Piglet birth weight and uniformity

Importance of the pre-mating period

Anne Wientjes

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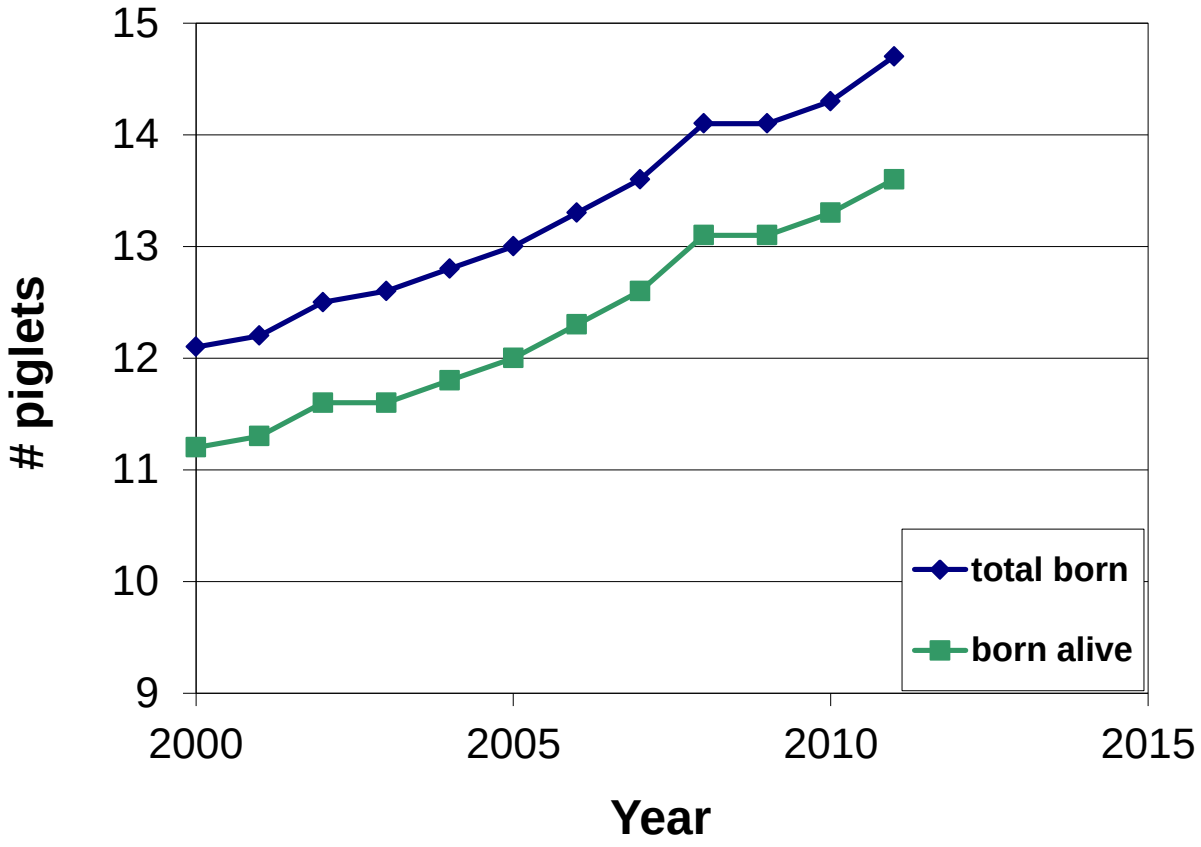
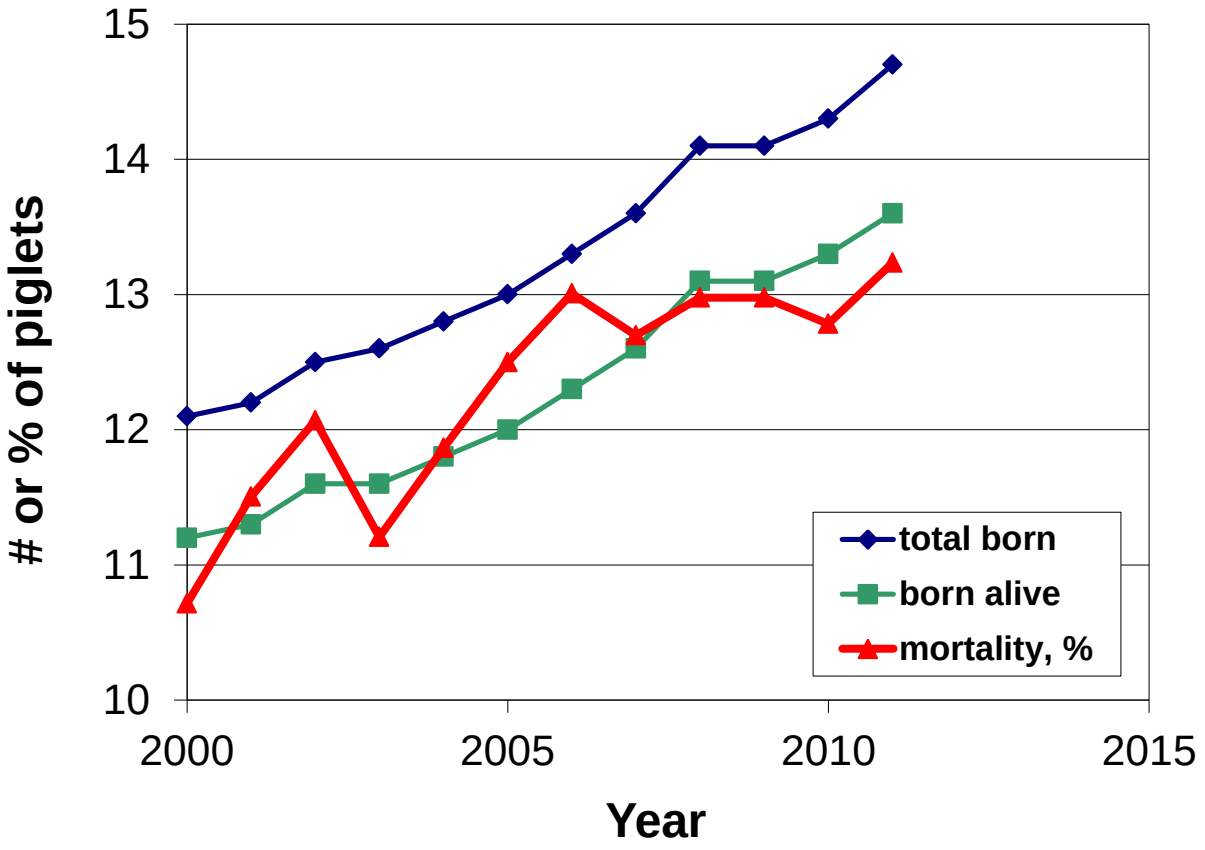
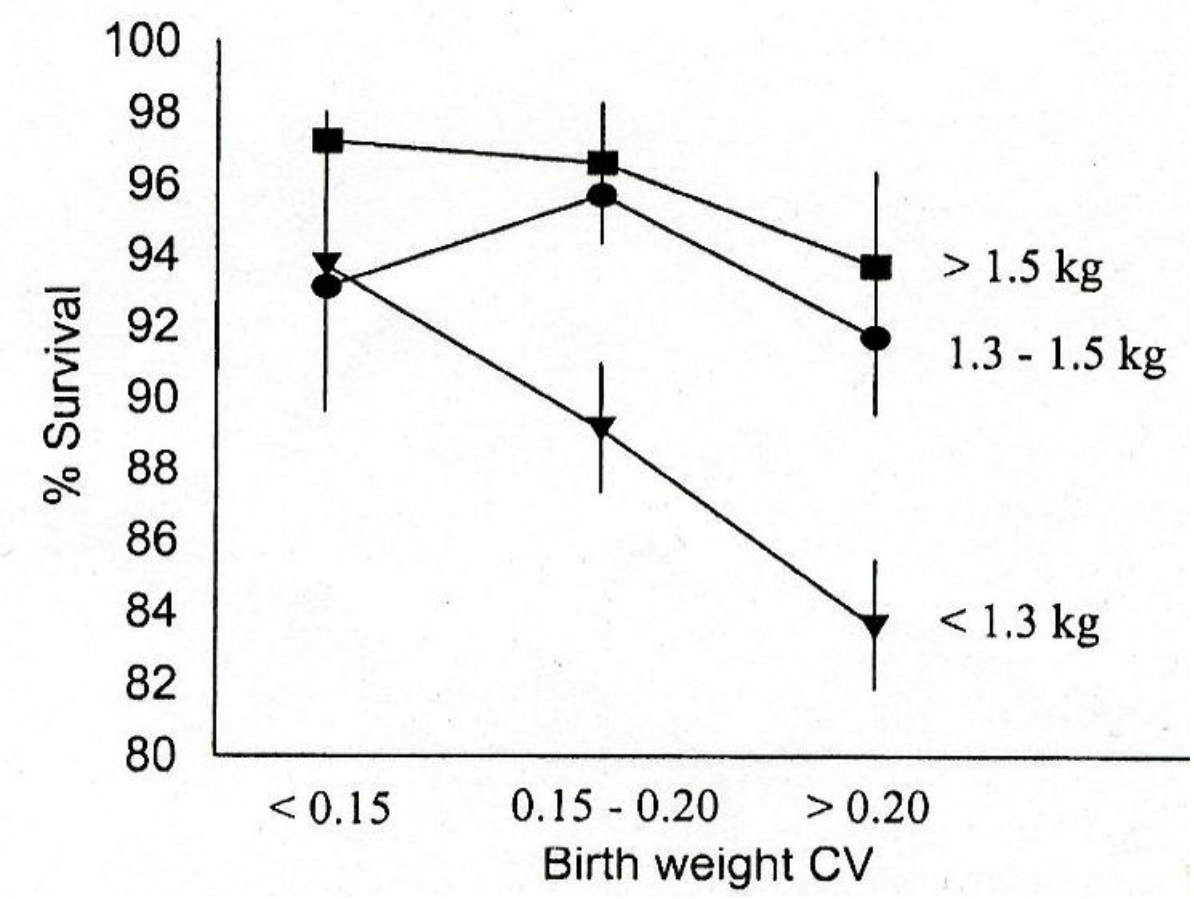
Technical results, the Netherlands



Technical results, the Netherlands



Piglet birth weight, uniformity and survival



Birth weight and uniformity negatively related with litter size

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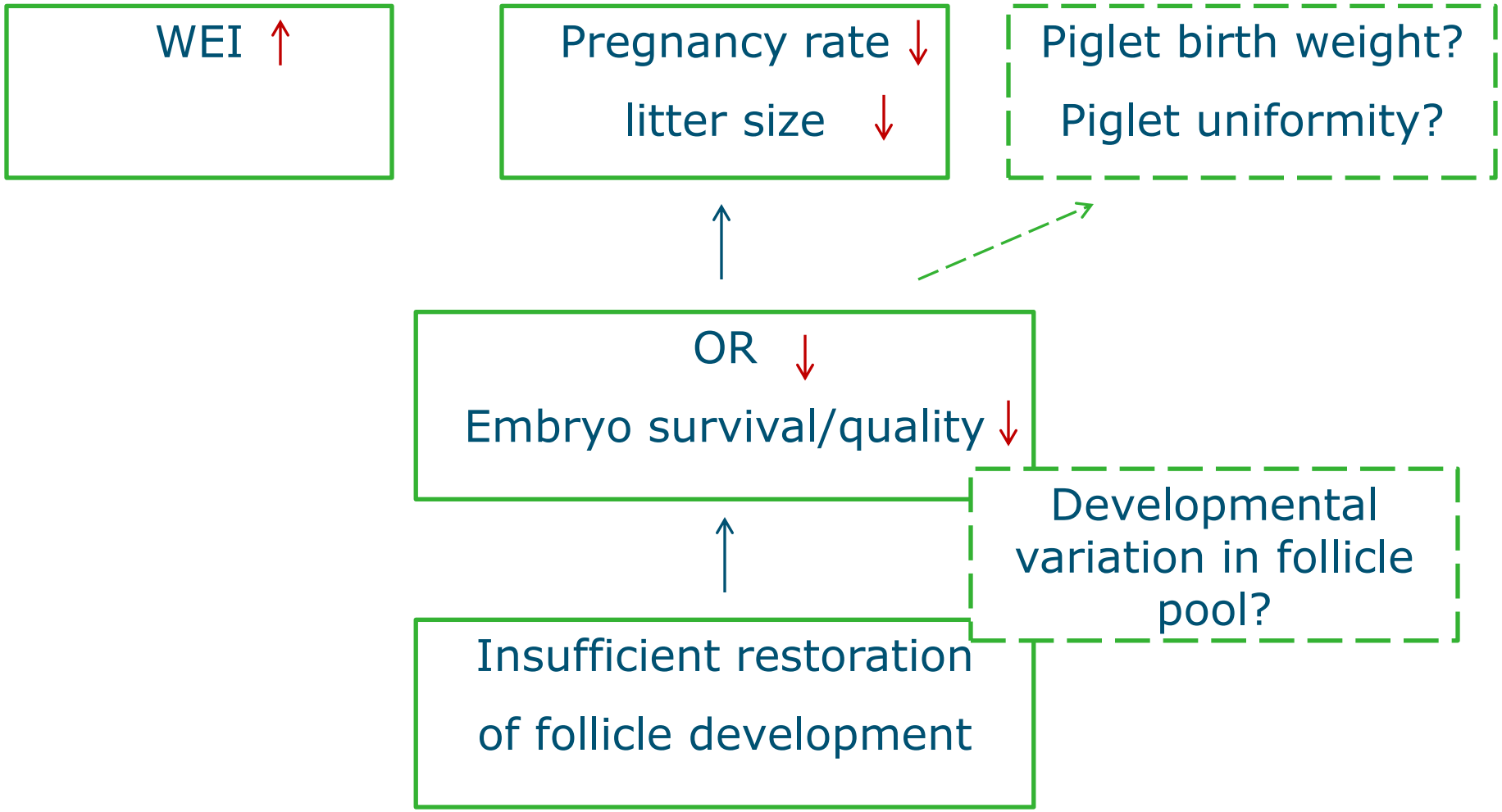
Milligan et al., 2002; Quesnel et al. 2008; Wientjes et al. 2012

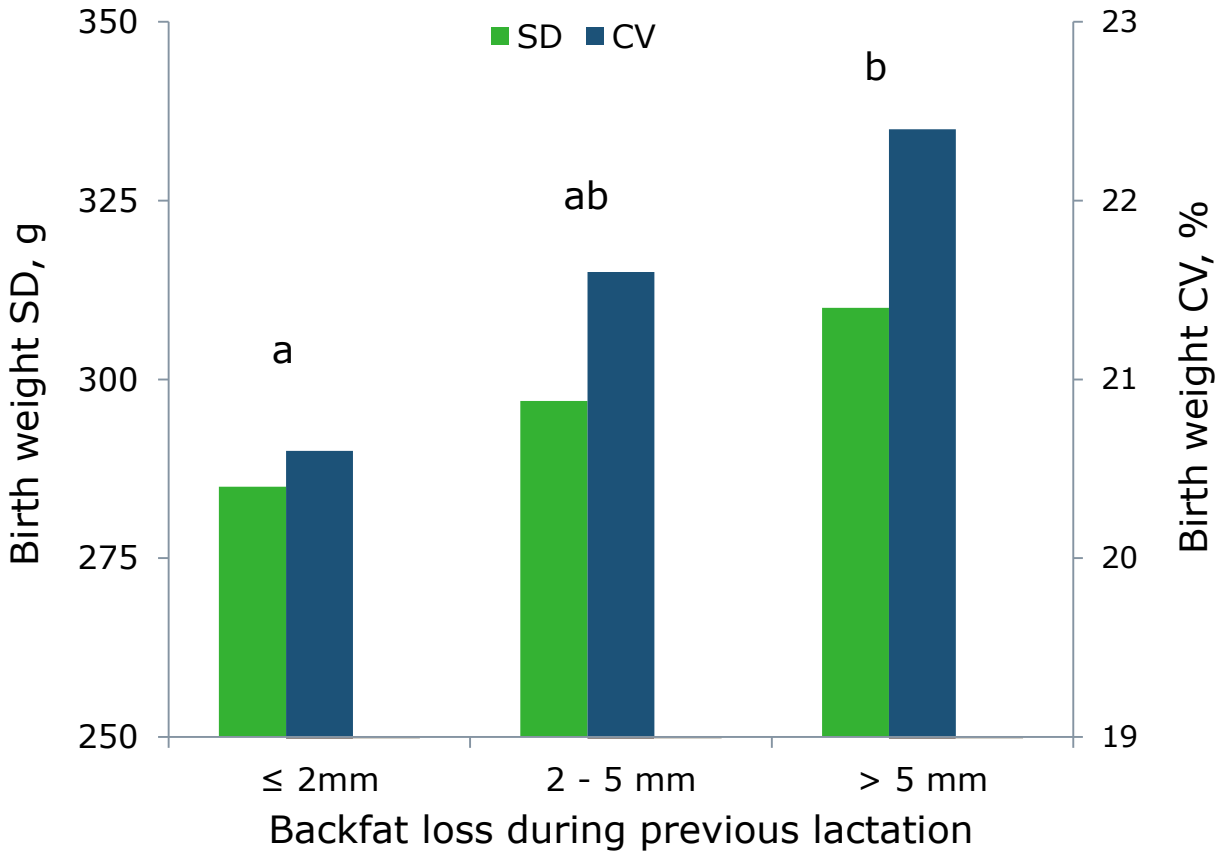
How to improve piglet uniformity?

Part of uniformity at birth already determined in pre-mating period?

Sow body condition loss during lactation



Sow body condition loss during lactation



- n = 772 Topigs20 sows with WPI ≤ 7d
- Corrected for litter size
- ab P < 0.05

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Wientjes et al. (submitted)

Prolonged weaning-to-pregnancy interval

	WPI ≤7d	WPI 8-21d	WPI >21d[1]	SEM	P-value
n	1,584	72	182		
Total number born, n	**13.7[a]**	**14.9[b]**	**14.4[b]**	**0.3**	**<0.01**
Mean birth weight[2], g	1,428	1,438	1,431	17	0.83
Birth weight SD[2], g	**310[b]**	**291[ab]**	**287[a]**	**7**	**<0.01**
Birth weight CV[2], %	**22.2[b]**	**20.8[ab]**	**20.5[a]**	**0.5**	**<0.01**

[1] including repeat breeders
[2] corrected for litter size

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Wientjes et al. (submitted)

Yes,

- Pre-mating period is important
  - Piglet uniformity is compromised by severe sow body condition losses during lactation
  - Piglet uniformity is improved in sows with a prolonged WPI
    - (insufficient) follicle restoration?

➡ How to improve piglet uniformity?

Pre-mating insulin-stimulating diets

- Dextrose (150g/d) during WII:

	CON	DEX	SEM	P-value
Total born piglets, n	13.96	13.44	0.38	0.35
Mean birth weight, kg	1.59	1.61	0.05	0.81
CV birth weight, %	**21.2**	**17.5**	**1.3**	**0.03**
Mortality until weaning, %	7.4	6.9		0.68

Van den Brand et al., 2006; 2009

Pre-mating insulin-stimulating diets

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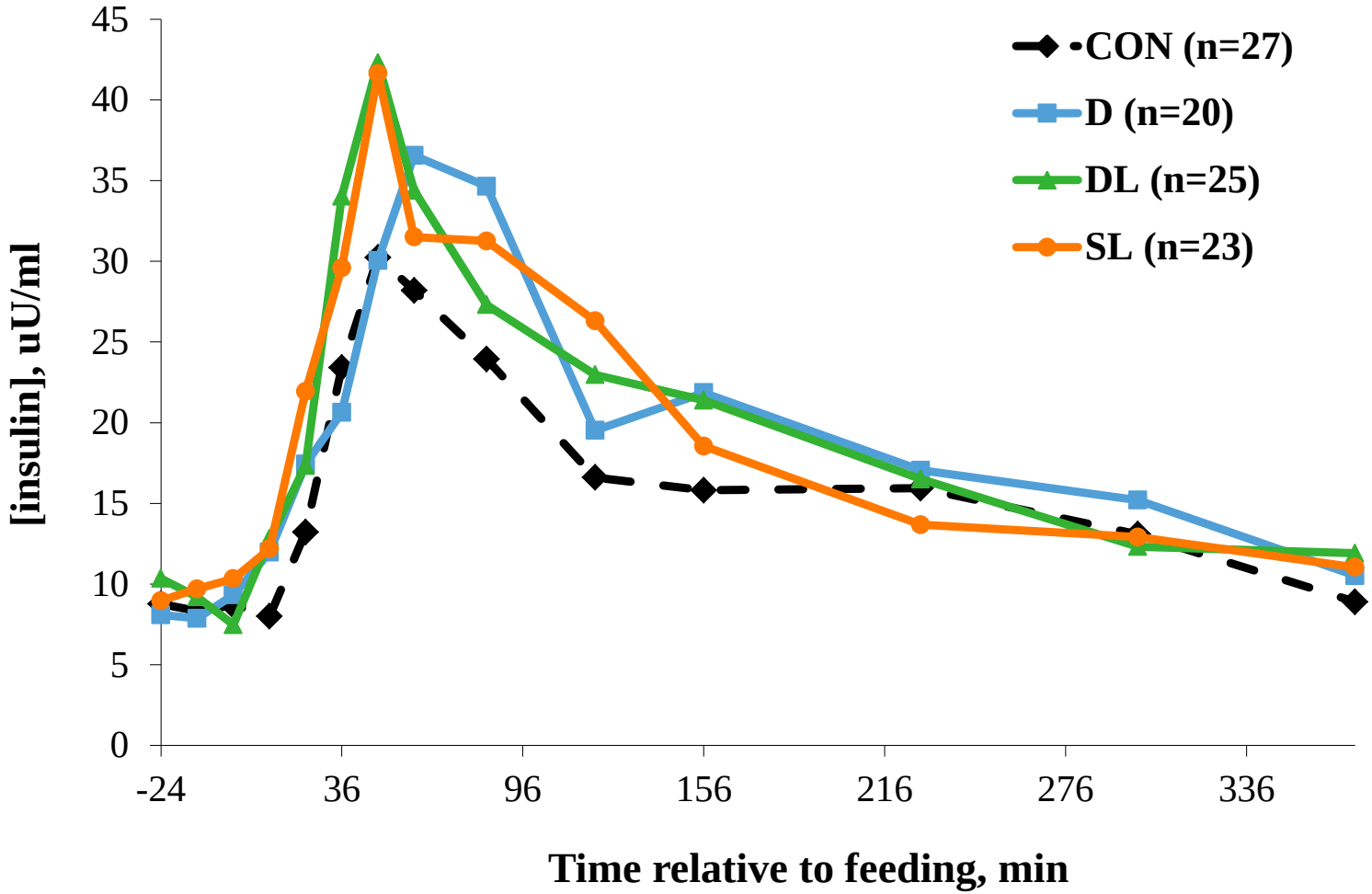
Mortality until weaning, %	7.4	6.9		0.68

- Dextrose+lactose (both 150g/d) during lactation and WII:

	CON	DEX+LAC	SEM	P-value
Total born piglets, n	14.25	14.40	0.52	0.84
Mean birth weight, kg	**1.47**	**1.55**	**0.03**	**0.05**
CV birth weight, %	**23.7**	**20.5**	**1.0**	**0.04**
Mortality until weaning, %	13.4	12.1		0.44

Van den Brand et al., 2006; 2009

Insulin-stimulating diets



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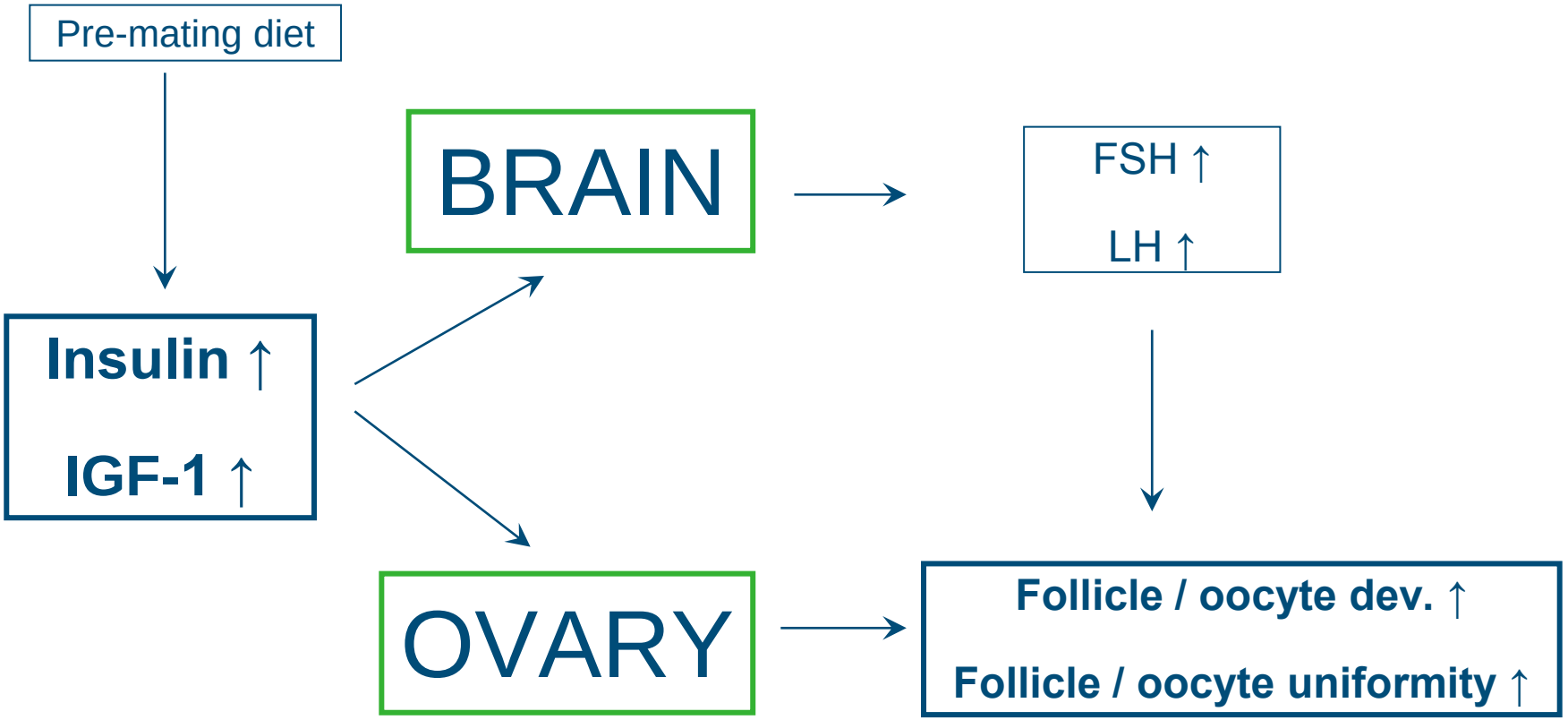
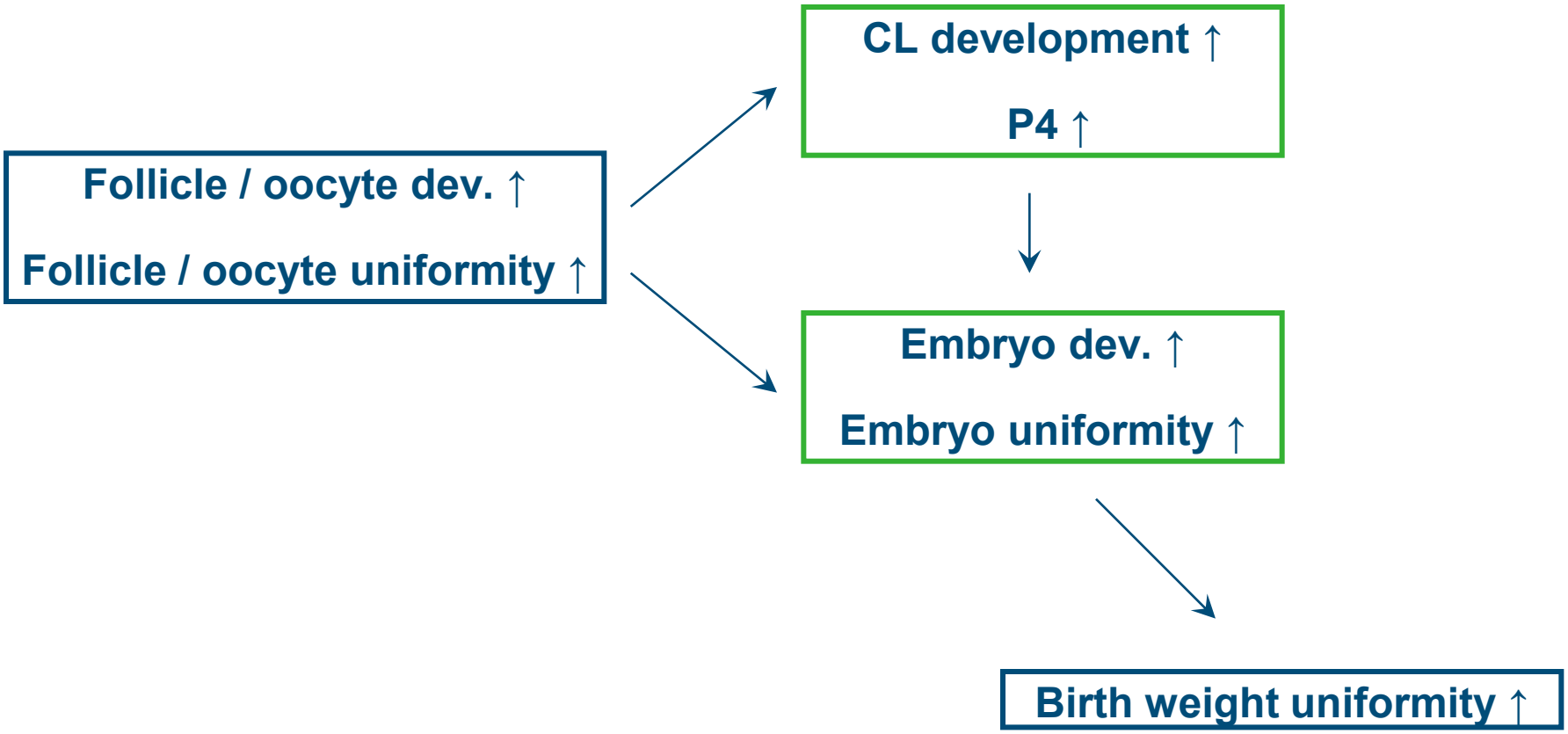
Wientjes et al. 2012

Possible mechanism involved (1)

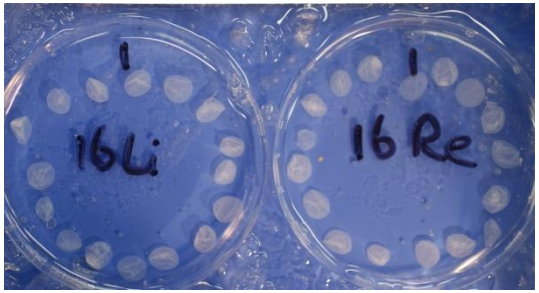


Possible mechanism involved (2)



Unravelling the mechanism

- 32 multiparous Topigs20 sows
- Effects of nutritionally increased insulin and/or IGF-1 levels during WII on:
  - Reproductive hormones → LH and P4
  - (uniformity in) pre-ovulatory follicle development
  - Luteal development
  - (uniformity in) embryo development at d10

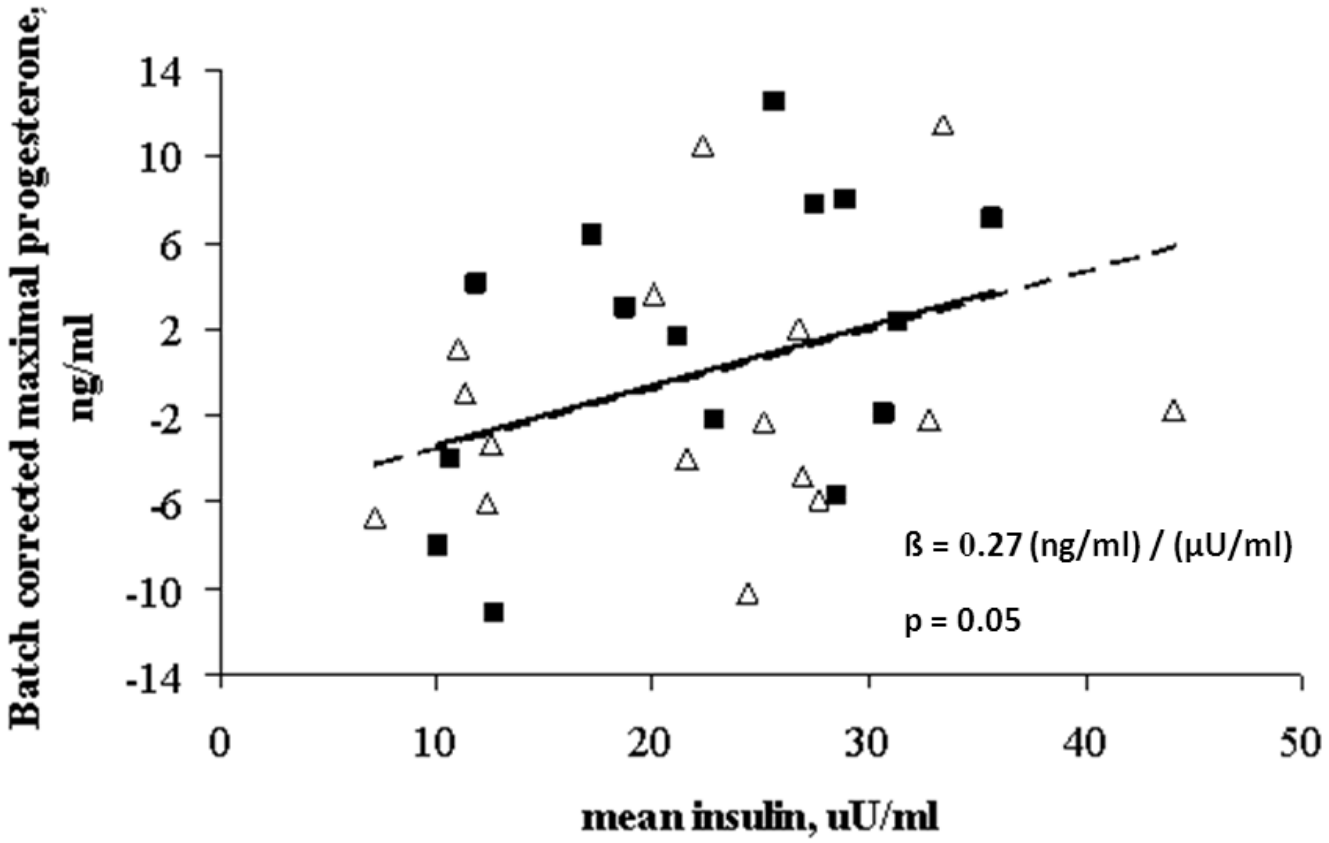


Insulin/IGF-1 levels during WII related to:

- Follicle diameter
  - basal insulin with follicle diameter at ovulation: +
- LH
  - insulin AUC/mean insulin/IGF-1 with basal LH level: +
- Progesterone
  - insulin AUC/mean insulin with mean and maximal P4: +
- Embryo development
  - insulin AUC/mean insulin with embryo diameter: +

Wientjes et al. (2012)

Relation between mean insulin and P4 at d10



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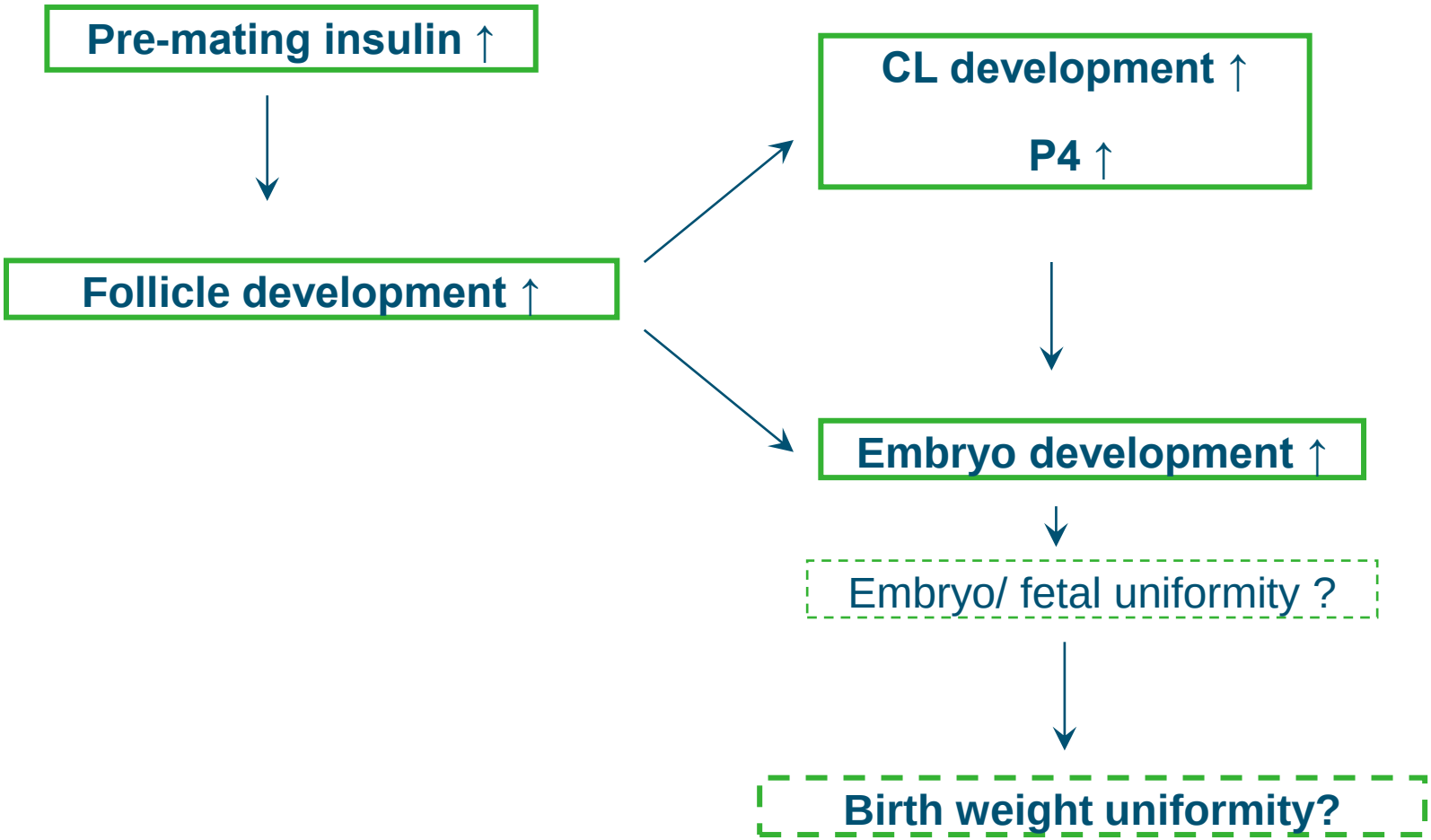
Wientjes et al. (2012)

Yes,


Pre-mating insulin ↑
CL development ↑
P4 ↑
Follicle development ↑
Embryo development ↑
Embryo/ fetal uniformity ?
Birth weight uniformity?

Effects of sow metabolic state

- Conventional sows:
  - Catabolic state during 3-4wk lactation

    ⟶ Suppresses insulin and follicle development

- Organic sows:
  - 6wk lactation → 4±2 kg (1.6%) body weight loss
  - Switch to anabolic state during last wks?

    ⟶ Follicle development less suppressed?

    (larger litters)

Effect of pre-mating insulin-stimulating diets

	CON N = 34	WII N = 42	LAC+WII N = 39	SEM	P-value
Total born piglets, n	17.0	17.2	17.8	0.5	0.53
Mean birth weight, kg	1.28	1.29	1.23	0.03	0.48
CV birth weight, %	23.4	22.6	23.3	1.0	0.79
Mortality d0-3, %	15.8	16.0	16.5	1.6	0.96
Mortality d0-weaning, %	27.7	27.2	23.1	2.5	0.33

Wientjes et al. (2012)

Take home message

- Pre-mating period is important for piglet birth weight and uniformity:
  - Compromised by severe sow body condition losses during lactation
  - Improved in sows with a prolonged WPI

    (insufficient) follicle restoration?

  - Insulin-stimulating diets during the pre-mating period may be beneficial for follicle development and subsequent piglet birth weight and uniformity
    - But only so in sows with a compromised follicle development at weaning?

Thanks for your attention!

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