



## Evaluation of Medium Chain Fatty Acids in Nursery Pig Diets

### Abstract

Multiple studies have been completed showing the benefit of medium chain fatty acid (MCFA) inclusion in nursery pig diets.<sup>1,2,3</sup> A 42d study was completed to evaluate a proprietary C8:C10 MCFA blend (MCFA blend) on nursery pig performance. A total of 360 pigs (initial BW=13.4 lb.) were randomized to pens (10 pigs per pen) and blocked by body weight and sex to 2 dietary treatments (18 pens per treatment). Treatments consisted of control (basal diet) and 1.0% MCFA blend substituted for tallow at a 1:1 rate in the diet. Treatments were formulated and manufactured in 3 dietary phases. Pigs fed MCFA blend had improved body weight (BW), average daily gain (ADG), average daily feed intake (ADFI) and feed conversion (F:G) over the 42-day duration of the study.

### Materials & Methods

#### *Experimental Design*

A 42d study to evaluate the performance of nursery pigs (initial BW = 13.4 lb) fed MCFA blend at 1.0% was conducted at a commercial research facility in the Midwest United States. A total of 360 pigs (initial BW = 13.4 lb.) were blocked by body weight and sex and randomly allotted (10 pigs per pen) to a dietary treatment (18 pens per treatment). Pigs were subjected to seasonal heat stress and water/feed withdrawal for 24 hours following placement, with the exception of water access for 30 minutes following placement.

#### *Animals and Diets*

Pigs were weaned between 18-21 days of age and sourced from a sow flow experiencing *Streptococcus* issues. Due to the challenge, pigs were treated with amoxicillin (48 hours on and 48 hours off) for the first three weeks of the study. No other antibiotic treatments were applied during the study. Diets were formulated in three dietary phases, with phase 1 from d0-7, phase 2 from d7-21 and phase 3 from d21-42. All diets were manufactured in pelleted form. MCFA blend was substituted at a 1:1 rate at the expense of tallow in the diet. Calculated nutrient compositions are shown in Table 1.

#### *Analysis and Statistics*

Pig weights and feed disappearance were measured on d0, 7, 14, 21, 28, 35 and 42 to determine average daily gain (ADG), average daily feed intake (ADFI) and feed to gain ratio (F:G). Feed samples were collected from each treatment and diet phase for proximate analysis and analyzed for medium chain fatty acid content (C8-C10) to determine product inclusion levels. Data were analyzed using JMP software (SAS Institute Inc., Carey, NC). All results were considered significant at  $P < 0.05$  and a tendency from  $P = 0.05-0.10$ .

### Results

Over the duration of the study (d0-42), pigs fed MCFA blend had improved BW, ADG, ADFI and feed conversion (Figure 1,  $P < 0.0001$ ) compared to pigs fed diets without MCFA blend. As shown in Table 2, pigs fed MCFA blend had improved ADG ( $P = 0.042$ ) and tended to improve feed conversion ( $P = 0.069$ ) following phase 1 (d0-7). Additionally, pigs fed MCFA blend had improved BW, ADG, ADFI and feed conversion ( $P \leq 0.003$ ) following phase 2 (d0-21).

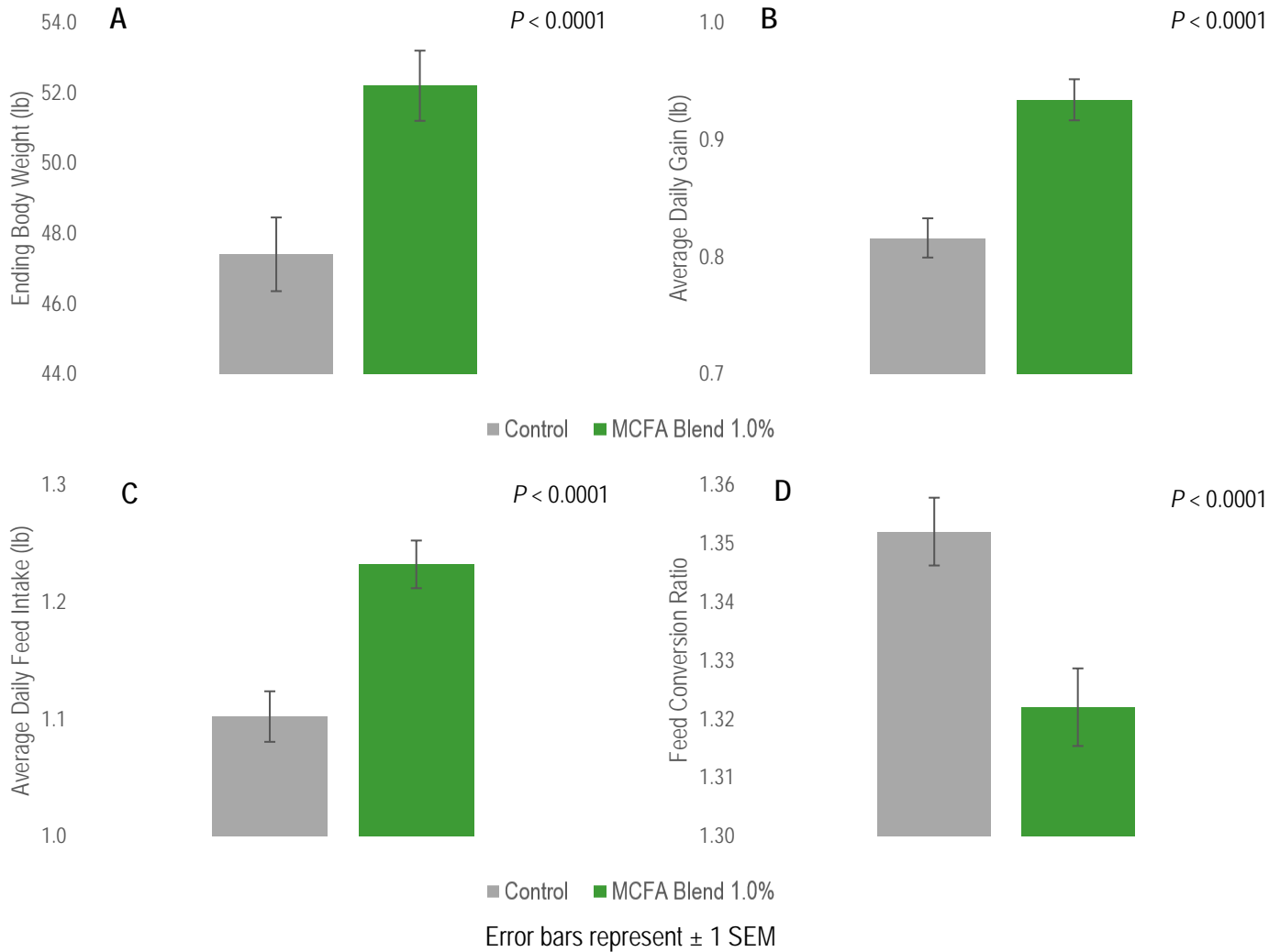


Figure 1. Effect of a proprietary MCFA blend on overall (d0-42) nursery pig performance; body weight (A), average daily gain (B), average daily feed intake (C) and feed conversion ratio (D).<sup>4</sup>

## Conclusion

A proprietary blend of medium chain fatty acids was able to improve performance of nursery pigs under a stress challenge of initial feed and water withdrawal. Pigs fed MCFA blend exhibited improved performance over the duration of the study. Although a rigorous antibiotic program was used, MCFA blend still exhibited a consistent positive effect.

## References

1. Zentek J., Buchheit-Renko S., Ferrara F., Vahjen W., Van Kessel A.G., and Pieper R. (2011). Nutritional and physiological role of medium-chain triglycerides and medium-chain fatty acids in piglets. *Animal Health Research Reviews*. 12.1: 83-93.
2. Gebhardt J.T., Thomson K.A., Woodworth J.C., Tokach M.D., DeRouchey J.M., Goodband R.D., and Dritz S.S. (2017). Evaluation of medium chain fatty acids as a dietary additive in nursery pig diets. *Kansas Agricultural Experiment Station Research Reports*. 3.7: 10.
3. Kemin Internal Document, 18-00148.
4. Kemin Internal Document, 18-00518.

**Table 1.** Calculated nutrient composition of diets by treatment and phase.

Nutrient Name	Phase 1		Phase 2		Phase 3	
	Control	MCFA Blend	Control	MCFA Blend	Control	MCFA Blend
Crude Protein (%)	22.6	22.6	21.6	21.6	20.0	20.0
Crude Fat (%)	4.5	3.5	4.6	3.6	4.7	3.7
Crude Fiber (%)	2.4	2.4	2.8	2.8	3.0	3.0
Calcium (%)	0.85	0.85	0.85	0.85	0.85	0.85
Phos-Total (%)	0.73	0.73	0.74	0.74	0.74	0.74
Phos-Available (%)	0.48	0.48	0.45	0.45	0.43	0.43
ME (kcal/lb)	1557.0	1557.0	1530.0	1530.0	1530.0	1530.0
Lysine (%)	1.68	1.68	1.51	1.51	1.39	1.39
Methionine (%)	0.57	0.57	0.54	0.54	0.50	0.50
Meth & Cystine (%)	0.97	0.97	0.87	0.87	0.81	0.81
Tryptophane (%)	0.30	0.30	0.28	0.28	0.25	0.25
Threonine (%)	1.13	1.13	1.00	1.00	0.94	0.94
Lactose (%)	12.00	12.00	5.00	5.00	0.00	0.00
Sodium (%)	0.42	0.42	0.21	0.21	0.22	0.22
Added Selenium (ppm)	0.30	0.30	0.30	0.30	0.30	0.30
Added Zn (ppm)	3000.0	3000.0	2000.0	2000.0	95.0	95.0
Added Cu (ppm)	14.0	14.0	14.0	14.0	14.0	14.0
SID Lysine (%)	1.50	1.50	1.35	1.35	1.25	1.25
SID Methionine (%)	0.53	0.53	0.50	0.50	0.46	0.46
SID Met & Cys (%)	0.87	0.87	0.78	0.78	0.73	0.73
SID Threonine (%)	0.96	0.96	0.86	0.86	0.81	0.81
SID Tryptophan (%)	0.27	0.27	0.25	0.25	0.23	0.23
SID Valine (%)	0.98	0.98	0.89	0.89	0.82	0.82

**Table 2.** Effect of MCFA blend on commercial nursery pig growth performance.

		MCFA Blend (%)		RSME	P-Value
		0.0	1.0		
0	BW (lb)	13.4	13.4	4.77	0.989
d0-7	BW (lb)	16.0	16.3	5.14	0.476
	ADG (lb)	0.38	0.42	0.26	0.042
	ADFI (lb)	0.41	0.42	0.15	0.336
	F:G	1.15	1.08	0.48	0.069
d0-21	BW (lb)	24.0	25.7	7.22	0.003
	ADG (lb)	0.38	0.45	0.17	<0.0001
	ADFI (lb)	0.62	0.67	0.16	<0.0001
	F:G	1.66	1.52	0.42	<0.0001
d0-42	BW (lb)	47.4	52.2	12.19	<0.0001
	ADG (lb)	0.82	0.93	0.21	<0.0001
	ADFI (lb)	1.10	1.23	0.26	<0.0001
	F:G	1.35	1.32	0.05	<0.0001