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Beyond Nutrition

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FEEDING INNOVATION



Impact of amino acid formulation strategy on finishing pig performance

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Introduction

- f Synthetic amino acids are commonly added to finisher pig diets, especially low protein diets, to ensure the levels of essential amino acids are maintained and that the 'ideal protein ratio' is delivered
- f Historically, finisher pig diets have been formulated to adequate levels of Lys, M+C and Thr
- f However, some recommended that finisher pig diets should be formulated to adequate levels of the 6 most limiting amino acids
- f Formulating to the 6 most limiting amino acids will add expense to the diet



Aim

- f To formulate finisher pig diets which differed in how many amino acids were of specific focus (3, 4 or 6)
- f To assess finisher pig performance when these diets were offered.



Materials and Methods

- f All diets were barley, wheat, maize, soya bean meal based
- f All were formulated to contain 13.85 MJ DE/kg
- f 4 dietary treatments were:
 - f Control - 17% CP and formulated to supply adequate Lys, M+C and Thr
 - f Low CP (15%) and formulated to supply adequate Lys, M+C and Thr
 - f Low CP (15%) and formulated to supply adequate Lys, M+C, Thr and Trp
 - f Low CP (15%) and formulated to supply adequate Lys, M+C, Thr, Trp, Ile, Val, Arg



Formulated -total amino acids (g/kg)

	Con. 17% (Lys, M+C, Thr)	Con15% (Lys, M+C, Thr)	Con 15% + Trp	Con 15% +Trp, Arg, Ile, Val
Lys	10.5	10.5	10.5	10.5
Met	3.3	3.4	3.4	3.6
M+C	6.6	6.3	6.3	6.3
Thr	6.7	7.0	7.0	7.0
Trp	2.2	1.8	2.0	2.0
Arg	10.8	8.3	8.3	8.4
Ile	6.1	4.6	4.6	5.8
Val	7.2	5.6	5.6	7.4

Formulated -total amino acids (g/kg)

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Lys	10.5	10.5	10.5	10.5
Met	3.3	3.4	3.4	3.6
M+C	6.6	6.3	6.3	6.3
Thr	6.7	7.0	7.0	7.0
Trp	2.2	1.8	2.0	2.0
Arg	10.8	8.3	8.3	8.4
Ile	6.1	4.6	4.6	5.8
Val	7.2	5.6	5.6	7.4

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Lys	10.5	10.5	10.5	10.5
Met	3.3	3.4	3.4	3.6
M+C	6.6	6.3	6.3	6.3
Thr	6.7	7.0	7.0	7.0
Trp	2.2	1.8	2.0	2.0
Arg	10.8	8.3	8.3	8.4
Ile	6.1	4.6	4.6	5.8
Val	7.2	5.6	5.6	7.4

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Lys	10.5	10.5	10.5	10.5
Met	3.3	3.4	3.4	3.6
M+C	6.6	6.3	6.3	6.3
Thr	6.7	7.0	7.0	7.0
Trp	2.2	1.8	2.0	2.0
Arg	10.8	8.3	8.3	8.4
Ile	6.1	4.6	4.6	5.8
Val	7.2	5.6	5.6	7.4

Materials and Methods

- f 360 finisher pigs (PIC 337 x (LRxLW), balanced for gender and penned in groups of 10
- f 8 pen replicates per dietary treatment over 8 time periods
- f Pigs were offered diets from 12 weeks of age until slaughter (110kg)
- f Pigs were weighed and feed intake recorded every 3 weeks
- f Diets were analysed for crude protein and amino acid content
- f Carcass data (cold weight, back fat depth at P² and Kill out %)+
- f Data was analysed using ANOVA in Genstat



Analysed -total amino acids (g/kg fresh)

	Con 17% (Lys, M+C, Thr)	Con 15% + (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val
Lys	10.5	10.4	10.6	10.6
Met	3.2	3.6	3.1	3.2
Thr	6.6	6.6	6.7	6.7
Trp	1.4	1.1	1.1	1.1
Arg	10.6	8.7	8.6	8.6
Ile	6.6	5.3	5.3	5.7
Val	7.7	6.5	6.5	7.1

Analysed -total amino acids (g/kg fresh)

	Con 17% (Lys, M+C, Thr)	Con 15% + (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val
Lys	10.5	10.4	10.6	10.6
Met	3.2	3.6	3.1	3.2
Thr	6.6	6.6	6.7	6.7
Trp	1.4	1.1	1.1	1.1
Arg	10.6	8.7	8.6	8.6
Ile	6.6	5.3	5.3	5.7
Val	7.7	6.5	6.5	7.1

Results - Pig weight (kg)

	Con 17% (Lys, M+C, Thr)	Con 15% (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val	SEM	P Value
12 wk	39.5	39.9	40.5	40.3	0.43	NS
15 wk	53.8	55.5	56.4	56.8	0.74	0.051
18 wk	72.6	72.1	75.1	75.2	0.14	NS
21 wk	93.3	93.6	96.0	96.6	1.36	NS
Finish	111.1	112.8	112.7	111.4	1.13	NS



Results - Performance 12-15 wks

	Con 17% (Lys, M+C, Thr)	Con 15% (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val	SEM	P Value
Daily Gain (g/day)	682	742	755	786	21.4	0.021
Daily Feed Intake (g/day)	1634	1645	1661	1634	67.2	NS
FCR	2.41	2.22	2.20	2.08	0.071	0.033



Results - Performance 12-18 wks

	Con 17% (Lys, M+C, Thr)	Con 15% (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val	SEM	P Value
Daily Gain (g/day)	786	766	823	830	22.3	NS
Daily Feed Intake (g/day)	1836	1800	1847	1869	57.7	NS
FCR	2.34	2.37	2.25	2.25	0.053	NS



Results - Performance 18 wks-Finish

	Con 17% (Lys, M+C, Thr)	Con 15% (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val	SEM	P Value
Daily Gain (g/day)	1025	1073	1037	999	32.1	NS
Daily Feed Intake (g/day)	2618	2814	2631	2641	110.7	NS
FCR	2.56	2.63	2.53	2.64	0.084	NS



Results - Performance 12 wks-Finish

	Con 17% (Lys, M+C, Thr)	Con 15% (Lys, M+C, Thr)	Con 15% + Trp	Con15% +Trp, Arg, Ile, Val	SEM	P Value
Daily Gain (g/day)	903	908	922	907	18.7	NS
Daily Feed Intake (g/day)	2207	2275	2203	2227	62.0	NS
FCR	2.45	2.51	2.39	2.45	0.050	NS



Conclusion

- f Performance using 17% or 15% CP diet was similar.
- f Formulating to Trp improved early finishing performance (40- 60kg)
- f But no further improvements were observed when formulating to Val, Arg and Ile
- f Over the entire finishing period (40 to 112kg) there was no effect of diet formulation.



Industry implication

- f Formulating to all 6 amino acids cost £28/tonne extra (June 2015)
- f Formulating to 4 amino acids (Lys, M+C, Thr and Trp) cost £2/tonne extra compared with formulating to only Lys, M+C and Thr (June 2015)
- f But due to improved performance in the early finish periods the practice of formulating to 4 amino acids should be adopted.
- f The practice of formulating to all 6 is not viewed as economically beneficial.



Acknowledgements



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