



EFFECT OF DIETARY FREE OR PROTEIN-BOUND LYSINE, THREONINE, AND METHIONINE ON THE EXPRESSION OF $b^{0,+}$ AND MYOSIN IN PIGS

Grageola N. F., García H., Morales, A., Araiza, A.¹, Arce N., Cervantes M
ICA, Universidad Autónoma de Baja California, Mexicali, México
E-mail to: miguel_cervantes@uabc.edu.mx

INTRODUCTION

Pigs fed diets supplemented with free amino acids (AA) do not perform as good as those fed protein-bound AA. It is speculated that free AA are absorbed relatively faster than protein-bound AA, which in turn may provoke the difference in performance of pigs.

Since Lys is the first limiting AA, an experiment was conducted to analyze the expression of the cationic AA transporter $b^{0,+}$ in intestinal mucosa, liver, and two muscles, and myosin in two muscles of pigs fed diets with either free or totally protein-bound AA (TP-AA).

MATERIAL AND METHODS

- 12 pigs (31.7 ± 2.74 kg BW)
- Dietary treatments (T):
 - T1, low protein wheat-based diet plus 0.59% L-Lys, 0.32% L-Thr, 0.10% DL-Met
 - T2, High protein wheat-soybean meal diet, 19% CP
- Feed intake restricted to 1.53 kg/d
- 28 days trial
- Day 28, pigs were sacrificed and samples from jejunum and ileal mucosa, liver, and the *Longissimus* and *Semitendinosus* muscles were collected to analyze the expression of $b^{0,+}$; the expression of myosin in both muscles was also analyzed.



Experimental diets

Ingredient, %	T1	T2
	Low CP + free AA	High CP protein bound AA
Wheat	96.52	75.20
Soybean meal, 48% CP		21.30
L-Lysine • HCl, 78.5%	0.75	
L-Threonine	0.33	
DL-Methionine	0.10	
Soybean oil		0.50
Vitamins and minerals	2.30	2.30
ME (MJ/kg)	13.79	13.76
CP, %	11.00	19.90
Total Lys, %	0.95	0.95
SID Lys, %	0.90	0.83
SID Met, %	0.27	0.42
SID Thr, %	0.58	0.62

Oligonucleotides for expression assays by qPCR

mRNA	Oligonucleotides
$b^{0,+}$: cationic amino acid transporter SLC7A9 (EF127857)	Forward 5'-CGGAGAGAGGATGAGAAGT-3' Reverse 5'-GCCCGCTGATGATGATGA-3'
Myosin (NM_001123141)	Forward 5'-AGATTTCTGACCTGACTG-3' Reverse 5'-TCTCCCTCCATCTTCTTC-3'
18S ribosomal RNA (AY265350)	Forward 5'GGCCTCACTAAACCATCCAA3' Reverse 5'TAGAGGGACAAGTGGCGTTC3'

RESULTS

- Expression of $b^{0,+}$ was higher in jejunal mucosa but lower in liver, in pigs fed the free-AA containing diet ($P < 0.01$).
- Diet did not affect the expression of $b^{0,+}$ in ileal mucosa, *Longissimus* and *Semitendinosus* muscles ($P > 0.05$)
- Expression of myosin was not affected by the diet, either in *Longissimus* or *Semitendinosus* muscles.
- There was a negative correlation in the expression of $b^{0,+}$ between jejunum and liver ($r = 0.80$; $P = 0.001$).
- Expression of $b^{0,+}$ was higher in ileum as compared to jejunum.
- It appears that the high expression of $b^{0,+}$ in liver compensates for the lower expression in jejunal mucosa

Relative expression (arbitrary units, mRNA Mol/18S rRNA Mol) of amino acid transporter $b^{0,+}$ for pigs on T1 and T2

Tissue	Dietary treatment		P value
	T1	T2	
Jejunal mucosa	0.041	0.104	< 0.01
Ileal mucosa	0.571	0.348	ns
Liver	0.013	0.003	< 0.01
<i>Longissimus dorsi</i>	0.005	0.006	ns
<i>Semitendinosus</i>	0.001	0.002	ns

Relative expressions of myosin for pigs in muscles			
<i>Longissimus dorsi</i>	0.006	0.005	ns
<i>Semitendinosus</i>	0.005	0.005	ns

CONCLUSION

$b^{0,+}$ is mostly expressed in the small intestine, especially ileum, and suggest that free AA are absorbed at a different rate than protein-bound AA.



63rd Annual Meeting
EAAP 2012
August 27th - 31st, 2012