

Impact of Grow-Finish Performance and Carcass Characteristics in Response to an Increased Apparent Health Challenge

A.S. Leaflet R3185

Alyssa S. Cornelison, Research Associate;
Noel H. Williams, Iowa Select Farms;
Ben Haberl, Iowa Select Farms;
Locke A. Karriker, VDPAM;
John F. Patience, Department of Animal Science

Summary and Implications

There are a variety of health challenges that affect pork producers; these challenges can have a significant impact on profit for the producer. The objective of this experiment was to quantify the impact of an apparent health challenge on growth performance and carcass characteristics during the grow finish stage of production. Within each of 3 barns, ~900 pigs (Init. BW = 13.1 ± 0.2 kg) were split by weight and blocked by sex. Each barn was categorized based on the apparent health status as low challenge (LC), moderate challenge (MC), or high challenge (HC). Fecal samples were collected at ~45 and ~100 kg in the HC and LC barns. There was a decrease in ADG and ADFI with increased health challenge ($P < 0.05$). Feed efficiency was greatest in LC, but the same in the MC and HC ($P < 0.05$). The MC and HC barns had greater HCW than the LC barn ($P < 0.05$). This was similar for percent yield ($P < 0.05$). However, there was no difference for percent lean or fat depth among the three health statuses ($P > 0.05$). The HC barn had greater ATT digestibility of DM and GE than the LC barn ($P < 0.05$). Health challenge impaired growth rate and feed intake and had a less than expected impact on feed efficiency. Digestibility of DM and GE did not explain poorer performance in the more health challenged barns.

Introduction

A health challenge can cause a significant loss of profit to a production system. In the event of a health challenge, nutrients are directed away from growth and are used to support the activated immune system. The objective of this experiment was to quantify the impact of an apparent health challenge on growth performance and carcass characteristics.

Materials and Methods

Three barns were used in this experiment; each was categorized based on the apparent health status as low challenge (LC), moderate challenge (MC), or high challenge (HC). Apparent health status was determined based on results from quantitative diagnostics assessments and mortality rates. Over the duration of the study, barns were diagnosed with porcine reproductive and respiratory

syndrome virus, influenza and secondary bacterial pathogens varying in combination. Mortality was 4.1%, 7.7%, and 21.2% for LC, MC, and HC, respectively. A biosecurity protocol was put in place to maintain the separate health statuses among the 3 barns. Pigs received ad libitum access to feed and water. Within each of the three barns, ~900 pigs (Init. weight = 13.1 ± 0.2 kg) were split by weight and blocked by sex with 16 barrow pens, 16 gilt pens, and 4 mixed sex pens. Pigs were marketed in a three cut structure at a common weight (~131.5 ± 1.3 kg). Barns marketed at 138 days, 152 days, and 165 days in the LC, MC and HC barns, respectively Titanium dioxide was included in the feed at 0.4% as an indigestible marker. Fecal samples were collected at ~45 and ~100 kg in the HC and LC barns. Data were analyzed using the PROC MIXED procedure of SAS (9.3) with pen as the experimental unit, apparent health status and sex as a fixed effect, block as a random effect, and start weight as a covariate (for growth and carcass performance parameters).

Results

With an increased health challenge there was a linear decrease for ADG (15%, $P < 0.05$), and ADFI (11%, $P < 0.05$ Table 1). The LC barn had the greatest G:F, while it remained the same in the MC and HC barns (LC = 0.42, MC = 0.40, HC = 0.40, $P < 0.05$). There was also a sex effect, where barrows had greater final weight (6%, $P < 0.05$), ADG (10%, $P < 0.05$), and ADFI (10%, $P < 0.05$) than gilts. Barrows had the lowest G:F (Barrows = 0.40, Mixed = 0.41, Gilts = 0.42, $P < 0.05$), which was probably driven by greater appetite and a fatter carcass. No significant differences due to health were observed for lean percent, loin depth or fat depth ($P > 0.05$, Table 2). The LC barn marketed at a lighter live weight (129.32 kg) than the MC (132.56 kg) and HC barns (132.57 kg, $P < 0.05$). This effect carried over to HCW (5%, $P < 0.05$), and yield (2%, $P < 0.05$). With increased health challenge, there was a similar linear effect for decreased carcass ADG (12%, $P < 0.05$). There was no effect of carcass G:F. Barrows had greater live weight ($P < 0.05$), and HCW ($P < 0.05$) than gilts, but performed similarly to the mixed pens. Gilts had the greatest lean percent ($P < 0.05$), which correlates with gilts having the lowest fat depth ($P < 0.05$). No differences were observed for a sex effect on yield or loin depth ($P > 0.05$). There was a difference observed for ATTD of DM and GE, where the HC barn had greater digestibility of DM and GE than the LC barn at both time points collected ($P < 0.05$, Table 3). No sex effect was observed. In summary, an increase in apparent health challenge decreased growth performance. Differences were observed for carcass performance, but the LC barn marketing at a slightly lower

live weight seems to be the driver. The sex differences observed were expected with barrows having greater ADG, ADFI, and live weight than gilts; gilts were also leaner than barrows. The HC barn had greater digestibility of DM and GE than the LC barn. The health challenge experienced by the pigs did impact growth performance, but increased their ability to digest DM and GE. Based on these data, the cost of a poor health status can be estimated, and may be greater than many people expect.

Acknowledgements

We gratefully acknowledge Iowa Select Farms for funding this experiment, as well as ADM Animal Nutrition, ISU VDPAM, USDA, ARS, NCAUR, and Elanco Animal Health for financial and other in-kind support or contributions.

Iowa State University Animal Industry Report 2017

Table 1. Effect of an apparent health challenge (AHC) on growth performance, low challenge (LC), moderate challenge (MC), and high challenge (HC)

Parameter	Apparent Health Challenge			Sex			SEM	<i>P</i> -value ¹		
	LC	MC	HC	Barrows	Mixed	Gilts		AHC	Sex	AHC*Sex
Start BW, kg	13.27 ^b	13.66 ^a	12.37 ^c	12.98	13.12	13.20	0.19	<0.0001	0.270	0.0001
End BW, kg	129.06	130.65	130.52	133.57 ^a	130.52 ^b	126.15 ^c	1.43	0.397	<0.0001	0.160
ADG, kg	0.86 ^a	0.79 ^b	0.73 ^c	0.82 ^a	0.80 ^{ab}	0.77 ^b	0.01	<0.0001	0.0003	0.730
Carcass ADG, kg	0.61 ^a	0.58 ^b	0.54 ^c	0.59 ^a	0.58 ^{ab}	0.56 ^b	0.01	<0.0001	0.005	0.785
ADFI, kg	2.05 ^a	2.00 ^a	1.82 ^b	2.06 ^a	1.95 ^b	1.85 ^c	0.04	<0.0001	<0.0001	0.980
G:F	0.42 ^a	0.40 ^b	0.40 ^b	0.40 ^c	0.41 ^b	0.42 ^a	0.004	<0.0001	<0.0001	0.778
Carcass G:F	0.30	0.29	0.29	0.29 ^b	0.30 ^a	0.30 ^a	0.004	0.111	<0.0001	0.821

^{a-e} Within a row, least squares means lacking a common superscript differ, *P* < 0.05

Average start weight was used as covariate

¹Probability values for main effect of apparent health challenge (AHC), sex, and AHC * sex interaction

Table 2. Effect of an apparent health challenge (AHC) on carcass performance, low challenge (LC), moderate challenge (MC), and high challenge (HC)

Parameter	Apparent Health Challenge			Sex			SEM	<i>P</i> -value ¹		
	LC	MC	HC	Barrows	Mixed	Gilts		AHC	Sex	AHC*Sex
Days on Feed ² , d	138	152	164							
Live Wt., kg	129.32 ^b	132.56 ^a	132.57 ^a	134.96 ^a	132.00 ^b	127.48 ^c	1.33	0.010	<0.0001	0.086
HCW, kg	93.55 ^b	98.23 ^a	97.60 ^a	99.00 ^a	96.66 ^b	93.72 ^c	0.99	<0.0001	<0.0001	0.129
Lean, %	55.05	54.78	54.80	53.44 ^c	54.91 ^b	56.29 ^a	0.29	0.525	<0.0001	0.677
Yield, %	72.37 ^c	74.13 ^a	73.60 ^b	73.35	73.23	73.51	0.21	<0.0001	0.356	0.327
Loin, mm	60.13	60.53	60.69	60.09	60.44	60.81	0.71	0.685	0.326	0.398
Fat, mm	18.05	18.54	18.52	20.71 ^a	18.36 ^b	16.04 ^c	0.39	0.303	<0.0001	0.354

^{a-e} Within a row, least squares means lacking a common superscript differ, *P* < 0.05

Average start weight was used as covariate

¹Probability values for main effect of apparent health challenge (AHC), sex, and AHC * sex interaction

²Days on Feed, total pig days ÷ pigs that were marketed as full value, light or cull

Iowa State University Animal Industry Report 2017

Table 3. Effect of an apparent health challenge (AHC) on apparent total tract digestibility (ATTD) of dry matter (DM) and gross energy (GE), low challenge (LC), moderate challenge (MC), and high challenge (HC)

Parameter	Apparent Health Challenge			Sex		SEM	P-value ¹		
	LC	HC	Barrows	Mixed	Gilts		AHC	Sex	AHC*Sex
ATTD DM, %									
~45 kg	90.77	91.54	91.03	91.02	91.41	0.30	0.003	0.689	0.183
~100 kg	91.64	93.69	92.70	92.50	92.79				
ATTD GE, %									
~45 kg	89.99	90.86	90.39	90.21	90.67	0.33	0.003	0.851	0.217
~100 kg	90.76	92.99	91.97	91.62	92.04				

^{a-e} Within a row, least squares means lacking a common superscript differ, $P < 0.05$

Average start weight was used as covariate

¹Probability values for main effect of apparent health challenge (AHC), sex, and AHC * sex interaction