010 Effects of increasing space allowance by removing a pig or gate adjustment on finishing pig growth performance. C. B. Carpenter, C. J. Holder, M. D. Tokach, J. M. DeRouchey, J. C. Woodworth, R. D. Goodband, and S. S. Dritz, *Kansas State University, Manhattan*

A total of 256 pigs (PIC 327 × 1050; initially 55.9 kg) were used in a 71-d study to determine the effects of space allowance and pig removal on finishing pig performance. The 4 treatments included: $0.91m^2$/pig or $0.63m^2$/pig for the entire study and initially $0.63m^2$/pig with a gate adjusted or the heaviest pig removed to keep pigs above their predicted minimum space requirement ($m^2 = 0.0336*BW^{0.66}$). Initially, there were 8 pigs/pen and 8 pens/treatment. From d 0 to 28, prior to any space adjustments, ADG was marginally greater ($P = 0.076$) for pigs provided $0.91m^2$ compared with those provided $0.63m^2$. From d 28 to 71, ADG and ADFI decreased ($P = 0.001$) when pigs were provided $0.63m^2$ compared with pigs provided $0.91m^2$. Pigs provided increased space by removing pigs had similar performance to those where gates were adjusted; however, pig removal resulted in lower ADFI than pigs allowed $0.91m^2$ throughout the experiment. Overall, pigs allowed $0.91m^2$ had increased ($P = 0.001$) ADG compared with pigs allowed $0.63m^2$ or either adjusted space treatment. Removing pigs or adjusting gating increased ($P = 0.001$) ADG compared to those kept at $0.63m^2$; however, neither treatment had ADG similar to pigs allowed $0.91m^2$. Pigs allowed $0.91m^2$ had greater ($P = 0.001$) ADFI compared with pigs allowed $0.63m^2$ with adjusted space allowance pigs being intermediate. Feed efficiency was not affected in the cumulative growth periods. In summary, either removing a pig or adjusting the gating as pigs reached the critical *k*-value influenced growth similarly. Results indicate the performance benefit from removing the heaviest pigs from the pen is primarily from increased space allowance. Pigs provided more space as they reached the space requirement had lower growth than unrestricted pigs indicating the minimum space prediction equation ($m^2 = 0.0336*BW^{0.66}$) doesn't fully explain pen space effects on pig performance.

Key Words: finishing pig, growth, space
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Table 010.

Item[1]	$0.91m^2$	$0.63m^2$	Gate adjustment	Pig removal	SEM	Probability, $P <$
BW, kg						
d 0	55.9	56.0	55.9	55.6	0.15	0.361
d 28	84.0^{x}	82.3^{y}	82.6^{y}	82.8^{y}	0.47	0.081
d 71	127.3^{a}	121.7^{c}	124.9^{b}	122.5^{c}	0.73	0.001
d 0 to 28						
ADG, kg	1.00^{x}	0.94^{y}	0.95^{y}	0.97^{xy}	0.015	0.076
ADFI, kg	2.39	2.28	2.35	2.37	0.036	0.200
d 28 to 71						
ADG, kg	1.01^{a}	0.92^{b}	0.98^{a}	0.98^{a}	0.013	0.001
ADFI, kg	3.01^{a}	2.77^{c}	2.97^{ab}	2.89^{b}	0.035	0.001
d 0 to 71						
ADG, kg	1.00^{a}	0.93^{c}	0.97^{b}	0.98^{b}	0.009	0.001
ADFI, kg	2.76^{a}	2.58^{c}	2.73^{ab}	2.66^{b}	0.029	0.001

[1]Means within a row differ: $^{abc}P < 0.05$, $^{xyz}P < 0.10$.

011 Withdrawn

012 Design and feasibility of a novel sprinkler control algorithm for swine heat stress alleviation. B. C. Ramirez*, S. J. Hoff, J. D. Harmon, *Agricultural and Biosystems Engineering, Iowa State University, Ames.*

Pigs have a relatively low capacity to dissipate excess body heat and depend more on reducing metabolic heat production through a reduction in voluntary feed intake in hot conditions, resulting in a growth performance decrease. Effectiveness of current cooling devices (e.g., evaporative coolers or sprinklers) in facilities is governed by the Water Vapor Pressure (WVP) concentration gradient between the air (a function of dry-bulb temperature, t_{db}; relative humidity, RH; and atmospheric pressure) and saturated WVP at a wet surface. Traditional sprinkler control systems (TSCS) often operate solely on t_{db} feedback and at fixed "off" intervals to allow dispersed water to evaporate. This control strategy does not account for the WVP concentration gradient; hence, water is wasted and only a limited amount of latent heat can be removed from the animal. Therefore, the objectives were to develop and simulate a novel variable interval sprinkler control system (VISCoS) that dynamically changes the "off" interval based on t_{db}, RH, and airspeed feedback. A theoretical convective mass transfer model (i.e., evaporation) was developed to estimate water evaporation rate as a function of the thermal environment, surface area, skin temperature, and volume of water applied. A pig's geometry was assumed a cylinder approximately 30% wet with a 1-mm film of water. The feasibility of implementing VISCoS was evaluated at six locations (AZ, IA, MN, MO, IN, and NC) by simulating water usage for a 1000 hd, mechanically ventilated,