Effects of dextrose and L-arginine in sow diet on litter heterogeneity at birth

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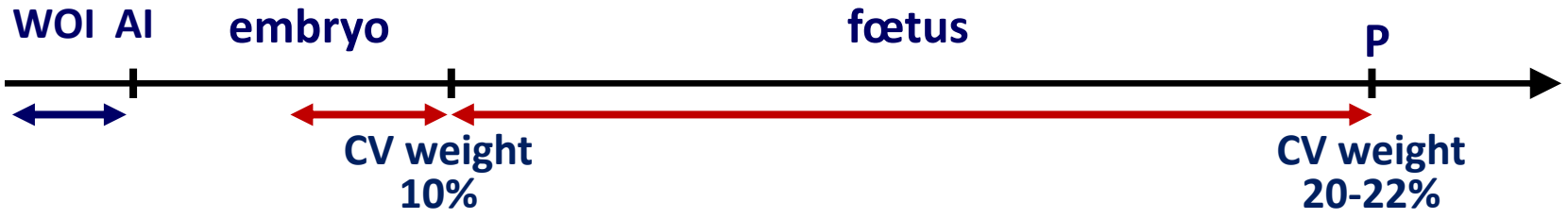
Within-litter heterogeneity in birth weight

Birth weight and within-litter variation of birth weight are determinant factors for pre-weaning piglet survival.

Milligan et al. 2002, Quiniou et al. 2002, Knol et al. 2002, Wientjes et al. 2012



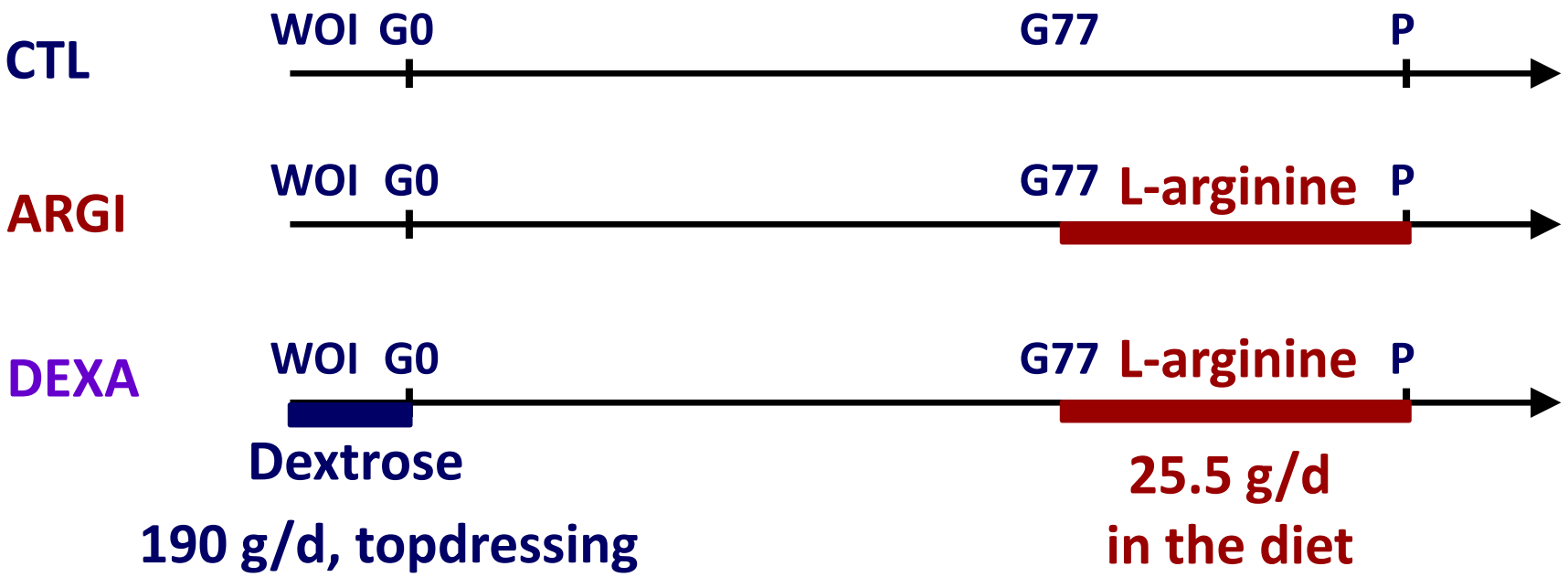
Dextrose
-3% CV birth weight
Embryo quality?
van den Brand et al. 2006

L-arginine: precursor of NO and polyamines
↗ litter size
without negative effect on heterogeneity
Hazeleger et al. 2007, Mateo et al. 2007

Objective

Investigating the effects of supplementing sow diet with dextrose and L-arginine on within-litter variation of birth weight

Experimental design



L-arginine provided during the last third of gestation:
to avoid any increase in litter size
to stimulate blood flow when fetal growth is exponential

Experimental design

73 crossbred LD x LW multiparous sows

Fed a conventional gestation diet

Effect of treatment on sow body reserves

	CTL	ARGI	DEXA	Effect
No. of sows	23	24	26	
Parity at weaning	4.1	3.9	4.0	NS
Gain during gestation				
Body weight, kg	48	41	47	NS
Backfat thickness, mm	3.8	3.4	3.5	NS

Effect of treatment on piglet number and weight at birth

	CTL	ARGI	DEXA	Effect
Piglets				
Total born, n	15.3	16.1	15.3	NS
Born alive, n	14.0	14.9	13.8	NS
Mean birth weight				
Total born, kg	1.45	1.49	1.51	NS
Born alive, kg	1.46	1.50	1.54	NS

Effect of treatment on litter heterogeneity

	CTL	ARGI	DEXA	*P*-value
CV of birth weight, %				
Total born	**25.9^{a}**	**21.7^{b}**	**23.1^{ab}**	**0.06**
Born alive	**25.6^{a}**	**21.0^{b}**	**22.2^{ab}**	**0.03**
Piglets < 1 kg, %	**17**	**14**	**13**	**NS**

With number of piglets at birth as a covariate

Effect of litter size on litter heterogeneity

	No. of total born piglets		*P*-value
	≤ 16	> 16	
CV of birth weight, %	20.9	26.5	< 0.01

Effect of treatment on litter heterogeneity in relation with litter size

	CTL	ARGI	DEXA	*P*-value
No. of litters				
≤ 16 total born	**12**	**11**	**16**	
> 16 total born	**11**	**13**	**10**	
CV birth weight, %				**T x LS : NS**
≤ 16 total born	**24.3^{ac}**	**17.6^{b}**	**20.7^{ab}**	**T : 0.07**
> 16 total born	**27.7^{c}**	**25.3^{c}**	**26.9^{c}**	**LS : < 0.01**

Effect of treatment on litter performance during lactation

	CTL	ARGI	DEXA	Effect
Litter size				
on d 1	**12.9**	**13.3**	**13.4**	**NS**
at weaning	**11.8**	**12.3**	**12.0**	**NS**
Litter growth rate, kg/d	**3.10**	**3.13**	**3.14**	**NS**

➔ ***No relation between variation in birth weight and pre-weaning survival***

Interaction with mean birth weight (1.5 kg)?

Conclusions

- ✓ **L-arginine supplementation during the last third of gestation reduced variation of piglet birth weight within litter**

- ✓ **Combining L-arginine supply with a supply of dextrose before insemination provided no additional benefit**

➔ **The effect of L-arginine supply needs to be investigated on a large number of females.**

Thank you for your attention!