

# Amino acid digestibility of a synthetic diet fed to mink

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## Introduction

A synthetic diet has been designed with a protein fraction entirely made up by crystalline amino acids (Sandbol et al., 2007). The amino acid composition is based on the ideal protein concept (Sandbol et al., 2004). It is assumed that crystalline amino acids are 96% digestible. To confirm this hypothesis, a digestibility trial was conducted with the purpose to determine the apparent digestibility of the individual amino acids used in the diet.

## Materials and methods

The trial was conducted with 4 adult male mink of the colour type Brown/Glow. The animals were offered the diet (Table 1) in an adaptation

**Table 1** Composition of the diet (% of fresh weight), calculated energy content and distribution.

| Ingredient                  | Composition, % of diet |
|-----------------------------|------------------------|
| Methionine <sup>1)</sup>    | 0.20                   |
| Cystine                     | 0.08                   |
| Lysine                      | 0.30                   |
| Threonine                   | 0.17                   |
| Tryptophane                 | 0.05                   |
| Histidine                   | 0.10                   |
| Phenylalanine               | 0.20                   |
| Tyrosine                    | 0.15                   |
| Leucine                     | 0.38                   |
| Isoleucine                  | 0.18                   |
| Valine                      | 0.24                   |
| Arginine                    | 0.24                   |
| Glutamic acid               | 0.57                   |
| Glycine                     | 0.26                   |
| Alanine                     | 0.24                   |
| Serine                      | 0.22                   |
| Aspartic acid               | 0.31                   |
| Proline                     | 0.26                   |
| Corn starch                 | 9.64                   |
| Cellulose                   | 2.32                   |
| Soy Oil                     | 3.62                   |
| Lard                        | 3.74                   |
| Vitamin premix              | 0.24                   |
| NaCl                        | 0.05                   |
| Water                       | 75.94                  |
| Energy, calculated:         |                        |
| ME <sup>2)</sup> MJ / 100 g | 0.56                   |
| ME from protein, %          | 15                     |
| ME from fat, %              | 55                     |
| ME from carbohydrates, %    | 30                     |
| Dry matter, %               | 23                     |

<sup>1)</sup> All amino acids are L-isomers

<sup>2)</sup> ME is metabolizable energy

period of 7 days and in the following 4 days of collection. The mink were housed in balance cages (mod. after Jorgensen and Glem-Hansen, 1973).

In the collection period, feed consumption and faeces was registered daily and pooled across days for the individual mink.

Apparent digestibility was calculated according to the direct method as follows:

Apparent digestibility, % =

$$100 * (AA_{\text{intake}} - AA_{\text{faeces}}) / AA_{\text{intake}}$$

where AA is the individual amino acid in gram.

One animal with a low feed intake and a high faecal dry matter excretion was excluded from the calculations.

## Results and discussion

The apparent digestibility of the individual amino acids were typically between 89 and 95% (Table 2), which is slightly lower than the assumed 96%. Methionine digestibility was slightly higher with 98%.

The digestibilities of Cystine and Threonine were 74 and 79%, respectively. The method used to determine the apparent digestibility contains the endogenous excretion in the value. As a carnivore, mink has a substantial endogenous excretion of enzymes involved in the digestion processes. However, Elnif and Hansen (2004) states that the reabsorption is very efficient and therefore most amino acids will contribute little to the amount found in faeces. Only for Cystine, Threonine and Aspartic acid a low apparent digestibility can be explained by endogenous excretion (Elnif and Hansen, 2004). This supports our findings for Cystine and Threonine.



The synthetic diet ready to be served!

**Table 2.** Analysed dietary content and calculated apparent digestibility of amino acids (means of 3 mink).

| Amino acid <sup>1)</sup> | g/kg diet | Digestibility, % | SEM <sup>2)</sup> |
|--------------------------|-----------|------------------|-------------------|
| Alanine                  | 2.21      | 92               | 0.26              |
| Arginine                 | 2.41      | 94               | 0.20              |
| Aspartic acid            | 3.09      | 92               | 0.10              |
| Cystine                  | 0.53      | 74               | 0.97              |
| Glutamic acid            | 5.58      | 94               | 0.20              |
| Glycine                  | 2.52      | 94               | 0.15              |
| Histidine                | 0.99      | 92               | 0.15              |
| Isoleucine               | 1.83      | 94               | 0.11              |
| Leucine                  | 3.76      | 95               | 0.11              |
| Lysine                   | 2.38      | 95               | 0.08              |
| Methionine               | 1.78      | 98               | 0.08              |
| Phenylalanine            | 2.14      | 95               | 0.07              |
| Proline                  | 2.64      | 92               | 0.19              |
| Serine                   | 2.15      | 89               | 0.39              |
| Threonine                | 1.63      | 79               | 0.63              |
| Tryptophan               | 0.51      | 89               | 0.30              |
| Tyrosine                 | 1.64      | 89               | 0.22              |
| Valine                   | 2.67      | 93               | 0.16              |

<sup>1)</sup>All amino acids are L-isomers

<sup>2)</sup> SEM = standard error of the means

A further contribution to the lower digestibility of Cystine could be contamination of faeces with hair. However, the digestibility of Glutamic acid and Serine, also abundant in hair, suggests that contamination was without importance.

## Conclusion

Apparent digestibility of individual amino acids making up the entire dietary protein fraction was between 89 and 95%. The apparent digestibility of Cystine and Threonine was 74 and 79%, respectively.

## References

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