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MUSTARD SEED (*SINAPIS ALBA*): NUTRIENT CONTENT AND DIGESTIBILITY IN SWINE

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We can enlarge the ring of the vegetable protein source of the monogastric animals with mustard seed, which is produced in Hungary on 10-35000 ha.
High eruca acid and antinutritive levels of mustard seed limit its usage in nutrition despite of its significant crude-protein and ether extract content.
The goal of our experiment was to determine nutritient value of native and treated mustard seed. Associated metabolic experiment was carried out with corn in growing pigs. Digestibility of nutrients and nitrogen metabolism were studied in case of diets with different mustard seed ratios (3, 6, 9%) native and treated (enzyme inactivated), supplemented with amino acids and in itself.

Table 1.

Nutrient contet of mustard seed samples(g/kg DM)

	Untreated	Treadted
	high eruca acid content	decreased
Nutrient content		
Crude protein	357	316
Ether extract	287	272
Crude fibre	73	75
Amino acid content (in the % of DM),		
THR	1.37	1.54
CYS	0.83	0.74
MET	0.53	0.53
LYS	1.96	2.05
Fatty acid composition (in the % of fatty acids)		
C18:1	30.3	55.9
C18:2n-6	12.7	14.2
C18:3n-3	9.9	9.4
C20:1	9.6	4.9
C22:1	28.0	6.4

Table 2.

Experimental design

	Components of the diets							
	mustard seed mixed ratio, %			corn	LYS	MET	THR	TRP
1. mustard seed, untreated, high eruka acid level								
corn + mustard seed in associated metabolic experiment	3	6	9	+	–	–	–	–
2. mustard seed, enzyme inactivated and decreased eruca acid level								
a) corn + mustard seed + LYS	3	6	9	+	+	–	–	–
b) corn + mustard + LYS + MET + THR + TRP	3	6	9	+	+	+	+	+

– absent, + has got

Table 3.

Composition and nutrient level of feed mixtures (%)

Treatment	1.	2.	3.	4.	5.	6.	7.	8.	9.
Composition									
Corn	94.1	91.1	88.1	91.4	88.4	85.4	91.2	88.2	85.2
Mustard seed with high eruca acid content, untreated	3.0	6.0	9.0	—	—	—	—	—	—
Mustard seed with decreased eruca acid content, treated	—	—	—	3.0	6.0	9.0	3.0	6.0	9.0
Lime	1.0	1.0	1.0	1.8	1.8	1.8	1.8	1.8	1.8
MCP	1.0	1.0	1.0	1.6	1.6	1.6	1.6	1.6	1.6
NaCl	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2
L-lysin-HCl	—	—	—	1.5	1.5	1.5	0.9	0.9	0.9
Vit.+mineral premix for grower*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Dl-methionine	—	—	—	—	—	—	0.3	0.3	0.3
Threonine	—	—	—	—	—	—	0.36	0.36	0.36
Tryptophan	—	—	—	—	—	—	0.12	0.12	0.12
Nutrient content									
DE pig. MJ/kg	14.1	14.3	14.5	13.8	13.9	14.0	13.8	13.9	14.1
Lizin	0.28	0.34	0.39	1.38	1.37	1.37	0.97	1.00	1.10
Methionine	0.18	0.19	0.21	0.15	0.15	0.14	0.47	0.48	0.49
Threonine	0.33	0.37	0.40	0.27	0.26	0.25	0.67	0.70	0.74
Tryptophan	0.07	0.07	0.08	0.05	0.05	0.05	0.18	0.19	0.20

* Premix: D.M. 94.8%, Ca 20.3%, Vit.-A. 2000000 IU/kg, D_3 3018800 IU/kg, Vit.-E. 4000 mg/kg, Vit.-B_2. 576 mg/kg, pantothenic acid 1156 mg/kg, colin chloride 45500 mg/kg, niacin 2940 mg/kg, Vit.-B_{12}. 3 mg/kg, biotin 40 mg/kg, Zn 24240 mg/kg, Cu 6160 mg/kg, Fe 23616 mg/kg, Mn 11.284 mg/kg, I 120 mg/kg, Co 103 mg/kg, Se 20 mg/kg

Digestion coefficient of nutrients in untreated, high eruca acid level and enzyme inactivated, decreased eruca acid level mustard seed diets with various amino acid supplementation.

Table 4.

Digestibility of nutrients in diets (%)

Treatment)	1, 2, 3	4	5	6	7	8	9
Mustard seed	3, 6, 9%	3%	6%	9%	3%	6%	9%
Nutrients							
Dry matter	86	87±1.19	87±2.16	87±2.13	88±0.77	87±1.03	88±1.06
Crude protein	86	83±1.19	81±2.45	83±3.12	85±1.90	86±1.61	87±2.01
Ether extract	77	76±8.68	82±2.50	81±2.96	77±6.59	71±4.25	71±5.32
Crude fibre	54	60±5.33	68±2.66	61±9.53	53±6.52	56±6.11	62±5.08
Energy		87±2.74	85±2.43	85±2.22	87±0.78	87±0.82	87±1.09
N free extract	94	92±1.07	92±1.66	92±1.40	93±0.58	93±0.62	93±0.56
Organic matter	86	90±1.08	89±1.64	89±1.92	90±0.82	90±0.92	90±0.91

Apparent digestibility of nutrients in mustard seed diets with decreased eruca acid content and supplemented with lysine and other essential amino acids shows only a slight difference. However protein digestibility of lysine supplemented diets is 81-83% while this value increased to 85-87% when methionine, threonine and tryptophan supplementations were also used.
Crude fibre contents of diets were very low 1.8-2.8% in both experiments, so the possible negative effect of fibre to protein digestibility could not be exerted.

Fig. 1.: **Whole nitrogen intake and passage (g/day)**

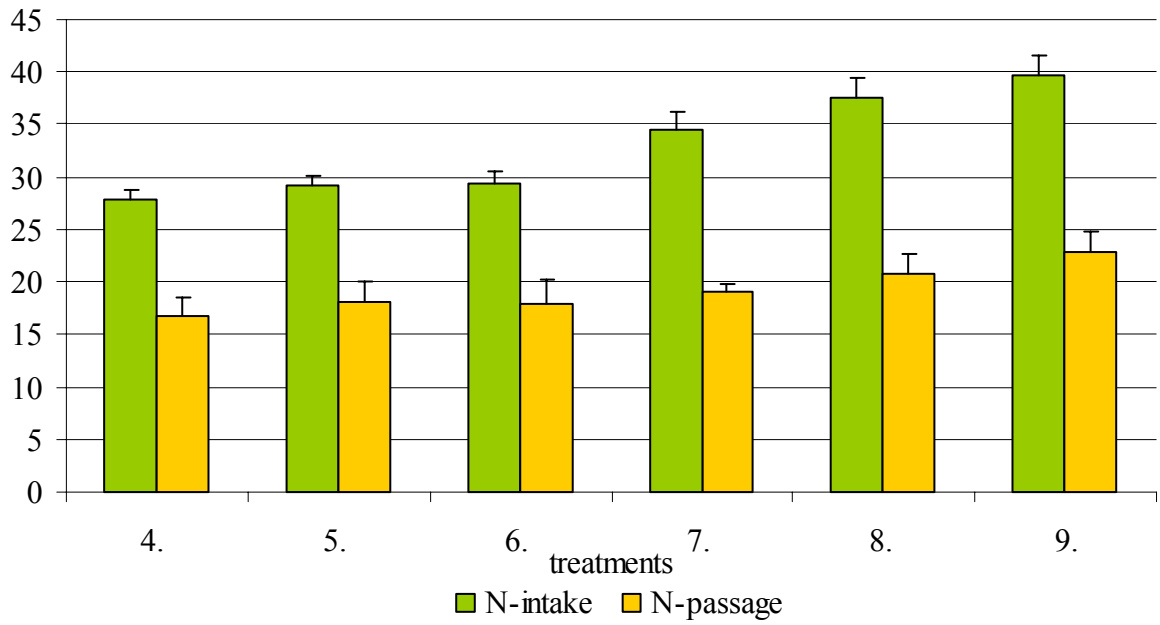
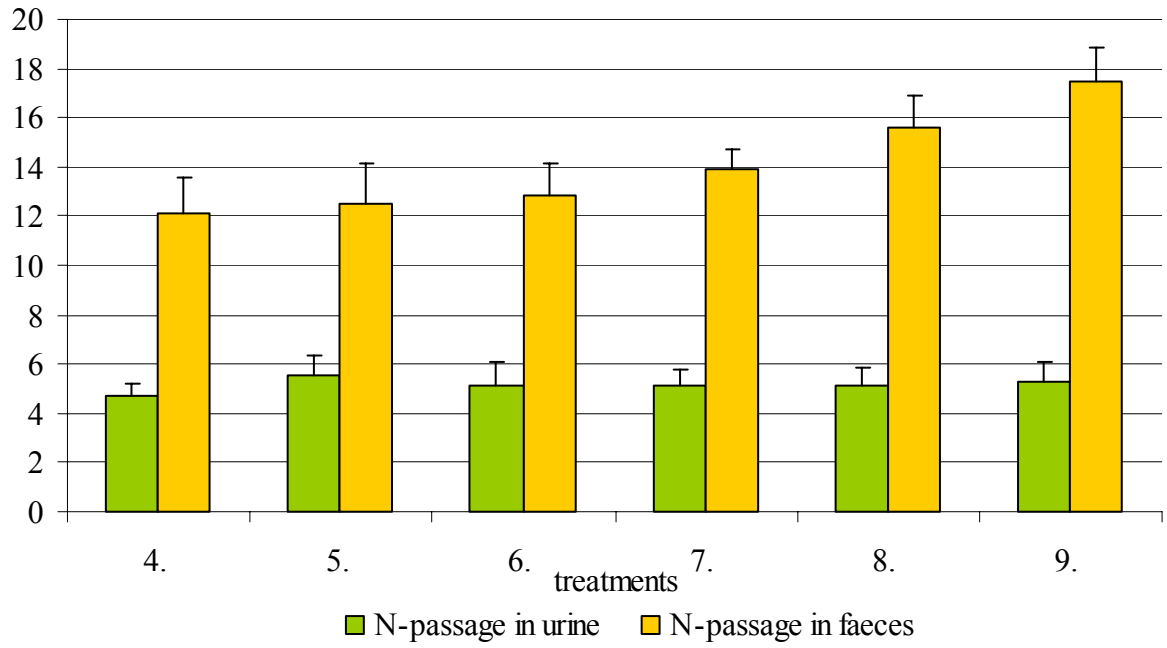
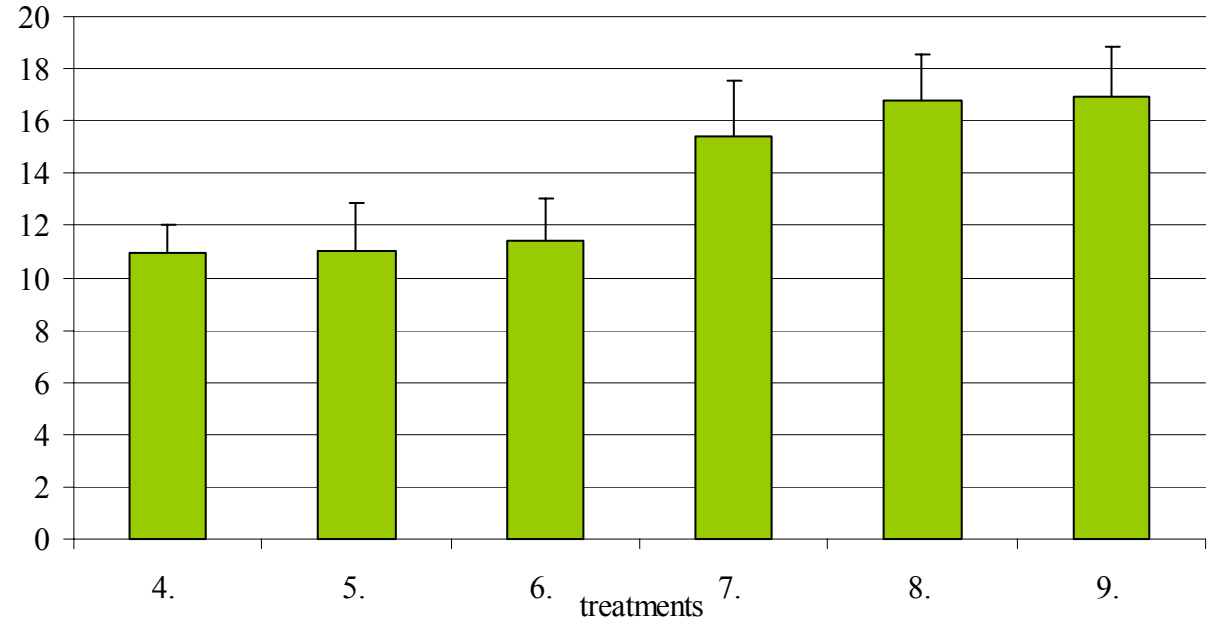


Fig. 2.: **N-passage (g/day)**



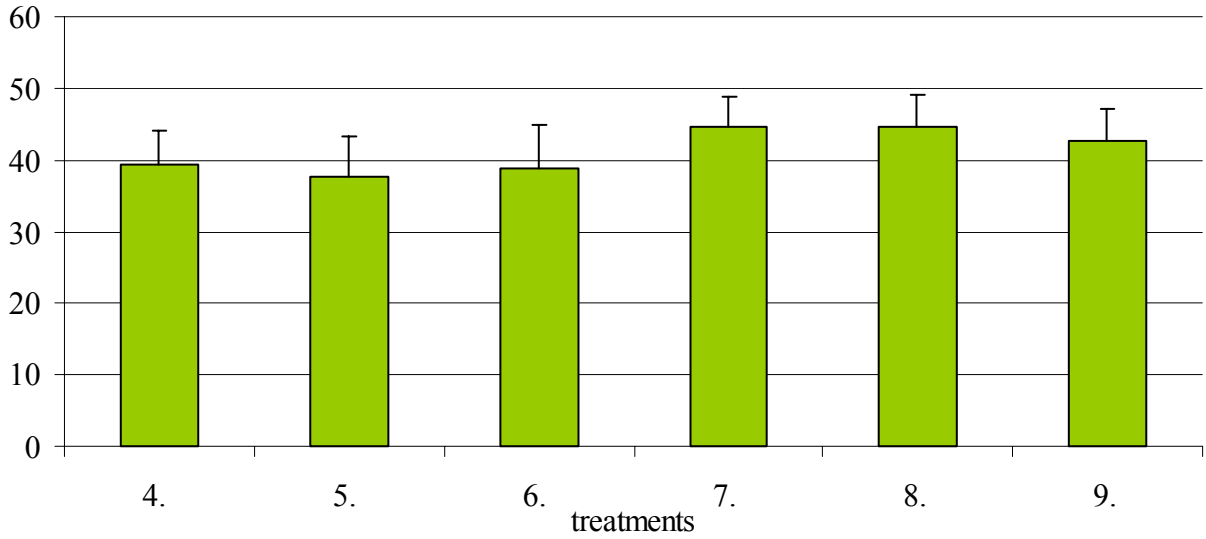
Nitrogen excrementation increases parallel with the increase of nitrogen uptake. However, it was found that nitrogen excremented with faeces is constant and N excremented with urine could only increase. About 5 g nitrogen was found in faeces of each animal, per day in both experiments. Therefore digestibility of crude protein did not changed significantly for the effect of lysine and other essential amino acid supplementation.

Fig. 3.: **N-retention (g/day)**



Considerable difference was found in nitrogen retention between the treatments. Nitrogen retention was 10.94-11.41 g/day in case of lysine supplementation and hardly changed with the alteration of mustard seed content. However nitrogen retention reached 15.43-16.92 g/day when methionine, threonine and tryptophan supplementations were also applied.

Fig. 4.: **Productive protein utilisation (%)**



We also find a beneficial activity of amino acid supplementation in productive protein utilisation. The utilisation was 37.81–39.46% in case of lysine supplemented diets, while it was 42.58–44.66% when methionine, threonine and tryptophan supplementations were also applied. However, it must be commented that 1.5% lysine supplementation caused an unbalanced amino acid ratio in diets. This fact can explain low nitrogen retention and productive amino acid utilisation.

Conclusion

- eruca acid content and enzyme activation of mustard seed influence the digestibility of nutrients in a slight degree
- differences in the levels of mustard seed between treatments affect nitrogen retention and protein utilisation in slighter degree than the amino acid composition of feed