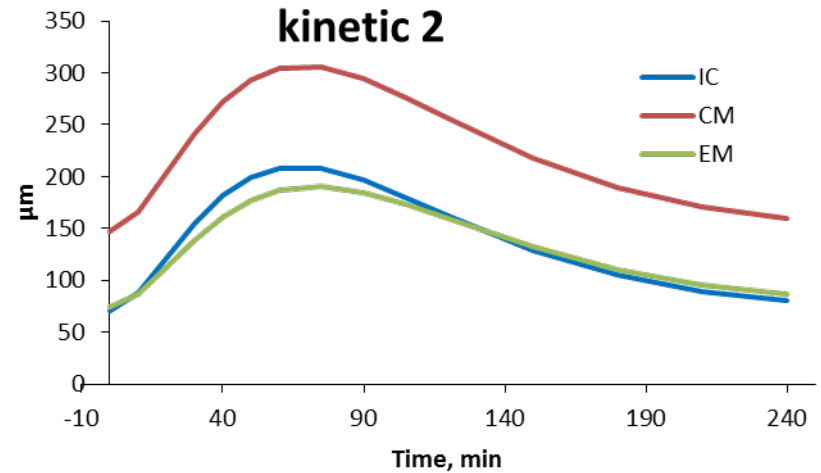
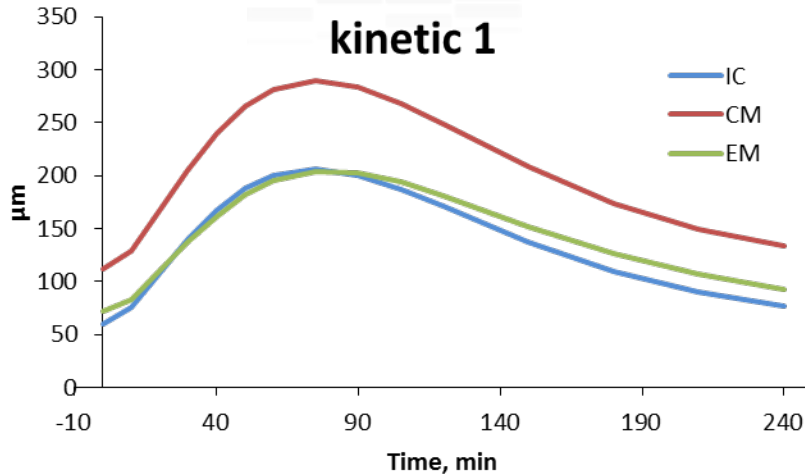
Lysine kinetics



To summarize :

- *Greater lysine concentrations (C0 and Cmax) in CM pigs*

Lysine kinetics

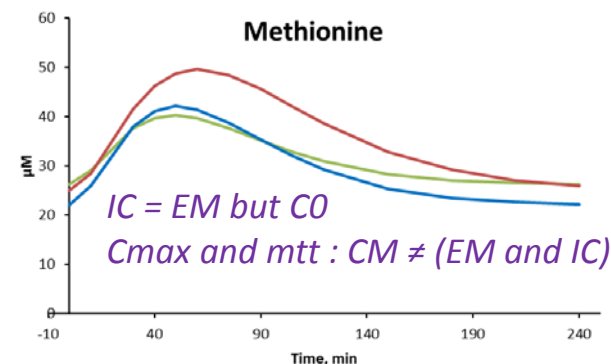
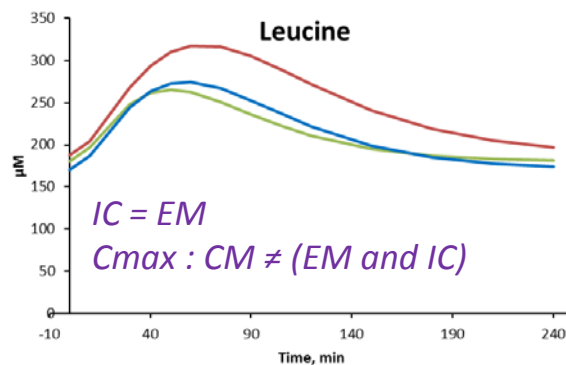
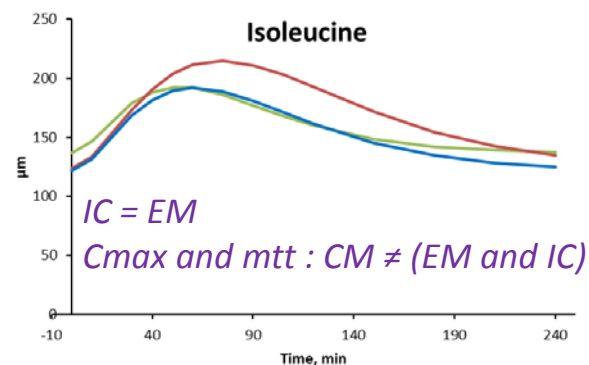
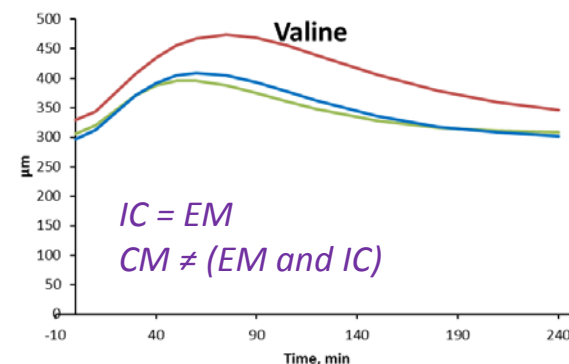
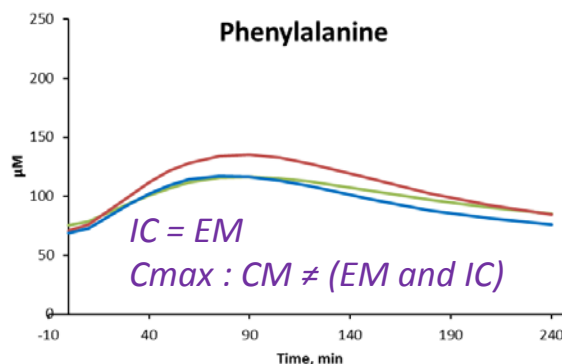
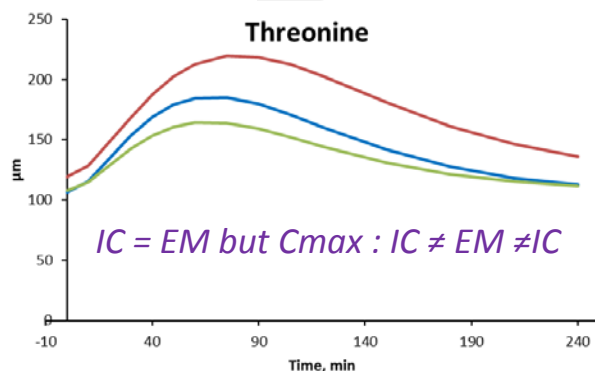


To summarize :

- *Greater lysine concentrations (C0 and Cmax) in CM pigs*
- *IC did not differ from EM pigs*

Other Essential AA (kinetic 3)

— IC
— CM
— EM



To summarize :

- All essential AA are in greater concentrations in CM pigs
- IC did not differ from EM pigs, but Thr (Cmax) and Met (C0)

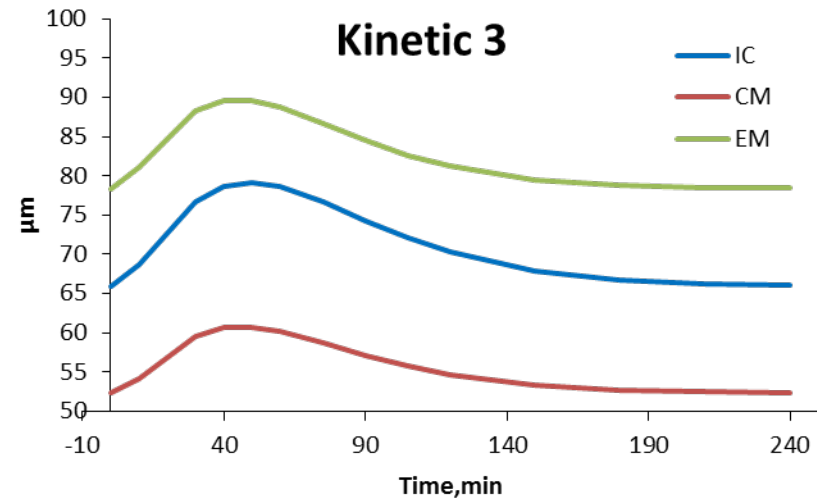
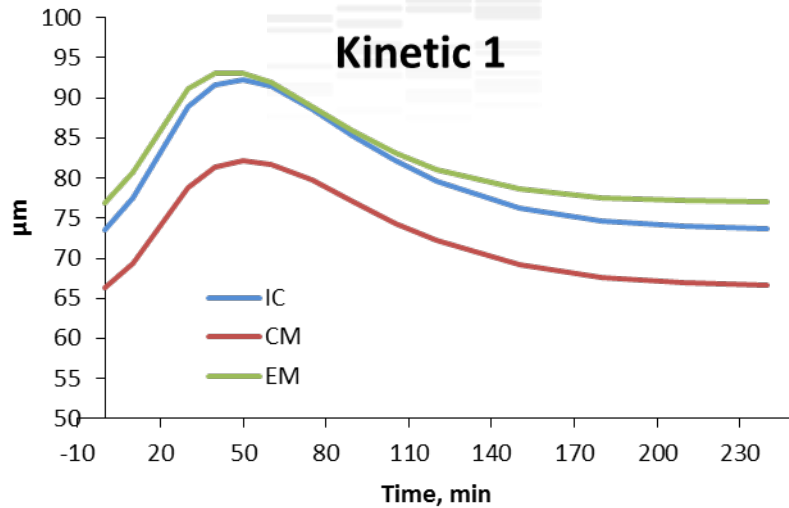
Non essential AA (kinetic 3)

EM < CM	EM = CM	EM > CM
Ornithine	Glycine	Glutamine
Proline	Serine	Glutamate
	Alanine	
	Aspartate	
IC = EM	IC = EM = CM	IC = EM

To summarize :

- IC did not differ from EM pigs

AA : hydroxyproline



To summarize :

- Greater hydroxyproline concentrations in EM pigs
- IC differed from CM pigs

Conclusions

➤ When pair fed, compared to **castrated males**, **entire males** had :

- Lower glucose clearance
- Less urea
- Faster clearance of essential AA
- Accumulation of hydroxyproline :
greater muscular and collagen mass

-----> ↘ Fat deposition?

↗ Protein anabolism ?

➤ **Immunocastration** influenced rapidly **glucose** metabolism

➤ **Immunocastrated** pigs seem to keep a **nitrogen metabolism similar** to that of **entire males** during the experimental period

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