

# Protein requirement for piglets and weaners

## Problem

According to the National Research Council (USA) recommended levels of protein and amino acids for pigs are based on data obtained in experiments performed under different conditions, e.g. genetic lines, dietary raw materials, health status and management practices (NRC, 2012). In organic farming, protein and amino acid balance is difficult to achieve, especially in the context of a 100 % organic diet. Reports based on practical experiences highlight that the amino acid requirements of modern pig breeds reared under organic conditions might be lower than the recommended levels, particularly with more balanced growth rates. Thus, e.g., the recommended intake of digestible lysine by organically reared pigs could be lowered.

For piglets, the most physiologically critical phase is the time after weaning when their protein requirement is high, but at the same time, they are sensitive to gastrointestinal disorders. Organic farmers have to rely on organic, and locally grown feedstuffs in combination with organic protein concentrates to provide a good balance of amino acids in the diet.

## Applicability box

### Theme

Pigs, feeding and ration planning

### Geographical coverage

Global

### Application time

Any time

### Required time

Diet formulation

Feed mixing on farm

### Period of impact

During the entire piglet and weaning period

### Equipment

Equipment for home-mixing.

### Best in

Farrowing farms, by either using home mixing or in cooperation with a local feed mill.

## Solution

Adjusting amino acid requirements to below the current recommended levels can help organic producers to meet the nutritional needs for piglets and weaners, in the context of a 100 % organic diet. The diets should be formulated according to the specific production potential and farmer objectives (breed, weaning age, actual health status, aimed growth rate and feed conversion). Examples of different dietary amino acid requirements according to various recommendations are shown in Table 1.



**It is important to always apply careful monitoring of the production and health status of the herd..** Photo: Marie Liljeholm, SLU

## Benefits

The acceptance of a reduced level of amino acids in the diet can enable higher use of locally produced protein feed resources and simplify feed manufacturing, feed handling and diet formulation at the farm level. Formulating diets with optimal protein content and amino acid composition, in relation to piglet needs, will improve health and growth performance and decrease the risk for excessive protein in the diets and excretion of nitrogen to the environment. Using a higher percentage of local feed resources increases self-sufficiency and sustainability of the farm.

**Table 1. Examples of dietary amino acid requirements<sup>a</sup> according to National Research Council of the US (NRC 2012)<sup>b</sup>, the Swedish University of Agricultural Sciences (SLU 2011)<sup>c</sup> and recommendations from the French ITAB (2014) based on practical experiences in organic farming.<sup>d</sup>**

Pig weight	Examples of some dietary essential amino acid requirements					
	NRC			SLU	ITAB	
	5-7 kg	7-11 kg	11-25 kg	10-30 kg	During lactation to 7-10 days post-weaning	Up to 25 kg
<b>Lysine</b>	1.47	1.32	1.22	1.03-0.94	1.2	1.1-1.0
<b>Methionine</b>	0.42	0.38	0.36	0.31-0.28	0.36	0.33-0.30
<b>Methionine + cysteine</b>	0.80	0.72	0.67	0.62-0.56	0.72	0.66-0.60
<b>Threonine</b>	0.86	0.77	0.72	0.64-0.58	0.78	0.72-0.65
<b>Tryptophane</b>	0.25	0.22	0.20	0.20-0.18	0.23	0.21-0.19

<sup>a</sup> Requirements are expressed as standardised ileal digestible (sis) basis (g/MJ NE).

<sup>b</sup> Recommended values (% in diet) are recalculated to g/MJ NE. The values for pigs of 5-11 and 11-25 kg are based on diets with 10.2 and 10.1 MJ NE, respectively.

<sup>c</sup> Requirements are expressed in a range, established by calculations based on BSAS (2003), Jørgensen & Tybirk (2008) and simulations in InraPorc (<http://w3.rennes.inra.fr/inraporc/>). For the calculations of NEv from FEsv 8.8 MJ NEv/FEsv (Sloth, 2008) was used. The overall recommendations are described by the equation:  $y = 1.06 - 0.00376 * x$ , where y is the recommended amount of sis-lysine/MJ NEv and x the live weight of the pigs.

<sup>d</sup> ITAB (2014). Cahier technique: Alimentation des porcs en agriculture biologique.

## Abbreviations

NE = net energy

NEv = net energy for growing pigs

FEsv = feed unit for piglets and growing pigs

Sis-lysine = standardised ileal digestible lysine

## Practical recommendation

- Current recommended levels are based on the maximum production that can be achieved under varying conventional conditions regarding sex, health, environment and breed.
- Use the recommended levels more as guidelines and not as absolute requirements for achieving a certain performance under organic conditions, as the pigs' response can further vary with sex, health, environment and genotype.
- Focus on a gut-friendly diet (adjusted to the piglet's gastrointestinal conditions and nutritional requirements) in order to strengthen the pigs' micro flora and intestinal health.
- A less energy-dense diet with reduced amino acid content, fed *ad libitum*, can increase the daily feed intake by the pigs, and thereby assure a sufficient total daily intake of amino acids.
- Always apply careful monitoring of the production and health status of the herd.
- Own replacement of gilts could be one way to get animals with a lower requirement of amino acids.
- Contact an agricultural adviser for diet formulation or when implementing new feed formulation tools and investing in new technical equipment.
- Analyse the contents of protein and amino acids for the main feed ingredients produced on the farm and those bought on the market in order to make correct diet formulations.



## Further information

## Link

- BSAS (2003). British Society of Animal Science, 2003. Nutrient requirement standards for pigs. (Authors: Whittemore, C.T., Hazzledine, M.J. and Close, W.H.), BSAS, Penicuik.
- ITAB (2014). Alimentation des porcins en agriculture biologique. Cahier Technique. ITAB, Paris. Available at Technical report. <http://itab.asso.fr/downloads/porc-bio/cahier-porc-0.pdf>
- Jørgensen & Tybrik (2008). Jørgensen, L. & Tybrik, P. 2008. Normer for næringsstoffer. Info Svin, <http://vsp.lf.dk/>
- Sloth, (2008). Sloth, N.M. 2008. Energiindhold og fodervurderingssystemer. Info Svin, <http://vsp.lf.dk/>
- SLU (2011). Fodermedel och näringsrekommendationer för gris. SLU, Uppsala, Sweden <https://www.slu.se/institutioner/husdjurens-utfodring-var/Verktug/fodertabeller-och-naringsrekommendationer-for-gris/>
- NRC (2012). Nutrient Requirements of Swine, 11th edition, 459–477. National Academy Press, Washington D.C., p. 210.
- Check the Organic Farm Knowledge platform for more [practical recommendation on animal husbandry](https://www.organicfarmknowledge.org/).

## About this practice abstract and OK-Net EcoFeed

**Publishers:**

Dept. of Animal Nutrition and Management, Swedish University of Agricultural Sciences (SLU). Box 7024, SE-750 07 Uppsala  
<https://www.slu.se/institutioner/husdjurens-utfodring-var>

Research Institute of Organic Agriculture (FiBL)  
Ackerstrasse 113, Postfach 219, CH-5070 Frick  
Phone +41 62 865 72 72, [info.suisse@fibl.org](mailto:info.suisse@fibl.org), [www.fibl.org](http://www.fibl.org)

## IFOAM EU

Rue du Commerce 124, BE-1000 Brussels  
Phone +32 2 280 12 23, [info@ifoam-eu.org](mailto:info@ifoam-eu.org), [www.ifoam-eu.org](http://www.ifoam-eu.org)

**Authors:** Magdalena Presto Åkerfeldt

**Contact:** [magdalena.akerfeldt@slu.se](mailto:magdalena.akerfeldt@slu.se)

**Permalink:** [organic-farmknowledge.org/tool/38395](https://www.organic-farmknowledge.org/tool/38395)



**OK-Net EcoFeed:** This practice abstract was elaborated in the Organic Knowledge Network on Monogastric Animal Feed project. The project is running from January 2018 to December 2020. The overall aim of OK-Net EcoFeed is to help farmers, breeders and the organic feed processing industry in achieving the goal of 100% use of organic and regional feed for monogastrics.

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

**Project partners:** IFOAM EU Group (project coordinator), BE; Aarhus University (ICROFS), DK; Organic Research Centre (ORC), UK; Institut Technique de l'Agriculture Biologique (ITAB), FR; Research Institute of Organic Agriculture (FiBL), CH; Bioland, DE; Associazione Italiana per l'Agricoltura Biologica (AIAB), IT; Donau Soja DS, AT; Swedish University of Agricultural Sciences, SE; ECOVALIA, ES; Soil Association, UK.

© 2020

