Effects of Linseed Oil on Growth Performance, Carcass Traits, and Meat Quality in Ningxiang Pigs: Postprint

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Abstract

This experiment was conducted to investigate the effects of dietary flaxseed oil (LO) supplementation on growth performance, carcass traits, and meat quality of Ningxiang pigs. Thirty Ningxiang castrated female pigs with similar age and body weight of approximately 43 kg were randomly allocated into 2 groups with 5 replicates per group and 3 pigs per replicate. The control group was fed a basal diet, while the experimental group was fed a test diet supplemented with 2% LO in the basal diet for an 8-week period. The results showed that, compared with the control group, dietary supplementation with 2% LO significantly decreased the average daily feed intake of Ningxiang pigs (P<0.05) and tended to decrease the feed conversion ratio (0.05 P 0.10); skin thickness increased by 13.4% (0.05 P 0.10); muscle shear force decreased by 21.89% (0.05 P 0.10), and muscle ΔpH increased by 21.37% (P<0.05); the contents of threonine (Thr), serine (Ser), glycine (Gly), and arginine (Arg) in the liver were significantly increased (P<0.05), while the contents of glutamic acid (Glu), alanine (Ala), and lysine (Lys) tended to increase (0.05 P 0.10). These results indicate that dietary supplementation with 2% LO can improve feed conversion ratio, increase muscle tenderness and the content of some essential amino acids (Thr, Ser) in the liver of Ningxiang pigs, but may have certain negative effects on skin thickness and muscle pH.

Full Text

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Abstract

This experiment was conducted to investigate the effects of linseed oil (LO) on growth performance, carcass traits and meat quality of Ningxiang pigs. Thirty Ningxiang barrows with similar age and body weight (about 43 kg) were randomly allocated into 2 groups (each group had 5 replicates with 3 pigs per replicate). Pigs were fed either a basal diet (control group) or the basal diet supplemented with 2% LO (experimental group). The experiment lasted for 8 weeks. The results showed as follows: compared with the control group, diet supplemented with 2% LO significantly decreased the average daily feed intake (P<0.05), and tended to decrease the feed/gain (F/G) (0.05 P 0.10); increased the skin thickness by 13.40% (0.05 P 0.10); reduced the muscular shear force by 21.89% (0.05 P 0.10), and increased the muscular pH by 21.37% (P<0.05); significantly increased the contents of threonine (Thr), serine (Ser), glycine (Gly) and arginine (Arg) in liver (P<0.05), and tended to increase the contents of glutamic acid (Glu) and alanine (Ala) in liver (0.05 P 0.10). The results above indicate that diet supplemented with 2% LO can improve feed conversion rate, and increase the tenderness and the contents of part essential amino acids (such as Thr and Ser) in the liver of Ningxiang pigs, but has negative impacts on the skin thickness and muscular pH to some extent.

Keywords: linseed oil; growth performance; carcass traits; meat quality; amino acids; Ningxiang

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2.1 Effects of LO on Growth Performance

Table 1 Effects of LO on growth performance of Ningxiang pigs

Items	Control group	Experimental group	P-value
IW/kg	43.47±0.50	43.37±0.48	P>0.05
BW/kg	71.71±1.16	71.22±0.88	P>0.05
ADG/(g/d)	504.36±17.87	497.41±10.71	P>0.05
ADFI/(g/d)	1,838.59±29.61	1,706.44±43.60	P<0.05

Items	Control group	Experimental group	P-value
F/G	3.66±0.07	3.43±0.08	0.05 P 0.10

Note: In the same row, values with different small letter superscripts mean significant difference (P<0.05). The same as below.

2.2 Effects of LO on Carcass Traits

Table 2 Effects of LO on carcass traits of Ningxiang pigs

Items	Control group	Experimental group	P-value
Slaughter yield/%	72.92±0.31	73.03±0.62	P>0.05
Carcass straight length/cm	80.67±1.61	81.67±1.08	P>0.05
Carcass oblique length/cm	71.83±1.17	71.92±0.90	P>0.05
Average backfat thickness/mm	44.50±1.19	44.37±1.89	P>0.05
Skin thickness/mm	4.03±0.22	4.57±0.19	0.05 P 0.10

2.3 Effects of LO on Meat Quality

Table 3 Effects of LO on meat quality of Ningxiang pigs

Items	Control group	Experimental group	P-value
L* value	42.71±0.45	44.23±0.80	P>0.05
a* value	6.98±0.25	6.67±0.09	P>0.05
b* value	3.11±0.12	2.90±0.20	P>0.05
Marbling score	3.58±0.20	3.42±0.15	P>0.05
pH min	6.67±0.09	6.87±0.07	P<0.05
pH h	5.74±0.08	5.71±0.06	P>0.05
Drip loss/%	13.90±0.96	16.87±0.26	P<0.05
Shear force/kg	1.27±0.12	1.57±0.11	0.05 P 0.10
Cook meat rate/%	66.30±0.87	65.66±1.09	P>0.05

Note: pH=100×(pH min-pH h)/pH min

2.4 Effects of LO on Amino Acid Contents

Table 4 Effects of LO on hydrolytic amino acid contents in muscle of Ningxiang pigs

Items	Control group	Experimental group	P-value
Asp	7.31±0.10	7.38±0.10	P>0.05

Items	Control group	Experimental group	P-value
Thr	4.46±0.07	4.46±0.02	P>0.05
Ser	3.81±0.05	3.86±0.02	P>0.05
Glu	13.41±0.15	13.51±0.06	P>0.05
Gly	3.52±0.05	3.57±0.07	P>0.05
Ala	5.07±0.07	5.06±0.03	P>0.05
Cys	0.90±0.03	0.89±0.01	P>0.05
Val	4.50±0.05	4.47±0.02	P>0.05
Met	2.23±0.04	2.15±0.10	P<0.05
Ile	4.14±0.04	4.12±0.02	P>0.05
Leu	7.30±0.08	7.33±0.03	P>0.05
Tyr	2.73±0.04	2.73±0.03	P>0.05
Phe	3.64±0.04	3.65±0.02	P>0.05
Lys	7.90±0.09	7.93±0.03	P>0.05
His	4.12±0.08	4.11±0.03	P>0.05
Arg	5.52±0.06	5.55±0.03	P>0.05
Pro	3.60±0.07	3.73±0.04	P<0.05

Table 5 Effects of LO on hydrolytic amino acid contents in liver of Ningxiang pigs

Items	Control group	Experimental group	P-value
Asp	5.98±0.16	6.00±0.09	P>0.05
Thr	3.60±0.07	3.73±0.04	P<0.05
Ser	3.57±0.05	3.80±0.04	P<0.05
Glu	9.37±0.14	9.72±0.08	0.05 P 0.10
Gly	3.95±0.06	4.28±0.01	P<0.05
Ala	4.48±0.08	4.68±0.06	0.05 P 0.10
Cys	0.99±0.03	1.01±0.03	P>0.05
Val	4.28±0.10	4.44±0.05	P<0.05
Met	1.48±0.04	1.52±0.05	P<0.05
Ile	3.09±0.05	3.18±0.07	P<0.05
Leu	6.93±0.14	7.15±0.08	P<0.05
Tyr	2.67±0.07	2.79±0.04	P<0.05
Phe	3.93±0.08	4.06±0.06	P<0.05
Lys	5.34±0.09	5.53±0.05	P<0.05
His	2.10±0.06	2.17±0.06	P<0.05
Arg	3.80±0.04	4.39±0.07	P<0.05
Pro	4.58±0.04	5.52±0.06	P<0.05

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Note: Figure translations are in progress. See original paper for figures.