63 Effects of Dietary Calcium and Phosphorus Deficiency on Growth Performance and Subsequent Recovery of Bone Mineralization in Replacement Gilts. Piterson Floradin[1], Candido Pomar[2], Marie-Pierre Létourneau-Montminy[1], Patrick Schlegel[3], *[1]Laval University, [2]Agriculture and Agri-Food Canada, [3]Agroscope*

Abstract: This study was performed to test the hypothesis that after a depletion period that renders replacement gilts more efficient in their use of calcium (Ca) and phosphorus (P), they can recover bone mineralization when fed a repletion diet. To this end, 24 gilts were fed according to a 2-phase feeding program (60–95 kg BW and 95–140 kg BW, respectively), corresponding to the period of depletion and repletion in Ca and P, respectively. The experimental diets for the first phase were a finisher control diet (D100; 2.1 g digestible P/kg) providing 100% of estimated Ca and P requirements or a finisher low-P diet (D60; 1.2 g digestible P/kg) providing 60% of estimated Ca and P requirements. In the second phase, one-half of the gilts from each finisher diet were randomly assigned to either a control (R100) diet or a high-P diet (R160; 3.5 g digestible P/kg) according to a 2 × 2 factorial design, resulting in 4 treatments: D60R100, D60R160, D100R100 and D100R160. Whole-body bone mineral content (BMC) and body composition of pigs were measured on each gilt at 2-week intervals by dual energy X-ray absorptiometry. Diets did not influence the growth performance throughout the experiment. At 95 kg, gilts fed D60 had reduced BMC and BMD (-9% vs D100; $P < 0.001$). At 140 kg, no significant effect of depletion diets was observed on BMC. These results show the high potential to limit dietary digestible P concentration during the growing period without causing any detrimental effects to gilts at mating, and they confirm the ability of replacement gilts to recover their BMC at 140 kg BW by increasing BMC deposition and their dietary Ca and P efficiency. Finally, high-digestible P content from 95-140 kg BW allowed gilts to increase BMC further, but required the use of dietary phosphates.

Keywords: dual-energy X-ray absorptiometry (DXA), minerals, swine

71 The Effect of Different Bones and Analytical Method on Assessment of Bone Mineralization Response to Dietary P, Phytase and Vitamin D in Nursery Pigs. Hadley Williams[1], Taylor Chin[1], Jordan T. Gebhardt[1], Mike D. Tokach[1], Jason C. Woodworth[1], Joel M. DeRouchey[1], Robert D. Goodband[1], Jon R. Bergstrom[2], Michael Rahe[3], Christopher Siepker[3], Panchan Sitthicharoenchai[3], *[1]Kansas State University, [2]DSM Nutritional Products North America, [3]Iowa State University*

Abstract: Three hundred-fifty pigs (initially 11.9±0.56 kg) were used to evaluate effects of different bones and analytical methods on assessment of bone mineralization response to dietary P and vitamin D in nursery pigs. Pens of pigs (5 pigs/pen) were randomized to 6 dietary treatments in a randomized complete block design with 10 pens/treatment. After feeding diets for 28-d, 8 pigs/treatment were harvested for bone analysis. Treatments were: 1) P at 0.19% STTD P (deficient), 2) P at 0.33% STTD P (NRC requirement) using monocalcium phosphate, 3) P at 0.33% STTD P including phytase, 4) P at 0.44% STTD P (industry level) using monocalcium phosphate, phytase, no vitamin D, 5) diet 4 with vitamin D (1,653 IU/kg), 6) diet 5 with additional 2,000 IU/kg 25(OH)D_3 (HyD). Final BW, ADG, and ADFI increased linearly ($P < 0.05$) and G:F improved (quadratic, $P < 0.05$) as P increased. The response to treatment for bone density and ash was dependent upon bone (density×bone interaction, $P = 0.044$; non-defatted bone ash×bone interaction, $P = 0.060$; defatted bone ash×bone interaction, $P = 0.068$). Pigs fed 0.19% STTD P had decreased ($P < 0.05$) bone density and ash (non-defatted and defatted) for all bones compared with 0.44% STTD P, with 0.33% STTD P generally intermediate or similar to 0.44% STTD P. Pigs fed 0.44% STTD P with no vitamin D had greater ($P < 0.05$) non-de-fatted fibula ash compared with all treatments other than 0.44% STTD P with added HyD. Pigs fed the 3 diets with 0.44% STTD P had greater ($P < 0.05$) de-fatted 2nd rib ash compared with pigs fed 0.19% STTD P or 0.33% STTD P with no phytase. In summary, bone density and ash responses varied depending on bone. Differences in bone density and ash in response to vitamin D and P were most apparent with fibulas and 2nd ribs.