

Danish nutrient standards

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Main conclusion

Nutrient recommendations for gilts during the rearing period have been revised, and a separate table of amino acid and macro mineral recommendations has been developed specifically for gilts. The revision applies exclusively to gilts weighing 30 to 60 kg and is scientifically justified by an increase in the dietary content of digestible amino acids to a level that minimises the risk of undesirable behaviours, such as ear biting and tail biting.

Revisions in 37th edition

1. The nutrient recommendations for sows and gilts have been separated and are now presented in two separate tables, Tables 4 and 5, respectively. This change has been requested by several users of the Nutrient Standards, with the aim of improving clarity and ease of use in relation to gilt feeding.
2. For sows, the intended use of the different diets has been revised and the footnotes have been updated. The previous column containing transition feed for use from entry into the farrowing unit until 1 to 2 days after farrowing has been removed. The use of a diet containing 5.0 g digestible lysine per FUsow (feed unit for sows) is no longer recommended as transition feed, as it is not possible to achieve a daily intake of 22 g digestible lysine at a realistic feed dose during the days immediately prior to farrowing. A transition feed should therefore either be the lactation diet itself or a diet containing approximately 6.5 g digestible lysine per FUsow. At this level, a daily feed dose of ≥ 3.5 FUsow will assure the sow of 22 g digestible lysine per day. As a transition feed, a mix consisting of 62% lactation feed and 38% gestation feed will meet these requirements.
3. The nutrient recommendations for gilts in the 30-60 kg and 45-85 kg weight intervals have been revised. The revision consists of an increase in the dietary concentration of digestible amino acids, and it is therefore recommended to follow the amino acid profile used for growing pigs in the 30–60 kg period (Nutrient Standard Column 23) and the 45-75 kg period (Nutrient Standard Column 31), respectively, both based on an assumed feed conversion ratio of 2.60-2.75 FU_{gp} per kg of weight gain. At the same time, the calcium and digestible phosphorus requirements of gilts have been reassessed. As a result, the recommendation for digestible phosphorus is 0.2 g per FU_{gp}/FU_{sow} higher than that for finishers, and the calcium recommendation has been increased proportionally. If no aggressive or undesirable behaviour is observed among the gilts, there is no reason not to continue using the previous recommendation for gilts in the 30-60 kg period. This recommendation will remain included in the Nutrient Standards, although it will now be listed under lactation feed (Nutrient Standard Column 50).

The Danish feed evaluation system

The Danish feed evaluation system is based on the physiological energy value of nutrients and on the standardised digestibility of these nutrients. In 2002, the old feed unit was replaced by two new feed units: FUgp (feed units for weaned pigs, growers and finishers) and FU_{sow} (feed units for sows).

Energy evaluation in Denmark is based on:

1. Chemical analyses of water, ash, crude protein and crude fat
2. In vitro digestibility at ileal level and faecal level
3. Energy values of nutrients based on 'potential physiological values'.

The protein evaluation system is based on the standardised ileal digestibility of each amino acid.

All recommendations are expressed per Danish Feed Unit. In order to calculate g per kg or per MJ in other evaluation systems, the below table can be used.

Energy content per kg diet of a conventional complete diet:					
	Feed unit	MJ ME	MJ NE (French)	EW (Dutch)	MJ physiological energy, DK
Lactation period	1.06 FU _{sow}	13.0	9.9	1.06	8.2
Gestation period	0.99 FU _{sow}	12.0	9.2	0.99	7.6
Weaned pigs, 6-9 kg	1.17 FUgp	13.8	10.3	1.17	8.6
Weaned pigs, 9-30 kg	1.12 FUgp	13.4	9.9	1.12	8.3
Finishers, 30-100 kg	1.05 FUgp	12.8	9.4	1.05	7.7

Amino acids, protein and macrominerals – weaned pigs

The standards for weaned pigs are divided into categories based on feed efficiency, i.e. a higher nutrient content is used for better feed efficiency. During periods of diarrhoea outbreaks, a lower standard level may be chosen, where protective standards provide the best protection against diarrhoea. However, feeding according to a lower standard will reduce productivity and should be limited to the period when diarrhoea problems are most severe. A protein level below the recommended minimum at a given lysine level results in a deficiency of non-essential amino acids.

Calcium and phosphorus recommendations have also been adjusted in relation to feed efficiency, while the standards for other minerals are, for the time being, independent of feed efficiency. The calcium standards are lower for the smallest pigs, as a high calcium supply from feed-grade limestone increases the risk of diarrhoea. This means that the calcium level represents a compromise between minimising the risk of diarrhoea and achieving maximum bone mineralisation.

Table 1a. Nutrient standards – weaned pigs.

Diet	Feed efficiency good: 1.50-1.65 FUgp / kg gain, 6-30 kg				Feed efficiency excellent: < 1.50 FUgp / kg gain 6-30 kg				
	6-9 6-15	9-15	9-30	15-30	6-9 6-15	9-15	9-30	15-30	
Leucine, histidine & isoleucine in % of "ideal protein profile"	86	86	88	90	86	86	88	90	% of lysine
Standard column	1	2	3	4	5	6	7	8	
Standards for digestible protein and amino acids, gram per feed unit									
Lysine	11.5	11.5	12.0	12.0	12.0	12.0	12.5	13.0	
Methionine	3.7	3.7	3.8	3.8	3.8	3.8	4.0	4.2	32
Methionine + cystine	6.2	6.2	6.5	6.5	6.5	6.5	6.8	7.0	54
Threonine	7.1	7.1	7.4	7.4	7.4	7.4	7.8	8.1	62
Tryptophan	2.65	2.65	2.52	2.52	2.76	2.76	2.63	2.73	21-23
Isoleucine	5.2	5.2	5.6	5.7	5.5	5.5	5.8	6.2	46-48
Leucine	9.9	9.9	10.6	10.8	10.3	10.3	11.0	11.7	86-90
Histidine	3.2	3.2	3.4	3.5	3.3	3.3	3.5	3.7	28-29
Phenylalanine	6.2	6.2	6.5	6.5	6.5	6.5	6.8	7.0	54
Phenylalanine + tyrosine	10.9	10.9	11.4	11.4	11.4	11.4	11.9	12.4	95
Valine	7.2	7.2	7.6	7.6	7.5	7.5	7.9	8.3	62-64
Protein, min	135	137	145	148	141	143	151	160	
Protein, max	143	145	153	156	149	151	159	168	
Macrominerals, gram per feed unit									
Digestible phosphorus	3.4	3.3	3.2	3.1	3.7	3.6	3.5	3.4	
Calcium, 0% phytase	7.2	8.2	8.7	8.7	7.4	8.4	8.9	8.9	
Calcium, 60-100% phytase	6.7	7.7	8.2	8.2	6.9	7.9	8.4	8.4	
Calcium, 150-250% phytase	6.4	7.4	7.9	7.9	6.6	7.6	8.1	8.1	
Calcium, 300-400% phytase	6.2	7.2	7.7	7.7	6.4	7.4	7.9	7.9	
Sodium	2.5	2.1	2.0	1.9	2.5	2.1	2.0	1.9	
Chloride	4.0	3.5	3.4	3.2	4.0	3.5	3.4	3.2	
Potassium	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Magnesium ¹	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
Vit. + micro., see Table 6	6-9	9-15	9-30	15-30	6-9	9-15	9-30	15-30	

* Increase by 0.2 g, if phytase dosage (Table 7) is 100% or less.

Table 1b. Nutrient standards – weaned pigs

Diet	Protective		Regular 1.65-1.8 FUgp/kg gain 6-30 kg				
	5-9	9-15 6-15	6-9 6-15	9-15	9-30	15-30	
	74	86	86	86	88	90	
	10 ^{1,2}	11 ²	14	15	16	17	
Standards for digestible protein and amino acids, gram per feed unit							% of lysine
Lysine	12.0	10.5	11.0	11.0	11.5	11.5	
Methionine	3.8	3.4	3.5	3.5	3.7	3.7	32
Methionine + cystine	6.5	5.7	5.9	5.9	6.2	6.2	54
Threonine	7.4	6.5	6.8	6.8	7.1	7.1	62
Tryptophan	2.76	2.42	2.53	2.53	2.42	2.42	21-23
Isoleucine	4.7	4.8	5.0	5.0	5.4	5.5	39-48
Leucine	8.9	9.0	9.5	9.5	10.1	10.4	74-90
Histidine	2.8	2.9	3.0	3.0	3.2	3.3	24-29
Phenylalanine	4.8	5.7	5.9	5.9	6.2	6.2	40-54
Phenylalanine + tyrosine	8.9	10.0	10.5	10.5	10.9	10.9	74-95
Valine	7.0	6.5	6.9	6.9	7.2	7.3	58-64
Protein, min	125	125	130	132	140	143	
Protein, max	128	133	138	140	148	151	
Macrominerals, gram per feed unit							
Digestible phosphorus	3.1	3.0	3.2	3.1	3.0	2.9	
Calcium, 0% phytase	6.8	6.8	7.0	8.0	8.5	8.5	
Calcium, 60-100% phytase	6.3	6.3	6.5	7.5	8.0	8.0	
Calcium, 150-250% phytase	6.0	6.0	6.2	7.2	7.7	7.7	
Calcium, 300-400% phytase	5.8	5.8	6.0	7.0	7.5	7.5	
Sodium	2.5	2.1	2.5	2.1	2.0	1.9	
Chloride	4.0	3.5	4.0	3.5	3.4	3.2	
Potassium	2.5	2.5	2.5	2.5	2.5	2.5	
Magnesium ³	0.9	0.9	0.9	0.9	0.9	0.9	
Vit. + micro., see Table 6	6-9	9-15	6-9	9-15	9-30	15-30	

1) For standard column 10, it is a prerequisite that, with regard to free, crystalline lysine, no more than 0.5% lysine sulphate is used in the diet, as applied in Trial Report No. 1263. The remaining added lysine must be supplied as lysine hydrochloride (lysine HCl), as the sulphate contribution from lysine sulphate is suspected of increasing the risk of osmotic diarrhoea.

² The two lowest levels of protein and amino acids (standard columns 10 and 11) minimise diarrhoea but at the same time impair production results and should therefore be used for the shortest possible period.

³) Increase by 0.2 g if the phytase dose (Table 7) is 100% or lower.

Amino acids, protein and macrominerals – growers and finishers

The standards for amino acids, protein and macrominerals for growers and finishers are presented in Tables 2 and 3. The price relationships used to calculate the economically optimal amino acid levels, as well as guidance on adjustment using herd-specific figures, are given in the Appendix.

The recommended weight intervals and the choice of standard levels depend on feed efficiency throughout the entire finishing period from 30 to 115 kg. If feed efficiency in the 30-115 kg period is, for example, 2.55 feed units (FUgp) per kg of weight gain, then in the 30-60 kg period a diet containing 9.8 g digestible lysine per feed unit should be used (standard column 22), along with all nutrients from that standard column.

For growers, as for weaned pigs, emphasis has been placed on maximising protein utilisation at the lowest possible protein level, due to the risk of diarrhoea. To meet all standards at the minimum protein level, and with typical feed ingredient choices, it may be necessary to also include tryptophan and valine in the diets in addition to lysine, methionine and threonine. Alternatively, the protein level must be slightly increased.

Table 2. Nutrient standards – growers and finishers (standard columns 20 to 30).

Table 2. Nutrient standards – growers and finishers (standard columns 20 to 30).						
Feed efficiency, 30-115 kg	Weight interval current diet, kg					% of lysine
2.00 – 2.15 FUgp/kg gain	30-75	30-115 45-75	45-115	60-115	75-115	
2.15 – 2.30 FUgp/kg gain	30-60	30-75	30-115 45-75	45-115	60-115	
2.30 – 2.45 FUgp/kg gain	25-45	30-60	30-75	30-115 45-75	45-115	
2.45 – 2.60 FUgp/kg gain	20-45	30-45	30-60	30-75	30-115 45-75	
2.60 – 2.75 FUgp/kg gain		20-45	30-45	30-60	30-75	
> 2.75 FUgp/kg gain			20-45	30-45	30-60	
Leucine, histidine + isoleucine in % of "ideal protein profile"	90	92	94	96	98	
Standard column	20	21	22	23	24 og 30	
Standards for digestible protein and digestible amino acids, gram per feed unit						
Lysine	11.0	10.4	9.8	9.2	8.6	100
Methionine	3.3	3.1	2.9	2.8	2.6	30
Methionine + cystine	5.9	5.6	5.3	5.0	4.6	54
Threonine	6.8	6.5	6.2	5.9	5.6	62-65
Tryptophan	2.20	2.08	1.96	1.84	1.72	20
Isoleucine	5.2	5.1	4.9	4.7	4.5	48-52
Leucine	9.9	9.6	9.2	8.8	8.4	90-98
Histidine	3.2	3.1	2.9	2.8	2.7	29-31
Phenylalanine	5.9	5.6	5.3	5.0	4.6	54
Phenylalanine + tyrosine	11.0	10.4	9.8	9.2	8.6	100
Valine	7.0	6.7	6.3	5.9	5.5	64
Protein, minimum	143	138	133	128	124	
Macrominerals, gram per feed unit						
Digestible phosphorus	3.2	3.0	2.8	2.6	2.4	
Calcium, 0% phytase	8.6	8.2	7.8	7.5	7.2	
Calcium, 60-100% phytase	8.0	7.6	7.3	7.0	6.7	
Calcium, 150-250% phytase	7.7	7.3	7.0	6.7	6.4	
Calcium, 300-400% phytase	7.5	7.1	6.8	6.5	6.2	
Sodium	2.1	1.9	1.8	1.7	1.6	
Chloride	3.5	3.2	3.0	2.8	2.6	
Potassium	2.5	2.5	2.5	2.5	2.5	
Magnesium ¹	0.9	0.8	0.8	0.8	0.7	
Vit. + micro., see Table 6	Finishers					

* Increase by 0.2 g if the phytase dose (Table 7) is 100% or lower.

The recommended weight intervals and selection of standard levels depend on feed efficiency throughout the entire finishing period from 30 to 115 kg.

The amino acid standards represent the economically optimal level for a given feed efficiency potential, based on average prices over a five-year period. The Appendix provides guidance on the optimal choice of standard column under different pricing conditions. For a feed efficiency of 2.45-2.60 feed units (FUgp) per kg of weight gain, the standard is therefore 8.6 g digestible lysine per FUgp (standard columns 24 and 30), together with all nutrients in that standard column. If, in such a herd, 9.2 g digestible lysine is used, productivity will increase marginally, but feed costs will rise slightly more than the value of the improved productivity. Conversely, the loss in productivity will exceed the savings from lower feed costs if the level is reduced to 8.2 g digestible lysine.

For finishers, the minimum standards for digestible protein will normally ensure that only lysine, methionine, threonine and tryptophan need to be supplemented - although tryptophan can often be omitted in diets containing less than 5% sunflower meal. While it is possible to meet all standards at a lower protein level by supplementing both tryptophan and valine, this cannot be recommended, as the feed does not become cheaper and as lower protein levels reduce the meat percentage. The standards for calcium and digestible phosphorus are sufficient to ensure maximum productivity and good bone mineralisation, and represent the recommended levels based on considerations of productivity, animal welfare, environmental impact, and economic efficiency.

Table 3. Nutrient standards – growers and finishers (standard columns 30 to 35).

Feed efficiency, 30-115 kg	Weight interval current diet						
2.30 – 2.45 FUgp/kg gain	45-115	60-115	75-115				
2.45 – 2.60 FUgp/kg gain	30-115 45-75	45-115	60-115	75-115			
2.60 – 2.75 FUgp/kg gain	30-75	30-115 45-75	45-115	60-115	75-115		
> 2.75 FUgp/kg gain	30-60	30-75	30-115 45-75	45-115	60-115	75-115	
Leucine, histidine + isoleucine in % of "ideal protein profile"	98	100	100	100	100	100	
Standard column	24 og 30	31	32	33	34	35	
Standards for digestible protein and digestible amino acids, gram per feed unit							% of lysine
Lysine	8.6	8.2	7.9	7.6	7.3	7.1	100
Methionine	2.6	2.5	2.4	2.3	2.2	2.1	30
Methionine + cystine	4.6	4.4	4.3	4.1	3.9	3.8	54
Threonine	5.6	5.4	5.2	5.0	4.8	4.7	65-67
Tryptophan	1.72	1.64	1.58	1.52	1.46	1.42	20
Isoleucine	4.5	4.3	4.2	4.0	3.9	3.8	52-53
Leucine	8.4	8.2	7.9	7.6	7.3	7.1	98-100
Histidine	2.7	2.6	2.5	2.4	2.3	2.3	31-32
Phenylalanine	4.6	4.4	4.3	4.1	3.9	3.8	54
Phenylalanine + tyrosine	8.6	8.2	7.9	7.6	7.3	7.1	100
Valine	5.5	5.2	5.1	4.9	4.7	4.5	64
Protein, minimum	124	120	116	112	108	105	
Macrominerals, gram per feed unit							
Digestible phosphorus	2.4	2.3	2.2	2.1	2.0	2.0	
Calcium, 0% phytase	7.2	7.0	6.7	6.3	6.1	6.1	
Calcium, 60-100 % phytase	6.7	6.5	6.2	5.9	5.6	5.6	
Calcium, 150-250 % phytase	6.4	6.2	5.9	5.6	5.4	5.4	
Calcium, 300-400 % phytase	6.2	6.0	5.7	5.4	5.2	5.2	
Sodium	1.6	1.5	1.4	1.3	1.3	1.3	
Chloride	2.6	2.5	2.4	2.2	2.2	2.2	
Potassium	2.5	2.5	2.5	2.5	2.5	2.5	
Magnesium ¹	0.7	0.7	0.7	0.6	0.6	0.6	
Vit. + micro., see Table 6	Finishers						

* Increase by 0.2 g if the phytase dose (Table 7) is 100% or lower.

Amino acids, protein and macrominerals – sows

Standards for protein, amino acids and macro minerals for sows are shown in Table 4. Please note that the footnotes include important feeding recommendations for the transition period to ensure maximum udder development and to establish the basis for high milk production. Similarly, a professional assessment is provided regarding deviations from the standard recommendations for lactating sows.

Table 4. Nutrient standards for sows. Recommended use is indicated by “X”, while “(X)” indicates a possible, but not primary, recommendation, and “÷” indicates a use that is not recommended.

Primary use	Lactating sows	Empty sows and gestating sows		
Lactating sows	X			
Weaning to service	(X)	X	(X)	÷
Gestating incl. gilts, day	÷	90-114	0-114	0-90
Gestating excl. gilts, day		90-114	0-114	0-110
Standard column	50	51 og 63 ¹	52 og 64 ²	53
Standards for digestible protein and digestible amino acids, gram per FU_{sow}				
Lysine	7.7 ^{3,4}	5.0 ^{3,5}	4.0 ^{3,5}	3.5 ^{3,5}
Methionine	2.4	1.5	1.2	1.1
Methionine + cystine	4.5	3.3	2.6	2.3
Threonine	5.0	3.6	2.9	2.5
Tryptophan	1.54	1.0	0.8	0.7
Isoleucine	4.3	3.0	2.4	2.1
Leucine	8.3	5.1	4.1	3.6
Histidine	2.8	1.8	1.4	1.2
Phenylalanine	4.2	2.9	2.3	2.0
Phenylalanine + tyrosine	8.7	5.1	4.1	3.6
Valine	5.3	3.7	3.0	2.6
Protein, minimum	118	90	80	75
Standards for macro minerals, gram per FU_{sow}				
Digestible phosphorus	3.0	2.3	2.0	2.0
Calcium, 0% phytase	8.0	7.0	7.0	7.0
Calcium, 60-100% phytase	7.5	6.5	6.5	6.5
Calcium, 150-250% phytase	7.2	6.2	6.2	6.2
Calcium, 300-400% phytase	7.0	6.0	6.0	6.0
Sodium	1.5	1.5	1.5	1.5
Chloride	2.5	2.5	2.5	2.5
Potassium	2.5	2.5	2.5	2.5
Magnesium ⁶	1.0	0.6	0.5	0.5
Vit. and micro., see Table 6	Lactating	Gestating		

¹⁾ Columns 51 and 63 are identical, as the same amino acid content can be used in feed for the service unit and for gilts weighing 85-110 kg.

²⁾ Columns 52 and 64 are identical, as the same amino acid content can be used in feed for gestating sows and for gilts weighing more than 110 kg.

³⁾ To ensure optimal udder development and subsequent milk yield, sows and gilts should be provided with at least 22 g of digestible lysine per day from day 108 after service until farrowing. All supporting amino acid levels must be maintained relative to the 22 g of digestible lysine, in accordance with the standards for lactating sows (standard column 50). The intake of 22 g digestible lysine per day can, for example, be achieved by feeding a lactation diet (standard column 50) at a daily feed dose of >2.85 FU sow per day, or by using a specific transition diet containing, for example, 6.5 g digestible lysine per FU sow and a daily feed dose of >3.4 FU_{sow} per day. A mix consisting of 62% lactation feed (standard column 50) and 38% gestation feed (standard column 53) will also ensure compliance with the above requirement.

⁴⁾ The requirement for an additional nutrient standard for lactating sows was reassessed in 2026 based on a re-analysis of results from previous feeding standard trials. A positive effect (up to approximately 100 g increase in daily litter weight gain) from increasing the level to, for example, 9.0 g digestible lysine and proportionally increasing all other amino acids to maintain the current amino acid profile can only be expected in herds where a large proportion of sows (>60-70%) achieve a daily litter weight gain exceeding 3.0–3.2 kg per day while simultaneously consuming at least 9.0 FU sow per day from around 14 days post-farrowing until weaning. Based on trials conducted between 2017 and 2025, it is considered that only a limited number of herds would benefit from exceeding the current standard (standard column 50).

⁵⁾ Of which a maximum of 30% may be supplied as free lysine when feeding once daily, as free amino acids are not fully utilised under a single daily feeding regime.

⁶⁾ Increase by 0.2 g per FU sow if the phytase dose (Table 7) is 100% or lower.

The nutrient recommendations for sows in the service unit and for gestating sows are designed to ensure maximum productivity and optimal bone strength, while limiting undesirable body growth so that the sows do not become excessively heavy. At the same time, the low amino acid and protein content enables an efficient restoration of body condition. The recommendation for lactating sows has been

assessed as economically optimal in herds with high litter growth, corresponding to an average daily litter weight gain of 3.0-3.2 kg per day.

For gestating sows, it is recommended that free lysine should account for no more than 30% of digestible lysine when feeding once daily, as free lysine has reduced utilisation at high inclusion levels under a once-daily feeding regime. When feeding two or more times daily, a high proportion of free lysine is not problematic. Other amino acids very rarely reach 30% free amino acids when the minimum recommendations for protein are met.

Amino acids, protein and macrominerals – gilts

The recommended levels of protein, amino acids and macrominerals for gilts are shown in Table 5. For gilts, lower levels of digestible protein and amino acids are recommended than for finishers in order to ensure that the gilts do not become excessively large and heavily muscled, and that they develop sufficient backfat prior to first mating. National and international trials and practical experience have shown that excessively low levels of protein and amino acids increase the risk of aggressive behaviour, including tail biting and ear biting. Therefore, phase feeding is recommended, as it allows growth rates to be reduced without increasing the risk of behavioural problems during the early stages of the growing period. The recommended levels of calcium and phosphorus for gilts are slightly higher than those for finishers in order to ensure optimal mineral deposition in the bones.

Table 5. Nutrient standards for gilts.

Primary use	Gilts				
Gilts, weight interval kg	30-45/60	45-60/85	60-110	85-110	110-150
Standard column	60	61	62	63 og 51 ¹	64 og 52 ²
Standards for digestible protein and digestible amino acids, gram per feed unit					
Lysine	9.2	8.2	6.0 ³	5.0	4.0
Methionine	2.8	2.5	1.9	1.5	1.2
Methionine + cystine	5.0	4.4	3.5	3.3	2.6
Threonine	5.9	5.4	3.9	3.6	2.9
Tryptophan	1.84	1.64	1.2	1.0	0.8
Isoleucine	4.7	4.3	3.4	3.0	2.4
Leucine	8.8	8.2	6.5	5.1	4.1
Histidine	2.8	2.6	2.2	1.8	1.4
Phenylalanine	5.0	4.4	3.3	2.9	2.3
Phenylalanine + tyrosine	9.2	8.2	6.8	5.1	4.1
Valine	5.9	5.2	4.1	3.7	3.0
Protein, minimum	128	120	100	90	80
Standards for macro minerals, gram per feed unit					
Digestible phosphorus	2.8	2.5	2.3	2.3	2.0
Calcium, 0% phytase	7.8	7.4	7.0	7.0	7.0
Calcium, 60-100% phytase	7.3	6.9	6.9	6.5	6.5
Calcium, 150-250% phytase	7.0	6.6	6.6	6.2	6.2
Calcium, 300-400% phytase	6.8	6.4	6.4	6.0	6.0
Sodium	1.8	1.7	1.5	1.5	1.5
Chloride	3.0	2.7	2.5	2.5	2.5
Potassium	2.5	2.5	2.5	2.5	2.5
Magnesium ⁴	0.8	0.8	0.7	0.6	0.5
Vit. and micro., see Table 6	Gestating				

¹ Standard columns 63 and 51 are identical, as the same amino acid concentrations can be used in feed for gilts from 85 to 110 kg as in the feed used in the service unit.

² Standard columns 52 and 64 are identical, as the same amino acid concentrations can be used in feed for gilts weighing more than 110 kg as in feed for gestating sows.

³ The amino acid profile for gilts at 6.0 g digestible lysine per FU has been set equal to the lactation profile to allow for the possible use of the same diet during the final 7 days before farrowing.

⁴ Increase by 0.2 g per FU (FEsv/FEso) if the phytase inclusion level (Table 7) is 100% or lower.

Vitamins and microminerals

Table 6. Vitamin and micromineral standards – all pigs.

	Gestating sows Gilts > 110 kg Service unit	Lactating sows	Weaned pigs			Finishers and gilts 30-110 kg
			6-9 kg	9-15 kg	15-30 kg	
Vitamins = added per feed unit						
Vitamin A, i.u.	8000	8000	8000	5000	5000	4000
Vitamin D ₃ , i.u.	800*	800*	800	500	500	400
Vitamin E, i.u.	40	165	140	140	60	40
- as <i>dl</i> - α -tocopherol, mg	36	150	130	130	54	36
- corresponding to vitamin E (all-rac acetate), mg	40	165	140	140	60	40
- corresponding to vitamin E (RRR), mg	27	111	94	94	40	27
- corresponding to vitamin E (RRR acetate), mg	29	121	103	103	44	29
Vitamin K ₃ , mg	2	2	2	2	2	2
Thiamine (B ₁), mg	2	2	2	2	2	2
Riboflavine (B ₂), mg	5	5	4	4	4	2
Pyridoxine (B ₆), mg	3	3	3	3	3	3
Niacine, mg	20	20	20	20	20	20
Biotin, mg	0.2	0.2	0.2	0.2	0.2	0.05
D-Pantothenic acid, mg	15	15	10	10	10	10
Folic acid, mg	1.5	1.5	0	0	0	0
Vitamin B ₁₂ , mcg	20	20	20	20	20	20
Microminerals = total content in feed, ie. added + natural content per feed unit						
Iron, mg	80	80	150**	150**	150**	80
Copper, mg	6	6	6	6	6	6
Manganese, mg	40	40	40	40	40	40
Zinc, 0-150% phytase, mg***	100	100	100	100	100	100
Zinc, 200-400% phytase, mg***	100	100	100	100	100	70
Iodine, mg****	0.5	1.0	0.3	0.3	0.3	0.3
Selenium, mg****	0.2	0.2	0.35	0.35	0.35	0.2

* The active part of vitamin D is 25-OH D3 vitamin. Vitamin D can be added to feed either as regular vitamin D3 (cholecalciferol) or as 25-OH D3 vitamin (HyD®). 1 microgram HyD® corresponds to 40 i.u. vitamin D3. Danish studies show that when added to feed in identical concentrations, 25-OH D3 vitamin content in blood is more than twice as high when using HyD® compared with regular vitamin D3, and that HyD® has a positive effect on sow productivity – in particular in pigs' weaning weight, as HyD® is more easily transferred to foetuses and sow milk than regular vitamin D3-vitamin. Correspondingly, Danish trials have shown that the use of Hy-D® in feed for gilts in the growth period does not enhance bone strength compared with the use of vitamin D3 dosed according to current standards.

** Of this min. 100 mg easily soluble iron salt

*** Feed contains approx. 30 mg natural zinc per FUgp, which is why the added dose is 30 mg lower than the standard. Consequently, if finisher feed contains minimum 200% phytase, only 40 mg zinc per FUgp is added.

**** According to the Danish Feedstuff Act, diets must not contain more than 0.5 mg selenium per kg complete diet. Depending on the composition of the diet, ie. it is allowed to add 0.2-0.35 mg selenium per feed unit.

***** If the feed contains more than 10% rapeseed product (> 1.5 mmol glucosinolates/kg), it is recommended to increase iodine by 50%.

Phytase and recommended minimum content of total-phosphorus

The majority of phytase products are subject to the same official analysis method, whereby the activity is analysed at pH 5.5. Table 7 below only includes phytase products that have been analysed using this method. Given that phytase must function in the stomach at pH 3.0-4.5, the activity recorded at this pH combined with resistance to the pig's enzymes and other enzyme traits determines the effect in the pigs. Table 7 shows the levels at which the relevant enzymes generate the same effect. These levels can all

be applied in the Danish phytase analysis system, provided that the feed contains the stated amount of phytase, also after pelleting.

It is important to highlight that in pelleted feed, analyses should reveal 150-300 FTU more than the amount added, as 150-300 FTU of grain phytase is typically capable of surviving the pelleting process. Correspondingly, analyses of home-mixed feed will typically reveal 400-800 FTU more phytase than the amount added, as this is the amount of grain phytase that originates from grain that has not been subject to heat treatment. The challenge arises from the fact that 500 FTU grain phytase have a significantly lower effect than 500 FTU phytase from the enzymes added as grain phytase is not as effective in the low pH of the stomach.

Table 7. Phytase units/kg feed in different phytase products; inclusion rates ranging from 100 to 400%.

Inclusion	Natuphos ¹ Ronozyme HiPhos (FYT) Optiphos Plus (FTU)	Axtra Phy (FTU)	Axtra Phy Gold (FTU)	Quantum Blue (FTU) HiPhorius (FYT)	Natuphos E (FTU)	Enzy ³ Phostar (FTU)
100%	500	300	(260) ²	325 ⁴	350	750
150%	750	450	(390) ²	488	525	1,125
200%	1,000	600	520	650	700	1,500
300%	1,500	900	780	975	1,050	2,250
400%	2,000	1,200	1,040	1,300	1,400	3,000

1) 500 FTU inclusion of Natuphos is original reference for 100% inclusion, but Natuphos is not commercially available today.

2) Minimum allowed inclusion is 500 FTU as this is the lowest tested inclusion in the EFSA approval.

3) Enzy Phostar is not pelleting-resistant and can only be used in meal-based feed.

4) Quantum Blue minimum inclusion in feed for sows and finishers: 250 FTU. Minimum inclusion in feed for weaned pigs: 500 FTU.

As it is not possible to analyse the content of digestible phosphorus in feed, it can be assessed to some degree on the basis of the total content of phosphorus. Table 8 illustrates the recommended minimum content of total phosphorus in diets containing phytase.

Table 8. Guiding minimum content of total phosphorus¹ in complete diets with phytase, g per feed unit.

Phytase, % of standard ²	Dig. P	Min. content of total P when adding phytase					
		100		200		300	400
Complete diet (CD) / Home-mixed (HM)		CD	HM	CD	HM	Both	Both
Weaned pigs, 9-30 kg	3.1	5.4	5.1	5.1	5.0	4.9	4.8
Finishers, 30-115 kg	2.5	4.50	4.25	4.20	4.05	3.95	3.90
	2.4	4.35	4.10	4.05	3.90	3.80	3.75
	2.3	4.20	3.95	3.90	3.75	3.65 ³	3.60 ³
	2.2	4.05	3.80	3.75	3.60 ³	3.50 ³	3.45 ³
Gestating sows	2.0	3.8	3.5	3.4	3.3	3.3	3.2
Lactating sows	3.0	5.2	5.0	4.9	4.8	4.75	4.7

1) Prerequisites of minimum recommendations: conventional diets based on grain and soybean meal without extracted rapeseed meal and extracted sunflower meal, in which wheat constitutes approx. 50% of the grain in feed for sows and minimum 2/3 of the grain in feed for weaned pigs and finishers. Phosphorus source: monocalcium phosphate. In other types of diets, the content of total phosphorus often needs to be slightly higher to meet the standards for digestible phosphorus. Minimum standard for finisher feed: Four standards for digestible phosphorus corresponding to four levels of feed conversion ratio.

2) Phytase units in different phytase products in different inclusion rates are shown in table 7.

3) Such a low level of phosphorus is difficult to reach as the feed's natural content of phosphorus is usually higher even when only grain and soybean meal are used – depending on P content in the harvest of the year in question.

Revision of the standards

The standards are routinely revised. Revisions are made by experts from Aarhus University, the University of Copenhagen, pig production advisors, the feedstuff industry and SEGES Innovation.

Amino acids and protein:

1990:	The standards for the first five amino acids were revised according to new weaner trial results.
1991:	The standards for male pigs were reduced by 10% on the basis of new trial results. Consequently, this set of standards does not include specific standards for male pigs.
1996:	Standards were determined for the remaining six amino acids.
1998:	Standards were incorporated applicable to phase feeding.
2001:	- The standards for methionine, methionine + cystine, and threonine for sows were revised. - The standards for leucine for weaned pigs and growers, and for methionine for finishers were revised.
2002:	- The standards for threonine and tryptophan for weaned pigs were revised. - New amino acid standards and recommendations for minimum content of crude protein were incorporated. This applies to the new feed evaluation system introduced in the summer of 2002. - The amino acid standards were changed from apparent faecal digestible to standardised ileal digestible. - The standards for histidine and leucine for growers (20-45 kg) were changed in the new feed evaluation system, as there was no agreement between the standards for the different weight intervals for these two amino acids.
2004:	- The threonine standard for finishers was increased and the standards for several of the amino acids were adjusted slightly, as the composition of the ideal protein for certain weight intervals was deemed illogical. - The weight intervals were standardized, which means that 30-100 kg is used in all tables for unity mixes for finishers.
2005:	Standards were introduced for heavy pigs (slaughter weight: 110-115 kg) in the weight interval 65-110 kg.
2006:	The standard for tryptophan for weaned pigs was revised.
2008:	- The amino acid standards for weaned pigs were revised and recommendations were incorporated for amino acid content in feed on farms with diarrhoea problems. - A maximum content of digestible protein per FUgp was introduced in weaner feed. - The standards for methionine, tryptophan, valine and leucine for finishers were changed. - The rule-of-thumb for the importance of amino acid deficiency was deleted.
2010:	The standard for valine for weaned pigs was revised.
2012:	- The standard for lysine for weaned pigs was revised. - Weight intervals in the weaner period were revised. - Ideal protein composition was revised (isoleucine, histidine and tryptophan) for weaned pigs. - Guiding minimum and maximum content of digestible protein per feed unit was reduced. - Phase feeding standards for growers/finishers were revised.
2013:	Amino acid standards for lactating sows and for finishers were revised.
2014:	Amino acid standards for gilts were incorporated.
2015:	The ideal protein profile for weaner and finisher feed was revised. For weaned pigs, the revision concerned leucine, phenylalanine and phenylalanine+tyrosine. For finishers, the revision concerned methionine, isoleucine, phenylalanine, phenylalanine+tyrosine, and valine. Furthermore, a standard

	for specialised production was introduced focusing on lean meat %, relevant for, for instance, producers delivering pigs for the British markets.
2015:	The standard for digestible lysine for lactating sows was raised to 7.7 g per feed unit and the amino acid profile in per cent of lysine was maintained, ie. all amino acids standards were raised by 16-17%. The minimum standard for digestible crude protein for lactating sows was raised from 110 to 125 g per feed unit.
2016:	The lysine standard was raised to 8.8 and 8.5 g per feed unit for growers in the weight intervals 30-45 kg and 30-55 kg. The remaining amino acids for growers were revised according to the current amino acid profile with the exception of isoleucine, leucine and histidine. These three amino acids were lowered to the same percentage of lysine as in the weaner standards for all weight intervals for growers and finishers, ie. 53, 100 and 32% of lysine. The standards for amino acids and protein for finishers in all weight intervals were raised by 2.5% for each time FCR improves by 0.1 with on a point of departure of 2.8 feed units per kg gain.
2017:	The tryptophan standard for weaned pigs is increased to 21% of lysine. The standards for digestible methionine, methionine+cystine, leucine, histidine, valine and protein in lactation feed were lowered.
2018:	The amino acid standards for weaned pigs are adjusted to 10.6 g digestible lysine per FUgp for the entire period 6-30 kg. A fourth step for improved FCR was introduced in the finisher standards, and a slightly greater effect of feed consumption is now included: 0.3 g digestible lysine and 4 g digestible protein per 0.1 FUgp/kg gain improved FCR. The effect of production for the UK market is increased to 0.3 g digestible lysine and 8 g digestible protein per FUgp in diets used up to slaughter.
2019:	Amino acid standards for weaned pigs are adjusted: in the 6-15 kg period, leucine, isoleucine and histidine only constitute 90% and valine only 95% of lysine. Consequently, the minimum protein standards are lowered in diets for pigs below 15 kg. For pigs above 15 kg the standards for lysine, methionine, threonine and tryptophan are raised by approx. 4% and the standards for leucine, isoleucine and histidine are lowered by 1%. Thereby leucine, isoleucine and histidine constitute 95% and valine approx. 98% of the previous standard. It is now possible to select a protective diet for all weight intervals. Amino acid standards for growers and finishers are adjusted slightly as there are now amino acid standards for three levels of feed conversion. For small growers, the standards for leucine, isoleucine and histidine are lowered to 96-98% of the previous profile to avoid a high protein level. The standards for protein and amino acids for specialised productions are specified in a separate table. The lysine standard for gestating sows in the entire period is raised to 4.0 g digestible lysine per FUsow and standards are provided for phase feeding of gestating sows with 3.5 g digestible lysine per FUsow until day 85 after service followed by 5.0 g digestible lysine per FUsow until transfer to the farrowing unit. The amino acid profile for the service unit and for gestating sows is also adjusted, so that the profile is now met based on theoretical calculations of requirement for growth and maintenance.
2021:	Standards for weaned pigs are adapted (inclusion and profile) to three levels of FCR. The standards recommended in cases of poor FCR can also be applied for 'protective' diets for prevention of diarrhoea. Lysine, methionine, threonine, tryptophan and valine are raised by approx. 5% to a given protein level (leucine level). Consequently, in the growth intervals 6-15, 9-30 and 15-30 kg, leucine, isoleucine and histidine only constitute 86, 88 and 90%, respectively, of the previous (pre-2019) percentage of lysine. Valine constitutes 93, 94 and 95% of lysine in the growth intervals 6-15, 9-30 and 15-30 kg. For finishers, protein minimum standards are lowered – in particular in the 'UK standards' – while the amino acid standards remain unchanged.

2023:	Tryptophan standards for pigs up to 15 kg are raised from 21 to 23% of lysine. Lysine standards for growers and finishers are raised by 0.2 g digestible lysine/FUgp, and valine standards are lowered from 67 to 64% of lysine. This has permitted a reduction in digestible protein by 2 g/FUgp for all standards below 9.5 g digestible lysine/FUgp.
2024:	The phase-feeding standards replace the unity standard of 6.0 g digestible lysine in feed for gilts in the 30-110 kg period. This is done in order to prevent behavioural issues during the initial growth period. The minimum standards for digestible protein in feed for empty sows and gilts are lowered by 5-10 g per feed unit to fulfil the necessary requirements in order to comply with all amino acid standards (safety margin eliminated). In addition, footnotes in table 4 stipulate that sows must be provided with a minimum of 5 g digestible lysine per feed unit in the final week prior to farrowing to stimulate milk production. The weight interval for the use of the lowest protective standard is modified from 6-15 to 6-9 due to the risk of behavioural issues associated with long-term use.
2026:	New category for weaned pigs with particularly good feed efficiency. New content in standard column no. 10: 12 g lysine, profile: 74%, 125 g digestible protein. Protective standard columns nos. 12 and 13 have been removed. Higher amino acid content in standard columns nos. 20–23 for growers and finishers.
2026:	The nutrient standards for sows and gilts have been separated into two separate tables. The recommended application ranges for different types of sow feed have been adjusted in accordance with the latest trial results. The amino acid standards for gilts have been revised for the 30-60 kg weight interval, and a new standards column covering 45-85 kg has been added.

Minerals:

1991:	The selenium standard was revised.
1995:	Standards for digestible phosphorus for growers and finishers were incorporated in the standards.
1997:	The standards for calcium and digestible phosphorus for sows and weaned pigs were revised.
1998:	Phase feeding standards for phosphorus were incorporated in the standards.
2000:	Calcium standards for sows and weaned pigs were revised.
2002:	- The recommendations for total-P in the feed including phytase were revised. - A calcium standard was incorporated for the use of phytase.
2005:	The standard for digestible phosphorus was made a minimum standard.
2006:	- The standard for digestible phosphorus for weaned pigs was revised. - The guiding minimum content of total-P was revised. - Recommendations for double dosage of phytase were introduced.
2008:	The standards for digestible phosphorus were revised for all animal groups.
2010:	- The standards for digestible phosphorus for growing pigs and finishers were revised, and the guiding levels of total phosphorus were revised. - A recommendation for increased phosphorus content was introduced when a high zinc inclusion is applied (2,500 ppm).
2012:	Efficiency of a new phytase product (Ronozyme NP) was determined.
2014:	Mineral standards for gilts and recommendation for calcium content in feed for weaned pigs suffering from diarrhoea were incorporated.
2015:	The standard for digestible phosphorus for lactating sows was raised from 2.7 to 3.0 g per feed unit.
2016:	Optiphos phytase – efficiency estimated at 250 OTU for 100% inclusion (standard inclusion).
2016:	Axtra Phy and Quantum Blue efficiency estimated at 400 FTU for 100% inclusion (standard inclusion). Recommendations added on the addition of zinc to feed for finishers with normal and high inclusion of phytase.

2017:	Calcium standard is graduated in relation to phytase dose, and the calcium standard for weaned pigs 9-15 kg is lowered to 0.5 g.
2018:	Sodium and chloride standard were raised for weaned pigs, particularly in starter diets, and lowered for finishers. Standards for digestible P are adapted to finishers' FCR and calcium standards are adapted to the new P standards for finishers. For gilts, calcium and phosphorus standards are now equal to finisher standards at an FCR of 2.55-2.65.
2019:	Specification of individual minerals in connection with new tables, but no principal changes to mineral levels.
2020:	Revision of phosphorus and calcium standards following an overall assessment of recent trial results. Aextra Phy efficiency revised from 400% to 300% FTU for 100% inclusion.
2021:	Calcium and phosphorus standards for weaned pigs are adjusted according to FCR. Standard recommendations remain unchanged, whereas calcium and digestible phosphorus are lowered by 0.2 and 0.1, respectively, in protective diets, and correspondingly raised in diets for a good FCR. The efficiency of two new phytases is assessed: Optiphos Plus requires 500 FTU and Enzy Phostar 750 FTU for a standard dose.
2021:	Magnesium standards for all pigs are increased and are determined according to theoretical calculation of amount required for normal deposit.
2023:	Iodine standards are raised from 0.2 mg/FUgp for all pigs to 0.3 mg/FUgp for growers and to 0.5 and 1.0 mg/FUsow for gestating sows and lactating sows, respectively. A footnote introduces a 50% increase in iodine in feed containing more than 10% rapeseed products.
2023:	Efficiency of Aextra Phy Gold is estimated at 260 FTU for 100% inclusion. Ronozyme NP, Phyzyme and Optiphos are removed from the table as they are longer commercially available. 60% inclusion is also eliminated from the table as such a low inclusion is no longer relevant.
2024:	Gilt standards are adapted to phase feeding and the recommendation for the Quantum Blue phytase is reduced from 400 FTU to 325 FTU at a 100% dosage.
2026:	The standards for weaned pigs have been adjusted in line with the latest trial results. The phytase enzyme HiPhorius has been assessed such that 325 FYT per kg of feed corresponds to a 100% dose.

Vitamins:

1990:	The vitamin standards were revised.
2004:	The vitamin E standard for lactating sows was revised.
2005:	The vitamin E standard for weaned pigs was revised.
2012:	The vitamin E standard is presented in IU and supplemented with conversion to mg when using different vitamin E products.
2014:	Vitamin standards for gilts were incorporated.
2018:	Recommendation of Hy-D® for sows is added.
2019:	Implementation of a vitamin E standard of 60 i.u. in the 15-30 kg period in connection with harmonization of weight intervals in all tables.

37th edition, September 2026

Appendix

The following averages of feed ingredient prices (DKK) over the past five years (February 2021 to March 2026) have been used. The three prices highlighted in bold are the most central and are used in the guidance below for selecting the appropriate standard column.

Price set used: 5-year average, SEGES Innovation price collection and 5-year average of pig price	
<i>Pig price, weaned pigs and pig meat</i>	
Weaned pigs, 30 kg, DKK/pig	443
Pig price, pig meat, DKK/kg incl. expected bonus	11.77
<i>Ingredient prices (DKK)</i>	
Grain, weighted (33% barley & 67% wheat)	184
Soybean meal, dehulled, toasted, medium protein content	336
Barley, spring, heat-treated + xylanase	179
Wheat, heat-treated + xylanase	186
Rapeseed cake, average of all producers	276
Sunflower meal, dehulled	252
Vegetable oil and fat, palm	932
Lysine, L (HCl) 98.5%	1,336
Lysine sulphate 70%	769
Methionine, DL 99	1,999
Threonine, L 98.5%	1,404
Tryptophan, L 98%	6,243
Valine, L 96.5%	3,143
Feed limestone, 36% calcium	100
Monocalcium phosphate (16/22.7)	953
Feed salt	100
Std. 0.2% vitamin & mineral premix, 30-115 kg finishers, standard column no. 31	1,500
Phytase product	4,000
Faba beans	242
Peas	260

Guidance on herd-specific adjustment under alternative price assumptions

Follow this shortcut for guidance in Danish on selecting the standard column(s) that best match current conditions such as feed efficiency, prices of pig meat, grain and soybean meal, batch intervals, etc.:

[Shortcut to guidance](#)

Follow this shortcut to the Climate Feed Database (in Danish), which—via *Settings* (near the top left of the screen) - allows you to enter feed efficiency and prices of pig meat, grain and soybean meal, after which the programme suggests the appropriate standard level:

<https://www.klimafoderdatabase.dk/Blandingsberegner>