CHM - FeedLogics 2009-11

2A-108

Report prepared for the Co-operative Research Centre for an Internationally Competitive Pork Industry

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Feed Logic Project 9: Enhancing the efficacy of ractopamine with amino acid complexed zinc.

Introduction

Ractopamine is an in-feed additive that has been readily adopted by the Australian pig industry. Its ability to repartition nutrients towards increased lean deposition leads to increased growth performance and carcase characteristics. However, due to the market structure of the Australian pig industry the former response is the primary reason for its use. Thus it is generally fed for a two-week period at a rate of 5 ppm, compared with the US where it tends to be fed for longer periods at higher inclusion rates. The growth response appears to be reduced as the additive is fed for longer.

Recent work on heavy finisher pigs in the USA has shown an ability to enhance both the growth response and to extend the duration of its action through the inclusion of amino acid complexed zinc (Wilson pers comm., 2009). If such a response was able to be seen in lighter finisher pigs, it would provide Australian producers another tool to enhance production efficiency.

Hypothesis

The response, in finisher gilts, to ractopamine can be enhanced through the inclusion of amino acid complexed zinc.

Methods

Treatments

To test the ability to enhance the effects of ractopamine through the inclusion of amino acid complexed zinc under commercial conditions three treatments were investigated (Table 1). Each treatment was fed for the final two weeks of production.

Table 1. Treatments used to assess the efficacy of amino acid complexed zinc (AvailaZn) to boost ractopamine response in finisher gilts.

Treatment	Diet	Ractopamine	AvailaZn
A	Control	-	-
B	Control + ractopamine	7.5 ppm	-
C	Control + ractopamine + zinc	7.5 ppm	50 ppm

Diets

Three basal diets were formulated to meet the treatment requirements (Table 2). Composition of these diets can be found in Appendix 1. Finisher diets containing ractopamine and amino acid complexed zinc (Diets 2 & 3 respectively) contain double the final concentration of these two compounds to allow for blending to occur. Treatment blends are shown in Table 3.

Table 2. Specifications of basal diets.

Diet	Name	MJ DE/kg	AvL (g) / MJ DE	Ractopamine	AvailaZn
1	Feedlogic experiment 9 - diet 1	13.8	0.6	-	-
2	Feedlogic experiment 9 - diet 2	13.8	0.6	15 ppm	-
3	Feedlogic experiment 9 - diet 3	13.8	0.6	-	100 ppm

Table 3. Blend ratios of basal diets to produce dietary treatments.

Treatment	Diet 1	Diet 2	Diet 3	Ractopamine	AvailaZn
A	100%				
B	50%	50%		7.5 ppm	
C		50%	50%	7.5 ppm	**50 ppm**

Pigs and feeding

The experiment utilised 12 pens of pigs (n=43) blocked on average pen weight.

The FEEDLOGIC delivery system was used for feeding. All animals received the same diet prior to the start of the experiment. Delivery to the feeders was stopped 24 hours prior to initial weighing. Feeders were filled to capacity, after weighing, on the first day of the experiment with the allocated dietary treatment and an attempt was made to maintain the feeders at full capacity for the duration of the experiment so that daily feed consumption could be recorded. Pigs were reweighed after two weeks of experimental treatment. Delivery to the feeders was stopped approximately 24 hours prior to weighing and residual feed left in feeders on the final day of the experiment was removed and weighed. Responses measured included average daily gain, feed intake and feed:gain ratio.

Statistical analyses

Differences between treatments were assessed using a simple on-way ANOVA. All analyses were conducted using Genstat 13th Edition.

Results

There was no significant difference in starting weight (p=0.999, table 4). Average daily gain (p=0.662), average daily feed intake (p=0.604) and feed:gain ratio (p=0.472) did not differ significantly between treatments during the experimental period (figure 1).

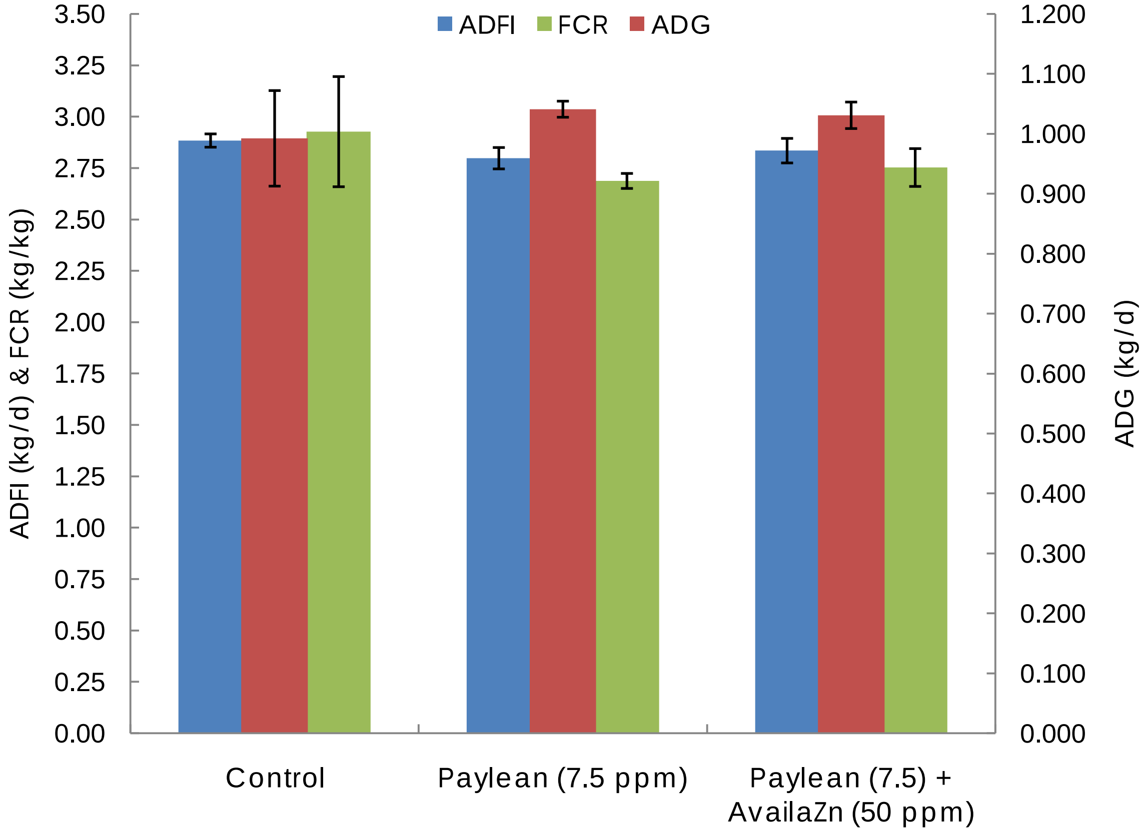

Figure 1. Average daily feed intake (ADFI), average daily gain (ADG) and feed:gain ratio (F:G Ratio) for each treatment group (mean ± SE) during the experimental period.

Whilst there was a lack of significance over the experimental period, including ractopamine in the finisher phase improved FCR by six to eight per cent, which is likely to have become significant at a higher level of power.

Table 4. Parameter values showing treatment means and p-values for treatment for the experimental period.

Parameter	Control	Control with ractopamine	Control with ractopamine and AvailaZn	SED	P value
N. (Pens)	3	4	4		
Days on experiment	14	14	14		
Start weight (kg)	79.1	79.0	79.1	3.5	0.999
Final weight (kg)	93.0	93.5	93.5	3.2	0.983
ADG (kg/d)	0.993	1.041	1.031	0.051	0.662
ADFI (kg/d)	2.88	2.80	2.83	0.08	0.604
F:G Ratio	2.93	2.69	2.75	0.18	0.472

Discussion

These results indicate that there was no significant effect in production efficiency between treatments throughout the experimental period, although improvements in feed efficiency when ractopamine is introduced into the diet (8 %) was in line with previous experimental results within this system. The inclusion of amino acid complexed zinc did not appear to have any additional benefit over ractopamine alone, however, the full immune benefits of such a product may not have been able to be expressed over such a short time period.

This experiment was the first to be conducted after the commercial farm has made some changes to their production system resulting in increased weaning weights and better performance in the nursery facility. These changes have made a significant impact on the finishing pigs through improved feed intake and growth rates (table 5), resulting in a large improvement in production efficiency.

Table 5. Summary of raw control performance across FeedLogic experiments.

Experiment	MJ DE/kg	g AvL/MJ DE	ADG (kg/d)	ADFI (kg/d)	FCR (kg/kg)	Duration (d)
3	13.4	7.4	0.735	2.57	3.50	28
4	13.5	7.4	0.618	2.27	3.70	21
5	13.5	7.4	0.692	2.41	3.49	21
6	14.0	7.0	0.777	2.78	3.63	14
7	14.0	7.0	0.662	2.50	3.85	14
8	13.8	6.0	0.883	2.40	2.89	14
9	13.8	6.0	0.993	2.88	2.93	14

APPENDIX 1 – DIET FORMULATIONS

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: Single-Mix Tools    (FM)    MCLEAN FARMS    {22} MAY 2010         FULL PRINT          14:03 29/04/10  0001 :
: 925.1/1.2                    (   29) Plant=0088    Robb                                                     :
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Formula basic data

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Cost :	308.359	Created	: 29/04/10	Version :	
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Tonnes :	0.0	User name	: Robb	VM key :	KPE 60

External reference:
Script file name :

Code	Raw material	%	[Kg]	Tonnes
13240	SORGHUM 11.0	50.06	750.9	0.0
14240	WHEAT 13.0	27.8	417.0	0.0
16020	MILLRUN 16.0	3.133333	47.0	0.0
33170	CANOLA MEAL 38.0 [EXP]	7.0	105.0	0.0
40100	BLOOD MEAL 90.0	2.466667	37.0	0.0
40660	MEAT MEAL 50.0	8.4	126.0	0.0
49005	SALT (FINE)	0.2	3.0	0.0
52810	CHOLINE CHLORIDE 60%	0.053333	0.8	0.0
53000	DL METHIONINE	0.073333	1.1	0.0
53150	L-LYSINE SULPHATE (51% LYSINE)	0.4	6.0	0.0
53200	L-THREONINE	0.06	0.9	0.0
61700	MYCOSORB (ALLTECH) 1-2KG/TONNE	0.1	1.5	0.0
PCP4005	CHM PIG GROWER PMX (McLEAN) - 2.5 KG/T	0.253333	3.8	0.0
		100.0	1500.0	0.0

Analysis

[VOLUME]	%	100.0	THREONINE	%	0.71583	CHOLINE	MG/KG	1103.526667
DRYMATTER	%	88.4661	TRYPTOPHAN	%	0.185258	FAT/EE	%	3.59188
MOISTURE	%	11.180567	M+C	%	0.687712	W3_FA	%	0.134522
PROTEIN	%	19.08774	AILYSPIG	%	0.826492	W6_FA	%	0.93502
NITROGEN	%	2.992309	CALCIUM	%	1.094245	W3+W6_FA	%	1.069542
C_FIBRE	%	3.035193	PHOSPHORUS	%	0.769081	#AILYS/DEP		0.059892
DE_PIG_MJ	MJ/KG	13.799653	AV_PHOS	%	0.450569	#MET/LYS		0.350813
ME_PIG_MJ	MJ/KG	0.066	#CAL/PHO		1.422797	#M+C/LYS		0.672527
ISOLEUCINE	%	0.614382	#CAL/AVPHO		2.428584	#TRY/LYS		0.181168
LYSINE	%	1.022579	SODIUM	%	0.175144	#THR/LYS		0.700024
METHION	%	0.358734	SALT	%	0.435652	#ISO/LYS		0.600816

Formula basic data

Code : 81000 Name : FEEDLOGIC EXPERIMENT 9 - DIET 2

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Tonnes :	0.0	User name :	Robb	VM key :	KPE 60

External reference:
Script file name :

Raw material		%	[Kg]	Tonnes
13240	SORGHUM 11.0	49.985	749.775	0.0
14240	WHEAT 13.0	27.8	417.0	0.0
16020	MILLRUN 16.0	3.133333	47.0	0.0
33170	CANOLA MEAL 38.0 [EXP]	7.0	105.0	0.0
40100	BLOOD MEAL 90.0	2.466667	37.0	0.0
40660	MEAT MEAL 50.0	8.4	126.0	0.0
49005	SALT (FINE)	0.2	3.0	0.0
52810	CHOLINE CHLORIDE 60%	0.053333	0.8	0.0
52960	PAYLEAN (RACTOPAMINE) ELANCO	0.075	1.125	0.0
53000	DL METHIONINE	0.073333	1.1	0.0
53150	L-LYSINE SULPHATE (51% LYSINE)	0.4	6.0	0.0
53200	L-THREONINE	0.06	0.9	0.0
61700	MYCOSORB (ALLTECH) 1-2KG/TONNE	0.1	1.5	0.0
PCP4005	CHM PIG GROWER PMX (McLEAN) - 2.5 KG/T	0.253333	3.8	0.0
		100.0	1500.0	0.0

Analysis

[VOLUME]	%	100.0	THREONINE	%	0.715558	CHOLINE	MG/KG	1103.076667
DRYMATTER	%	88.473975	TRYPTOPHAN	%	0.18518	FAT/EE	%	3.58978
MOISTURE	%	11.172692	M+C	%	0.687432	W3_FA	%	0.13447
PROTEIN	%	19.07949	AILYSPIG	%	0.826365	W6_FA	%	0.934195
NITROGEN	%	2.990989	CALCIUM	%	1.09423	W3+W6_FA	%	1.068664
C_FIBRE	%	3.033618	PHOSPHORUS	%	0.768863	#AILYS/DEP		0.059929
DE_PIG_MJ	MJ/KG	13.789003	AV_PHOS	%	0.450524	#MET/LYS		0.350754
ME_PIG_MJ	MJ/KG	0.066	#CAL/PHO		1.42318	#M+C/LYS		0.672372
ISOLEUCINE	%	0.614052	#CAL/AVPHO		2.428793	#TRY/LYS		0.181124
LYSINE	%	1.022398	SODIUM	%	0.175114	#THR/LYS		0.699882
METHION	%	0.358611	SALT	%	0.435562	#ISO/LYS		0.6006

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: 925.1/1.2 (29) Plant=0088 Robb :

Formula basic data

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Tonnes :	0.0	User name :	Robb	VM key :	KPE 60

External reference:
Script file name :

Raw material	%	[Kg]	Tonnes
13240 SORGHUM 11.0	49.96	749.4	0.0
14240 WHEAT 13.0	27.8	417.0	0.0
16020 MILLRUN 16.0	3.133333	47.0	0.0
33170 CANOLA MEAL 38.0 [EXP]	7.0	105.0	0.0
40100 BLOOD MEAL 90.0	2.466667	37.0	0.0
40660 MEAT MEAL 50.0	8.4	126.0	0.0
49005 SALT (FINE)	0.2	3.0	0.0
51600 AVAILA ZN 100	0.1	1.5	0.0
52810 CHOLINE CHLORIDE 60%	0.053333	0.8	0.0
53000 DL METHIONINE	0.073333	1.1	0.0
53150 L-LYSINE SULPHATE (51% LYSINE)	0.4	6.0	0.0
53200 L-THREONINE	0.06	0.9	0.0
61700 MYCOSORB (ALLTECH) 1-2KG/TONNE	0.1	1.5	0.0
PCP4005 CHM PIG GROWER PMX (McLEAN) - 2.5 KG/T	0.253333	3.8	0.0
	100.0	1500.0	0.0

Analysis

[VOLUME]	%	100.0	THREONINE	%	0.715467	CHOLINE	MG/KG	1102.926667
DRYMATTER	%	88.3786	TRYPTOPHAN	%	0.185154	FAT/EE	%	3.58908
MOISTURE	%	11.168067	M+C	%	0.687338	W3_FA	%	0.134452
PROTEIN	%	19.07674	AILYSPIG	%	0.826323	W6_FA	%	0.93392
NITROGEN	%	2.990549	CALCIUM	%	1.094225	W3+W6_FA	%	1.068372
C_FIBRE	%	3.033093	PHOSPHORUS	%	0.768791	#AILYS/DEP		0.059942
DE_PIG_MJ	MJ/KG	13.785453	AV_PHOS	%	0.450509	#MET/LYS		0.350735
ME_PIG_MJ	MJ/KG	0.066	#CAL/PHO		1.423307	#M+C/LYS		0.672321
ISOLEUCINE	%	0.613942	#CAL/AVPHO		2.428863	#TRY/LYS		0.181109
LYSINE	%	1.022337	SODIUM	%	0.175104	#THR/LYS		0.699835
METHION	%	0.358569	SALT	%	0.435532	#ISO/LYS		0.600528

Fatty acid source effects on commercial finisher performance.

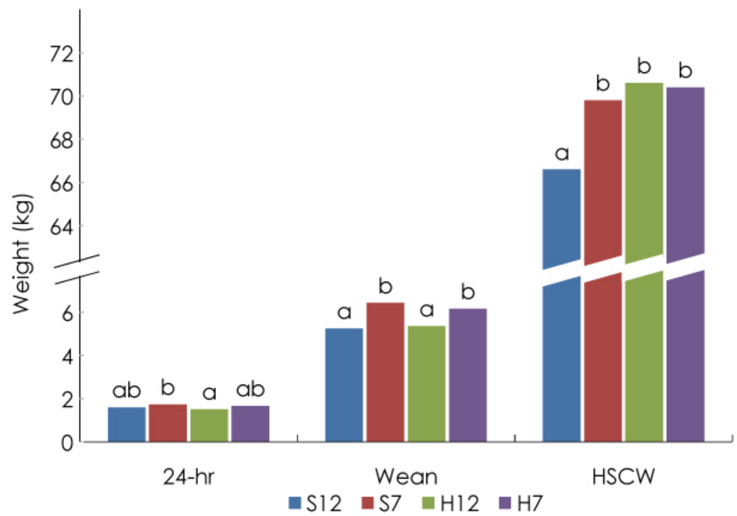
Wilkinson *et al.* (2009) investigated the role of fatty acid source on finisher performance. They found that pigs that received a 3 per cent inclusion of safflower oil (high n-6:n-3 ratio) grew significantly slower than pigs receiving either tallow or a low n-6:n-3 ratio polyunsaturated fatty acid, without significant effects on carcase composition.

Whilst this work showed significant results it would be pertinent to look at such a dietary inclusion in commercial group housing, where the known effects of competition, etc... results in around 30 per cent reduction in performance when compared with individually housed animals. It is a zero cost technology that improved growth performance by approximately 7 per cent.

The proposed experimental design is a 3x2 factorial, investigating three fatty acid treatments during the finisher phase (tallow, vegetable oil and a 50:50 blend of the two fatty acid sources) and also investigate any differing effects as a result of paylean use. Differences between treatments will be assessed via feed intake, growth rate and FCR. The effect of fatty acid source on fat quality will also be assessed (via iodine number evaluation) from a subset of carcases.

Maternal lysine intake during lactation improves gilt progeny performance.

Results from an incidental project from the sow longevity studies showed a significant response in whole of life gain of gilt progeny. Piglets from large litters whose dam received high levels of lysine during lactation achieved comparative performance with progeny from low litter sizes (12 pigs per litter versus 7), in spite of them being approximately 1 kg less at weaning (Hewitt *et al.*, 2009). Progeny achieved a gain over there large litter size counterparts whose dams received a standard lactation diet of 4 kg in carcase weight, an advantage of upwards of $10 per pig. The cost of treatment was in the vicinity of $10 per gilt, resulting in a ROI of 12:1.



There would appear to be some evidence of a mechanism behind this result with the known biochemical pathway of lysine to carnitine, and some evidence showing the ability of carnitine being able to ameliorate the negative consequences of low birth weight on body composition.

The proposed experiment is to replicate this treatment to determine if the above results were real, it would involve feeding lactating gilts one of three diet treatments throughout lactation;

- standard lactation diet (14.3 MJ DE/kg, 0.56 g AvL/MJ DE),
- high lysine lactation diet (14.5 MJ DE/kg, 0.90 g AvL/MJ DE), and
- standard lactation diet, top-dressed with 250 mg/d L-carnitine (Ramanau *et al.*, 2005).

Dietary treatments would commence at 24-hrs after normal fostering procedures, at which stage female piglets would be individually identified by different coloured eartags, ids recorded as litter groups. Piglets would receive no non-standard treatments until entering the Feedlogic system, where they would be penned by dam treatment. Once again, no non-standard treatments would be applied, however feed intake, growth rate and feed conversion would be recorded, as well as carcase measurements.

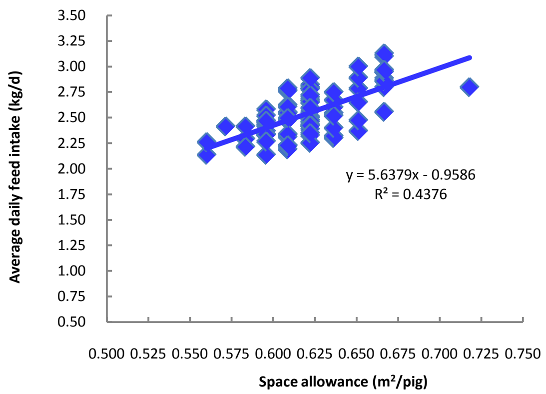
References

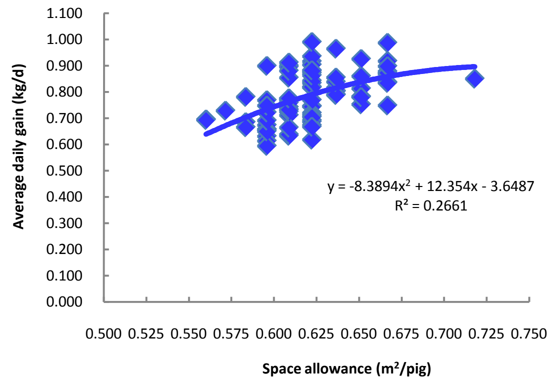
Hewitt, R.J.E., Hudson, A. and van Barneveld, R.J. (2009) In ‘Manipulating Pig Production XII’, p. 48
Loesel, D., Kalbe, C., Nuernberg, G. and Rehfeldt, C. (2009) EAAP Growth and Development Symposium
Ramanau, A., Kluge, H. and Eder, K. (2005) *British Journal of Nutrition* **93:** 717-721

Optimising stocking density to improve pig performance

Recent results from Pork CRC projects (Moore and Mullan, 2009) show that progeny from Australian genotypes have a high genetic potential for fast, efficient lean production that is not being expressed in commercial herds. Whilst there are a multitude of factors that are likely to affect performance in a commercial herd such as health status, diet formulation and management strategies, one factor that seems to have limited information available for these modern, low appetite, highly efficient genotypes is stocking density and/or feeder access.

Some retrospective analysis of results from completed Pork CRC projects have shown there are strong correlations between the space allowed per pig and the average daily feed intake and daily gain of pigs.





If we use the minimum space requirement as specified by the model code of practice as our basis, 0.66 m^2 for a 100 kg finisher, overstocking by 10 per cent will lead to a reduction in feed intake of 12.3 per cent (2.76 *c.f.* 2.42 kg/d) and a decreased growth rate of 12.4 per cent (850 *c.f.* 745 g/d). If any other event was to reduce feed intake by 100 g/d it would be heavily investigated.

Demonstrating the effects of overstocking on feed intake may also allow for a remedial diet to be formulated in the event of a need to overstock, that allows nutrient intake to be maintained even though feed intake is compromised.

The proposed experiment would look at five different stocking rates in an effort to determine the optimum stocking density for the modern genotype, with average daily feed intake, average daily gain and feed conversion being recorded.

Number per pen	34	38	42	46	50
Space allowance (m^2/pig)	0.82	0.74	0.66	0.61	0.56
Predicted ADFI (kg/d)	3.66	3.21	2.76	2.48	2.20
Predicted ADG (g/d)	841	899	851	766	639

Feed Logic Project 10: The influence of birth and weaning weight on whole of life performance in a commercial operation.

Hypothesis

- The influence of birth and weaning weight on whole of life performance is maintained within a commercial operation.
- Whole of life performance in a commercial operation reflects experimental performance.

Methods

Treatments

Piglets born from gilt litters were individually identified with a tattoo and RFID eartag at birth, with birthweight recorded. Piglets were subject to standard commercial practices throughout their whole growth period. Upon entry to the FeedLogic facility, piglets were separated into three groups, low birthweight, high birthweight and medium birthweight.

Owing to the commercial operation of the facility, the lightest 40 animals were placed in a single pen, the heaviest 40 animals were placed in a single pen and then the remaining pigs were allocated to pens. This occurred for both sides of the facility, filled one week apart.

Diets

Standard diets for this commercial operation where fed throughout this experiment (table 1).

Table 1. Diets fed during FeedLogic phase of experiment.

Diet	MJ DE/kg	g AvL/MJ DE	Weeks fed
Porker	14.45	0.81	5
Grower	14.20	0.74	3
Baconer	14.00	0.64	4
Paylean Finisher	13.40	0.63	2

Feeding

The FeedLogic delivery system was used for feeding. All animals received the same diets for the same time periods. Feeders were filled to capacity, after weighing, on the first day of the experiment and an attempt was made to maintain the feeders at full capacity for the duration of the experiment so that daily feed consumption could be recorded.

Weighing

Pigs were individually weighed throughout their growth period. Pigs were weighed at birth, weaning, at exit from the weaner facility at 10 weeks of age and with dietary changes in the FeedLogic facility, at 15 and 18 weeks of age, and weighed at exit from the facility.

Statistical analyses

Responses measured included average daily gain, feed intake and feed:gain ratio. Differences between treatments were assessed using a simple on-way ANOVA. All analyses were conducted using Genstat 13th Edition.

Results

Individual growth

There were some minor but statistically significant differences in age between treatment groups (table 2) at weaning, when weighed at week 18 and the final weight. These differences were generally less than one day.

Table 2. Age of low (<1.5 kg), medium (1.5 to 2.0 kg) and high (>2.0 kg) birth weight piglets at weighing. Values within rows with different subscripts indicate significant difference (P<0.05).

	Low	Medium	High	SED	P-value
N.	58	163	41		
Wean age	$25.0_{a} \pm 2.1$	$24.1_{b} \pm 2.3$	$23.9_{b} \pm 1.6$	0.39	0.020
Week 10 age	71.5 ± 2.9	71.4 ± 2.7	72.0 ± 3.1	0.49	0.478
Week 15 age	107.9 ± 2.0	107.6 ± 1.9	108.4 ± 1.9	0.34	0.075
Week 18 age	$128.8_{ab} \pm 2.0$	$128.6_{a} \pm 1.9$	$129.5_{b} \pm 1.9$	0.36	0.041
End age	$166.8_{a} \pm 2.0$	$166.4_{a} \pm 1.9$	$167.5_{b} \pm 1.5$	0.34	0.005

The weight of treatment groups differed significantly at birth (table 3) and throughout the whole growth period. Significant difference between all three treatment groups was maintained through to week 15 of life, however, in the final two weigh events there was no significant difference between medium and high treatment groups. These consistent differences between treatments can be seen in figure 2, which also shows the increased variation that occurs as the pig ages.

Table 3. Weight of low (<1.5 kg), medium (1.5 to 2.0 kg) and high (>2.0 kg) birth weight piglets. Values within rows with different subscripts indicate significant difference (P<0.05).

	Low	Medium	High	SED	P-value
N.	58	163	41		
Birth wt	$1.41_a \pm 0.06$	$1.72_b \pm 0.13$	$2.16_c \pm 0.15$	0.022	<0.001
Wean wt	$6.23_a \pm 1.05$	$6.67_b \pm 1.00$	$7.02_c \pm 0.14$	0.177	<0.001
Std wean wt#	$6.06_a \pm 0.93$	$6.73_b \pm 0.93$	$7.15_c \pm 0.92$	0.165	<0.001
Week 10 wt	$26.7_a \pm 4.1$	$29.0_b \pm 3.9$	$31.9_c \pm 4.4$	0.71	<0.001
Week 15 wt	$56.4_a \pm 6.3$	$58.8_b \pm 5.2$	$62.4_c \pm 5.8$	0.99	<0.001
Week 18 wt	$71.6_a \pm 7.0$	$74.4_b \pm 6.5$	$76.6_b \pm 7.9$	1.28	0.002
End wt	$94.2_a \pm 10.6$	$99.2_b \pm 9.4$	$100.0_b \pm 12.8$	1.86	0.003

#Std wean wt, weaning weight standardized to the average weaning age (24.3 d).

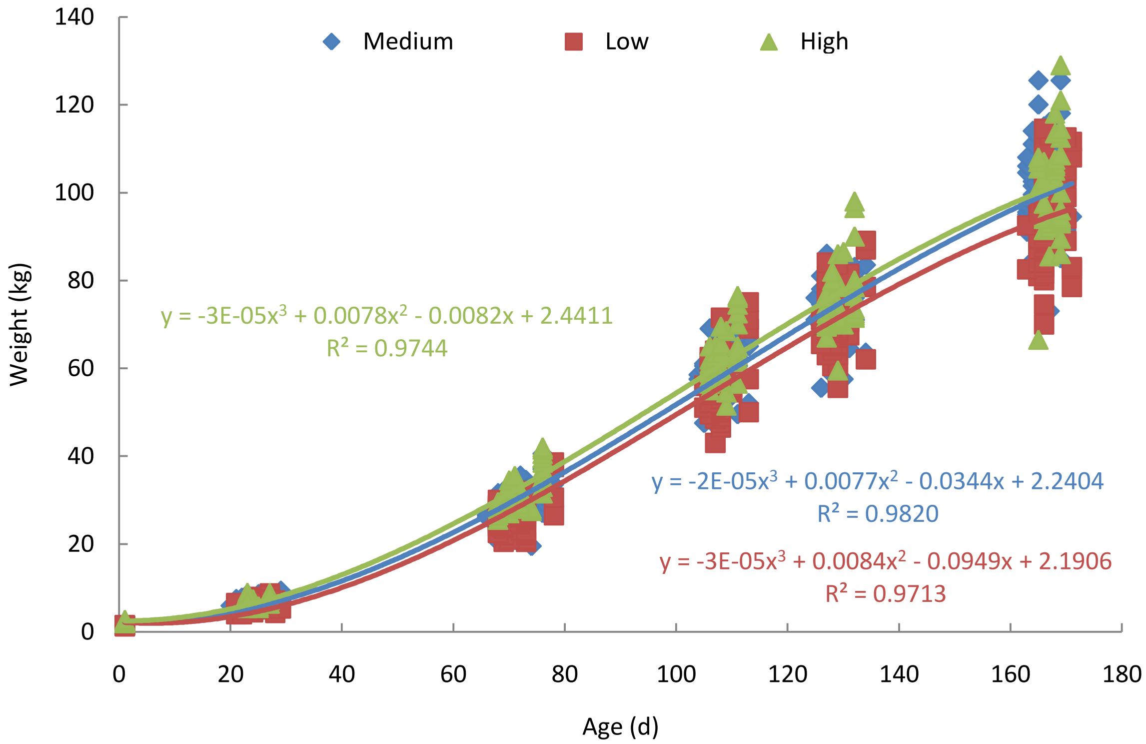


Figure 1. Growth curves for low (<1.5 kg), medium (1.5 to 2.0 kg) and high (>2.0 kg) birth weight pigs.

Pen feed and growth performance

Differences between treatment groups, when allocated on a pen basis, within the FeedLogic facility were significant (table 4). The average daily feed intake of pigs did not differ between treatment groups for the whole of the FeedLogic growth period or for any of the growth intervals. Similarly, no significant differences could be seen in average daily gain or feed conversion ratio during the growth intervals or the whole time period. Whilst average daily feed intake increased, as expected, as the animal aged, average daily gain did not increase, nor was it maintained, with a fall in growth rate occurring. Variation within treatment groups for average daily feed intake and average daily gain increased as the animal aged (figure 2). Feed conversion ratio was considerably higher in the final weigh interval.

Table 4. Average daily feed intake (ADFI), average daily gain (ADG) and feed conversion ratio (FCR) for the whole FeedLogic period and for weight intervals for weeks 10 to 15 (ADFI 10-15, ADG 10-15, FCR 10-15), weeks 15 to 18 (ADFI 15-18, ADG 15-18, FCR 15-18) and from week 18 to the end of trial (ADFI 18-End, ADG 18-End, FCR 18-End). Values within rows with different subscripts indicate significant difference (P<0.05).

	Low	Medium	High	SED	P-value
N.	2	3	2		
Birth weight	1.46_a ± 0.08	1.69_b ± 0.11	2.00_c ± 0.21	0.02	<0.001
ADFI	2.17 ± 0.08	2.26 ± 0.07	2.23 ± 0.05	0.07	0.466
ADG	0.709 ± 0.066	0.709 ± 0.071	0.722 ± 0.040	0.060	0.968
FCR	3.08 ± 0.96	3.07 ± 0.17	3.21 ± 0.23	0.18	0.703
ADFI 10-15	1.89 ± 0.06	1.98 ± 0.06	1.97 ± 0.09	0.07	0.415
ADG 10-15	0.784 ± 0.029	0.781 ± 0.036	0.795 ± 0.017	0.029	0.880
FCR 10-15	2.41 ± 0.16	2.54 ± 0.19	2.49 ± 0.17	0.17	0.749
ADFI 15-18	2.20 ± 0.04	2.32 ± 0.09	2.21 ± 0.00	0.07	0.215
ADG 15-18	0.738 ± 0.053	0.765 ± 0.049	0.714 ± 0.063	0.051	0.624
FCR 15-18	2.99 ± 0.27	3.03 ± 0.17	3.10 ± 0.27	0.21	0.883
ADFI 18-End	2.45 ± 0.30	2.52 ± 0.22	2.49 ± 0.24	0.23	0.960
ADG 18-End	0.619 ± 0.106	0.608 ± 0.120	0.656 ± 0.118	0.110	0.901
FCR 18-End	3.97 ± 0.20	4.20 ± 0.43	3.82 ± 0.32	0.34	0.556

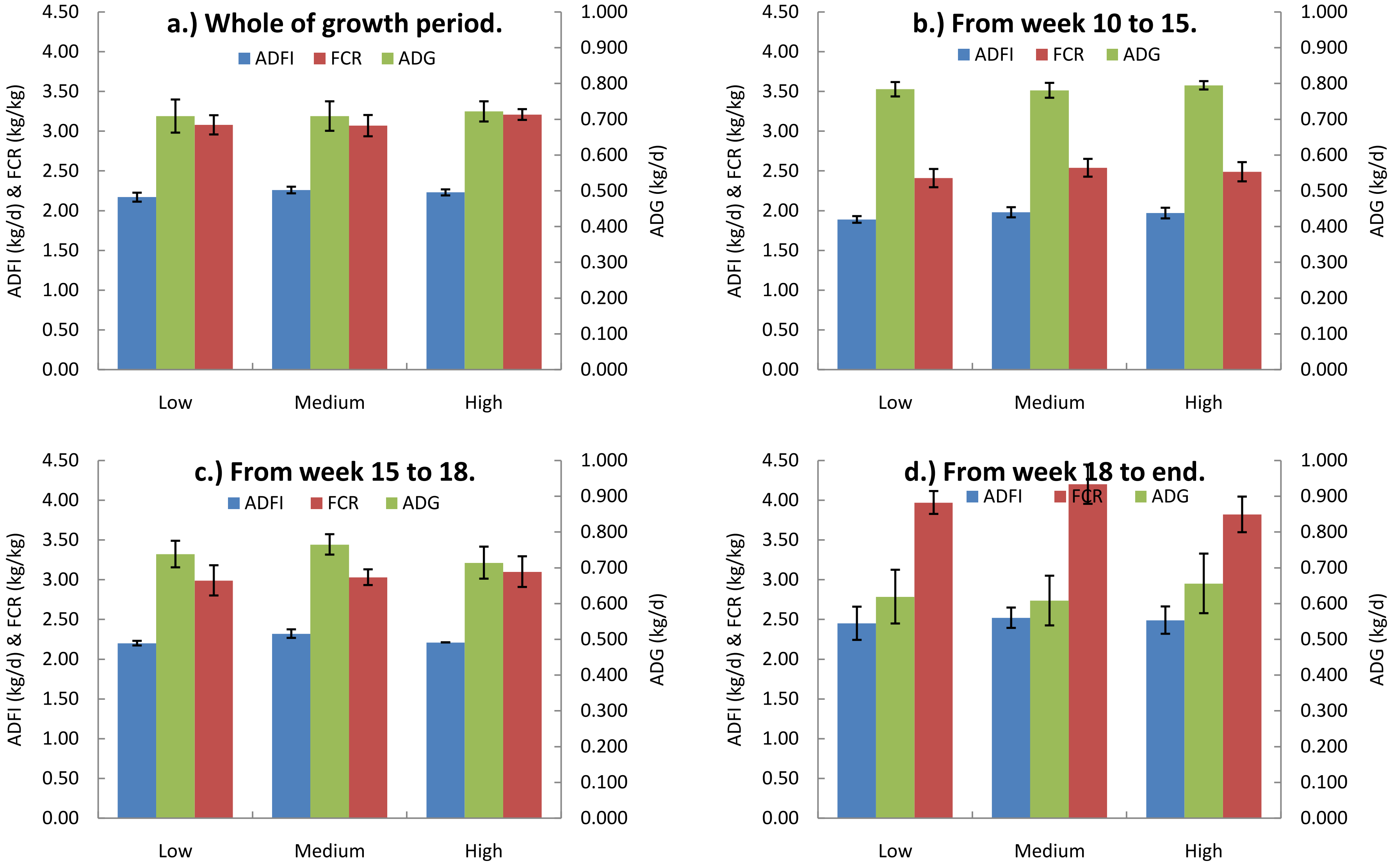


Figure 2. Graphical representation of average daily feed intake (ADFI), average daily gain (ADG) and feed conversion ratio (FCR) for the whole growth period (a.), and from week 10 to 15 (b.), week 15 to 18 (c.) and from week 18 to end (d.) for low, medium and high birth weight pens.

Growth projection

Comparisons were made between performance within this experiment and the recent experimental work at Medina that utilized pigs of a similar genetic base (figure 3). Whilst growth performance did not match, nor was it expected to, that found at Medina, projections based on growth performance through to week 10 and 15 indicated these pigs would follow a similarly shaped growth curve. However, actual performance began to deviate from these projections from week 18 onwards.

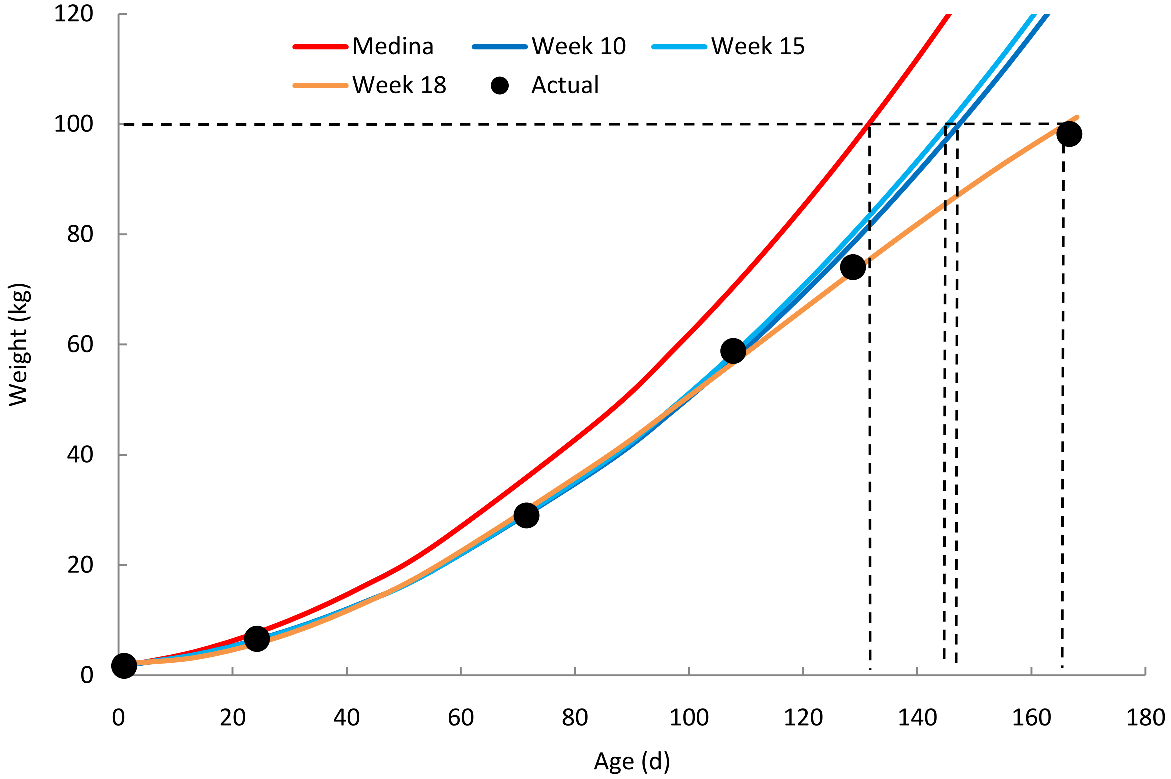


Figure 3. Actual (●) growth performance, prediction based on Medina experimental work and projections based on interval weighings at week 10, week 15 and week 18.

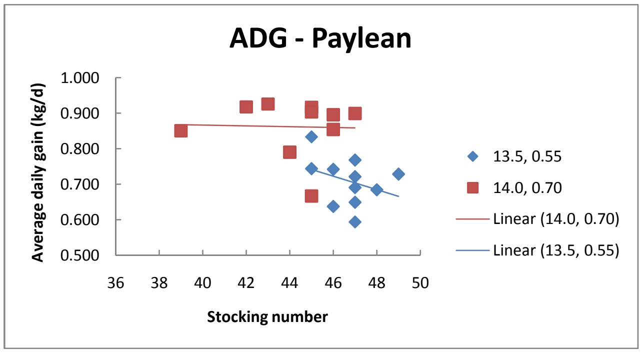
Discussion

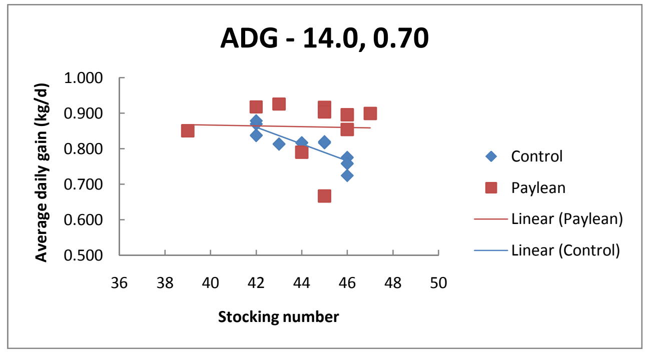
These results indicate that the actual growth of pigs is not significantly compromised, as indicated by very similar patterns of growth, by the birth weight of the piglet, but rather these differences in birth weights are maintained throughout the whole growth period.

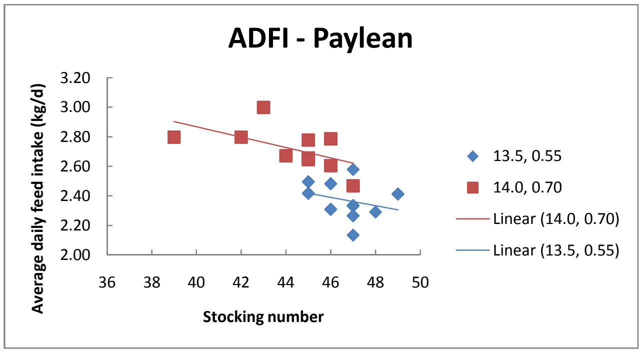
These results also indicate that pigs raised under commercial conditions definitely have the ability to express the potential that has been seen under experimental conditions. Whilst pig performance was below that seen at Medina the similarity of growth curves through to 15 weeks of age is very encouraging. However, performance indicates that issues still exist in the finishing phase under commercial conditions.

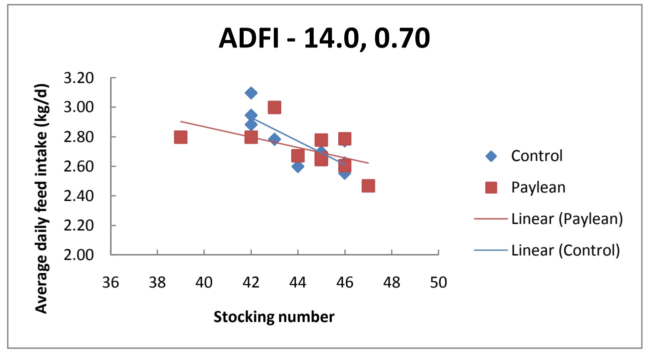
Some of this performance drop-off can be attributed to an outbreak of dermatitis, exacerbated by the environmental conditions at the time. However, it is my belief that this poorer performance also strongly reflects an often overlooked issue of feeder access. These pigs were maintained at a stocking density that complies with the animal welfare code (0.65 m^2 for a 100 kg pig) and are being fed from a feeder designed to feed that number of pigs (ie a 40-space feeder). However, at the height of summer, when this experiment was conducted, the environmental window at which a pig is comfortable eating is greatly reduced, such that the ability of an individual pig within a moderately sized group to consume properly is compromised. The reduction in average daily feed intake and the worsening of feed conversion seen in this period are a reflection of this issue.

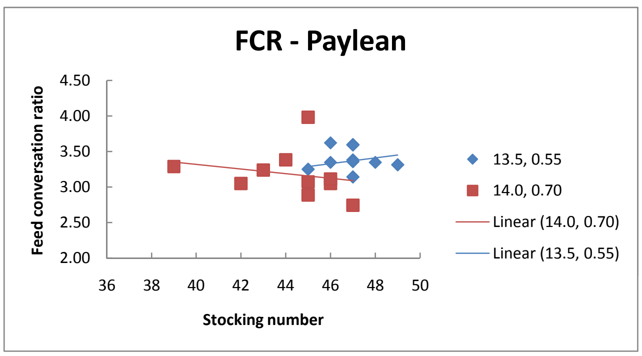
Whilst steps can, and have, been taken to reduce the impact of dermatitis within the herd, until a serious assessment of the impact of temperature on feeding behavior and subsequent feeder access has been conducted similar results are likely to be seen in conventionally ventilated sheds in the height of summer.

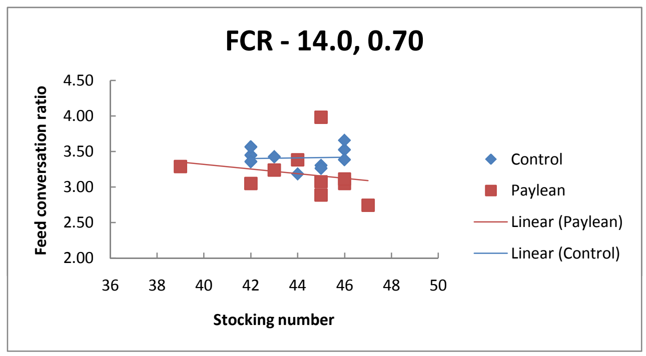

ADG - Paylean
Average daily gain (kg/d)
Stocking number
13.5, 0.55
14.0, 0.70
Linear (14.0, 0.70)
Linear (13.5, 0.55)


ADG - 14.0, 0.70
Average daily gain (kg/d)
Stocking number
Control
Paylean
Linear (Paylean)
Linear (Control)


ADFI - Paylean
Average daily feed intake (kg/d)
Stocking number
13.5, 0.55
14.0, 0.70
Linear (14.0, 0.70)
Linear (13.5, 0.55)


ADFI - 14.0, 0.70
Average daily feed intake (kg/d)
Stocking number
Control
Paylean
Linear (Paylean)
Linear (Control)


FCR - Paylean
Feed conversation ratio
Stocking number
13.5, 0.55
14.0, 0.70
Linear (14.0, 0.70)
Linear (13.5, 0.55)


FCR - 14.0, 0.70
Feed conversation ratio
Stocking number
Control
Paylean
Linear (Paylean)
Linear (Control)