

1 Supplementary Table 1 Composition and nutrient level for experiment 1.

Composition%	14%CP	17%CP	20%CP
Soybean meal	6.8	14.4	22.3
Corn	40	32.5	27.5
Expanded corn	32	32	28
Bean oil	0.98	0.72	1.7
Powder	0.56	0.55	0.50
NaCl	0.4	0.4	0.4
Expanded soybean	7	7	7
Fish meal	2	3	4
Whey powder	3	3	3
Glucose	1	11	1
Sucrose	2	2	2
Citric acid	0.8	0.8	0.8
ZnO	0.3	0.3	0.3
Choline chloride	0.1	0.1	0.1
Lysine	0.91	0.6	0.3
Methionine	0.31	0.21	0.12
Threonine	0.35	0.21	0.07
Tryptophan	0.1	0.05	0
Vitamine	0.05	0.05	0.05
Composite ore	0.15	0.15	0.15
Fungicide	0.06	0.06	0.06
Antioxidant	0.03	0.03	0.03
Nutritional Level			
CP	14.16	17.01	19.85
Lysine	1.32	1.31	1.32
Methionine+Cysteine	0.79	0.78	0.78
Threonine	0.83	0.83	0.83
Tryptophan	0.22	0.22	0.21

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3 Supplementary Table 2 Composition and nutrient level for experiment 2.

Composition%	17%CP	14%CP	BCAAs
Soybean meal	14.50	6.84	6.84
Corn	63.00	70.85	70.91
Bean oil	0.72	0.98	0.98
Powder	0.55	0.56	0.56
NaCl	0.40	0.40	0.40

Expanded soybean	8.00	8.00	8.00
Fish meal	3.30	2.20	1.50
Whey powder	3.20	3.00	3.00
Glucose	1.00	1.00	1.00
Sucrose	2.00	2.00	2.00
ZnO	0.30	0.30	0.30
Choline chloride	0.10	0.10	0.10
Lysine	0.60	0.91	0.91
Methionine	0.20	0.31	0.31
Threonine	0.21	0.35	0.35
Tryptophan	0.05	0.10	0.10
CaHPO ₃	0.87	1.10	1.10
Val	0	0	0.20
Leu	0	0	0.25
Ile	0	0	0.18
Premix	1.00	1.00	1.00
Nutritional Level			
CP	17.07	14.12	14.14
Lysine	1.34	1.34	1.31
Methionine+Cysteine	0.74	0.74	0.72
Threonine	0.84	0.84	0.82
Tryptophan	0.22	0.22	0.22
Valine	0.79	0.62	0.80
Leu	1.43	1.21	1.43
Ile	0.69	0.53	0.69

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5 Supplementary Table 3 Composition and nutrient level for experiment 3.

Composition%	17%CP	14%CP	Leu	Ile	Val
Soybean meal	14.50	6.84	6.84	6.84	6.84
Corn	63.00	70.85	70.80	70.80	70.80
Bean oil	0.72	0.98	0.98	0.98	0.98
Powder	0.55	0.56	0.56	0.56	0.56
NaCl	0.40	0.40	0.40	0.40	0.40
Expanded soybean	8.00	8.00	8.00	8.00	8.00
Fish meal	3.30	2.20	2.00	2.00	2.00
Whey powder	3.20	3.00	3.00	3.00	3.00
Glucose	1.00	1.00	1.00	1.00	1.00
Sucrose	2.00	2.00	2.00	2.00	2.00
ZnO	0.30	0.30	0.30	0.30	0.30
Choline chloride	0.10	0.10	0.10	0.10	0.10

Lysine	0.60	0.91	0.91	0.91	0.91
Methionine	0.20	0.31	0.31	0.31	0.31
Threonine	0.21	0.35	0.35	0.35	0.35
Tryptophan	0.05	0.10	0.10	0.10	0.10
CaHPO3	0.87	1.10	1.10	1.10	1.10
Val	0	0	0	0	0.20
Leu	0	0	0.25	0	0
Ile	0	0	0	0.25	0
Premix	1.00	1.00	1.00	1.00	1.00
Nutritional Level					
CP	17.07	14.12	14.17	14.17	14.17
Lysine	1.34	1.34	1.33	1.33	1.33
Methionine+Cysteine	0.74	0.74	0.73	0.73	0.73
Threonine	0.84	0.84	0.83	0.83	0.83
Tryptophan	0.22	0.22	0.22	0.22	0.22
Valine	0.79	0.62	0.62	0.62	0.86
Leu	1.43	1.21	1.45	1.20	1.20
Ile	0.69	0.53	0.52	0.77	0.52

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