385 Relationship between water quality and environmental stress in the pig. D.D. Maenz, and J.F. Patience*, University of Saskatchewan, Saskatoon.

Poor quality drinking water containing high levels of dissolved minerals has been implicated as a contributing factor to the high incidence of scouring and mortality in the newly weaned pig. In this study we set out to determine if a relationship exists between environmental stress and the impact of poor quality (high sulphate) drinking water on various parameters of weanling health and productivity. Pigs were assigned to treatment groups according to a 2x2 factorial design of good verses poor drinking water and a normal verses a chilled environment. The overall experiment consisted of 3 replicate 10 day trials with 12 weanling pigs per trial.

Performance Parameters (g)	Environment Norm.	Environment Chill.	Water Quality Good	Water Quality Poor	SEM
Avg. Daily Gain	118	64	56	127	46[1]
Avg. Daily Feed	187	194	161	219	35[1]
Avg. Daily Water	951	776	738	989	207[1,2]
Feed Conv. Eff.	.613	.246	.328	.531	.180[1,3]

Significant difference between means: good and poor water $P<0.05^{1}$; normal and chilled environment $P<0.05^{2}$, $P<0.01^{3}$.

Pigs offered the poor quality drinking water had a tendency toward increased scour scores with significantly higher scour scores recorded on days 4, 6, and 7 (P<0.05). Blood analysis revealed lower levels of creatinine, creatinine kinase, and plasma albumin in pigs offered the poor quality water and lower blood K^+, Cl^-, and lymphocytes levels with elevated plasma protein in pigs maintained in the chilled environment (p<0.05). In this study water quality was not detrimental to weanling productivity and no interactive effects of water quality and environmental temperature were found.

Key words: pigs, stress, water quality.

386 Effect of a diurnal pattern of heat stress on the physiological and nutritional status of the pig. J. F Umboh*, J. F. Patience and R. K. Chaplin, University of Saskatchewan, Saskatoon, Canada

This experiment was conducted to characterize the effect of a diurnal pattern of heat stress on the physiological and nutritional status of the pig. Two replicates of 6 pigs each (3 pairs of littermates) were assigned to one of two treatments: control (C) (constant temperature of 20°C) or diurnal heat stress (HS) 38°C (0800 to 2000) and 20°C (2000 to 0800). Respiration rates for HS pigs were higher (P< .0001) than C pigs (105.2 vs 15.0 times/min). Rectal temperatures were also elevated in HS pigs (39.7 vs 38.9°C) (P<.02). HS increased daily water intake (6.4 vs 4.8 kg) (P<.0001) but feed intake was not affected (P>.05). Diurnal heat stress reduced blood pCO2 (35.8 vs 36.8 mm Hg) (P<.0001), bicarbonate (25.8 vs 27.2 mmol/L) (P<.0001) and base excess (BE) (2.9 vs 3.7 mmol/L) (P<.0001), but increased pO2 (89.7 vs 77.9 mm Hg) (P<.0001). pH , adjusted for body temperature, was not affected by treatment (P>.05). Net urine output and urine specific gravity were not affected by treatment (P>.05). HS reduced urine pH (6.1 vs 6.3) (P<.02). HS reduced hemoglobin (103.3 vs 106.0 g/L) (P<.01), packed cell volume (0.31 vs 0.32 L/L) (P<.02) and increased mean cell volume (54.1 vs 52.3 fL) (P<.0001). HS also reduced plasma sodium (139.2 v140.9 mmol/L) (P<.0001), potassium (5.2 vs 5.5 mmol/L) (P<.03) and osmolality (287.2 vs 291.3 mmol/kg) (P<.0001). Heat-stressed pigs recovered during the cool overnight period as indicated by a reduction in respiration rates and rectal temperatures. The result demonstrates that a diurnal pattern of heat stress alters physiological state and mineral status of the pigs. Compared to previous studies, the effects are not as great as continuous heat stress.

Key Words: Pigs, heat stress, acid-base balance

387 **Genotype, sex, and dietary lysine influences on carcass quality in 104 and 127 kg finishing pigs.** K.G. Friesen, J.L. Nelssen, J.A. Unruh, R.D. Goodband, C.F. Carmack*, T.L. Weeden, and M.D. Tokach, Kansas State University, Manhattan and D.G. McLaren, Pig Improvement Company Inc. Franklin, KY.

A total of 120 growing/finishing pigs (fed from 44 to 104 or 127 kg) were utilized to determine the interrelationships between genotype, sex, and dietary lysine on carcass cutability and quality. Treatment structure was designed in a 2x2x2 factorial arrangement and analyzed as a randomized complete block. Pigs were derived from genotypes previously characterized based upon lean gain potential (high vs. medium lean gain; HLG and MLG, respectively). Within genotype, pigs were split by sex and fed one of two dietary lysine treatments. From 44 kg to a pen average of 104 kg, pigs were fed either a .90 or .75% lysine corn-soybean meal diet. When the average pen weight equaled 104 kg, one pig was slaughtered per pen, with the remaining two pigs being fed either a .70 or .55% lysine diet. At a pen average of 127 kg, the remaining two pigs were slaughtered for carcass analyses. Backfat thickness (BF) decreased (P<.01) and loineye area (LEA) increased (P<.01) in gilts compared to barrows slaughtered at 104 kg. High lean gain pigs had heavier (P<.01) trimmed ham and trimmed loin weights, with gilts having larger hams (P<.05) and loins (P<.01) than barrows. Marbling was decreased in HLG pigs with no differences (P>.10) detected in firmness and color. Estimated percent muscle was increased (P<.01) in gilts regardless of genotype or dietary lysine. When pigs were fed to 127 kg, BF decreased, LEA increased (P<.01), and trimmed ham and loin weights increased (P<.05) in HLG pigs. Gilt carcasses had lower (P<.05) BF, with increased (P<.01) LEA, and trimmed ham and loin weights. Carcass quality was improved in gilts compared to barrows and was maximized in HLG gilts (P<.05). Estimated percent muscle increased (P<.01) in gilts regardless of lean gain potential. These data suggest that carcass cutability and quality can be improved by selecting for increased lean gain potential and optimized in gilts compared to barrows.

Genotype	HLG				MLG				
Sex	Barrows		Gilts		Barrows		Gilts		
Lysine,%	.90	.75	.90	.75	.90	.75	.90	.75	CV
(104)BF,cm[b]	3.0	2.8	2.5	2.8	3.3	3.1	2.8	2.6	13.2
LEA,cm[2b]	29.9	31.4	35.5	34.1	29.9	27.8	33.5	33.4	4.9
Ham,kg[cd]	6.7	6.5	7.2	6.9	6.3	5.6	6.5	6.2	9.5
Loin,kg[cb]	8.0	8.4	9.1	8.7	7.4	7.1	8.1	8.0	6.9
(127)BF,cm[cd]	3.7	3.4	3.1	3.3	3.9	3.5	3.5	3.4	9.3
LEA,cm[2cb]	35.6	38.1	42.4	40.3	33.7	34.0	38.3	36.7	8.5
Ham,kg[cd]	7.6	7.9	8.4	8.2	7.4	7.3	7.6	7.8	17.2
Loin,kg[cb]	9.5	9.8	10.5	10.2	8.9	9.0	9.5	9.2	6.5

[a] Genotype effect (P<.01). [b] Sex effect (P<.01).
[c] Genotype effect (P<.05). [d] Sex effect (P<.05).
KEY WORDS: Finishing Pigs, Genotype, Lysine.

388 **The interrelationship between genotype, sex and dietary lysine in finishing pigs fed to 104 and 127 kg.** K.G. Friesen*, J.L. Nelssen, J.A. Unruh, R.D. Goodband, L.J. Kats, J.A. Hansen, and M.D. Tokach Kansas State University, Manhattan and D.G. McLaren, Pig Improvement Company, Inc. Franklin KY.

A total of 120, 44 kg finishing pigs fed to either 104 or 127 kg were utilized to determine the interrelationships between genotype, sex, and dietary lysine on ADG, ADFI, gain to feed ratio (G/F), protein accretion (PA), PA/ADFI ratio, and fat accretion (FA). A 2x2x2 treatment structure was utilized, and analyzed as a randomized complete block design. Pigs were obtained from genotypes previously characterized on lean gain potential (high compared to medium lean gain, HLG and MLG respectively). Within genotype, pigs were split by sex and within sex fed either .90 or .75% dietary lysine (corn-soybean meal diet) until an average pen weight of 104 kg was obtained. At this time, one of the three pigs per pen (5 pens/treatment) was randomly selected for slaughter, with the remaining pigs fed either a .70% or a .55% dietary lysine diet until a pen average weight of 127 kg was obtained. Average daily gain was increased (P<.05) in HLG pigs compared to MLG pigs, in barrows compared to gilts, and in pigs fed a .90% lysine diet compared to pigs fed a .75% lysine diet. Increased ADG in HLG pigs and in pigs fed a .90% lysine diet can partially be accounted for by tendencies (P<.08 and P<.06, respectively) for increased ADFI. Gain to feed was improved (P<.05) in HLG pigs compared to MLG pigs. Protein accretion and FA were increased (P<.05) in HLG pigs, with gilts having a greater (P<.05) PA and a lower (P<.05) FA than barrows. Increased dietary lysine improved (P<.05) PA and PA/ADFI. When pigs were fed to 127 kg, ADG was increased (P<.01) in HLG pigs, and improved (P<.05) in gilts and in pigs fed a high lysine diet. Average daily feed intake was increased (P<.05) in HLG pigs, in barrows, and in pigs fed a high lysine diet. These data suggest growth performance and PA can be improved by selecting HLG genotypes. Daily protein accretion and the efficiency of protein deposition (PA/ADFI) were optimized in HLG gilts fed higher levels of dietary lysine.

Genotype	HLG				MLG				
Sex	Barrows		Gilts		Barrows		Gilts		
Lysine, %	.90	.75	.90	.75	.90	.75	.90	.75	CV
ADG, kg[abc]	.99	.95	.91	.87	.91	.82	.86	.75	8.0
ADFI, kg	3.1	3.0	2.8	2.9	3.0	2.8	2.9	2.6	8.7
G/F[a]	.32	.32	.33	.30	3.0	.30	.30	.29	7.5
PA, g[abc]	116	105	131	120	102	64	108	99	16
PA/ADFI[abc]	.037	.035	.047	.042	.034	.023	.038	.037	16
FA, g[ab]	334	278	246	238	250	234	213	196	24

[a]Genotype effect (P<.05). [b]Sex effect (P<.05). [c]Lysine effect (P<.05).
KEY WORDS: Finishing Pigs, Genotype, Lysine, Sex.