Can sows maintain their bone mineral status when fed low-phosphorus lactation diets over successive parities?

J. Heurtault [a], M.P. Létourneau-Montminy [b], P. Schlegel [a]
[a] Agroscope, Swine Research Group, 1725 Posieux, Switzerland; [b] Department of Animal Sciences, Laval University, Quebec G1V 1A6, Canada
julien.heurtault@agroscope.admin.ch

Introduction

With the aim of:
Balancing phosphorus (P) excretion with plant requirements (Ordinance 910.13)
Reducing phosphate imports at the national level (Absenkpfad)

Our approach:
Use sow bone (P and Calcium (Ca) reserves) to meet the high P and Ca requirements during lactation

We know that:
In case of low dietary P and Ca supply during lactation, bone is mobilized. During the following gestation, the sow can replenish her mobilized bone reserves

We do not know:
The resilience of bone over several consecutive cycles with a reduced P and Ca supply in lactation

Objective: Study, over several successive production cycles, the sow's ability to replenish during gestation her mobilized bone reserves from the previous lactation

Material and methods

28 primiparous sows and their litter (standardized to 13 piglets)

4 lactation diets: Iso-energy Iso-protein

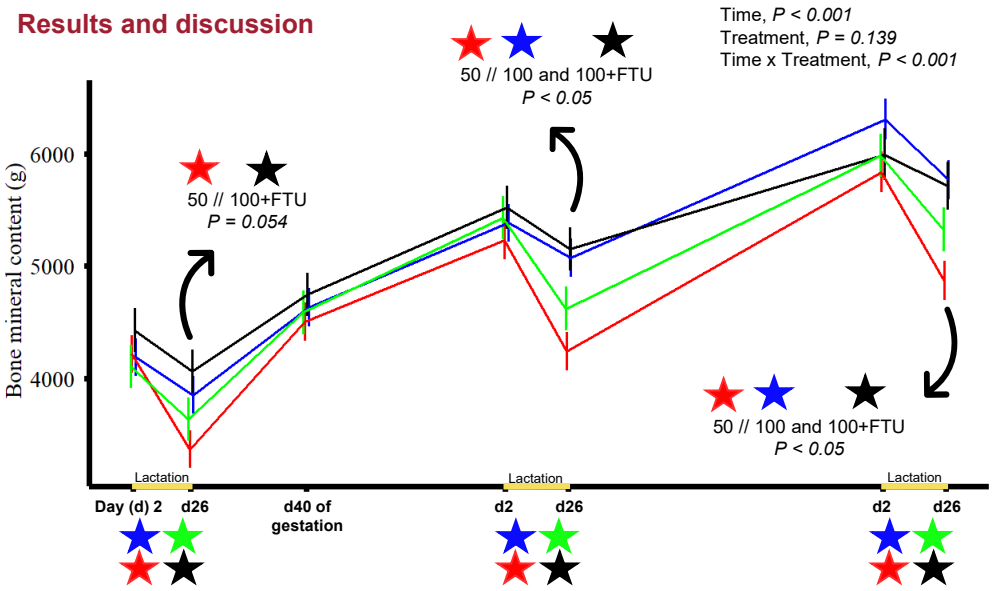
- **100** % of requirement (9.0 g Ca, 3.0 g digestible P/kg, 3:1 Ca/digestible P ratio; 8 sows) => **Control diet**
- **50** % of requirement (4.5 g Ca, 1.5 g digestible P/kg, 3:1 Ca/digestible P ratio; 8 sows)
- **100+FTU** (100+750 FTU/kg of phytase Quantum® Blue 5G; 6 sows)
- **50+FTU** (50+750 FTU/kg of phytase Quantum® Blue 5G; 6 sows)

Gestation diet : 100% of P and Ca requirement (7.8 g Ca, 2.4 g digestible P/kg) => **Control diet**

Piglets were weighed at birth and at weaning

Mixed-effects models
Fixed effets: time or lactation number, treatment, and their interaction
Random effect: sow
Residual covariance structure: corsymm

Results and discussion



Litter average daily gain (kg/d)
Lactation number, *P < 0.05*
Lact 1 (2.8 kg/d) lower than Lact 2 (3.1 kg/d) and Lact 3 (3.1 kg/d)
Treatment, *P = 0.895*
Lactation number x Treatment, *P = 0.651*

Bone mobilization (d2 – d26; g)
Lactation number, *P < 0.083*
Treatment, *P < 0.001*
From 915 g BMC (50) to 388 g BMC (100)
Lactation number x Treatment, *P = 0.375*

Sows fed a lactation diet supplying 50% of the current recommended requirements…

…without phytase :
Mobilized more bone mineral without affecting litter performance
Restored the mobilized bone mineral within each of the two consecutive gestations

…supplemented with phytase :
Mobilized a similar amount of bone mineral during lactation compared to 100 and 100 + FTU

This supports the potential for strongly limiting mineral phosphate use in lactation diets without compromising sow skeleton longevity nor litter performance

Agroscope good food, healthy environment

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