

Supplementary material 1 *Isoleucine dose-response experiments for which no response to an increasing Ile concentration was observed ($P > 0.25$)*

Reference ¹	BW range	Ile range ²	Change in Ile req. ³	Lys ⁴	Limiting AA ⁵	Blood products ⁶	Response	
	kg	%	%	%	%	g/kg	ADFI g/d ⁷	ADG g/d
Becker <i>et al.</i> , 1963 (3: Exp. 3)	53-75	107-162	14	183	-	173	-	740-780
Henry <i>et al.</i> , 1976	16-51	75-127	26	125	His (62)	-	1555-1630	568-608
Bergström <i>et al.</i> , 1996a (2: high Lys)	11-24	81-118	15	109*	-	20	916-1025	544-599
Bergström <i>et al.</i> , 1996b (1: low Lys)	6-8	71-112	8	103*	Thr (95)	20	220-238	166-183
Bergström <i>et al.</i> , 1996b (2: high Lys)	6-9	72-115	9	132*	-	20	233-252	206-226
Lawrence <i>et al.</i> , 2004	93-113	108-175	13	120*	Trp (76)	-	2427-2486	626-685
Dean <i>et al.</i> , 2005 (3: Exp. 5)	81-115	88-130	23	111	Val (96)	-	2850-3110	682-756
Fu, 2005 (1: Chapter 2, Exp. 1)	97-122	74-112	17	103*	-	-	3254-3574	811-935
Fu, 2005 (2: Chapter 2, Exp. 2 & 3)	88-113	104-128	16	105*	Trp (90)	-	3312-3384	1031-1107
Fu, 2005 (5: Chapter 3)	58-78	79-119	13	124*	-	-	2670-2879	1022-1111
Fu, 2005 (6: Chapter 4, Exp. 1)	14-22	112-169	7	128	-	-	823-878	584-602
Fu, 2005 (7: Chapter 4, Exp. 2)	12-22	81-113	11	109*	Trp (93)	-	868-926	571-584
Trautwein <i>et al.</i> , 2010	13-26	79-97	15	103*	Thr (96)	-	881-929	483-509

¹The first number within parentheses indicates that, within a publication, more than one Ile dose-response experiment was carried out. This number also refers to the identifiers used in Figure 3.

²Range of Ile concentrations used in the experiment, expressed relative to the requirement estimated by the NRC (1998).

³Anticipated change in Ile requirement during the experimental period. See text and Figure 1 for details.

⁴Lys concentration in the diet, expressed relative to the requirement estimated by the NRC (1998) for the average body weight during the experimental period. An asterisk indicates that the authors expressed the Ile requirement relative to Lys.

⁵First amino acid other than Ile or Lys that may have been limiting performance. The value within parentheses indicates the degree to which the amino acid may have been limiting, expressed relative to the requirement estimated by the NRC (1998).

⁶Blood meal or blood cells content of the diet.

⁷Missing information indicates that feed was not offered ad libitum.

Supplementary material 2 Isoleucine dose-response experiments for which a response to an increasing Ile concentration was observed ($P < 0.25$)

Reference ¹	BW range		Ile range ²	Change in Ile req. ³	Lys ⁴	Limiting AA ⁵	Blood products ⁶	Response		Requirement ⁸	
	kg	%						ADFI	ADG	ADFI	ADG
			%	%	%	%	g/kg	g/d ⁷	g/d	%	%
Brinegar <i>et al.</i> , 1950	18-36	38-181	13	165	-	-	237	-	332-630	-	57
Becker <i>et al.</i> , 1957 (1: Exp. 1, low CP)	15-30	31-159	13	101	Met+Cys (71)	-	150	390-1034	27-481	66	70
Becker <i>et al.</i> , 1957 (2: Exp. 1, high CP)	14-30	60-188	14	202	-	-	300	454-953	54-531	92	101
Becker <i>et al.</i> , 1957 (3: Exp. 2)	16-31	58-136	13	103	Met+Cys (72)	-	150	-	422-517	-	66
Becker <i>et al.</i> , 1957 (4: Exp. 3)	13-24	83-156	10	194	-	-	300	-	113-381	-	113
Becker <i>et al.</i> , 1963 (1: Exp. 1)	5-12	32-125	16	134	Met (65)	-	250	260-340	60-210	46	66
Becker <i>et al.</i> , 1963 (2: Exp. 2)	4-9	71-147	14	100	-	-	173	260-380	50-170	90	99
Becker <i>et al.</i> , 1963 (4: Exp. 4)	45-62	30-130	11	131	-	-	150	-	70-600	-	71
Bravo <i>et al.</i> , 1970	20-47	28-134	21	73	Phe+Tyr (81)	-	40	1086-1714	290-720	49	53
Oestemer <i>et al.</i> , 1973	6-19	34-128	24	70	Leu (92)	-	40	252-679	106-428	77	74
Taylor <i>et al.</i> , 1985 (1: high Leu)	25-55	77-110	21	111	Thr (88)	-	25	-	582-647	-	81
Taylor <i>et al.</i> , 1985 (2: low Leu)	25-55	76-108	21	109	Thr (87)	-	25	-	563-643	-	81
Bergström <i>et al.</i> , 1996a (1: low Lys)	11-21	79-115	11	74*	Thr (90)	-	20	735-993	331-449	91	89
Lenis and van Diepen, 1997	19-38	85-112	14	108	-	-	45	1020-1250	500-685	98	100
James <i>et al.</i> , 2000 (1: low Lys)	6-9	85-119	9	90*	Trp (87)	-	32	177-263	122-218	105	103
James <i>et al.</i> , 2000 (2: high Lys)	6-9	86-120	10	113*	Trp (98)	-	40	172-268	132-245	100	101
Parr <i>et al.</i> , 2003	27-42	83-126	12	108	Trp (83)	-	75	996-1471	459-729	106	99
Parr <i>et al.</i> , 2004	87-99	81-108	9	128	-	-	50	1210-1819	483-752	n.d. ⁹	99
Kerr <i>et al.</i> , 2004 (1: Exp. 1)	7-12	78-128	12	109	-	-	75	267-420	149-321	103	102
Kerr <i>et al.</i> , 2004 (2: Exp. 2)	7-11	64-135	11	96*	-	-	75	165-365	52-260	99	102
Kendall, 2004 (1: Chapter 5, Exp. 1)	92-117	92-146	18	132	-	-	50	2620-3620	662-1210	112	114
Kendall, 2004 (2: Chapter 5, Exp. 2)	89-121	70-133	21	110*	-	-	39	2750-3630	643-1110	86	90
Kendall, 2004 (3: Chapter 5, Exp. 3)	90-121	70-159	21	110*	-	-	39	2580-3520	628-1150	82	92
Dean <i>et al.</i> , 2005 (1: Exp. 2)	83-86	71-96	2	105	-	-	50	1840-2420	151-482	n.d. ¹⁰	n.d. ¹⁰
Dean <i>et al.</i> , 2005 (2: Exp. 3)	85-123	99-127	25	123	-	-	50	2650-3200	593-842	n.d. ¹⁰	113
Fu, 2005 (3: Chapter 2, Exp. 2 & 3)	88-113	98-122	16	103*	Trp (83)	-	39	2695-3268	785-1109	107	109
Fu, 2005 (4: Chapter 3)	58-77	76-113	13	120*	Trp (99)	-	72	2124-2773	633-1071	93	94
Fu, 2005 (8: Chapter 4, Exp. 2)	12-21	72-112	11	101*	Trp (87)	-	108	482-856	132-545	102	105

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Supplementary material 2 (Continued from previous page)

Reference ¹	BW range	Ile range ²	Change in Ile req. ³	Lys ⁴	Limiting AA ⁵	Blood products ⁶	Response		Requirement ⁸	
	kg	%	%	%	%	g/kg	ADFI g/d ⁷	ADG g/d	ADFI %	ADG %
Wiltafsky <i>et al.</i> , 2009 (1: Exp. 1)	8-23	64-127	21	96*	Thr (96)	75	298-636	173-450	99	94
Wiltafsky <i>et al.</i> , 2009 (2: Exp. 2)	12-14	64-127	3	97*	Thr (96)	75	-	153-287	-	87
Wiltafsky <i>et al.</i> , 2009 (3: Exp. 3)	8-27	65-131	23	92*	Thr (97)	-	334-644	187-450	95	92
Zhu <i>et al.</i> , 2009	10-22	78-116	15	94*	-	37	740-1030	436-578	n.d. ⁹	87
Htoo <i>et al.</i> , 2010	24-44	71-131	14	109*	-	45	1238-1537	569-749	82	81

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³Anticipated change in Ile requirement during the experimental period. See text and Figure 1 for details.

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⁶Blood meal or blood cells content of the diet.

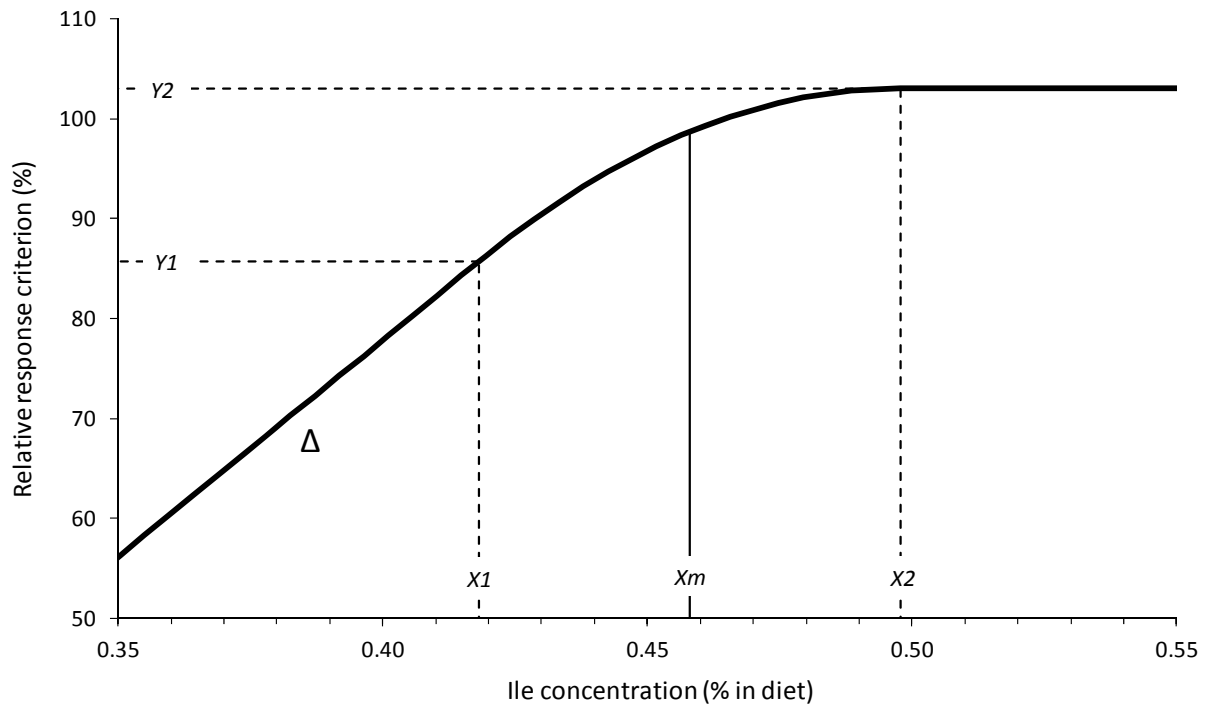
⁷Missing information indicates that feed was not offered ad libitum.

⁸Isoleucine requirement estimate under the assumption that only feed intake or the potential of the animal was second-limiting for performance after Ile. Values are expressed relative to the Ile requirement estimated by the NRC (1998).

⁹n.d. = not determined. Pigs were offered feed ad libitum but there was no indication of at least a linear increase in feed intake due to the increase in Ile supply.

¹⁰n.d. = not determined. Although there was an indication of at least a linear increase in feed intake or daily gain due to the increase in Ile supply, the response curve was convex.

Supplementary material 3 Mathematical description of the bent-stick model



X_m is the mid-point of the transition phase (used in this paper as the Ile requirement). X_1 denotes the beginning of the transition phase and X_2 the end of the transition phase. Y_1 (plateau value) and Y_2 are the responses at respectively X_1 and X_2 . The slope of the linear line segment is given by Δ . The change in the Ile requirement during the experimental period is given by R and depends on the experimental design (see Supplementary material 1 and 2). In the regression analysis Y_2 , X_m and Δ are estimated, while R is a constant.

Because $X_m = (X_1 + X_2)/2$ and $R = 1 - X_1/X_2$:

$$X_1 = 2 X_m (1 - R)/(2 - R)$$

$$X_2 = 2 X_m/(2 - R)$$

The bent-stick model is composed of three segments:

- 1) When $X \geq X_2$ then $Y = Y_2$
- 2) When $X_1 < X < X_2$ then $Y = a + b X + c X^2$, where
 - $b = \Delta/R$
 - $c = \Delta/(2 (X_1 - X_2))$
 - $a = Y_2 - (b X_2 + c X_2^2)$
- 3) When $X \leq X_1$ then $Y = Y_1 + \Delta (X - X_1)$, where
 - $Y_1 = a + b X_1 + c X_1^2$