



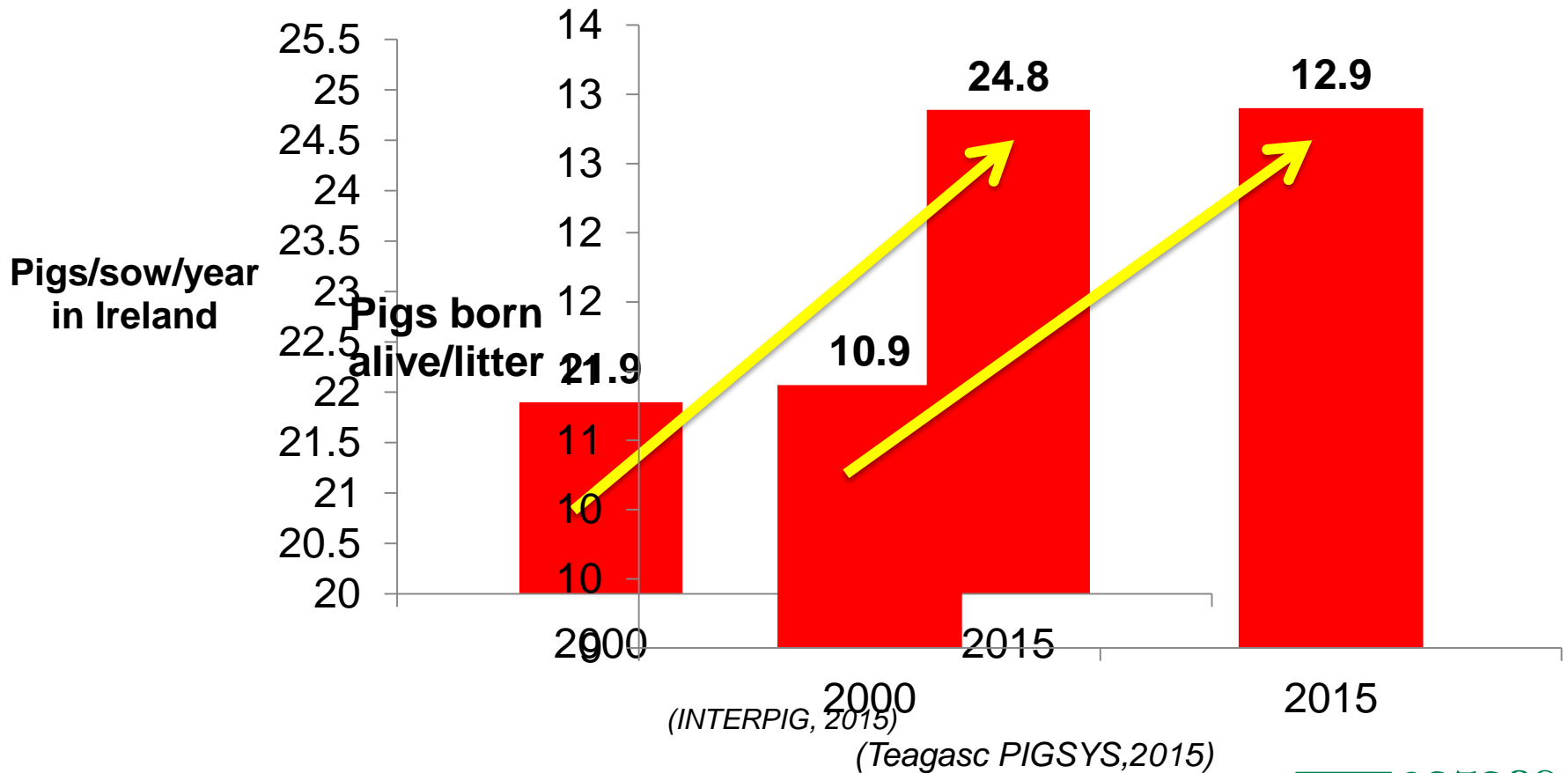
Effect of dietary fibre level and L-carnitine inclusion during gestation on gilt and piglet performance

H. Rooney^{1,2}, *K. O'Driscoll*¹, *J. O'Doherty*², *P.G. Lawlor*¹

¹Teagasc, Pig Development Department, AGRIC, Moorepark, Fermoy, Co Cork; ²University College Dublin, Belfield, Co. Dublin

Background

- Irish swine sector..

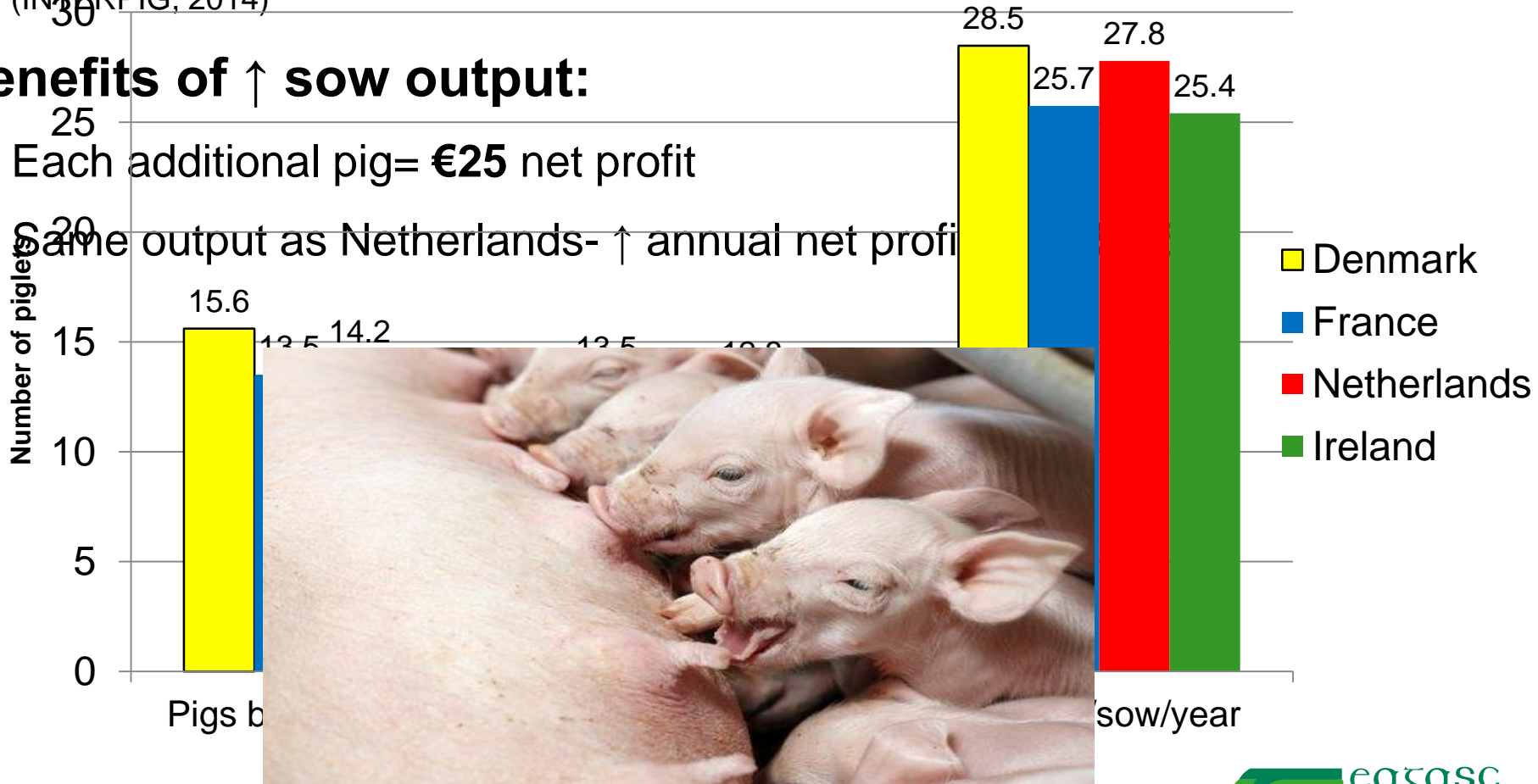


Background

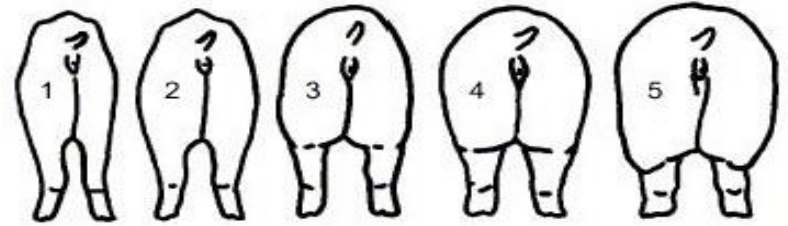
- Sow output in Ireland- Low vs. other leading pig producing countries (INTERPIG, 2014)

Benefits of ↑ sow output:

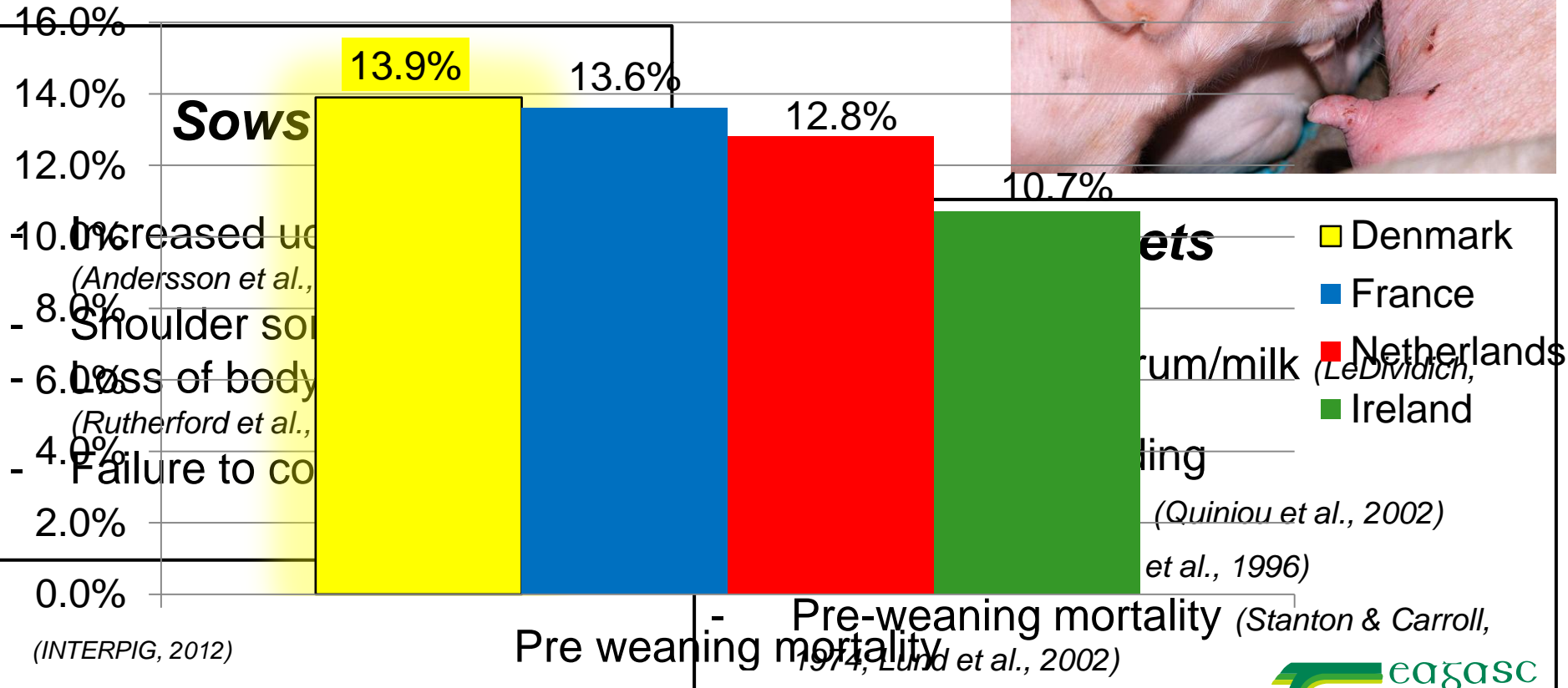
- ✓ Each additional pig= €25 net profit
- ✓ Same output as Netherlands- ↑ annual net profit



However....

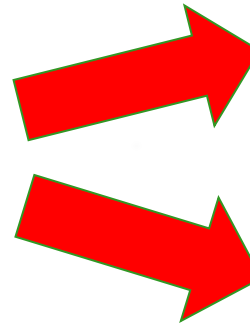


Litter size does have consequences



OPTIPIG Project

↑ No.pigs/sow/year



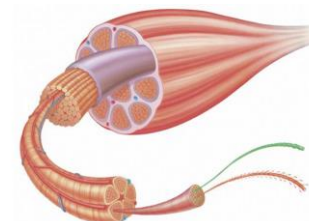
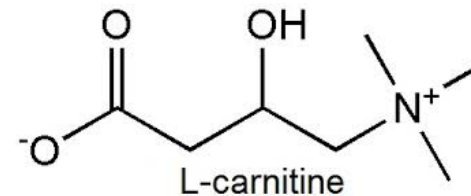
↑ number pigs born
alive/litter

↑ vitality of pigs born
alive & reduce pre-
weaning mortalities

How??

By investigation of gestational
nutritional management strategies

L-Carnitine



Quaternary ammonium compound
(AA: lysine and methionine)

- Hypothesized to

- ✓ ↑ number of muscle fibres at birth= ↑ piglet birth weight (*Waylan et al., 2005*)
- ✓ Regulate transport of fatty acids across mitochondrial membrane (*Birkenfield et al., 2006*)
- ✓ Enhance IGF-1 levels in the sow (*Musser et al., 1999; Owen et al., 2001*)
- ✓ Involved in glucose homeostasis (*Gaetano et al., 1999*)

- Previous sow work

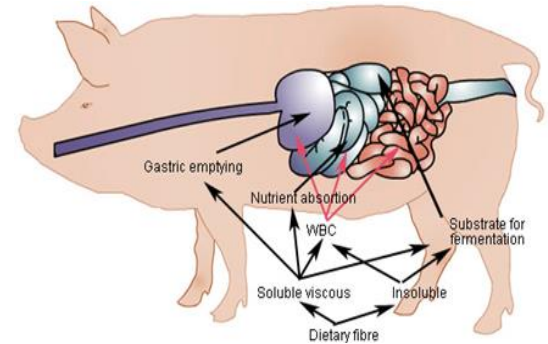
Total (Alive & Dead) piglet birth-weight	+60g	($P < 0.05$)
Entire litter (Alive & Dead) weight	+ 90g	($P = 0.09$)

(*Katherine Reid et al., 2016*)

Fibre

Carbohydrates in plant materials, indigestible by endogenous animal enzymes

- Widely used dietary components in gestation diets...
- Hypothesised to
 - ✓ Increase gut fill
 - ✓ > Lactation intakes = \uparrow milk yield (*Quesnel et al., 2009*)
 - ✓ Reduce stress levels (*Bergeron et al., 2000*)
 - Reduction in stereotypic behaviours (*Boyle et al., 2010*)
 - Reduction in aggression
 - ✓ Avoids possibility of constipation
- Sugar beet pulp
 - ✓ Soluble fibre source
 - ✓ Expansion



Therefore...

Increased dietary fibre level and the inclusion of L-carnitine to gestating gilt diets would:

- a) Increase piglet birth weights
- b) Increase gut capacity → Lactation intakes
- c) Increase milk yield → Piglet ADG & wean weight
- d) Gilts- better condition at subsequent service

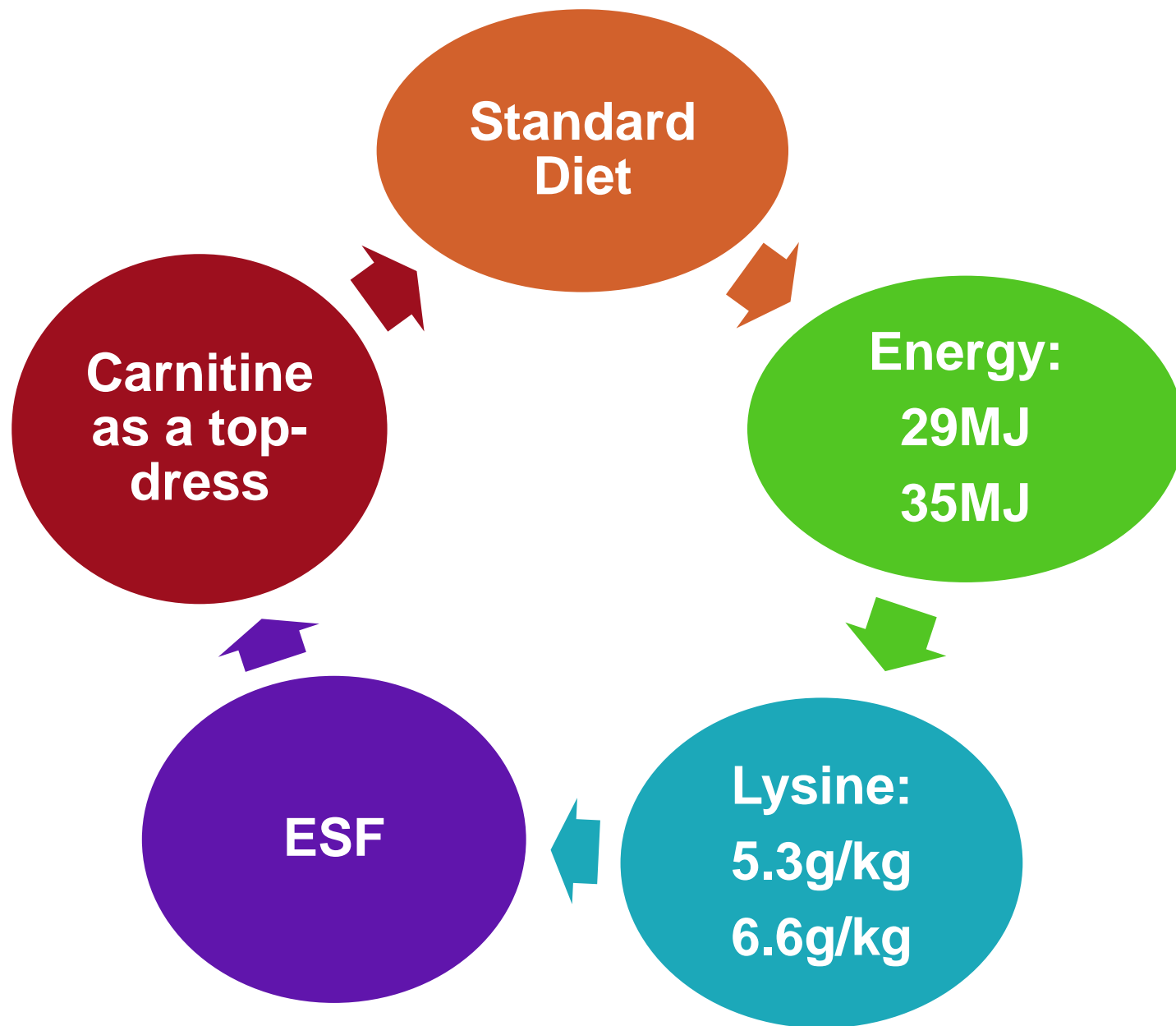
Experimental Design

- 2 x 2 factorial design
- 84 pregnant gilts → 4 Batches (~21 gilts each)
- D38 gilts blocked: Live-weight & Back fat depth
- Randomly assigned to treatment: D38- Farrowing



High Fibre= 40%
Unmolassed sugar beet pulp

		Crude Fibre		
		Low (4.5%)	High (9.8%)	
Carnitine	No (0g/day)	20	23	45
	Yes (0.125g/day)	21	22	41
		43	43	



Experimental Measures

Gilts

- Back fat depth → D38, D90, D110 , Weaning (D22-D29 lactation)
- Live-weight → D38, D90, D110, Weaning
- Cortisol → Every week between D90-D108

Piglets

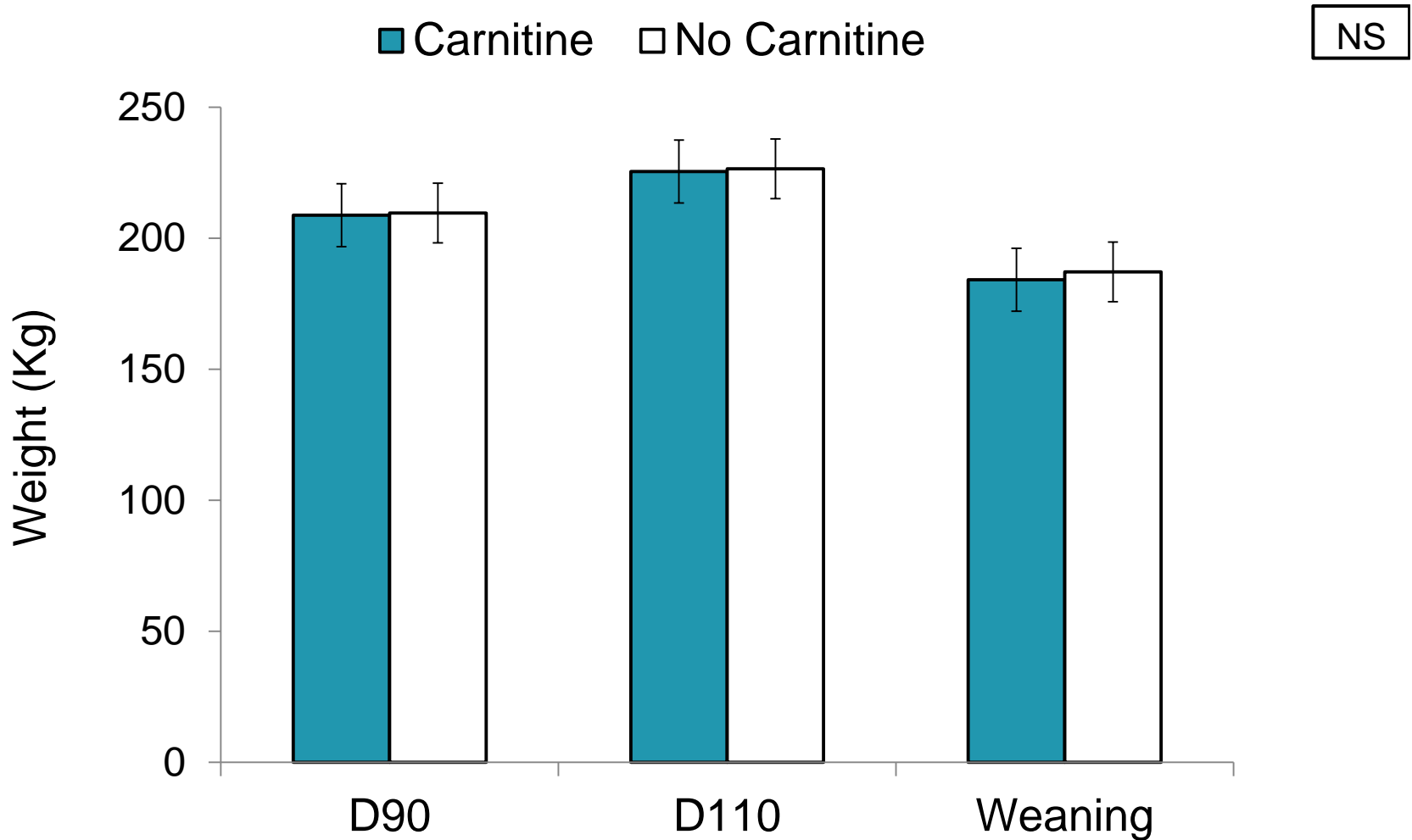
- Total born and born alive
- Weights → Birth (Total & Alive), Litter weight, 24hr, D6, D14, Weaning
- ADG → Birth to weaning
- Glucose → 24hrs



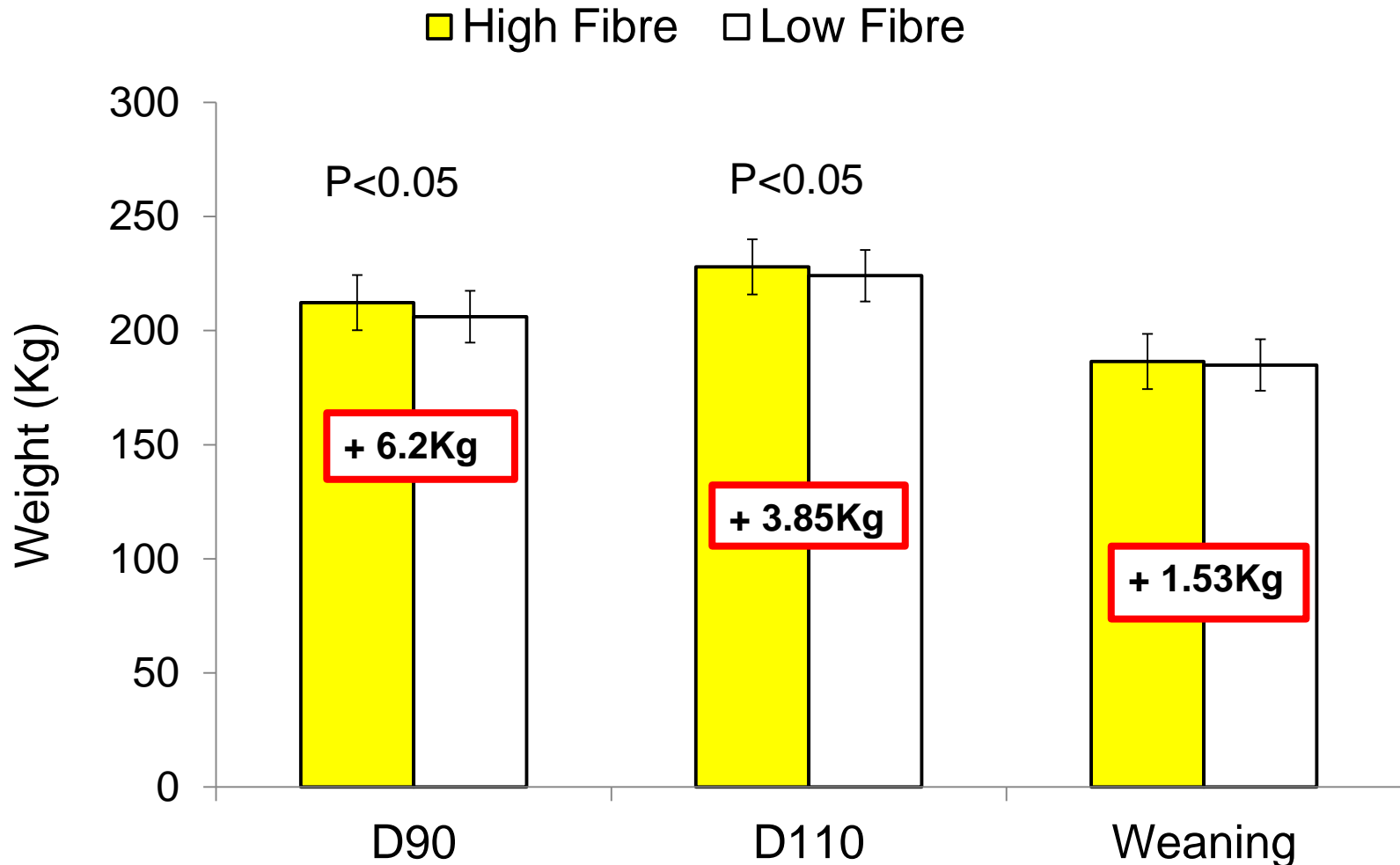
Results and Discussion



Gilt Weight

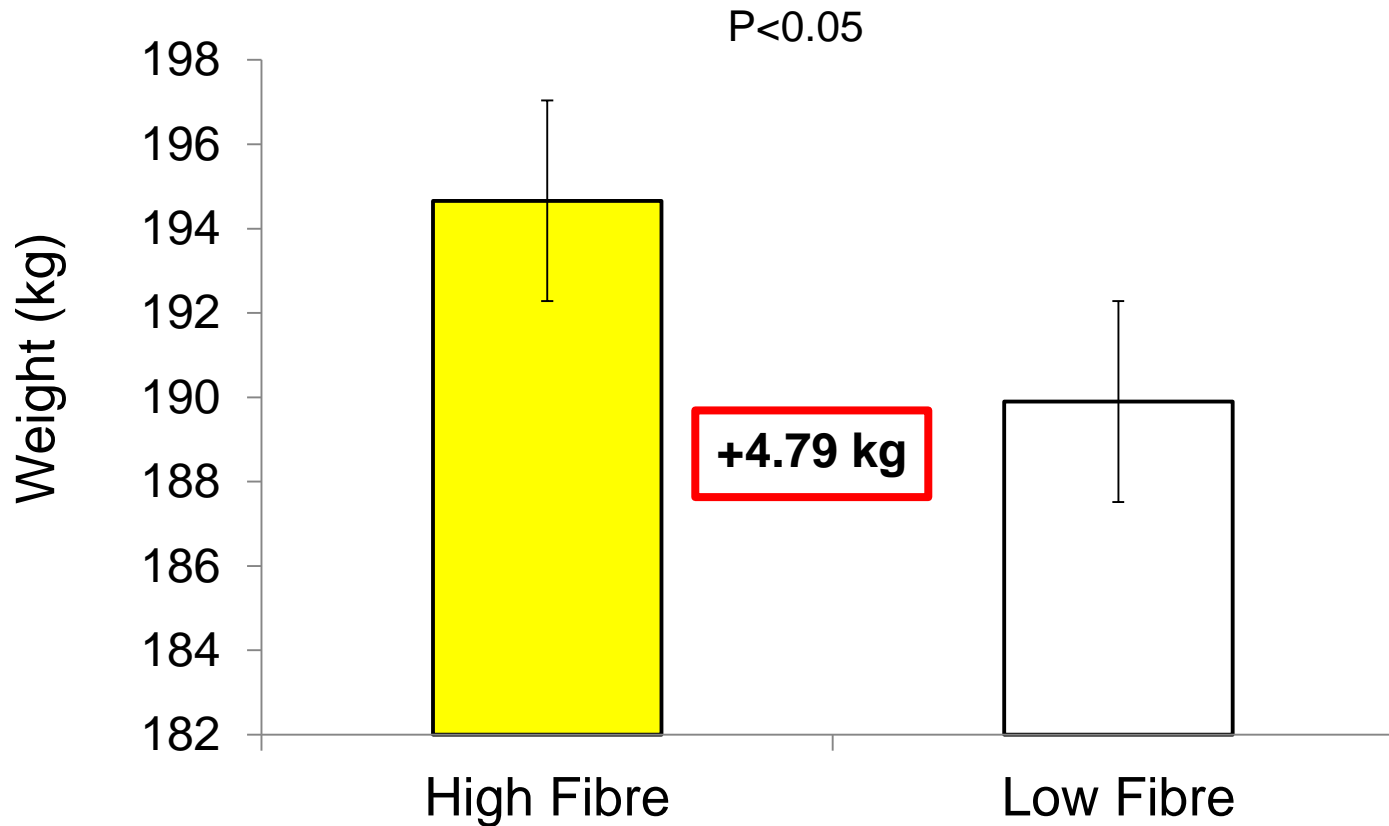


Gilt Weight



Gilt Weights

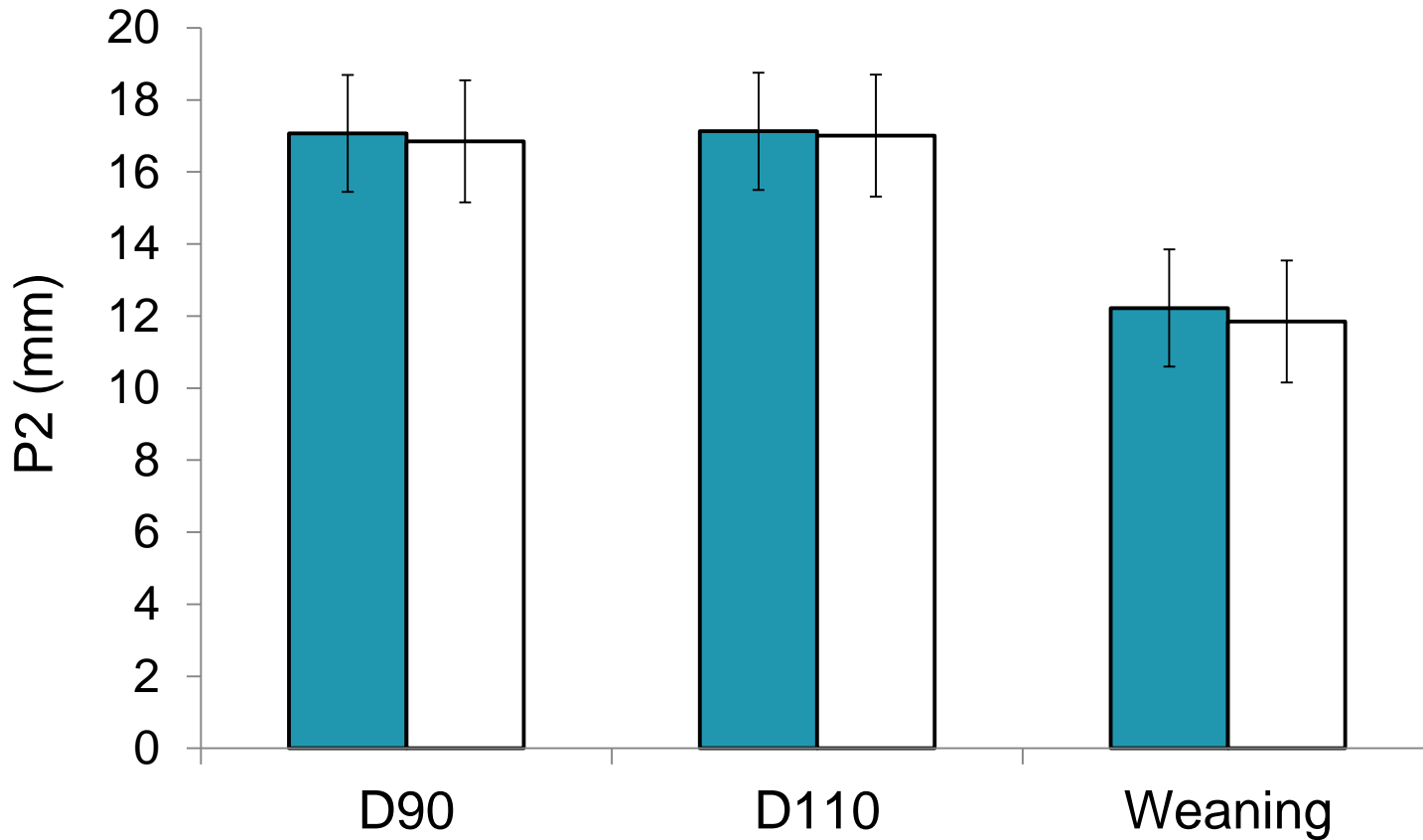
D110 Uterine adjustment



Gilt Back Fat Depth

■ Carnitine □ No Carnitine

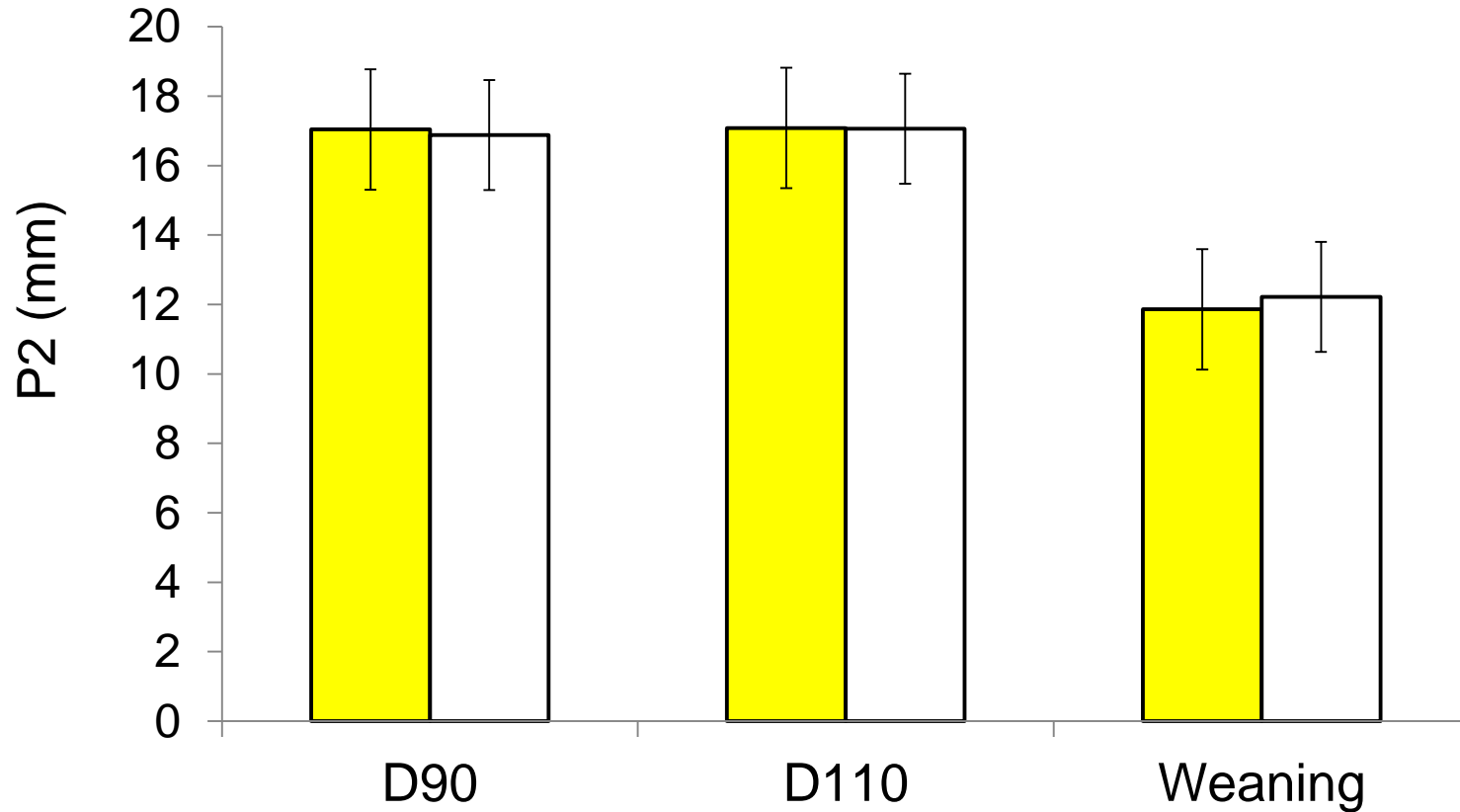
NS



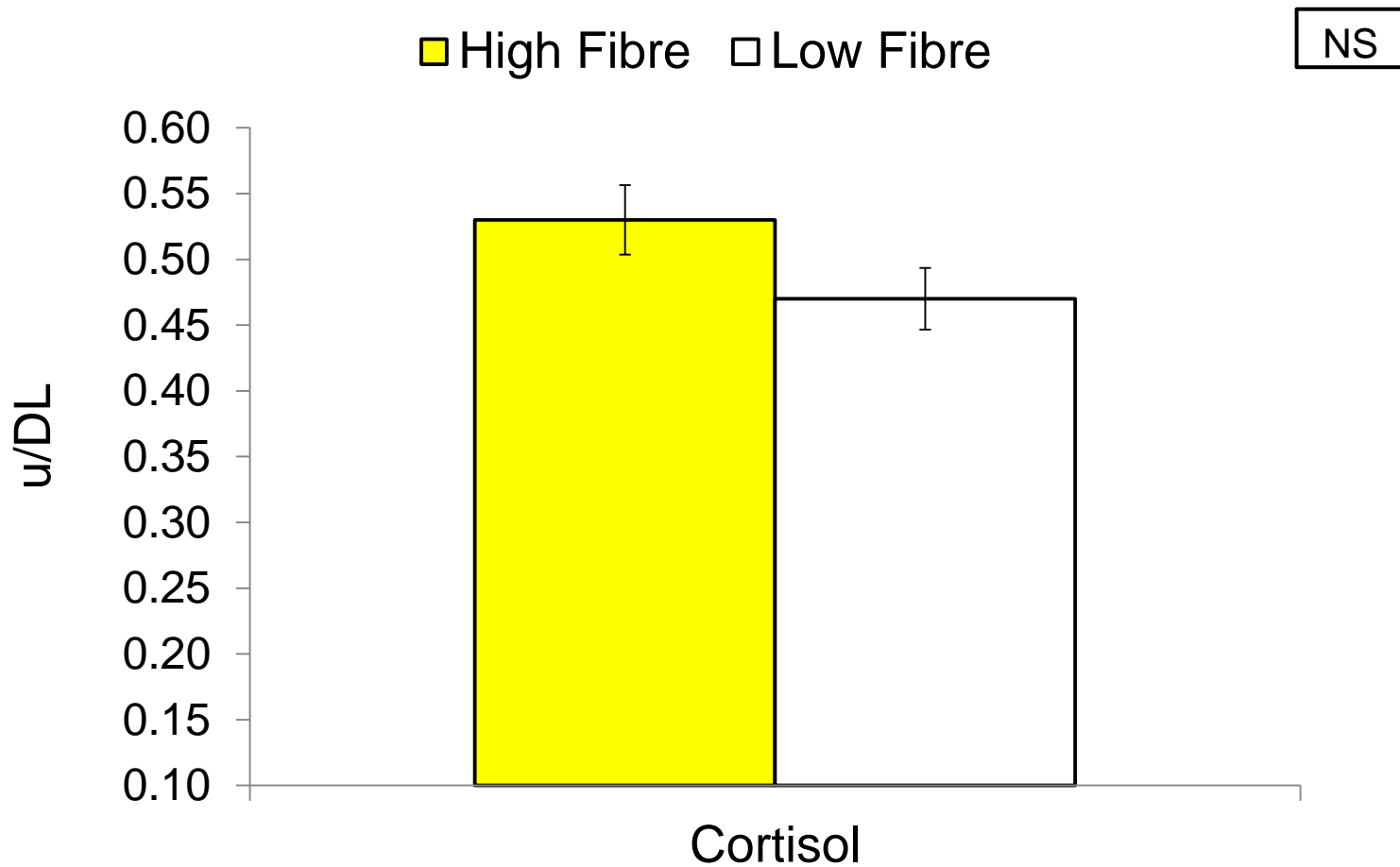
Gilt Back Fat Depth

■ High Fibre □ Low Fibre

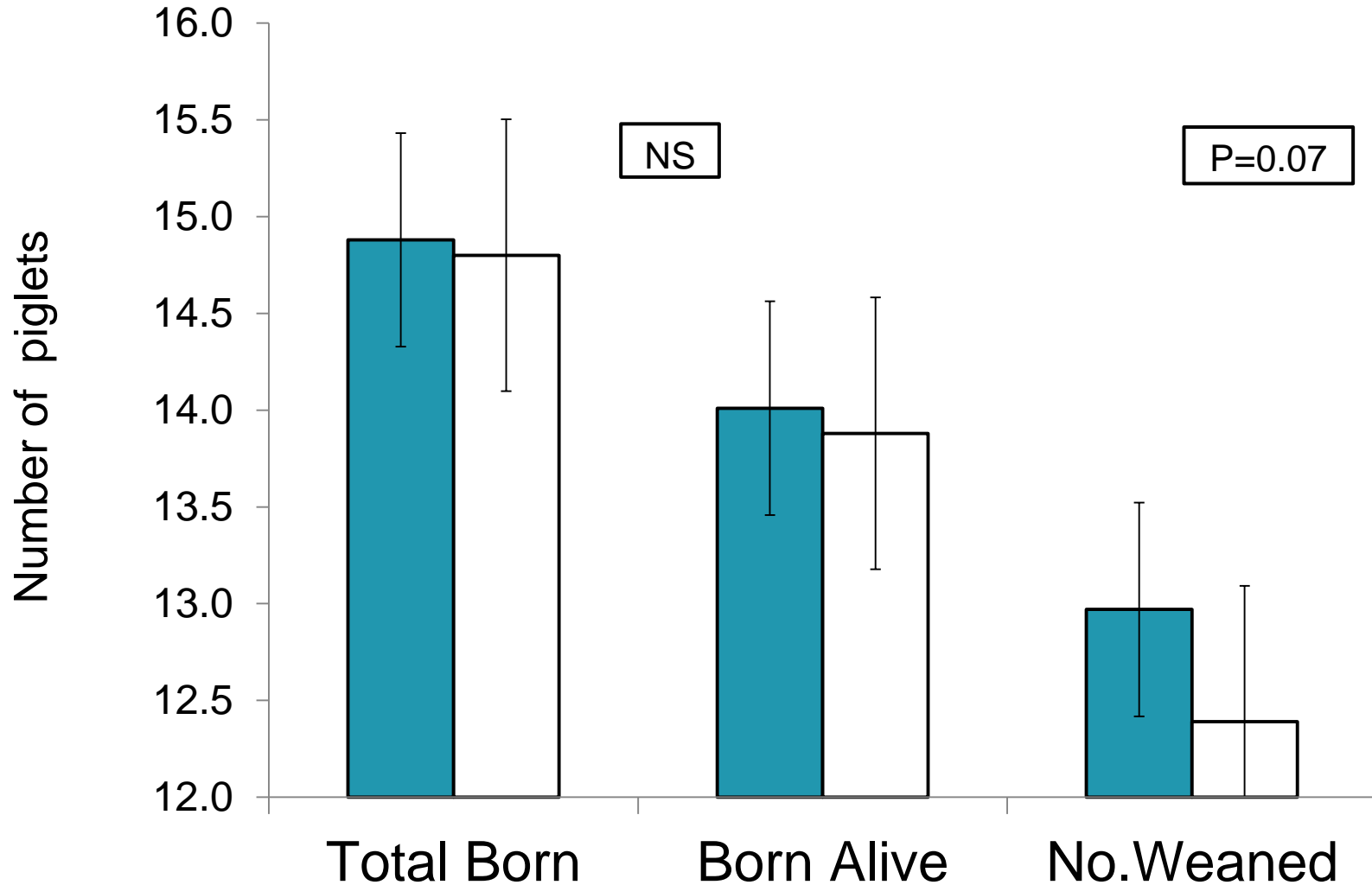
NS

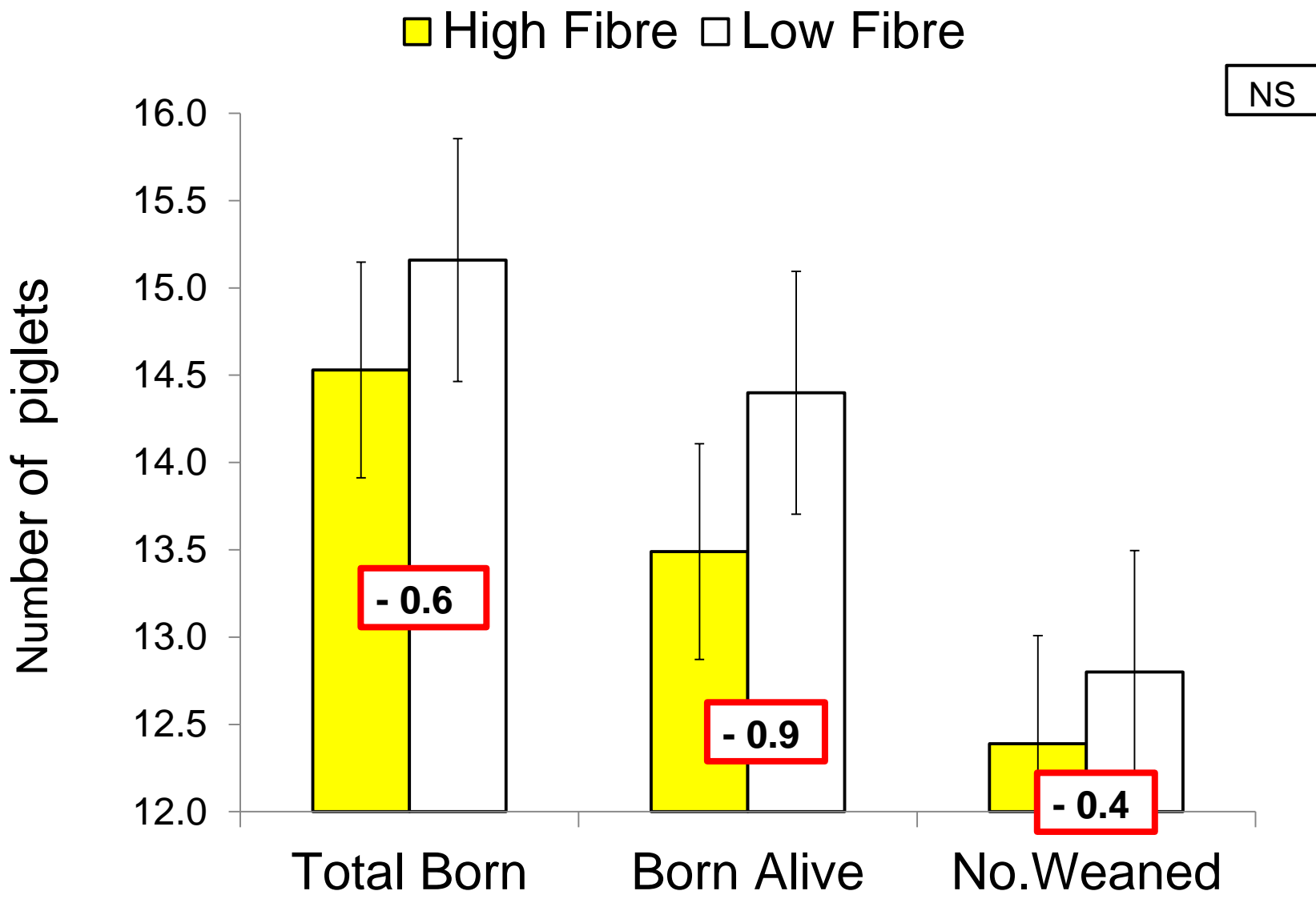


Gilt Cortisol Concentration



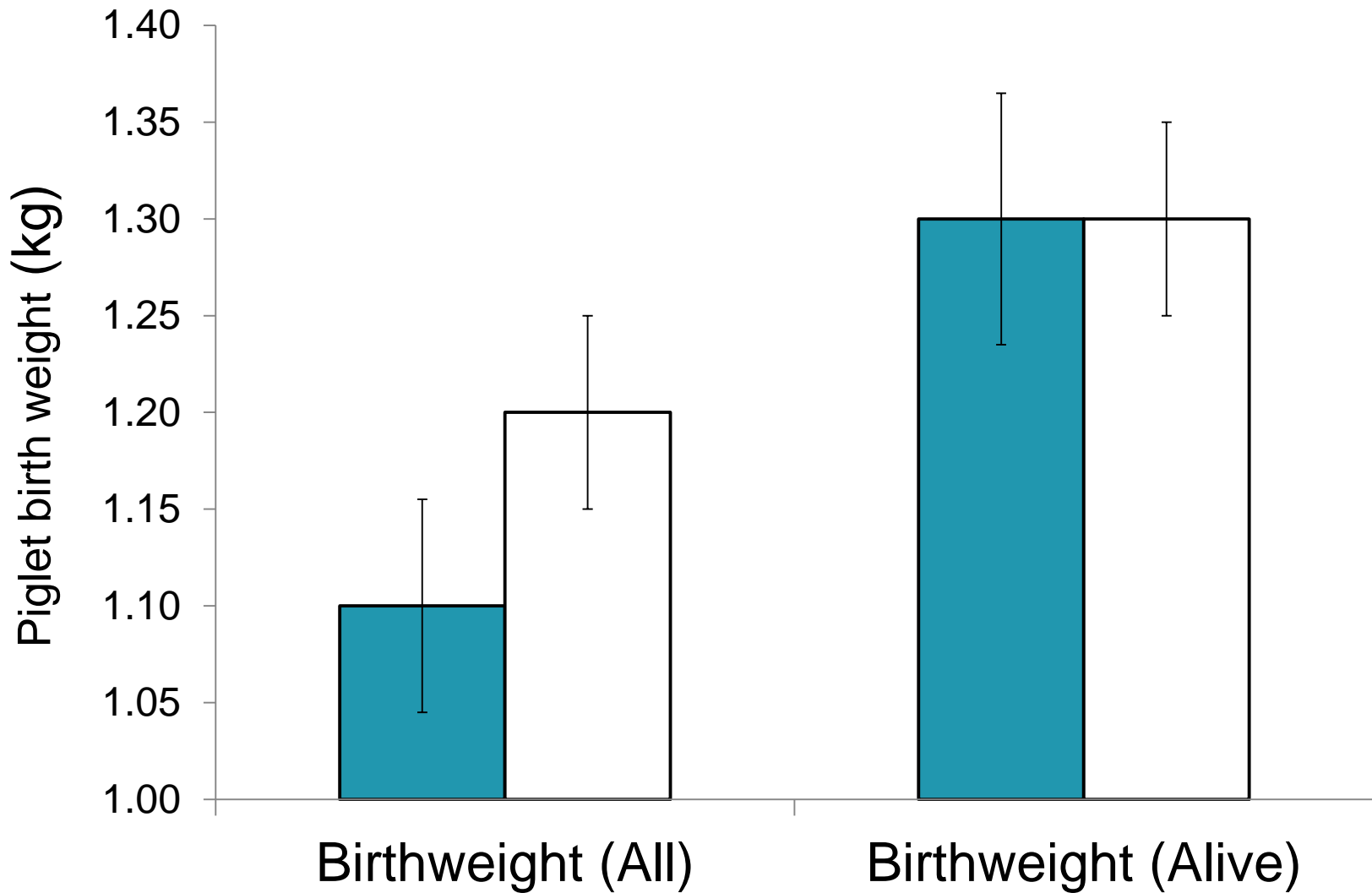
■ Carnitine □ No Carnitine

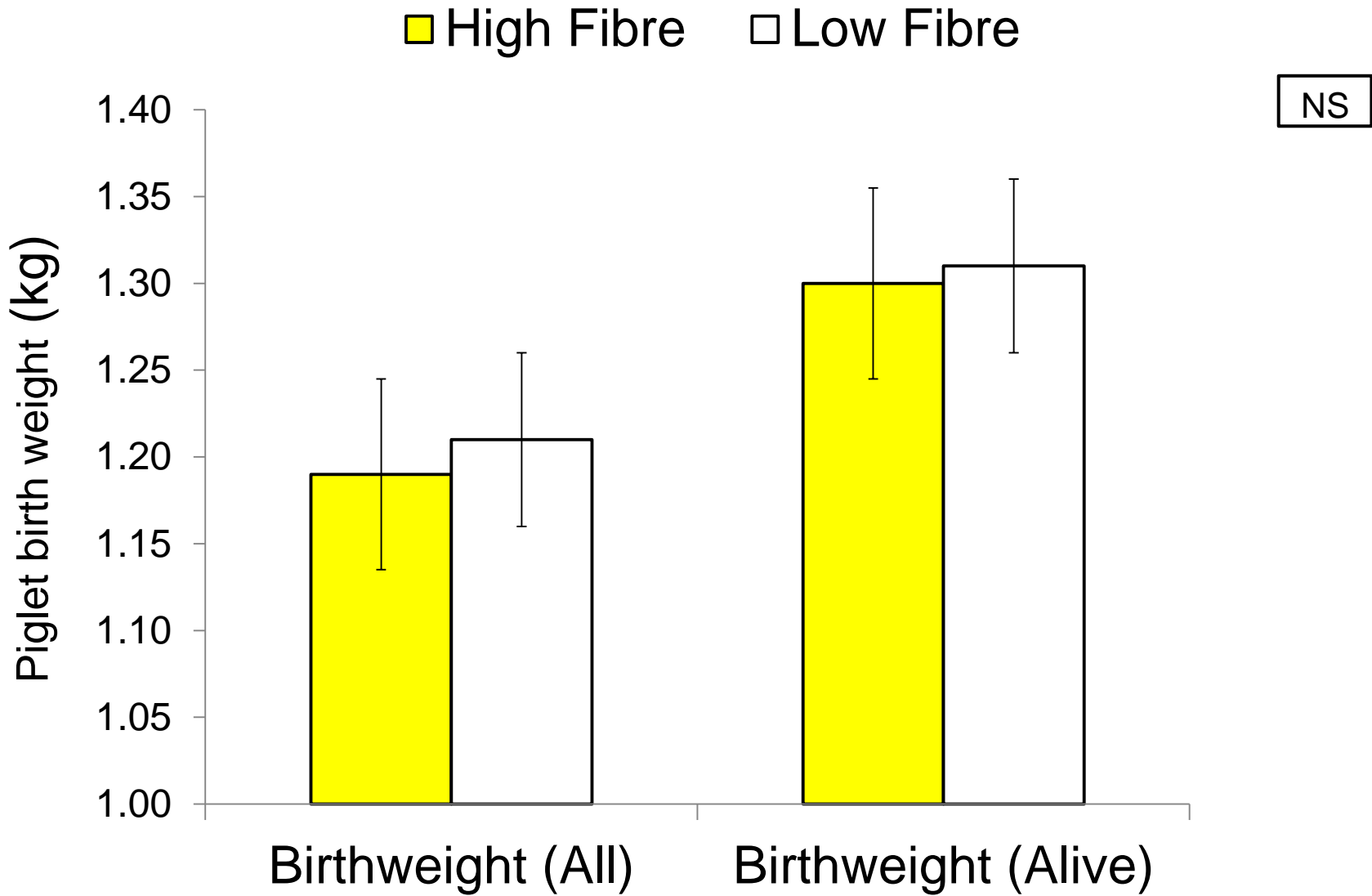




■ Carnitine □ No Carnitine

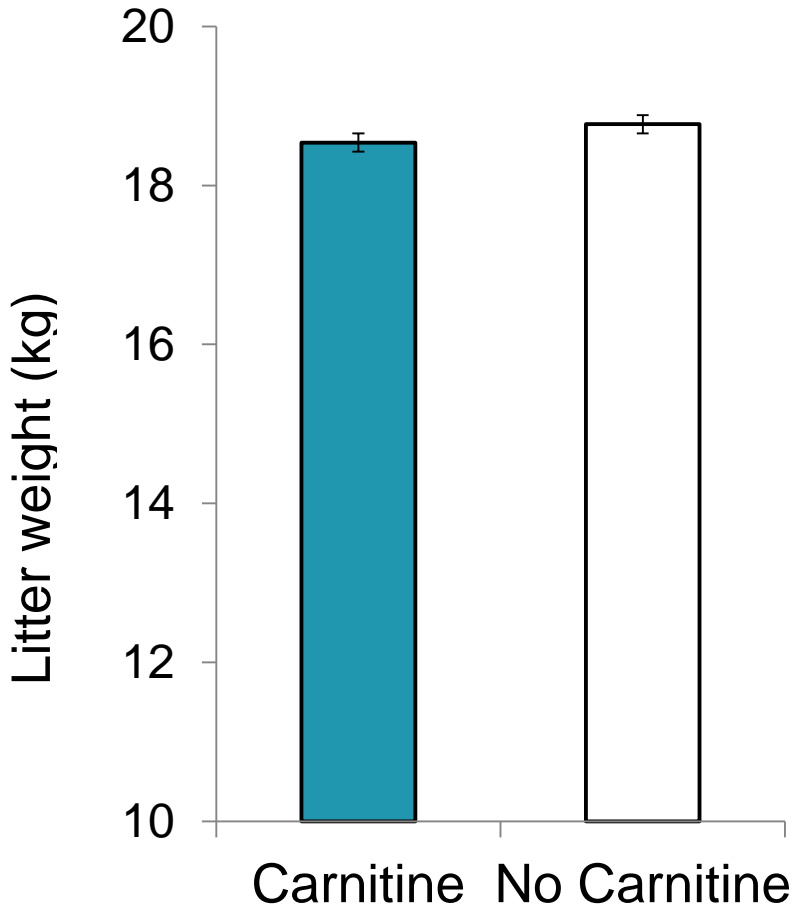
NS



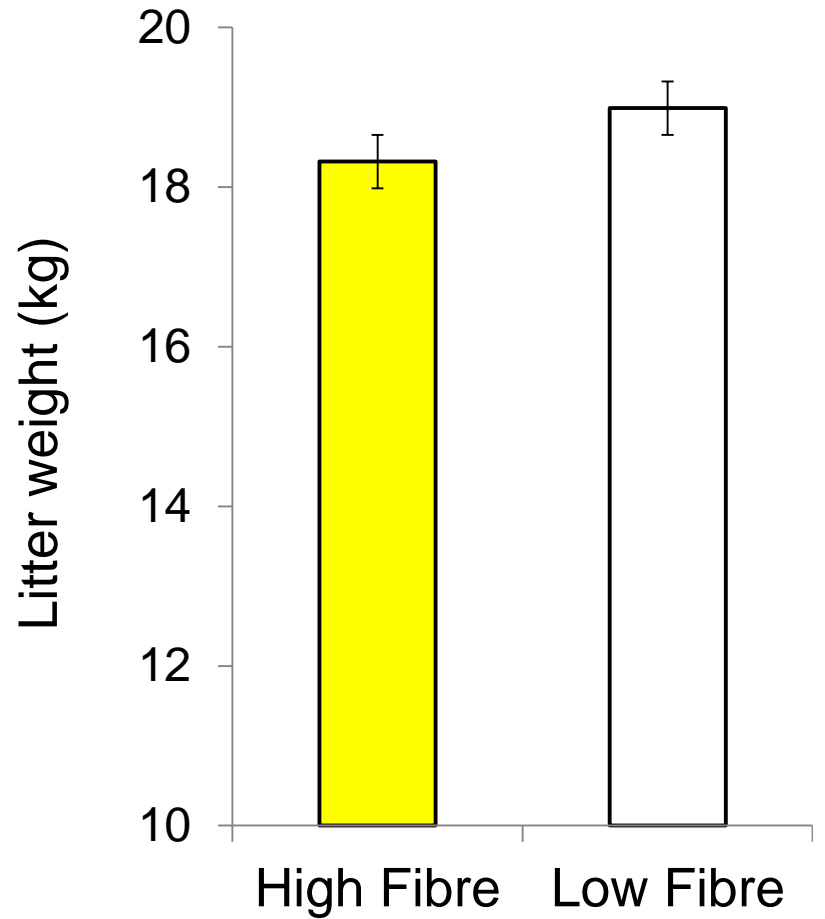


Litter Weight (Alive)

NS



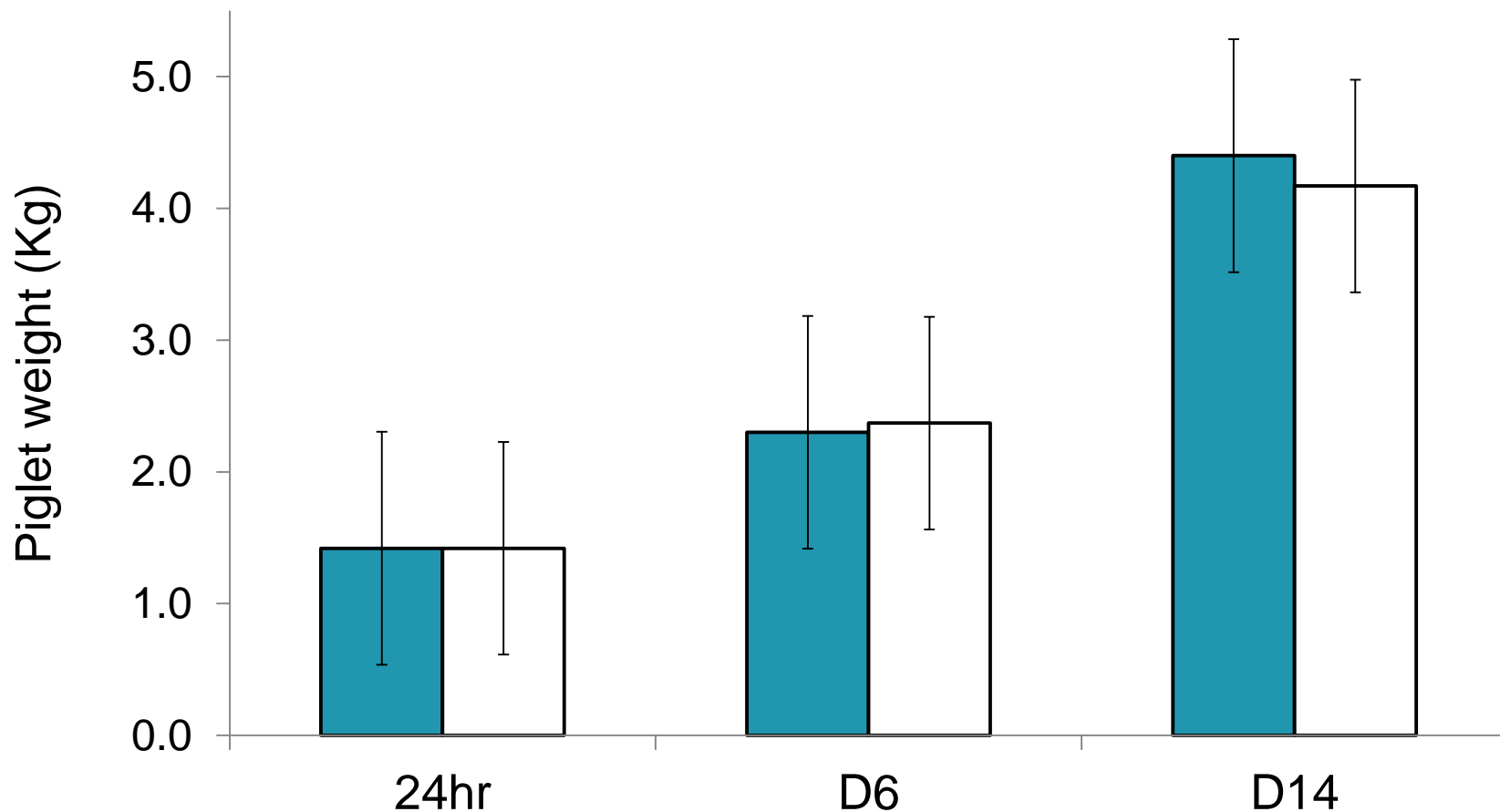
NS



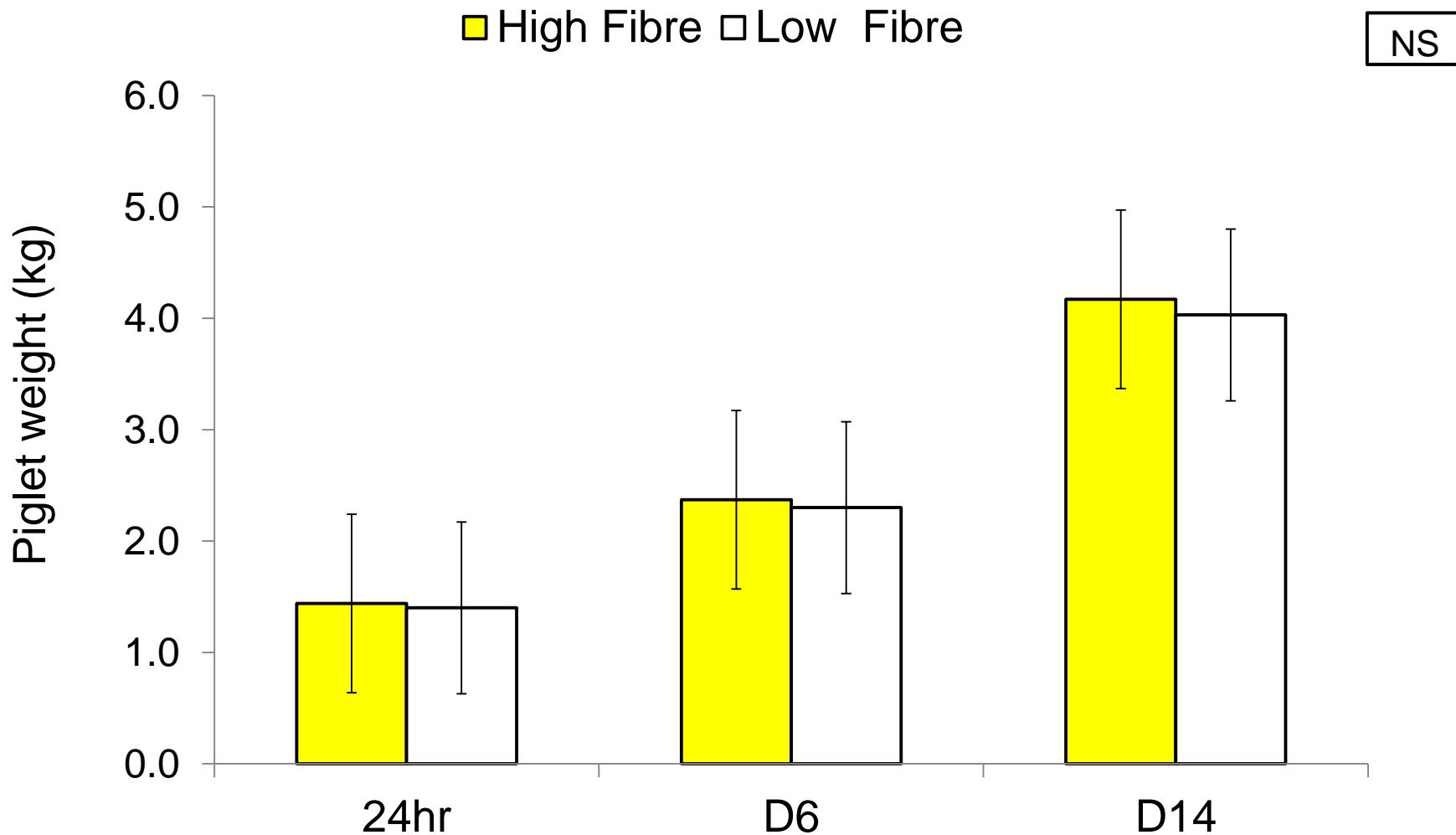
Individual Piglet Weight

■ Carnitine □ No Carnitine

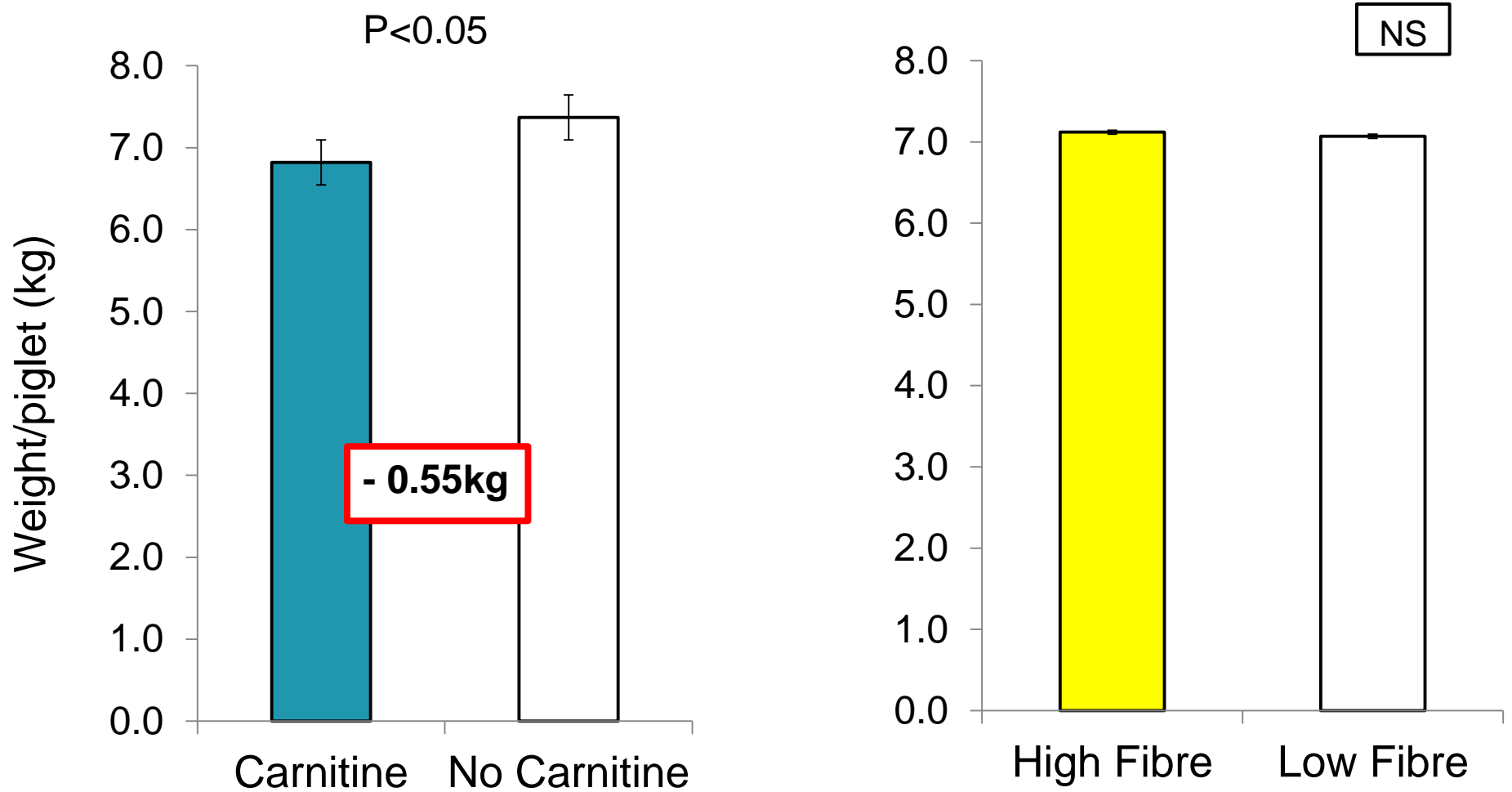
NS



Individual Piglet Weight

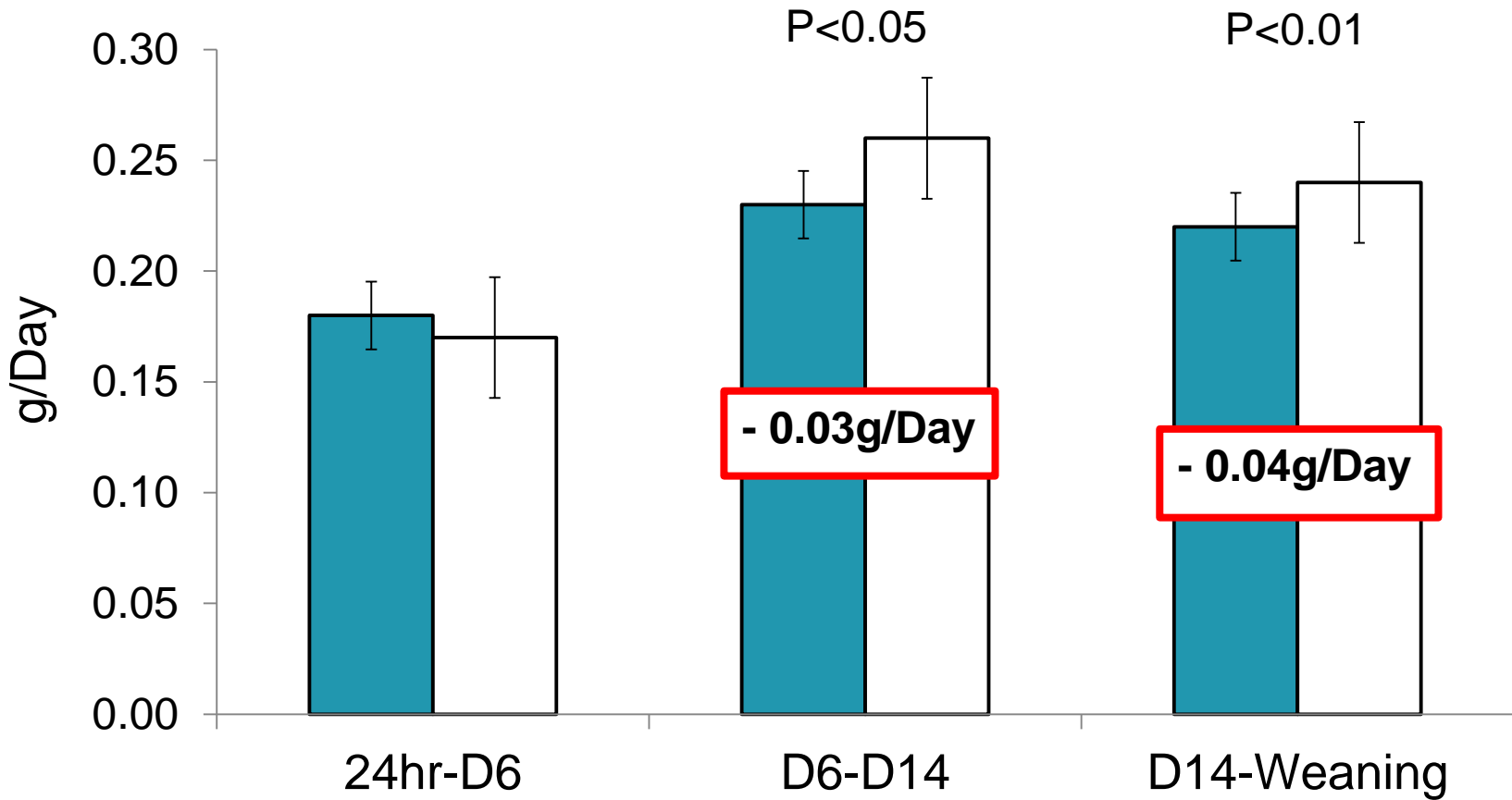


Weaning Weight



Piglet ADG

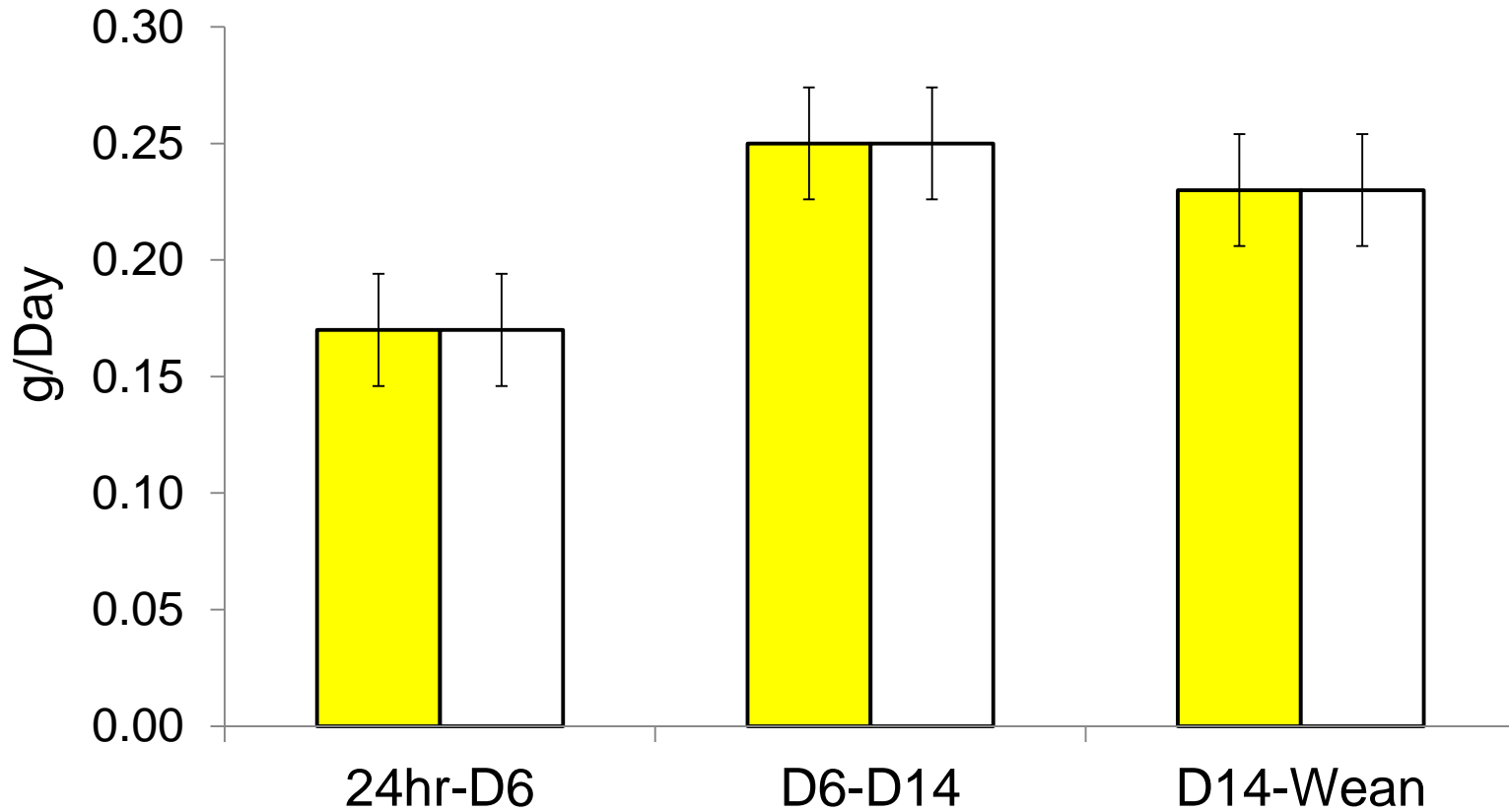
■ Carnitine □ No Carnitine



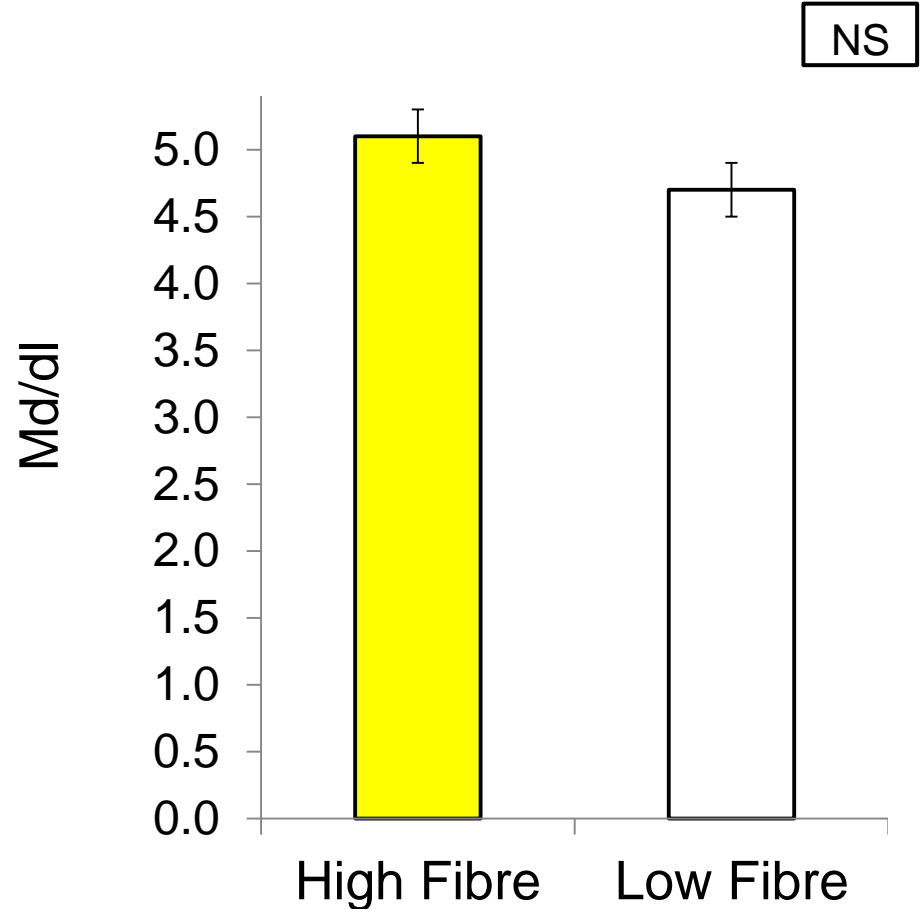
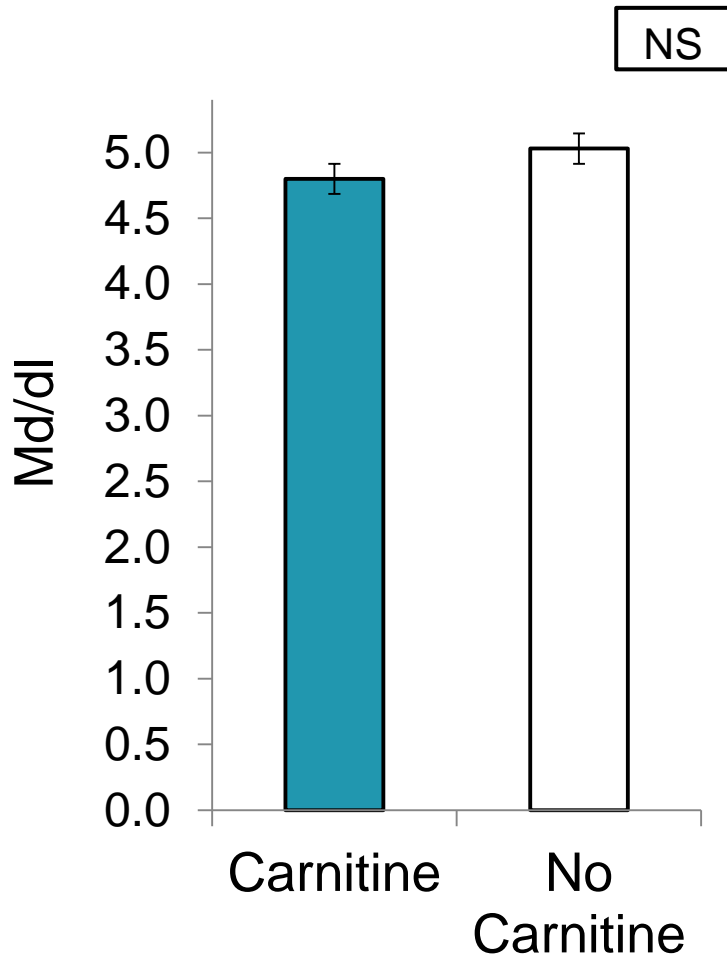
Piglet ADG

NS

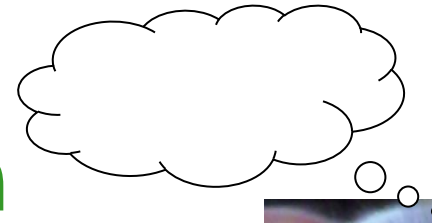
■ High Fibre □ Low Fibre



Piglet Glucose Concentration



Discussion



➤ Gilts vs. Sows

- Lighter piglets at birth (*Mahan, 1993; NADIS, 2016*)
- Growth rate to weaning (*Carney-Hinkle et al., 2013*)

➤ High Cortisol

- Too much gut fill..

➤ Weaning weight

- Run analysis again

➤ Post-weaning

Take home message

Supplementation of gestational diets with **L-carnitine** does not support our original hypothesis of increased piglet birth weight.

Increased **fibre level** showed positive results for gilt weight. No effect was seen for piglet ADG or weaning weight.



Department of
**Agriculture,
Food and the Marine**

An Roinn
**Talmhaíochta,
Bia agus Mara**



Thank you!



Moorepark Pig Research Unit
Technician: Oliver Clear
Research Assistant: Alexandra Courty