

# Focus on the amino acid content of energy feedstuff components

## Problem

Switching poultry rations from 95 % to 100 % organic feed can lead to a reduction in the use of home-grown and regional feed. Currently, conventional maize gluten and conventional potato protein are replaced by organic oilcake (soya, sunflower, rapeseed, sesame). Oilcake has a comparatively low content of important amino acids such as methionine and so higher proportions of oilcake must be used. This can lead to further reductions in the use of regionally produced and home-grown feed components such as cereals.

## Solution

Energy feedstuff components contain different amounts of amino acids such as methionine. Some grain species have a high methionine content and can grow well in most regions by the farmers themselves. The best examples are proso millet (*Panicum milleceum*) and naked oats (*Avena nuda*) followed by spelt, naked barley (*Hordeum vulgare* L. var. *nudum* Hook. f.) and buckwheat with all containing higher levels of methionine than wheat or maize.

Figures 1 and 2 show the harvest and a field visit as part of the project “Proso millet in poultry feed”



Figure 1: Millet harvesting. Picture: Julia Roesch



Figure 2: Millet field visit. Picture: Elisabeth Assmann

## Applicability box

### Theme

Layers, broilers, feeding and ration planning

### Context

High percentage of self-produced or regional feed components

### Application time

All-year-round use in animal feeding

### Period of impact

Permanent

### Equipment

Storage and mixing feed

### Best in

Own cultivation and use on the farm

## Benefits

In the present ration example, the use of oil cake can be reduced from 34.8 % (see Table 1) to 26.1 % (see Table 2). This means that the share of home-grown and regional components can be increased by more than 8 % since the oil content could also be reduced.

## Practical recommendation

In proso millet, the methionine content is high, but the lysine content is low. Lysine can be added easily to the ration with grain legumes such as peas, field beans, lupins or soya. The low crude protein of millet is positive, as it is well complemented by the higher crude protein content of other feedstuffs, e.g. grain legumes. Overfeeding crude protein is undesirable as it puts a strain on the animal's metabolism and leads to excessive nitrogen excretion. Naked oats have a high content of amino acids plus a high fat content so that the use of oil can be reduced.

Proso millet and naked oats are crops that are easy to grow in many regions in Central and Southern Europe.

**Table 1: Ration for 100 % organic feeding of laying hens with energy feed based on corn and wheat**

| Components     | Share         | Ingredients  |              |             |             |             |             |             |             |             |             |             | Batch        |
|----------------|---------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|                | %             | ME           | Protein      | Fat         | Fibre       | Lys         | Met         | Met+Cys     | Trp         | Ca          | P           | Na          | 3.000        |
|                |               | MJ           | %            | %           | %           | %           | %           | %           | %           | %           | %           | %           | kg           |
| Corn           | 20.00         | 2.88         | 1.72         | 0.72        | 0.64        | 0.05        | 0.03        | 0.09        | 0.00        | 0.01        | 0.06        | 0.00        | 600          |
| Wheat          | 19.50         | 2.24         | 2.11         | 0.51        | 0.60        | 0.06        | 0.04        | 0.09        | 0.03        | 0.01        | 0.06        | 0.00        | 585          |
| Milled grass   | 6.00          | 0.32         | 0.97         | 0.22        | 1.50        | 0.04        | 0.02        | 0.02        | 0.02        | 0.05        | 0.02        | 0.01        | 180          |
| Peas           | 8.10          | 1.02         | 1.70         | 0.22        | 0.55        | 0.13        | 0.02        | 0.04        | 0.02        | 0.01        | 0.04        | 0.00        | 243          |
| Feed lime      | 8.00          | 0.00         | 0.00         | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 3.05        | 0.00        | 0.00        | 240          |
| Sunflower oil  | 1.40          | 0.52         | 0.00         | 1.33        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 42           |
| Premix         | 2.20          | 0.00         | 0.00         | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.54        | 0.24        | 0.17        | 66           |
| Sunflower cake | 14.00         | 1.19         | 4.66         | 1.53        | 3.63        | 0.15        | 0.08        | 0.13        | 0.09        | 0.05        | 0.05        | 0.00        | 420          |
| Sesame cake    | 4.50          | 0.36         | 2.21         | 1.70        | 0.27        | 0.05        | 0.04        | 0.08        | 0.02        | 0.04        | 0.02        | 0.00        | 135          |
| Soya cake      | 16.30         | 1.78         | 7.24         | 1.30        | 1.17        | 0.47        | 0.09        | 0.23        | 0.09        | 0.05        | 0.13        | 0.00        | 489          |
|                | <b>100.00</b> | <b>10.31</b> | <b>20.61</b> | <b>7.52</b> | <b>8.36</b> | <b>0.94</b> | <b>0.31</b> | <b>0.68</b> | <b>0.27</b> | <b>3.81</b> | <b>0.63</b> | <b>0.18</b> | <b>3.000</b> |

**Table 2: Ration for 100% organic feeding of laying hens with energy feed based on proso millet and naked oats**

|                |               |              |              |             |             |             |             |             |             |             |             |             |              |
|----------------|---------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Wheat          | 12.00         | 1.38         | 1.30         | 0.31        | 0.37        | 0.04        | 0.02        | 0.06        | 0.02        | 0.01        | 0.04        | 0.00        | 360          |
| Proso millet   | 20.00         | 2.50         | 2.04         | 0.54        | 1.48        | 0.04        | 0.05        | 0.08        | 0.03        | 0.01        | 0.06        | 0.01        | 600          |
| Naked oats     | 15.00         | 2.10         | 1.52         | 1.05        | 0.23        | 0.09        | 0.04        | 0.10        | 0.03        | 0.02        | 0.05        | 0.00        | 450          |
| Milled grass   | 6.00          | 0.32         | 0.97         | 0.22        | 1.50        | 0.04        | 0.02        | 0.02        | 0.02        | 0.05        | 0.02        | 0.01        | 180          |
| Peas           | 10.00         | 1.26         | 2.10         | 0.27        | 0.68        | 0.16        | 0.02        | 0.05        | 0.02        | 0.01        | 0.05        | 0.00        | 300          |
| Feed lime      | 8.00          | 0.00         | 0.00         | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 3.05        | 0.00        | 0.00        | 240          |
| Sunflower oil  | 0.70          | 0.26         | 0.00         | 0.67        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 21           |
| Premix         | 2.20          | 0.00         | 0.00         | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.54        | 0.24        | 0.17        | 66           |
| Sunflower cake | 6.00          | 0.51         | 2.00         | 0.65        | 1.55        | 0.06        | 0.03        | 0.05        | 0.04        | 0.02        | 0.02        | 0.00        | 180          |
| Sesame cake    | 4.90          | 0.39         | 2.40         | 1.85        | 0.29        | 0.05        | 0.05        | 0.09        | 0.03        | 0.04        | 0.02        | 0.00        | 147          |
| Soya cake      | 15.20         | 1.66         | 6.75         | 1.22        | 1.09        | 0.44        | 0.08        | 0.21        | 0.08        | 0.05        | 0.12        | 0.00        | 456          |
|                | <b>100.00</b> | <b>10.38</b> | <b>19.07</b> | <b>6.78</b> | <b>7.20</b> | <b>0.92</b> | <b>0.31</b> | <b>0.68</b> | <b>0.26</b> | <b>3.79</b> | <b>0.62</b> | <b>0.19</b> | <b>3.000</b> |

|                      |       |       |      |      |      |      |      |      |      |      |      |
|----------------------|-------|-------|------|------|------|------|------|------|------|------|------|
| <b>Target values</b> | 10.60 | 17.50 | 6.00 | 5.00 | 0.80 | 0.32 | 0.73 | 0.17 | 3.70 | 0.54 | 0.18 |
|----------------------|-------|-------|------|------|------|------|------|------|------|------|------|

Abbreviations: ME = Metabolizable Energy; MJ = Megajoule; Lys = Lysine; Met = Methionine; Cys = Cysteine; Trp = Tryptophan; Ca = Calcium; P = Phosphorus; Na = Natrium (Sodium)

Values for Protein, Fat and Fibre = crude

Literature: Vogt-Kaute, W. et al. (2018) Proso millet as a protein source for organic poultry. In: Santra D et al.: Proceedings of 3<sup>rd</sup> International Millet Symposium, Fort Collins: 27

## Further information

### Weblinks

- Check the [Organic Farm Knowledge](https://www.organic-farmknowledge.org/) platform for more practical recommendations.
- Grashorn M et al. (2014) [Estimation of ideal nutrient digestibility in native energy and protein feeding stuffs for organic chicken meat production](#), Abschlussbericht BÖLN Projekt 2811OE070.
- Vogt-Kaute W et al. (2018) [Evaluation of millet \(panicum millaceum\) lines and varieties for use of their seeds for poultry](#).

## About this practice abstract and OK-Net EcoFeed

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**Project website:** [ok-net-ecofeed.eu](http://ok-net-ecofeed.eu)

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