Comparative efficacy of L-methionine and DL-methionine in piglets

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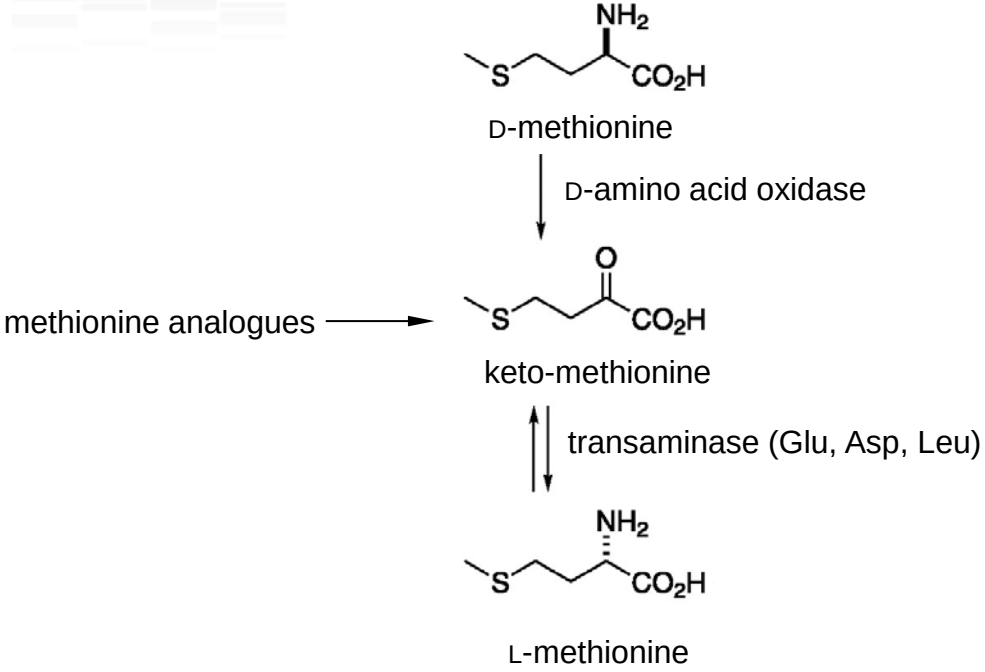
Introduction

- L-Methionine:
  - essential amino acid
  - component of structural and functional proteins
  - implicated in methylation reactions
  - precursor for the synthesis of Cys
- Sources of methionine:
  - dietary protein
  - synthetic isomers (DL-Met) or analogs (DL-HMB) of L-Met

D-Met has to be converted to L-Met by the animal to become biologically active



Hasegawa *et al*., 2005

Introduction

- There is a wealth of data (and debate) of the comparative efficacy of DL-Met and hydroxy analogues of Met
- Little information is available on the relative efficacy of DL-Met and L-Met in pigs:
  - D-Met : L-Met = 50% (Kim and Bayley, 1983)
  - D-Met : L-Met = 100% (Reifsnyder *et al.*, 1984; Chung and Baker, 1992)

Treatment	Feed intake, g/d	Daily gain, g/d
Control*	605[a]	268[a]
Control + L-Met	999[b]	498[b]
Control + D-Met	969[b]	498[b]
Control + DL-Met	1019[b]	516[b]

* deficient in Met

Chung and Baker, 1992

Two sources of Met of different origin and composition

	DL-Met	L-Met
Production method	chemical synthesis (commercially available)	fermentation* (experimental)
Met source	99% DL-Met (50% D-Met and 50% L-Met)	85.9% L-Met

*method developed by METabolic EXplorer and Roquette Frères

Diets

- **Diets based on barley (64%), corn (22%), and pea protein (9%)**
- **1 control diet, limiting in total sulfur amino acid supply:**

	Control diet	NRC (1998)
SID Lys	1.00%	1.09-0.93%
SID Met:Lys	20%	30%
SID (Met+Cys):Lys	42%	60%

- **6 diets based on the control diet and supplemented with 2 sources (L-Met or DL-Met) and 3 levels (0.05, 0.10, and 0.15% of "pure" Met)**

Experimental design

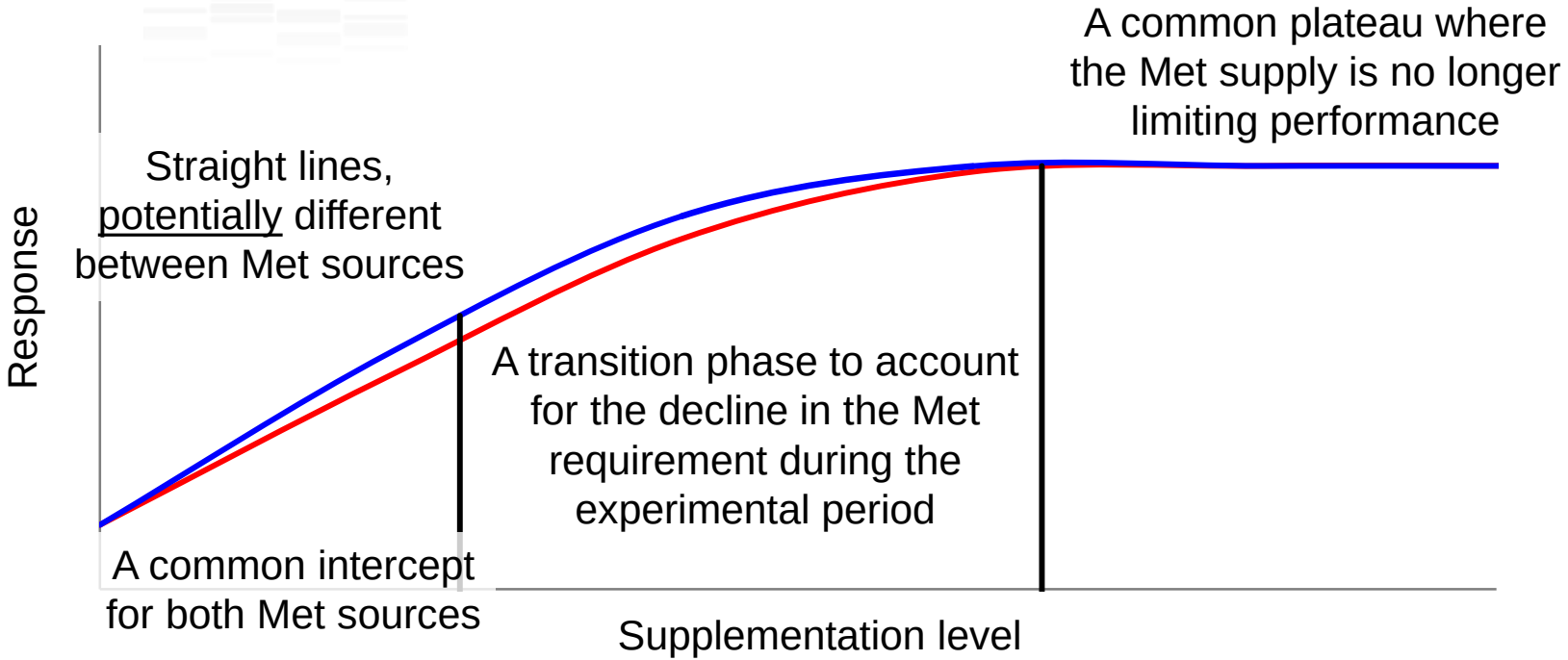
~11 kg
(6 wks of age)

77 piglets
P x (LW x LR)
50% ♂, 50% ♀
housed individually
ad libitum feeding

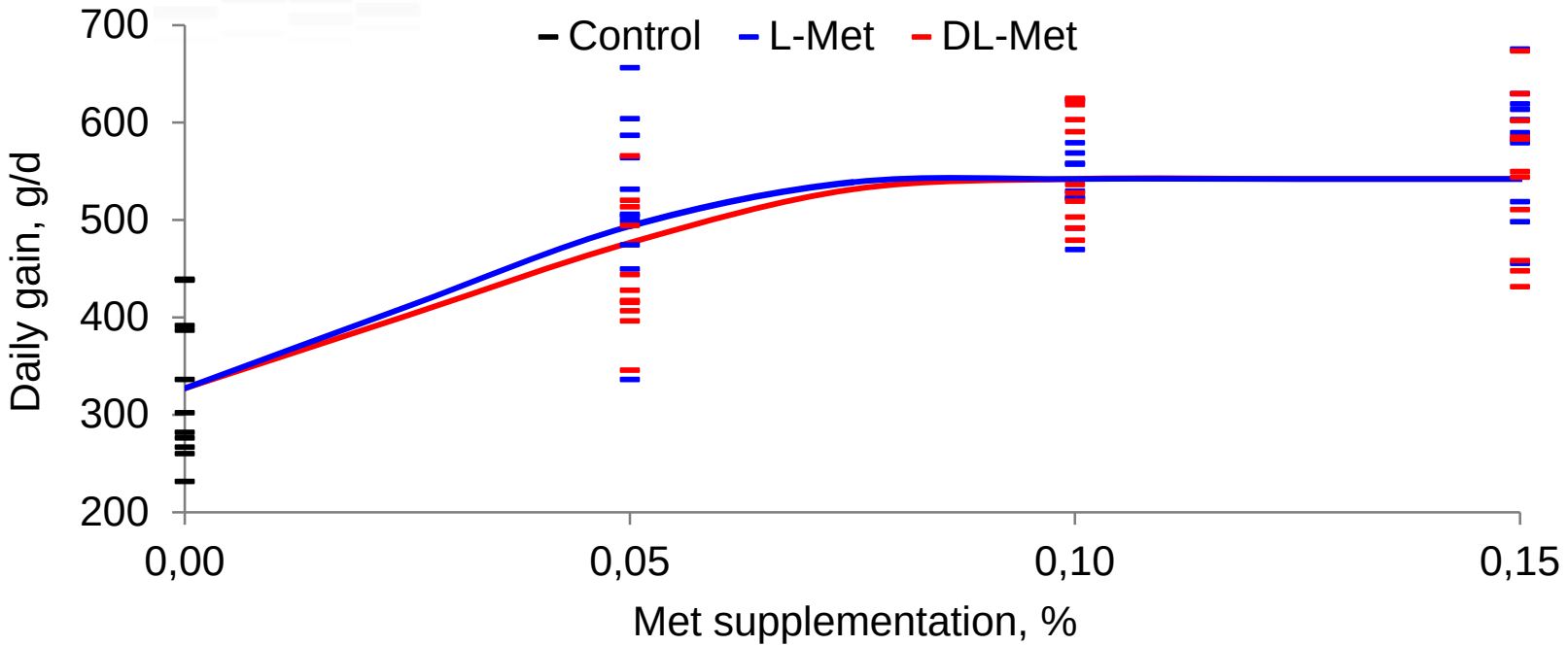
21 days
1 of 7 diets

~23 kg

Statistical analysis: bent-stick model



Effect of level and source of Met on growth in piglets



Comparative efficacy of using L-Met and DL-Met for growth in piglets

	Feed intake	Daily gain	Feed efficiency
Slope-ratio L-Met *vs* DL-Met	1.15 (0.12)	1.12 (0.09)	0.99 (0.12)
Probability slope-ratio ≠ 1	0.17	0.16	0.82
Residual SD, g/d	109	67	0.04

Conclusions

- There is no difference in the efficiency of using DL-Met or L-Met for growth in piglets (at equal Met levels)
- D-Met is converted efficiently to L-Met in pigs
- The limited response at higher levels of Met supplementation suggests that the Met requirement was lower than anticipated