

Protein quality of malt barley sprouts as co-product from food industry expressed by DIAAS method.

DIAAS

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Introduction

The protein quality of foods is expressed by digestibility of amino acids (AA) and the indispensable amino acid (IAA) composition of the protein. In human nutrition, the DIAAS (digestible indispensable amino acid score) method was established for the evaluation of protein quality in foods. There is only little information about the protein quality of some co-products from the food industry which could have some nutritional value for human nutrition.

Material and methods

Therefore, this study aimed to determine the protein quality of malt barley sprouts in growing pigs. A total of 6 gilts (initial BW 34.8 ± 0.7 kg) fitted with a T-cannula in the terminal ileum were used for the determination of apparent (AID) and standardized (SID) ileal digestibility of AA in malt barley sprouts. DIAA reference ratio for adults were calculated and DIAAS for sprouts was determined. The tested feed was the sole source of protein in the diet. On d 7 ileal digesta was collected continuously for 24 h. Chromic oxide (Cr<sub>2</sub>O<sub>3</sub>) was used as an indigestible marker (3.0 g per kg diet).

TIDAA

Lys

Taable 3 True ileal digestibility of AA (TIDAA) coefficients in malt barley sprout

TIDAA coefficients	
Lys	0.61
Met	0.73
M+C	0.52
Thr	0.49
Trp	0.56
Ile	0.63
Leu	0.58
Val	0.59
his	0.58
Arg	0.71
AAA	0.36
Phe	0.54
Tyr	0.18

Met



Leu

Results

SID of N was low (30%) and SID of AA ranged from 18% (tyrosine) to 74% (aspartic acid) (p<0.05). Ileal digestibility for lysine was 61% and for leucine 58%. DIAA ratios for adults were in the range from 0.43 (aromatic AA) to 2.71 (tryptophan). DIAA ratio for leucine was 0.49 and for lysine 0.59. DIAAS for malt barley sprouts was 43 (aromatic AA). Phenylalanine and tyrosine were the 1<sup>st</sup> limiting AA in the calculation of DIAAS. The 2<sup>nd</sup> limiting AA was leucine. Based on the DIAAS method, there is possible to conclude that malt barley sprouts are not a good protein source for human nutrition.

Table 1 Ingredient composition of experimental diets (% as fed basis)

Ingredients	Malt sprouts	NFD
Malt sprouts	68.0	-
Maize starch	29.0	73.9
Monocalcium phosphate	0.8	-
Sunflower oil	-	5.0
Limestone	1.2	-
Salt	0.4	-
Sucrose	-	10.0
Mineral mixture <sup>a</sup>	-	5.5
Cellulose	-	5.0
Premix <sup>b</sup>	0.3	0.3
Chromic oxide	0.3	0.3

**Legend:** <sup>a</sup> Provided the following per kg of diet: monocalcium phosphate 31 g; limestone 15 g; salt 4.4 g; KCl 3.8 g; MgO 0.8 g. <sup>b</sup> Provided the following per kg of diet: retinol 1.2 mg; cholecalciferol 25 mg; alpha-tocopherol 10 mg. metadione 0.2 mg; riboflavin 4 mg; pyridoxine 2.5 mg; d-pantothenic acid 10 mg; niacin 20 mg; folic acid 0.5 mg; biotin 0.1 mg; cyanocobalamin 30 g; choline 500 mg; Fe 92 mg; Zn 103 mg; Mn 40 mg; Cu 19 mg; Co 0.5 mg; Se 0.16 mg.

MALT

Table 2. Content of crude protein (CP) and amino acids in malt barley sprouts

CP/AA		
CP	(%)	30.5
Lys	(mg/g protein)	45.9
Met	(mg/g protein)	13.1
M+C	(mg/g protein)	22.3
Thr	(mg/g protein)	32.7
Trp	(mg/g protein)	31.8
Ile	(mg/g protein)	29.5
Leu	(mg/g protein)	49.2
Val	(mg/g protein)	42.6
His	(mg/g protein)	16.4
Arg	(mg/g protein)	49.2
Phe	(mg/g protein)	29.5
Tyr	(mg/g protein)	19.6
AAA	(mg/g protein)	49.1

Table 4. Malt barley sprouts

DIAA reference ratio for adults										DIAAS
His	Ile	Leu	Lys	SAA	AAA	Thr	Trp	Val	BCAA	%
0.60	0.62	0.47	0.59	0.50	0.43	0.65	2.71	0.63	0.56	43

BCAA

GLY