



Effects of Glycinin or β -Conglycinin on the Digestibility of Dry Matter and Crude Protein in Digestive Tract of Pigs at Different Growth Phases

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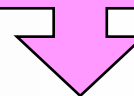
Introduction

**Glycinin
 β -Conglycinin**



**negative effects
on growth performance
for piglets**

**causing hypersensitivity
in young animals**



**negative effects of soybean allergens
the techniques for inactivation processing
the mechanism of hypersensitivity**



other growth phases



Experimental design

Items		Piglets			Growers			Finishers		
Groups		A	B	C	A	B	C	A	B	C
n		5	5	5	5	5	5	5	5	5
Age	1-28d	Sucking								
	29-38d	I A	I B	I C	Diets without leguminous products					
	39-98d	—			Diets without leguminous products					
	99-105d	—			II A	II B	II C	Diets without leguminous products		
	106-168d	—			—			Diets without leguminous products		
	169-175d	—			—			IIIA	IIIB	IIIC

Ingredient composition and nutrient levels of the diets (as-fed basis)

Body weight of pigs (kg)	3-5	5-10	5-10			10-20	20-60	20-60			60-120	60-120		
			experimental periods					experimental periods				experimental periods		
			I A	I B	I C			II A	II B	II C		IIIA	IIIB	IIIC
Ingredients(%) Maize	13	22	22.2	21	21	70.65	74.85	74.25	73	73	77.5	77	75	75
Fish meal	13	11.2	10.9	8.1	8.1	13	8.8	8.9	6	6	6.5	6.5	3.75	3.75
Corn gluten meal	—	—	—	—	—	9	9	9	9	9	6.5	6.5	3.3	3.3
Wheat bran	—	—	—	—	—	—	5	5	4.87	4.87	7.2	7.2	7.8	7.8
Whey powder	13.55	18	17.8	18	18	2	—	—	—	—	—	—	—	—
Milk powder	58	48	47.8	47.5	47.5	4.4	—	—	—	—	—	—	—	—
Glycinin	—	—	—	4	—	—	—	—	4	—	—	—	4	—
β -conglycinin	—	—	—	—	4	—	—	—	—	4	—	—	—	4
Corn oil	—	—	—	—	—	—	1	1	1	1	1	1	1.1	1.1
Salt	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Vitamin premix ^a	0.1	0.1	0.1	0.1	0.1	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Trace mineral premix ^b	0.2	0.2	0.2	0.2	0.2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Limestone	0.1	0.3	0.3	0.4	0.4	0.4	0.7	0.7	0.85	0.85	0.7	0.7	0.85	0.85
CaHPO ₄	1.17	—	—	—	—	—	—	—	0.1	0.1	—	—	1.1	1.1
L-Lysine	0.68	—	—	—	—	0.1	0.2	0.2	0.23	0.23	0.15	0.15	0.15	0.15
Cr ₂ O ₃	—	—	0.5	0.5	0.5	—	—	0.5	0.5	0.5	—	0.5	0.5	0.5
Nutrient contents ^c														
Crude protein (%)	26.37	23.92	23.68	23.67	23.67	20.82	17.99	17.99	17.96	17.96	15.73	15.68	15.66	15.66
DE(MJ/kg)	17.23	16.91	16.83	16.81	16.81	14.38	14.09	14.02	14.00	14.00	14.01	13.93	13.90	13.90
Calcium (%)	0.92	0.86	0.84	0.78	0.78	0.7	0.62	0.62	0.59	0.59	0.53	0.53	0.51	0.51
Phosphorus (%)	0.75	0.83	0.82	0.76	0.76	0.66	0.55	0.55	0.50	0.50	0.50	0.50	0.45	0.45
Lysine	1.53	2.00	1.98	1.94	1.94	1.17	0.96	0.97	0.95	0.95	0.79	0.79	0.76	0.76



Sample collection, analysis, and alculatation



All the pigs were slaughtered 2 hour after the morning meal. The digesta in stomach, duodenum, middle jejunum, ileum, and caecum were immediately collected and stored at -80°C until analysis.

The dry matter and crude protein analyses were performed in diets and digesta samples according to AOAC (2002) methods, respectively. According to the indicator technique, based on the concentration of dry matter or crude protein and Cr, the apparent digestive rate of dry matter or crude protein was calculated.



Statistical analysis

Performance data were analyzed using the general linear model procedure of Statistical Package for Social Sciences version 11.5 (SPSS Inc., Chicago, USA). The results were expressed as mean values \pm Standard Error of the Mean (SEM). Differences among means were tested using Duncan's multiple range tests. Statements of statistical significance were based upon $P \leq 0.05$.

If the digestibility of pigs in certain growth phase were significantly affected by glycinin or β -conglycinin, the relative apparent digestibility of dry matter and crude protein (the ratio of experimental group to control group) were calculated to compare the reduced degree of digestibility between the growth phases.



Results and Discussion

Growth performance

Items	Diets				
	Control group	Glycinin group	β -conglycinin group	SEM	<i>P</i> value
Average daily gain, g/day					
Piglets	248.57 ^a	214.29 ^b	216.14 ^b	5.95	0.02
Growers	791.43 ^a	728.57 ^b	714.29 ^b	20.07	0.03
Finishers	815.71	788.57	797.14	25.34	0.75
Average daily feed intake, g/day					
Piglets	379.00 ^a	345.00 ^b	344.00 ^b	6.05	0.02
Growers	1873.60 ^a	1730.80 ^b	1726.00 ^b	9.52	<0.001
Finishers	2978.00	2952.00	2965.00	9.63	0.20
F/G					
Piglets	1.53 ^b	1.61 ^a	1.59 ^a	0.02	0.03
Growers	2.37	2.39	2.42	0.06	0.87
Finishers	3.67	3.76	3.73	0.12	0.87



The apparent digestibility of dry matter or crude protein of pigs at different growth phases evidently increased as the digesta descended down the digestive tract, especially for stomach and the upper segments of small intestine. The digestibility tended to decrease from ileum to caecum, but there was no difference between the two segments.

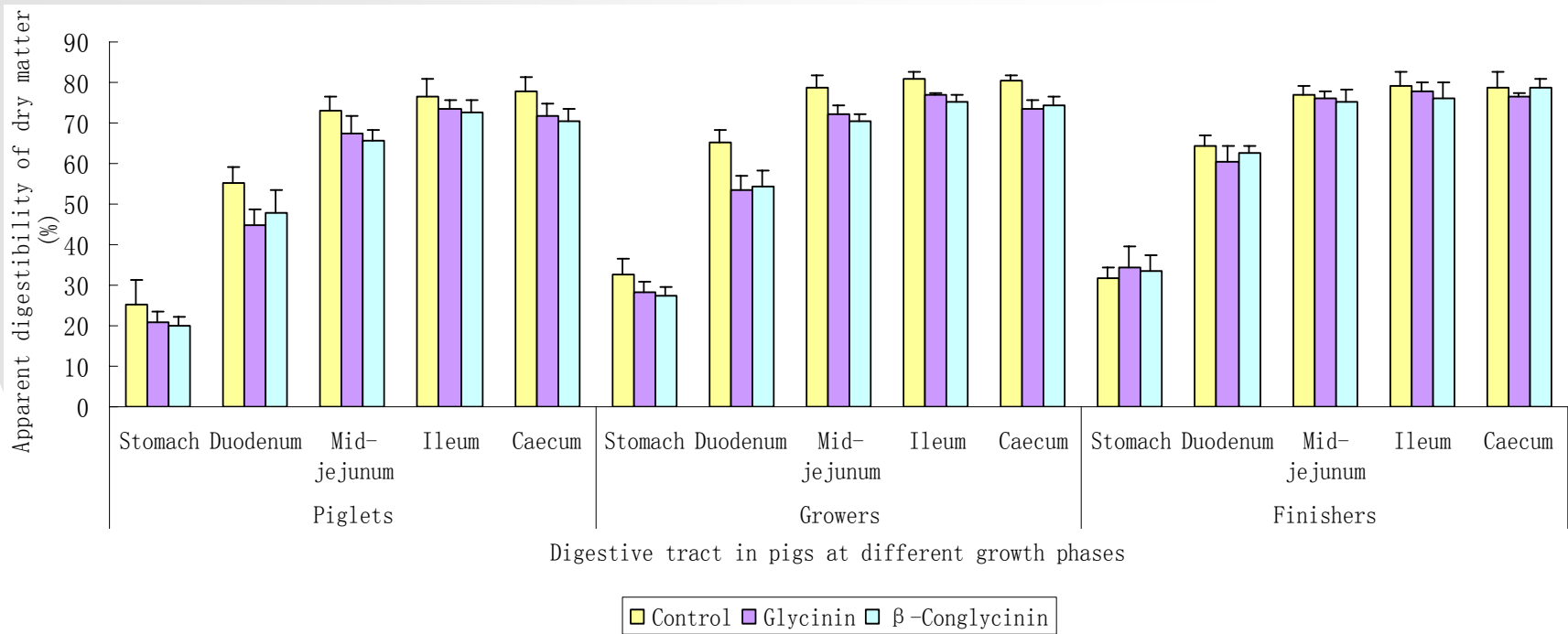


Figure 1 Effects of Glycinin and β -Conglycinin on apparent digestibility of dry matter in the digestive tract of pigs of different growth periods



Glycinin or β -Conglycinin reduces apparent digestibility of dry matter and crude protein for piglets and growing pigs .

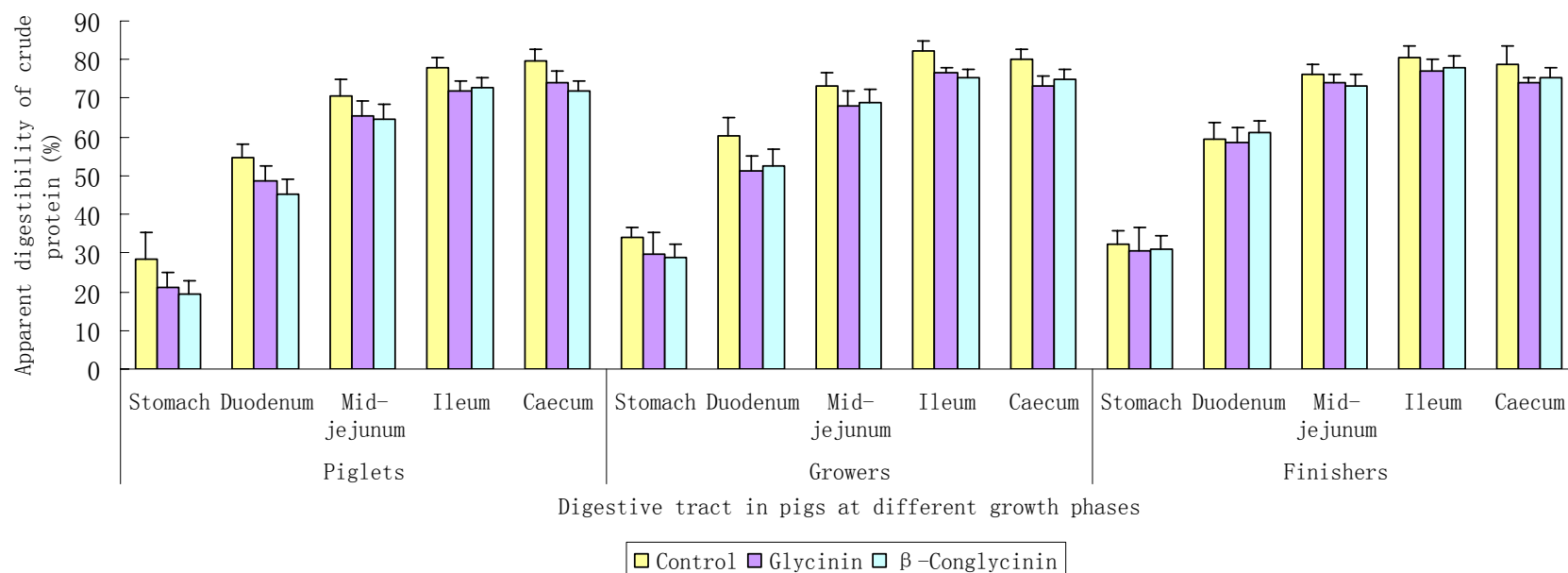


Figure 2 Effects of Glycinin and β -Conglycinin on apparent digestibility of crude protein in the digestive tract of pigs of different growth periods



Only in stomach, the decreased extent of digestibility of crude protein for piglets were larger than growers , but there were no difference at other sites of digestive tract between piglets and growers. And there were no difference between piglets and growers for the digestibility of dry matter .

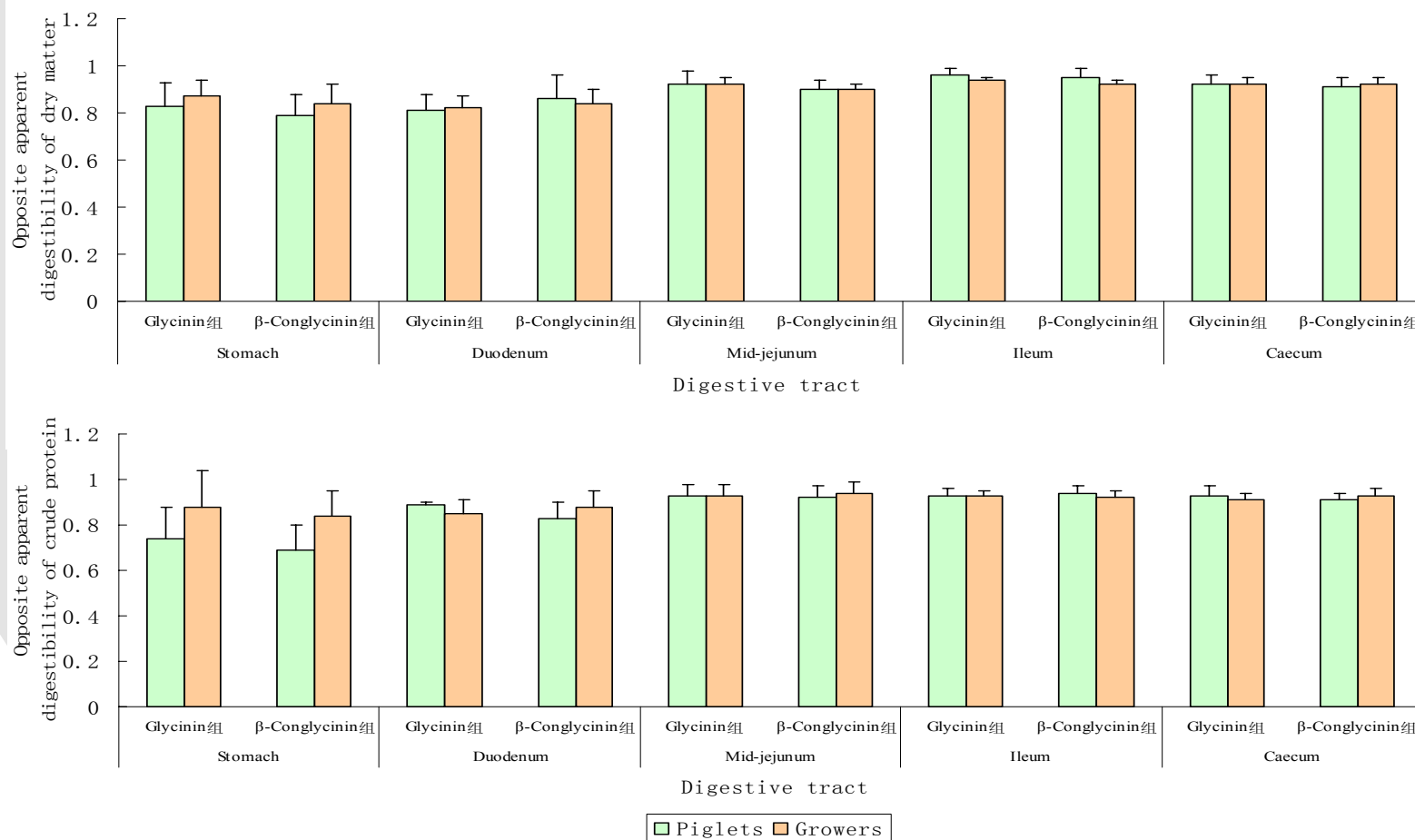


Figure 3 Effects of Glycinin and β -Conglycinin on apparent digestibility of dry matter in the digestive tract of piglets and growers



Conclusion



Glycinin or β -Conglycinin reduces growth performance and apparent digestibility of dry matter and crude protein for piglets and growing pigs .



Only in stomach, the declined extent of digestibility of crude protein for piglets was larger than growers.



Thank you!