Feeding quality of pea for poultry

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Legumes Translated

This note gives an overview of the components and feed value of field pea. Pea (*Pisum sativum* L.) is rich in protein and energy. Pea complements cereal in the feed ration because of the high content of lysine. The feed value of pea for poultry is determined by the metabolisable energy for poultry and the digestibility of the amino acids. Depending on the animal type and rearing phase, white-flowering, light-coloured pea can be used for poultry up to 30% of the feed compound mixture. The feeding value must be determined for each batch of pea so that the use can be targeted. Field pea can be sold to compound feed producers. But on-farm use gives a better return than can be achieved when sold to the market. Home-grown grain legumes are an important component of GMO-free feed rations.

Applicability

Theme: Feeding pea to layers and broilers

For: Farmer and compound feed producers

Where: At farm level or feed industry

Equipment: Storage, crushing and mixing equipment

Impact: Increasing market-value and self-sufficiency, GMO-free feeding

Nutritional components

Pea is used in livestock feed primarily because of its protein content. The dry matter is about 24% protein and also contains energy-rich ingredients such as starch, oil and sugar (Table 1). The nutrient contents vary depending on growing conditions and cultivar. The quality of the protein is determined by the amino acid profile which in turn is determined largely by the cultivar (variety). Pea is rich in lysine, but relatively poor in methionine and cysteine (Table 1). The limiting factor for the use of pea in poultry rations is the low methionine content. The digestibility of the amino acids is good. The mineral content is similar to that of cereals. Pea contains less phosphorus than soy and rapeseed extraction meal. The phosphorus is partly bound to phytin, which reduces uptake. The addition of phytase reduces this problem.

Laying hens. Photograph: Werner Vogt-Kaute

Anti-nutritional factors

Pea may contain anti-nutritional components such as tannin, protease inhibitors, lectins and saponins. These can affect digestion and animal health. Harmful levels of tannins are only found in purple-flowering pea that has a dark seed hull (seed coat). The bitter taste reduces feed intake. Most commercial cultivars are white-flowering, have a light-coloured seed hull and therefore, contain little tannin. A reduced digestibility of crude protein and enzyme binding due to tannins only plays a role with high inclusion rates of purple-flowering pea. Other anti-nutritional ingredients such as protease inhibitors, lectins and saponins are only present in small amounts in pea, which do not have a negative effect at the amounts listed below.

Table 1. Nutritional components of faba bean and pea compared to soybean meal (88% dry matter)

Feed constituent		Faba bean	Pea	Soybean meal 43*
Metabolic energy for poultry	MJ/kg	10.8	11.0	9.8
Crude protein (CP)	g/kg	263	228	442
Crude fat	g/kg	14	13	12
Crude fibre	g/kg	79	57	70
Starch	g/kg	362	420	62
Sugar	g/kg	35	54	95
Ash	g/kg	35	31	59
Calcium	g/kg	1.4	0.8	2.7
Phosphorus	g/kg	4.2	4.2	5.7
Sodium	g/kg	0.2	0.2	0.3
Potassium	g/kg	11.4	9.7	19.0
Copper	mg/kg	11	7	17
Zinc	mg/kg	40	21	62
Lysine	% of CP	6.4	6.0	10.2
Methionine	% of CP	0.8	0.8	2.2
Cystine	% of CP	1.2	1.3	2.5
Threonine	% of CP	3.5	3.1	6.5
Tryptophan	% of CP	0.9	0.8	2.2

* 43% crude protein
Sources: LfL, 2012; Bellof et al., 2013; Weindl and Bellof, 2016, supplemented with data from Vogt-Kaute, W., 2016

Feed value

The protein feed value depends largely on the amount of protein and the nutritional quality of the protein and the energy feed value resulting from the digestibility of the nutrients. Protein quality in poultry nutrition is characterised by the contents of the essential amino acids. These are lysine, methionine and cysteine, threonine and tryptophan. The digestibility of the amino acids is also important. This varies both between amino acids and between different grain legumes (Table 2).

Maximum inclusion rates of pea in poultry feed

The quantities used depend on age and performance phase (Table 3).

Depending on the other components in the feed, the use of peas can reduce the proportion of anti-nutritional substances in the total ration, e.g. non-starch polysaccharides (NSP) from oil cakes.

Table 2. Digestibility of selected amino acids in pea, faba bean and soybean meal (%)

Species	Lysine	Methionine	Cysteine	Threonine	Tryptophan
Pea	88	80	70	78	75
Faba bean	80	75	60	70	70
Soybean meal	85	85	75	80	80

Sources: Bellof, Halle and Rodehutscord, 2016

Table 3. Inclusion rates of pea (% of total ration) as affected by animal and pea type

Animal type	White-flowering pea	Purple flowering pea
Laying hen	30	10
Broiler	25 - 30	0 – 10
Fattening turkeys	10 – 30	0 – 20

Sources: Bellof, Halle and Rodehutscord, 2016; Vogt-Kaute, 2016

Further information

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