The effect of dietary magnesium aspartate supplementation on pork quality

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'Acute stress' just prior to slaughter can lead to pale, soft, exudative (PSE) pork by increasing the rate of muscle acidification at and immediately post-slaughter. As a consequence low pH values are reached in the muscle while the carcass temperature is still high. Magnesium antagonises calcium and reduces the effects of stress by reducing neuromuscular stimulation (reduces catecholamines secretion) (1). The aim of this experiment was to determine whether dietary magnesium aspartate (MgAsp) supplementation could be used to improve meat quality in pigs.

Forty-eight crossbred (Large White X Landrace) boars were randomly allocated in a 2x2 factorial design, with the respective factors being diet and handling. The dietary treatments were (a) pigs fed finisher diet for five days (b) pigs fed 40 g MgAsp/pig/day supplemented finisher diet for five days. At the completion of the diet treatment, the pigs were transported to the abattoir and slaughtered after overnight lairage. The handling treatments imposed just prior to slaughter were (a) minimum (minimum force) and (b) negative (15 shocks with an electric goad) handling.

Diet (D)	Control		MgAsp			P - values		
Handling (H)	Minimum	Negative	Minimum	Negative	sed	D	H	DxH
Noradrenaline[1] (mnol/ml)	1.79	1.24	0.89	1.05	0.380	0.048	0.470	0.194
Adrenaline[1] (nmol/ml)	0.40	0.43	0.32	0.33	0.085	0.150	0.729	0.945
LT Glycogen[1] (mg/g)	8.4	6.9	9.6	9.4	0.818	0.003	0.136	0.292
LT Lactic acid[1] (mg/g)	3.8	4.2	3.2	3.5	0.420	0.036	0.229	0.671
LT ultimate pH	5.48	5.51	5.61	5.57	0.045	0.004	0.864	0.224
LT % Drip Loss	4.0	6.4	3.5	3.5	0.824	0.006	0.047	0.047
LT Lightness L^*	48.7	49.1	45.2	47.4	1.109	0.002	0.115	0.247
% PSE[2]	8	33	0	0		0.050	0.280	0.093

[1]concentration at slaughter; [2] Exact contingency table test used; LT - Longissimus thoracis

Pigs fed the MgAsp supplemented diet had lower plasma noradrenaline, higher muscle glycogen and lower lactic acid levels at slaughter compared to pigs fed the control diet. Pigs fed the MgAsp diet had higher muscle pH at 24 h post-slaughter, less pale meat (L*), lower % drip loss and no PSE meat (drip loss > 5% and L* >50) compared to pigs fed the control diet. Pigs which were fed the control diet and were negatively handled prior to slaughter had the highest % drip loss and incidence of PSE meat. This experiment has confirmed that 'acute stress' just prior to slaughter can lead to inferior meat quality. The results have also demonstrated that dietary MgAsp supplementation in pigs can improve meat quality and reduce the incidence of PSE pork. The improvement in meat quality could possibly be due to the reduction in noradrenaline secretion at slaughter.

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1. Kietzmann M, Jablonski H. Blocking of stress in swine with magnesium aspartate hydrochloride. Praktische Tierzucht 1985;661:331.