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Plasma metabolites and amino acids in low and normal birth weight piglets at birth and 4 hours later

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Motivation

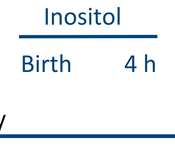
- Low birthweight (LBW) piglets suffer from higher rates of mortality and morbidity compared to normal birthweight (NBW) littermates.
- It is evident that at birth, LBW piglets are at a disadvantage compared to their NBW littermates, suggesting developmental retardation potentiated by changes in nutrient metabolism.
- Thus, free plasma metabolite and amino acid profiles at birth and post suckling may identify metabolic differences between LBW and NBW piglets

Aim

- **Determine if plasma free metabolite and amino acid profiles differ between LBW and NBW piglets at birth and 4 hours post-birth**

Animals

LBW
0.8-1.2 kg
n = 15



NBW
1.4-1.8 kg
n = 15

- Piglet gender: **Male**
- Litter size: **10-20 piglets**
- Sow parity: **1**

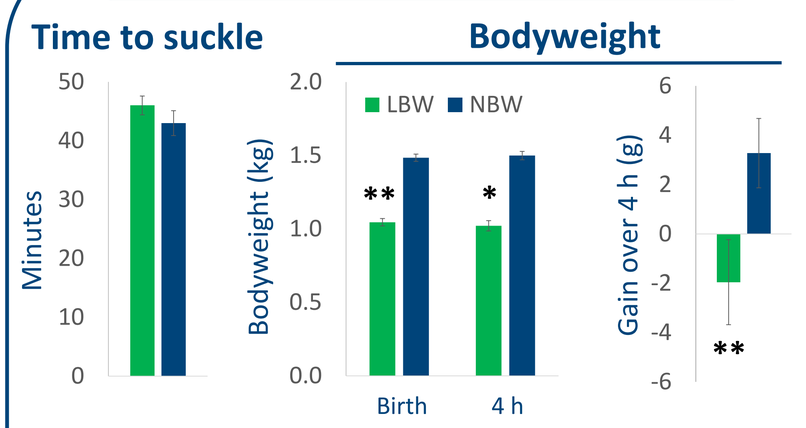
Samples

LBW

NBW

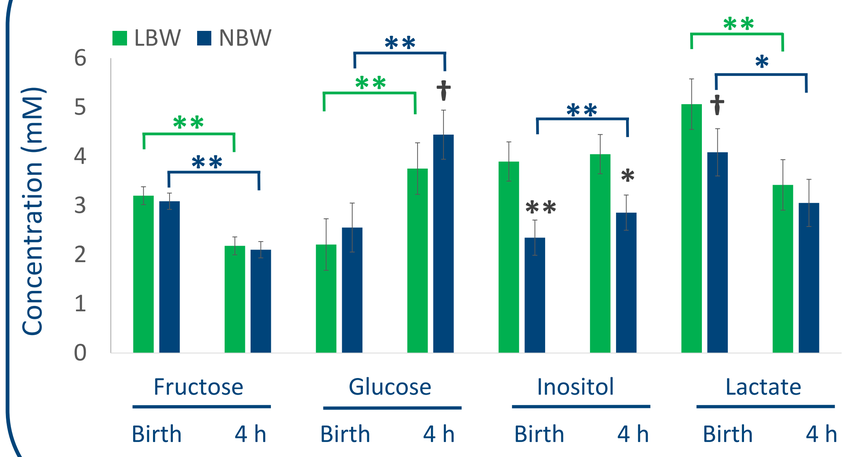
- Blood collected via venipuncture
- Plasma free metabolites and amino acids measured using HPLC

Zootechnical data



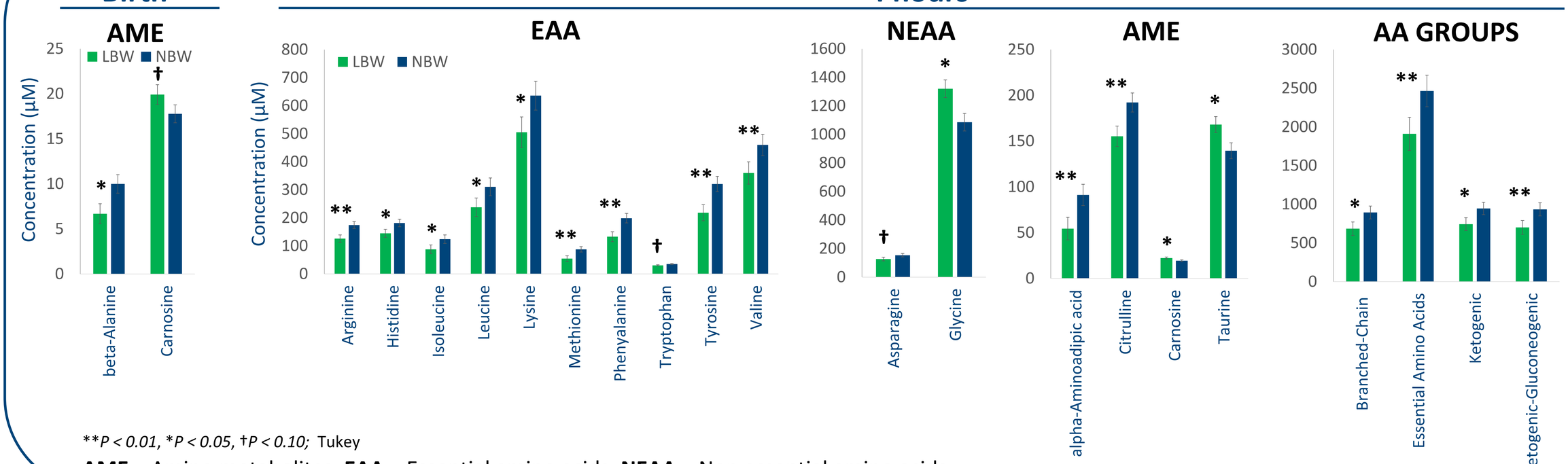
***P* < 0.01; **P* < 0.05; Tukey

Plasma free metabolites



***P* < 0.01, **P* < 0.05, †*P* < 0.10; Tukey

Plasma free amino acids



***P* < 0.01, **P* < 0.05, †*P* < 0.10; Tukey

AME = Amino metabolites, **EAA** = Essential amino acids, **NEAA** = Non essential amino acids

Conclusions

- LBW piglets appear to be exposed to a more hypoxic perinatal environment compared to their NBW littermates, which has been proposed as an underlying cause of increased early neonatal morbidity and mortality of LBW piglets[1].
- At 4 hours, LBW piglets appear to have consumed less colostrum than NBW littermates, as reflected by a lower bodyweight gain, plasma glucose and a significant number of individual and amino acid groups. This has also been associated with the increased early neonatal morbidity and mortality of LBW piglets[2].
- Higher plasma inositol and carnosine, at birth and 4 hours, suggests glucose metabolism is altered in LBW piglets compared to NBW littermates[3,4].
- All plasma AA significantly increased (*P* < *0.01*) from 0 to 4 h, with the exception of alanine, which may indicate altered urea metabolism between LBW and NBW piglets

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2. Devillers, N, et al. Animal (2011).
3. Nissen, Pia Marlene, et al. BioMed Research International (2010).
4. Cripps, Michael J, et al. Scientific reports (2017).