The lysine requirement of growing entire male pigs (10-15 weeks of age): a dose-response study

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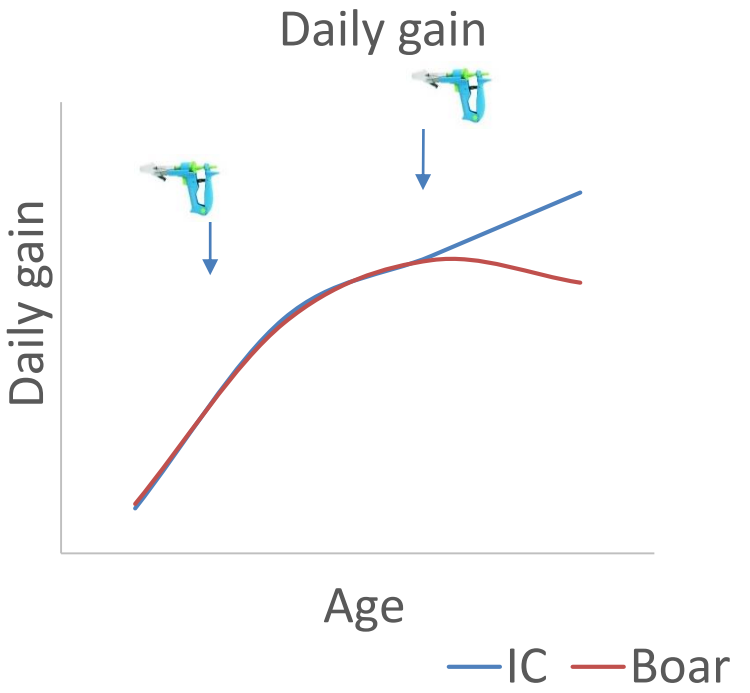
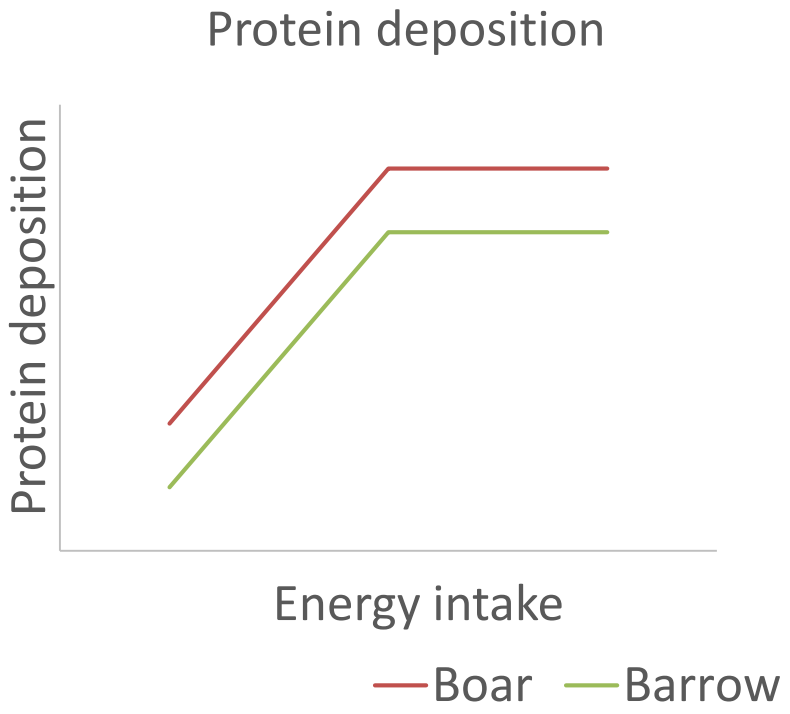
Introduction





- Growing phase: EM≈ IC
- What is the optimal AA level?

→ Study the lysine requirement of EM pigs between 10 and 15 weeks of age

Materials and methods

- 6 SID LYS levels
- Similar CP level
- All AA ≥ ideal AA pattern

→ apply linear, quadratic and broken line models

Materials and methods

SID lysine level	7.5	8.5	9.5	10.5	11.5	12.5
Barley	24.8	24.8	24.9	24.9	25.0	25.0
Corn	24.8	24.8	24.9	24.9	25.0	25.0
Wheat	18.8	18.8	18.8	18.9	18.9	18.9
Soybean meal	14.9	14.9	14.9	14.9	15.0	15.0
Palm kernel cake	3.6	3.6	3.6	3.6	3.6	3.6
Molasses	3.0	3.0	3.0	3.0	3.0	3.0
Limestone	1.7	1.7	1.7	1.7	1.7	1.7
Lard	1.5	1.5	1.5	1.5	1.6	1.6
Rapeseed meal	1.3	1.3	1.3	1.3	1.3	1.3
Premix	1.0	1.0	1.0	1.0	1.0	1.0
Salt	0.1	0.1	0.1	0.1	0.1	0.1
Monocalcium phosphate	0.2	0.2	0.2	0.2	0.2	0.2
BICAR-Z	0.6	0.6	0.6	0.6	0.6	0.6
L-Lysine HCL	0.24	0.37	0.50	0.62	0.75	0.88
Dl-Methionine	0.08	0.14	0.20	0.26	0.33	0.39
L-Threonine	0.10	0.17	0.24	0.31	0.38	0.46
L-Tryptophan	0.03	0.06	0.08	0.11	0.13	0.15
L-Isoleucine		0.04	0.08	0.12	0.16	0.20
L-Leucine		0.07	0.14	0.22	0.29	0.36
L-Valine		0.06	0.13	0.19	0.25	0.32
L-histidine		0.02	0.05	0.07	0.10	0.12
L-phenylalanine		0.02	0.03	0.05	0.06	0.08
L-tyrosine		0.02	0.03	0.05	0.06	0.08
L-glutamic acid	3.45	2.76	2.07	1.38	0.69	0.00
Phytase	0.01	0.01	0.01	0.01	0.01	0.01

Materials and methods

SID LYS	7.5	8.5	9.5	10.5	11.5	12.5
SID M+C :LYS	63	62	62	62	62	62
SID MET: LYS	35	39	41	43	44	46
SID THR :LYS	71	71	71	70	70	70
SID TRP: LYS	24	24	24	24	24	24
SID ILE: LYS	65	61	59	57	56	54
SID LEU: LYS	127	120	115	111	108	105
SID VAL : LYS	75	73	73	71	70	70
SID HIS: LYS	40	39	37	36	35	34
SID ARG: LYS	101	91	81	73	67	62
SID PHE: LYS	79	72	65	61	57	54
SID PHE+TYR : LYS	135	122	114	106	99	94
SID GLU: LYS	801	627	489	378	287	210
Crude protein	170	170	170	170	170	170
NEv, MJ/kg	9.9	9.9	9.8	9.7	9.7	9.6

Materials and methods

Parameter	Unit	Method (1)	Measure 1	Measure 2	Average - Uncertainty			Expected Value
Dry Matter	g%g	103°C - 4h	89.06		89.06			
Crude protein - TN x 6.25	g%g	NF EN ISO 16634-1*	17.2	17.4	17.3	+/-	0.5	17
Total Lysine	g%g	NF EN ISO 13903*	1.43	1.43	1.43	+/-	0.04	1.35
Total Threonine	g%g	NF EN ISO 13903*	0.95	0.94	0.95	+/-	0.03	0.96
Total Methionine	g%g	NF EN ISO 13903*	0.584		0.584	+/-	0.035	0.60
Total Cystine + Cystein	g%g	NF EN ISO 13903*	0.240		0.240	+/-	0.014	
Total Methionine + Cystine	g%g	NF EN ISO 13903*			0.824			0.845
Total Tryptophan	g%g	MOD.0094 version G*	0.316	0.319	0.318	+/-	0.010	0.33
Total Valine	g%g	NF EN ISO 13903*	0.98	0.98	0.98	+/-	0.03	0.98
Total Isoleucine	g%g	NF EN ISO 13903*	0.77	0.78	0.78	+/-	0.02	0.75
Total Leucine	g%g	NF EN ISO 13903*	1.48	1.48	1.48	+/-	0.04	1.46
Total Arginine	g%g	NF EN ISO 13903*	0.89	0.88	0.89	+/-	0.03	0.86
Total Phenylalanine	g%g	NF EN ISO 13903*	0.76	0.76	0.76	+/-	0.02	0.76
Total Tyrosine	g%g	NF EN ISO 13903*	0.56	0.56	0.56	+/-	0.02	
Total Histidine	g%g	NF EN ISO 13903*	0.47	0.47	0.47	+/-	0.01	0.47
Total Serine	g%g	NF EN ISO 13903*	0.70	0.70	0.70	+/-	0.02	
Total Alanine	g%g	NF EN ISO 13903*	0.67	0.68	0.68	+/-	0.02	
Total Aspartic Acid	g%g	NF EN ISO 13903*	1.26	1.27	1.27	+/-	0.04	
Total Glutamic Acid	g%g	NF EN ISO 13903*	3.01	3.00	3.01	+/-	0.09	
Total Glycine	g%g	NF EN ISO 13903*	0.61	0.61	0.61	+/-	0.02	
Total Proline	g%g	NF EN ISO 13903*	0.97	0.98	0.98	+/-	0.03	
Free base Lysine	g%g	NF EN ISO 13903*	0.684		0.684			0.683
Free Threonine	g%g	NF EN ISO 13903*	0.456		0.456			0.455

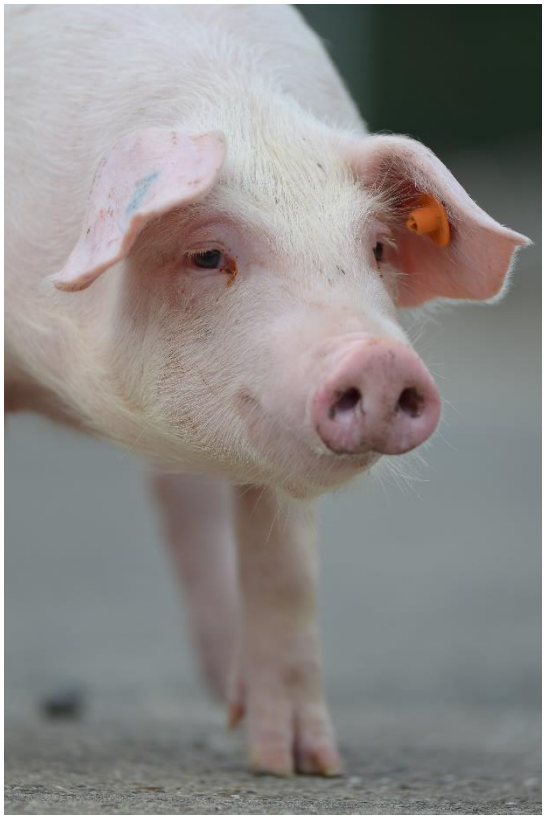
- All AA in line with formulation
- LYS higher than anticipated?

→ Formulated levels unadapted

→ Slight underestimation requirement?

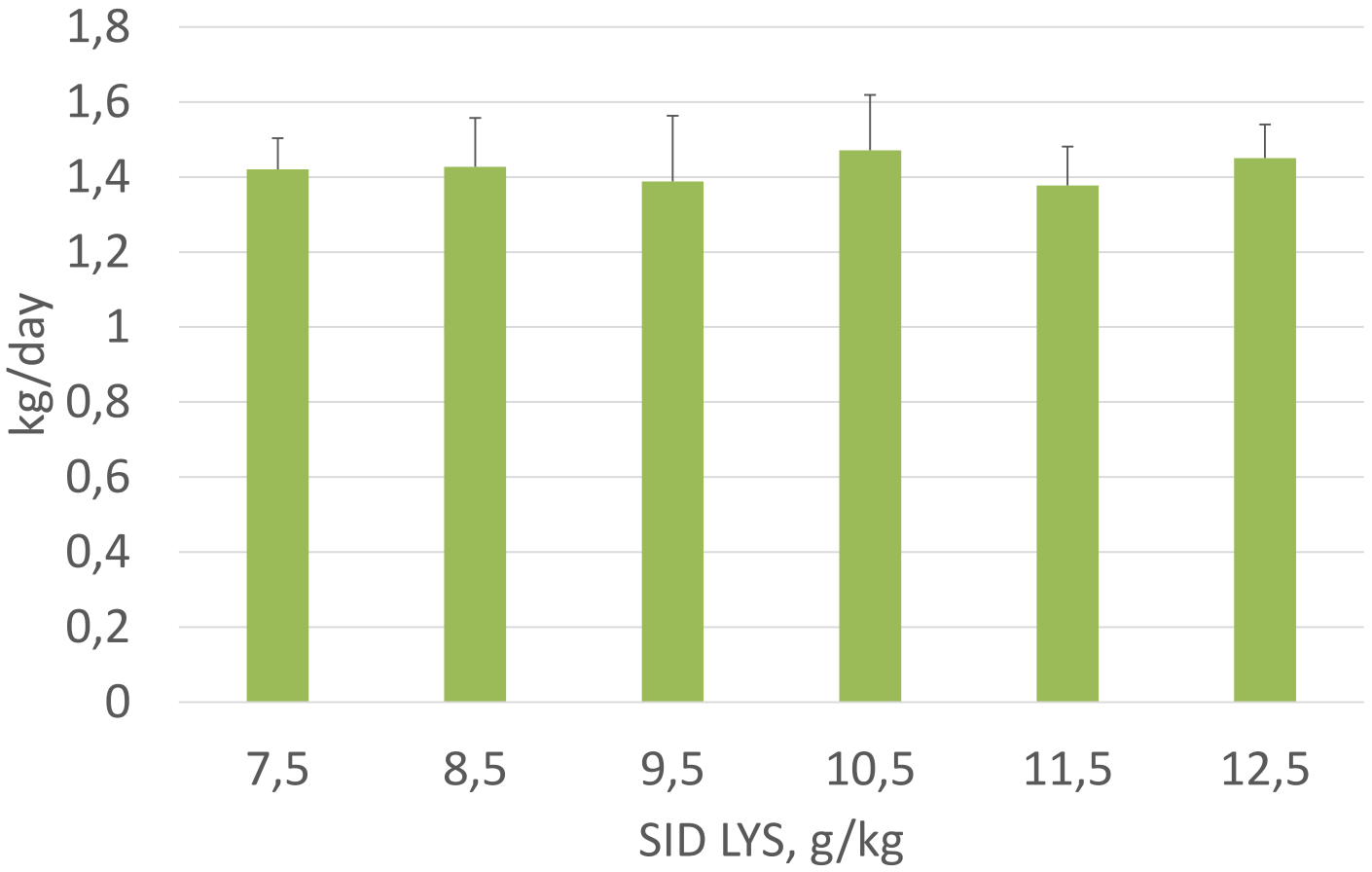
Materials and methods

- 6 treatment groups
- 9 pens per treatment
  - 3 male pigs per pen
- Measurements
  - Daily gain
  - Daily feed intake
  - Feed conversion ratio



Results

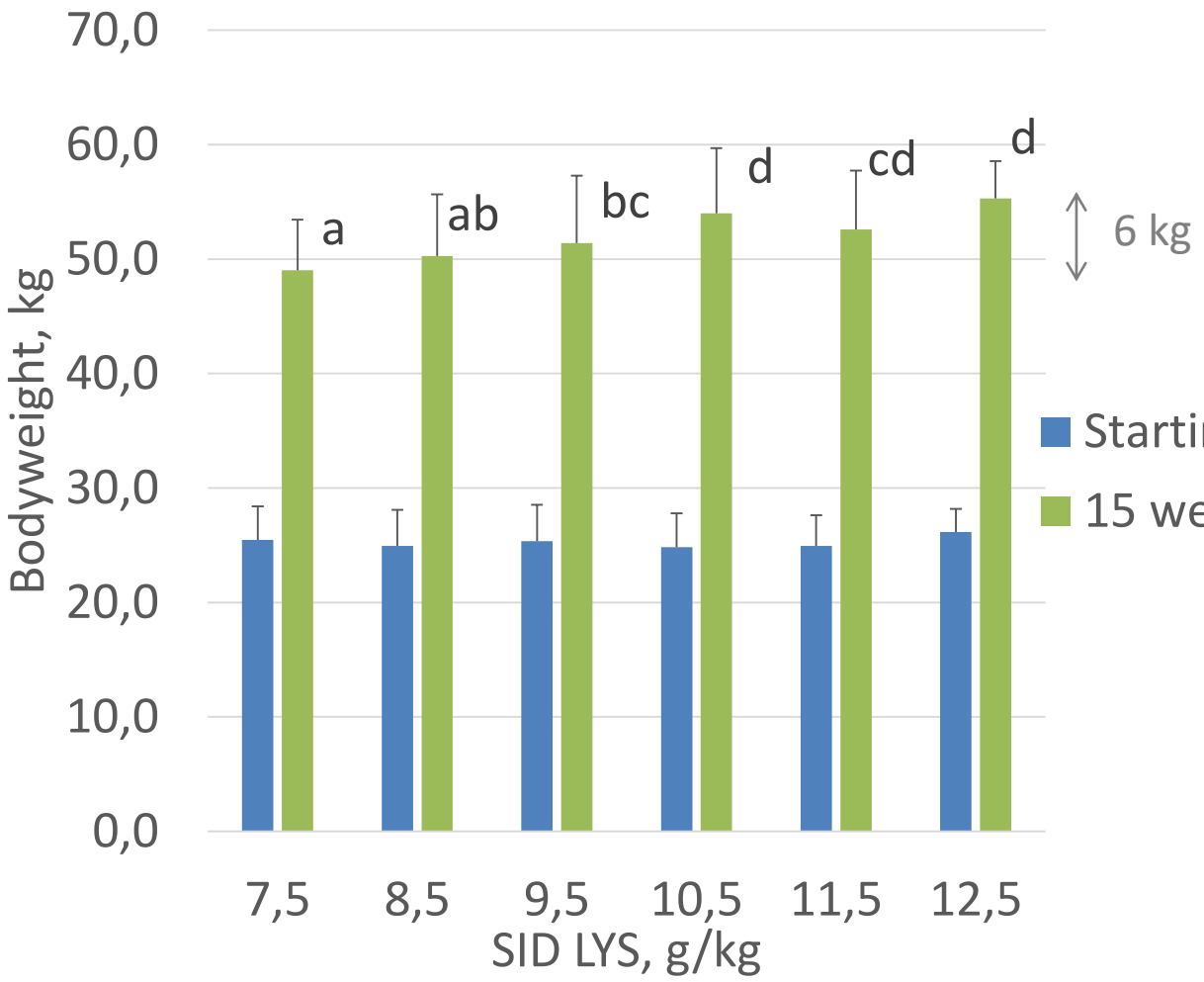
Daily feed intake



- P=0.117

Results

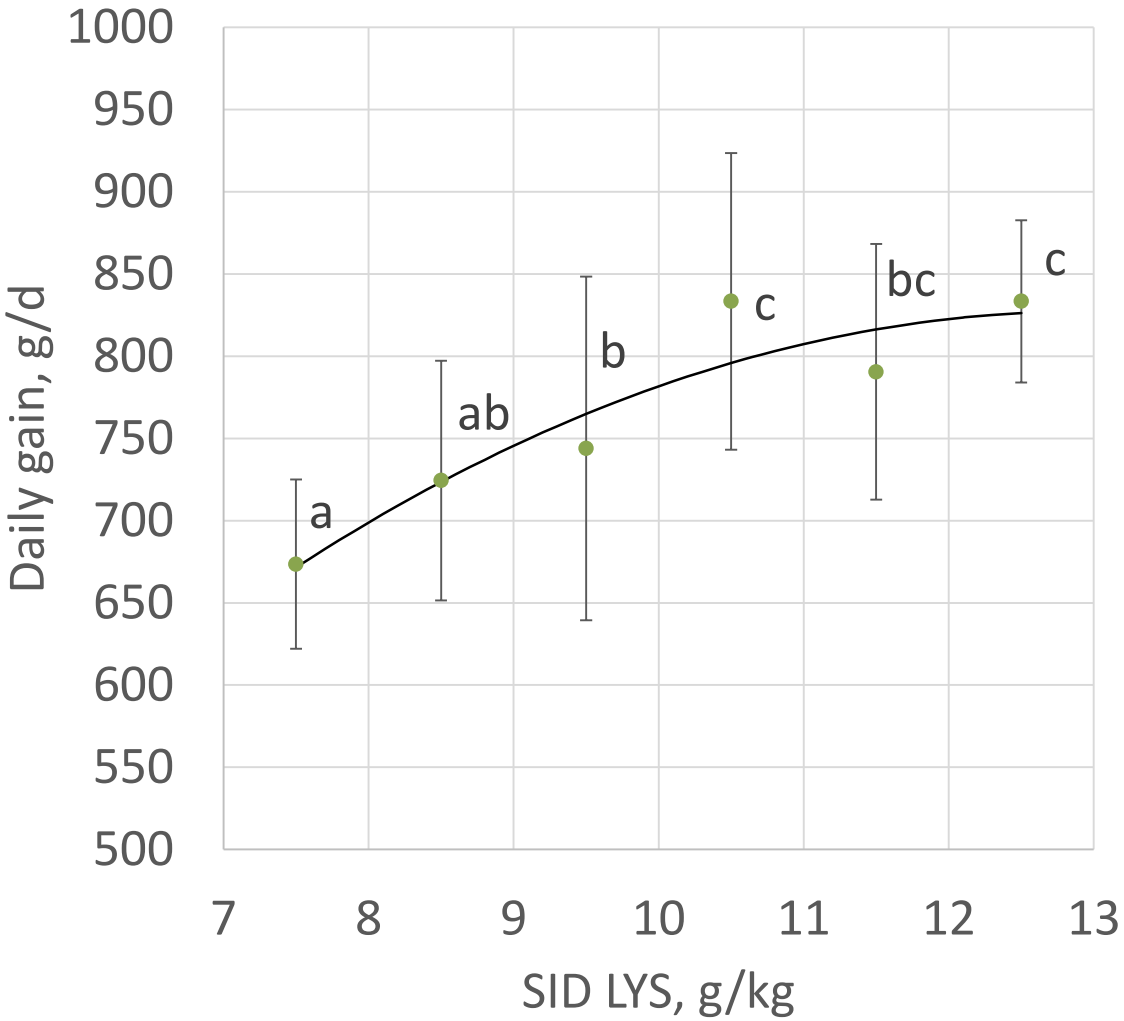
Bodyweight



- P< 0.001

Results

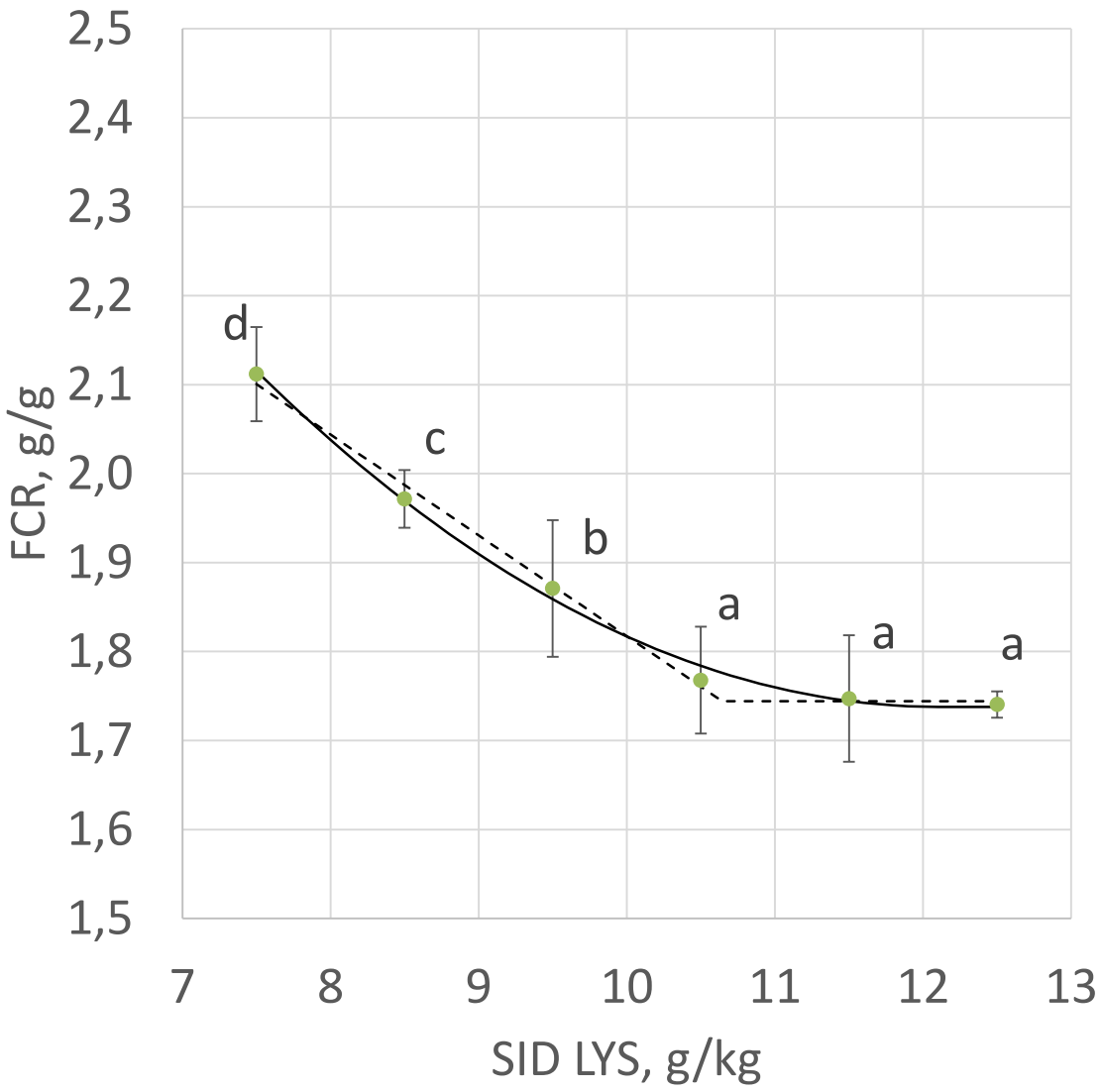
Daily gain



- Linear plateau model:
  => no solution
- Quadratic (plateau) model:
  => optimum > 12.5 g/kg
- Post hoc tests:
  => improvement up to 10.5 g/kg

Results

Feed conversion ratio



- Linear plateau model:
  => optimum at 10.65 g/kg
- Quadratic plateau model:
  => optimum at 12.11 g/kg
- Post hoc tests:
  => improvement up to 10.5 g/kg

Conclusion

- Clear response in daily gain and FCR
- SID LYS requirement for optimal FCR:

  10.65 g/kg for LP and 12.11 g/kg for QP

  =1.09 or 1.25g SID LYS/MJ NE
- Possibly underestimated

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