recommendations, phytase, or their interaction on the growth performance of pigs. Additionally, there was no significant interaction between Ca recommendations and phytase regarding bone mineralization. The digestible Ca recommendation for optimal bone mineralization resulted in heavier weights of dry bone and bone ash, and a higher percentage of bone ash than the digestible Ca recommendation for optimal growth performance ($P < 0.01$). These parameters were intermediate for the total Ca recommendation treatment. There was no significant effect of Ca recommendations on the percentage of bone Ca and P. Furthermore, no significant difference in any of the bone parameters was observed between the diets with and without phytase. In conclusion, this study demonstrates that there is no difference in growth performance between different Ca recommendations. However, optimal bone mineralization can be achieved by using the digestible Ca recommendation specifically designed for this purpose. **Key Words:** Calcium requirement, Phosphorus, Phytase

156 Effects of Bacillus-based probiotic application to sows on sow and suckling pig performance under heat stress. K.P. Kinsley*[1] and L. Hübertz Birch Hansen[2], [1]*Novonesis*, *West Allis, WI, United States*, [2]*Novonesis*, *Lyngby, Denmark*. Heat stress in sows disrupts lactation, increases oxidative stress, and reduces performance. We hypothesize that *Bacillus*-based probiotics (BBP) may promote amino acid breakdown into antioxidant precursors, reducing free radical damage. This study aimed to assess whether BBP supplementation to sows can mitigate heat stress and improve lactation performance. Thirty-two, parity 2 and 3 bred sows were acquired in May with late July anticipated farrowing dates. Sows were randomly allotted to one of two treatments (+/- BBP consisting of *B. licheniformis* 809A and *B. subtilis* 810A). A daily top dress application a BBP or control (CON) product was given from start gestation to weaning (21d post-farrow). No attempts were made to abate heat in the gestation facility outside of minimum ventilation fans. In the farrowing unit, temperature set points were set to keep minimum temperatures at or above 27ºC per 24-hour period. Sows and litters were clinically assessed daily for indicators of heat stress – respiratory distress (0 = normal to 2 = severe respiratory distress, apparent dyspnea), depressed attitudes (0 = normal to 2 clinical depression, listless, will not rise), and daily inappetence level (0 = normal to 3 = complete feed refusal). Sow and piglet serum samples were collected at farrowing and weaning to analyze antioxidant markers. During the farrowing period, there was no difference in sows exhibiting signs of heat stress (measured by days where more than one clinical metric score was > 0, $P > 0.05$). However, inappetence was a leading indicator with 15.1% of all CON and 8.1% of BBP lactation days experiencing complete feed refusal ($P < 0.01$). Additionally, individual pig wean weight (5.0 vs. 5.6 kg, $P < 0.001$) and birth to wean gain (3.4 vs. 3.8 kg, $P < 0.001$) were greater in the BBP treatment despite no difference in pig birth weights. In conclusion, BBP supported lactation performance under heat stress conditions. **Key Words:** Bacillus, Litter, Stress

157 Variable dietary calcium to phosphorous ratios and microbial phytase did not alter portal vein profiles of blood acid-base balance, blood gases, and electrolyte concentrations in pigs during a 10-hour post-absorption phase. A.P.U. García[1,2], T.D. Crenshaw[3], A. Narcy[4], P. Schlegel[5], M-P. Létourneau-Montminy[2], and D.B. Dalto*[1], [1]*Agriculture and Agri-Food Canada, Sherbrooke R&D Centre*, *Sherbrooke, Quebec, Canada*, [2]*Université Laval, Department of Animal Science*, *Quebec, Quebec, Canada*, [3]*University of Wisconsin, Department of Animal and Dairy Sciences*, *Madison, Wisconsin, United States*, [4]*INRAE, Université de Tours*, *Nouzilly, Centre-Val de Loire, France*, [5]*Agroscope, Swine Research Unit*, *Posieux, Hauterive, Switzerland*. This study compared different dietary calcium (Ca) to standardized total tract digestible phosphorous (STTD P) ratios and the use of microbial phytase on blood gases, electrolytes, and acid-base balance in pigs. Seven growing pigs (42.9 ± 2.2 kg) were equipped with portal vein catheters and assigned to five meals with different Ca:STTD P ratios: CTR - 2.6 Ca:STTD P ratio; C-Phy - 2.6 Ca:STTD P ratio + 750 phytase units (FTU)/kg; C-Phy+ - 2.6 Ca:STTD P ratio + 2,500 FTU/kg; LCa - 1.5 Ca:STTD P ratio; and L-Phy - 1.5 Ca:STTD P ratio + 750 FTU/kg. Portal blood samples were collected (2 experimental days per week) at 0, 2, 6, and 10 hours (hr) post-meal and analyzed for pH, partial

pressure of carbon dioxide (pCO2), partial pressure of oxygen (pO2), bicarbonate (HCO3), base excess (BE), sodium (Na), potassium (K), ionized calcium (iCa), and glucose (GLU) concentrations. Data were analyzed as a 5x5 Latin Square design with repeated measures over time. Differences were considered significant at $P \leq 0.05$ and tendencies at $0.05 < P \leq 0.10$. Most parameters were not impacted by treatments ($P \geq 0.16$) except that C-Phy tended ($P > 0.07$) to increase GLU compared to C-Phy+. Although no treatment x time interaction was detected ($P \geq 0.16$), the multiple comparison analysis shows that 10 hr after meal iCa was highest for C-Phy and lowest for LCa and L-Phy. Time effect was detected for most parameters ($P \leq 0.02$). Blood pH and K were highest 2 hr after meal and lowest at 10 hr. Blood BE, HCO3 and GLU were lowest at 0 and highest at 2 hr after meal. Blood Na was highest at 0 and lowest from 2 hr after meal whereas pCO2 was lowest at 0 and highest from 2 hr after meal. Blood iCa was lowest 2 hr after meal but by 10 hr returned to baseline (0 hr). In conclusion, there are remarkable changes in blood gases, electrolytes, and acid-base balance during 10 hr after meal. Different Ca:STTD P ratios did not impact the blood acid-base balance despite the lower iCa in low Ca:P ratio diets. **Key Words:** calcium:phosphorous ratio phytase portal vein

158 Comparison of P digestibility among magnesium phosphate, monocalcium phosphate, and monosodium phosphate at different Mg levels fed to piglets. N. Aubertin*[1], B. Ribeiro[1], M. Poujol[1], and V. Lagos[2], [1]*Phosphea*, *Dinard, France*, [2]*Schothorst Feed Research*, *Lelystad, The Netherlands*. This piglet study aimed to compare the apparent total tract digestibility (ATTD) of P of monocalcium phosphate (MCP), monosodium phosphate (MSP), and magnesium phosphate (MgP), and to evaluate the effect of dietary Mg level on P digestibility. Thirty weaned male piglets (8.50±2.0 kg, 30 days old) were assigned to a randomized complete block design with 5 experimental diets and 6 replicates per diet. Pigs were housed individually in metabolic cages and fed semi-ad libitum from day 17-25. The experimental diets were offered after a 7-day period with a common weaner diet. A semi-synthetic basal mix low in P and Mg was formulated and split into 5 batches to which the P source, limestone, and diamol were added. All diets had the same net energy, digestible Lys, Ca, and digestible P (3.06 g/kg), and included 0.5% TiO_2. Diets were formulated as a 2×2+1 factorial design with two P sources (MCP or MgP), two Mg levels (2.0 or 5.3 g/kg, provided by MgO or MgP), and a MSP, low Mg diet. The high Mg diets contained only MgP or MCP+MgO. The low Mg diets contained MSP+MgO, MCP+MgO, or MgP+MCP. Feces were collected from day 20-25. The ATTD of P in P sources was calculated by the difference procedure and the standardized total tract digestibility (STTD) of P was estimated based on dry matter intake. The three P sources were compared at low Mg level, and the main effects and interaction between P source and Mg level were evaluated. At low Mg level, MSP (94.1%) had the highest ($P < 0.05$) STTD of P, with no differences between MgP (81.9%) and MCP (83.4%) (SEM=2.61%). There was no interaction between P source and Mg level, but high Mg levels reduced (-10.4%; $P < 0.05$) the STTD of P in both P sources. The STTD of P in MgP and MCP at high Mg level was 73.8 and 70.6%, respectively, but no main effect of P source was observed. In conclusion, the use of high Mg levels in piglet feed decreases P digestibility regardless of P source, but there is no difference in P digestibility between MgP and MCP. **Key Words:** Digestibility, magnesium phosphate, piglets

159 Phytase appeared to counterbalance the inimical effect on N balance of acidosis associated with displacing calcium carbonate with calcium chloride in grower pigs. H Zhai*[1], E Perez-Calvo[2], S K Wang[1], J C Zhang[1], Z Z Wang[1], and J B Liu[3], [1]*dsm-firmenich, Animal Nutrition and Health, R&D Center*, *Bazhou, China*, [2]*dsm-firmenich, Animal Nutrition and Health*, *Kaiseraugst, Switzerland*, [3]*School of Life Science and Engineering, Southwest University of Science and Technology*, *Mianyang, China*. The objective of this study was to evaluate the effects of Ca source and phytase on the balance of Ca, Cl, and P and the chemistry of plasma and urine. There were 6 experimental diets arranged as a 3 × 2 factorial with 3 Ca sources [0.8% limestone (35.7% Ca), 0.8% $CaCl_2$, or their 1:1 mixture] and 2 phytase levels (0, and 1,000 FYT/kg). Each diet was fed to 8 barrows individually housed in metabolism cages. Fecal and urinary samples were quantitatively collected