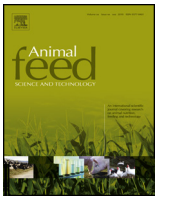
A ... 220 (2016) 180–186

C ... a a a a S ... D ...

l ... a ... l ... a : ... l/ ... a/a ...



...-Lactobacillus acidophilus...

... C... [1], ... (...) [*,1], ... C..., ... C..., C... (...) [*]

Animal Science College, Zhejiang University, The Key Laboratory of Molecular Animal Nutrition, Ministry of Education, Hangzhou, 310058, China

Institute of Animal Science, Guangdong Academy of Agricultural Sciences, Key Laboratory of Animal Nutrition and Feed Science in South China, Ministry of Agriculture, Guangzhou, 510640, China

ARTICLE INFO

Article history:
... 13 ... 2016
... C... 31 ... 2016
A... 9 A... 2016

Keywords:
...-*Lactobacillus acidophilus*
...

ABSTRACT

... *Lactobacillus acidophilus* ... (... *L. acidophilus*) ... ... *L. acidophilus* ... *L. acidophilus* ... *L. acidophilus* ... fl... A... 180 ... 21 ± 1 ... *L. acidophilus* ... *vivo* ... fi... : (1) ...; (2) *L. acidophilus*; (3) ...; (4) *L. acidophilus*; (5) ... *L. acidophilus* (... + *L. acidophilus*). ... *L. acidophilu* ... *in vitro* ... *L. acidophilus* ... ($P < 0.05$) ... *L. acidophilus* ... 80 ... fl... 240 ... *L. acidophilus*. ... *in vivo* ... *L. acidophilus* ... ($P < 0.05$) ... *Lactobacillus*, ... *L. acidophilus* ... ($P < 0.05$) ... fl... 4 ... *L. acidophilus* ... + *L. acidophilus* ... ($P > 0.05$) ... *L. acidophilus* ... *L. acidophilus* ... + *L. acidophilus*.

... — 2016 ... B... A...

1.

... fi... (... A... / ... ... C... ... (..., 2007). A... ... *L. acidophilus* ...

Abbreviations: ... 4, fl... ... 4 ...;

* ...
E-mail addresses: ...@163... (...), ...@... (C...).
[1] ...

.../10.1016/... .2016.08.012
0377-8401/— 2016 ... B... A...

fl . . . . . 0. . . . . *L. acidophilus* . . . . .

1

	572
	258
	50
	24
	45
	20.5
	11
	5
	3
	1
	0.5
	10
	14.40
	223.57
	14.3
	3.6
	8.3
	6.6

A, 5500 ; 3, 500 ; , 40 ; , 5.0 ; B12, 0.03 ; , 3.0 ; 3, 1.0 ; , 0.10 ; , 2.0 ; , 30 ; , 20 ; , 0.6 ; , 800 ; (4), 100 ; (4), 125 ; (4·5 2), 16 ; (4· 2), 15 ; ( ), 0.2 ; (2 3), 0.3 .

(2012).

2

		5′ 3′
E. coli	(2002)	CA CC C A AA AA C AAC CAA A CAAA
Lactobacillus	(2012)	C A AAA CCC C A CC CA C CA

A AC (2000). A *ad libitum* . A (A), (A), / . A ( ) (1 fi 10% .

2.4. Sample analysis

. 10 (,) .

+,154; +, 6.3; C −, 137; 2 4−, 0.3; C 2+, 1.2; 2+, 0.7; C 3−,24; 7.4) (., 2005; ., 2007; ., 2014). (CC C6, , CA, A) (., 2013 ,). B fl , A (, CA) . A 15 ( ) 15 1. 4 (4). 4 ( ) fi 0.4 / 4 fl (800, B).

, 16 A *Escherichia coli* *Lactobacillus* (2002) (2012). A A (B ,

3

C *L. acidophilus*. fl .

( )	*L. acidophilus*	+ *L. acidophilus*	-*L. acidophilus*		
40	81.25	82.09	83.92	3.21	0.839
80	58.11	60.54	70.82	2.73	0.036
120	78.89	80.08	88.91	3.27	0.139
240	69.73	72.31	81.27	2.20	0.023

C fi, , (*P* < 0.05).
L. acidophilus = *Lactobacillus acidophilus*.
=, C .
+ *L. acidophilus* = C C , *Lactobacillus acidophilus*.
L. Acidophilus = C C C C , *Lactobacillus acidophilus*.
C C , = 3.

4

C *L. acidophilus*, , + *L. acidophilus* *L. acidophilus* C C C C .

C C	*L. acidophilus*		+ *L. acidophilus*	-*L. acidophilus*		
A ,	269	275	274	278	298	6.69	0.045
A ,	368	369	366	370	372	8.49	0.993
/	1.37	1.34	1.35	1.34	1.25	0.05	0.409

C fi, , (*P* < 0.05).
L. acidophilus = *Lactobacillus acidophilus*.
=, C .
L. acidophilus = C C C C , *Lactobacillus acidophilus*.
+ *L. acidophilus* = C C , *Lactobacillus acidophilus*.
C C , = 6.

2.5. Statistical analysis

(A A) C 20.0 (., C C,). C fi *P* < 0.05.

3.

3.1. Survival rate of immobilized *L. acidophilus* in simulated gastrointestinal juices

C *L. acidophilus*, + *L. acidophilus* *L. acidophilus* C 3. C C *L. acidophilus*, *L. acidophilus* (*P* < 0.05) C *L. acidophilus* C C 80 fl C 240 . + *L. acidophilus* C (*P* > 0.05) C *L. acidophilus*. C *L. acidophilus* C , C 40 fl C 120 (*P* > 0.05).

3.2. Growth performance

4 C C C . A C C C , *L. acidophilus*, , + *L. acidophilus* C , *L. acidophilus* (*P* < 0.05) A ; C , *L. acidophilus* C + *L. acidophilus* C (*P* > 0.05) C A . A / C C (*P* > 0.05) .

3.3. Intestinal microbiota

A C C C C *L. acidophilus* (*P* < 0.05) *Lactobacillus* C C C C

L. acidophilus, + L. acidophilus L. acidophilus

		L. acidophilus		+ L. acidophilus	-L. acidophilus		
E. coli	7.22	6.85	7.11	6.81	6.52	0.18	0.078
Lactobacillus	6.07	6.75	6.11	6.78	7.15	0.24	0.014
E. coli	8.25	7.98	8.17	7.81	7.53	0.21	0.082
Lactobacillus	6.98	7.55	7.02	7.49	7.88	0.19	0.008

fi, ($P < 0.05$).

B 10 (16. A $^{-1}$).

L. acidophilus = *Lactobacillus acidophilus*.

=.

L. acidophilus = *Lactobacillus acidophilus*.

+ *L. acidophilus* = *Lactobacillus acidophilus*.

= 6.

L. acidophilus, + L. acidophilus L. acidophilus

(C , 1999).
fi (., 2010).
(., 2014; ., 2008). *Lactobacillus acidophilus*
(. *L. acidophilus*) *L. acidophilus* *L. acidophilus*
L. acidophilus *L. acidophilus*
(., 2014). *L. acidophilus*
L. acidophilus *L. acidophilus* *L. acidophilus*
fl (A
., 2013).
fi
(-, 2004; , 2009; ., 2012).
(1.5 /) (., 2013 ; ., 2012). A fi 3 / (., 2015). A (2015) *Lactobacillus* (5×10^{10} C /)
L. acidophilus (7.5×10^{8} C /) fl
(2015) (*L. reuteri* *L. plantarum*, 1×10^{9} C /)
A / *L. acidophilus*
fi *L. acidophilus*, *in vitro* *L. acidophilus*
L. acidophilus
fi *L. acidophilus*
E. coli *Lactobacillus* *L. acidophilus*
fi *Lactobacillus* *E. coli*.
(., 2007). A *L. acidophilus*
(., 2011).
L. acidophilus (., 2007) fi
Escherichia coli (., 2015).
L. acidophilus *ex vivo*
(., 2011). fl
4 (., 2010). A
fl 4 fl *L. acidophilus*
fl 4

.

.*L.acidophilus* *L. acidophilus* *L. acidophilus*
L. acidophilus, + *L. acidophilus*

fl

fl

A (201403047).

A AC, 2000.
A ., ., C ., ., C. ., 2013. A . B C . 4, 52.

C , C.C., C , C. ., A., 2009. 65, 169 175.
C , B., 1999. 82, 23 31.
, 2007. A 72, 446 450.
C., B., 2009. A 11, 89 99.
A (2002).
C 2012. C . 23. C , B , C .
C A , 2004. A 141 (6), 951 960.
B , C , C , 2007. A 134, 89 107.
C, C, 2011. A C 2+ 88 23, 1808 1815.
A., B., 2010. A 21, 914 921.
C , 2009. 166, 1377 1382.
C., C, 2013 . A 91, 1094 1101.
C., C 2013 . B 110, 681 688.
A C, 2004. 91, 253 260.
C , 2012. B 237, 305 311.
C., C, 2002. C C 40, 4423 4427.
C, C, C., B., 2014. C A C 195, 85 91.
C A., B C., 2009. B6 B6 287 (9), 1071 1076.
2016. A
B 2005. A C 59, 776 780.
C., C , 2014. 64, 822 830.
B., 2009. A A 1165, 183 189.
A., C, B A., 2005. C C 2 0211. 128, A539 A539.
A., C., C, B A., 2007. C C 2 A 292, 647 656.
C, C., B., 2007. B 97, 45 57.
2012. 11 A C.
C C, C C, A., C, A., 2007. A