Approaches for 100 percent organic feed to organic poultry in Sweden

Organic poultry production in Sweden is increasing rapidly. Researchers, advisers and farmers are working hard to find organic protein sources for their organic poultry.

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Introduction

The organic egg production in Sweden is growing, for the past five years there has been a 50 % increase in the number of organic layers and there are now approximately 800 000 layers in organic production.

There is a clear trend towards increasing consumption of egg in Sweden. And for that reason the production in total is also growing bigger. The degree of national self sufficiency is 92 %. The total population in 2011 is 6.7 million layers and the distribution among production systems is 53,3 % of layers in barn systems, 35,2 % in enriched cages and 11,5 % in organic production. There are around 400 egg producing farms altogether including 70 organic farms. The size of the organic farms is also growing bigger. The average organic farm host 12 000 birds, back yard flocks are excluded. Around 95 % of the birds are white birds and there are two hatcheries and three commercial hybrids to choose from namely, Lohmann, Bovans and Hy-Line.

Table 1: Production results, source Svenska Ägg 2011.

	Furnished Cage	**Barn**	**Organic**
Mortality % of hens placed	4	6	8
Production period, days	420	420	420
Feed conversion Kg feed/kg egg produced	2,05	2,25	2,35
Eggs per hen placed, kg in total	20,3	20,3	20,3*

* very few registrations

One of the aims in organic agriculture is to increase the internal nutrient flows within the individual farm system through a balance between feed production and animal density. However, many organic egg farms rely on buying a complete compound feed. Only a few farms make their own feed on farm. According to the feed- and salmonella legislation in Sweden the feed industry has to heat treat the ready feed mixture. This is one of the reasons why the feeds are pelleted. Traditionally, fish meal is accepted as a feed ingredient for poultry and pigs and most compound feeds for layers in the market contain 5 – 7 % fishmeal. Other protein sources have been soybeans, rapeseed and conventional maize gluten, potato protein, luzern and wheat bran. Most of it is imported. Sunflower is interesting for the future. Some rapeseed, peas and beans are currently grown in Sweden. According to The Swedish Board of Agriculture, it is estimated that 35 100 tonnes of protein feedstuff is imported to cover the requirement for all organic animal husbandry in Sweden 2011. The requirement of protein feedstuff in organic poultry feed was estimated to 14000 ton, where approximately 80 % is imported making an import of 11200 ton to this sector. In 2011 approximately 2000 ton was conventional produced (5 % of total consumption, 40000 ton).

Maize and hemp is currently not included in compound feeds and the general opinion in research and extension as well as in the feed industry is that these ingredients do not solve the problem with the protein quality in feed rations to poultry. The main problem with hemp is the low yield and difficulties in cropping as well as harvesting. Maize is an energy source and has very little importance as a protein source. Maize gluten has been used as a conventional protein source but is unrealistic to produce organically today.

Efforts to achieve the goal

Organic farmers together with research workers participated in a three year project concerning 100 % organic feed, protein sources and animal welfare. The project was conducted according to the method "participatory research" where discussions and meetings, preferably on farm, influenced topics for studies at the university research station and also on farm field trials.
Interesting vegetarian protein sources suggested in survey (Kalmendal, 2008) were peas, field beans, naked oats, canola, hempseed and sunflower. Other protein sources possible in the future are by-products from milling and from the dairy industry. Organic whey is currently not on the market and the reason is the cost of drying this product. Other possible by-products are organic wheat bran and organic spent grain (brewing industry) but the fractions are small and they are today not separated from conventional fractions at the moment. Furthermore the volumes must increase to be profitable. In Sweden we rely on a continuous use of fish meal. In 2012 and in the future mussel meal can contribute with a high value protein and methionine to balance the amino acid pattern in diets. A summary of the main issues concerning how organic farmers could work towards 100 % organic diets is listed below:

- To find possible future high quality protein feedstuff to compensate for non-organic ingredients, for example mussel meal
- The role of roughage for nutrient intake and animal welfare e g to keep the birds occupied
- To use more on farm grown ingredient. Feed mixtures adapted to specific farm situations and possibilities
- Possibility to add a pure protein source, refined for high methionine content or even to allow fermented amino acids
- To use a strain or breed with a somewhat lower performance would reduce nutritional requirements
- Finally - can management compensate for a limited availability of high quality feed ingredients?

Research work

Two different studies have been conducted at the research station to investigate the effect of sunflower in poultry diets. The results of a study on meat poultry were that diets including 20 % sunflower cake showed highest weight gain in relation to feed consumption. The study also revealed that a high fibre fraction was positive for gut health in chickens.

The second study investigated dehulled sunflower cake and influence of roughage, (luzern) in diets for layers. The positive effects were that layers fed either sunflower or luzern diets showed a better plumage and less pecking behaviour than control group, (Wall, 2011).

Mussels

Meat from blue mussels is a very interesting alternative to fish meal in poultry diets for several reasons. Mussels have high protein content with an amino acid pattern similar to fish meal. It is possible to certify mussel farming according to organic standards, and they easily fit in a 100 % organic diet. And furthermore mussels contribute to recycling nutrients by filtering coastal water from oversupply of nitrogen and phosphorous. Mussel farming may therefore be of environmental importance in the future. (Lindahl & Kollberg, 2008). A doctoral thesis in the subject was presented at the Swedish University of Agricultural Sciences in 2009. (Jönsson, 2009). Conclusions from four different studies were that it is possible to include up to 12 % mussel meal in layers diet without any negative effects on production, egg quality and animal health. Using mussel meal would therefore make it possible to reach the goal of 100 % organic feedstuff in the poultry diet and at the same time meet the nutritional requirements of the birds. There is still a problem to solve, to make mussel meal economical competitive in the diet. The cost of separating and drying mussels into meal is to high. A full scale method of preparing mussels to meal to low costs is required.

A “nutrient trading system” is suggested to pay part of the costs. This also means that we must communicate production cost and of course added environmental value to the organic egg. The fact that the EU-legislation still don’t approve of mussels as a feed ingredient is a hindrance for the development at the moment.

Farm trials

Two issues of major importance are methionine and roughage. Research, practical experience and extension have shown that these issues to some extend overlap each other. The question of using a more suitable breed is for the moment left as a side track as there are no alternatives available in the market to choose from.

Experience from on-farm trials show that it is possible to use mussel meal or crushed mussels instead of fish meal in the diet, in commercial production. There were no differences in production or health parameters in a flock of 1700 layers, fed an on-farm mixture with 4 % mussel meal. Composition of the trial diet is shown in Enclosure 1. Dried or frozen crushed mussels including shell fraction has also been studied. It can possibly substitute fishmeal as well as sea shells and calcium in the diet, but further studies are needed.

A 100 % organic feed was tested on farm, 12 000 layers have been fed a diet with no conventional feed ingredients but 6,8 % fish meal. There were no differences in health or performance parameters compared to the diet with 5 % conventional ingredients. Composition of the trial diet is shown in Enclosure 1.

Much research confirms the importance of forage and roughage from an animal welfare point of view. Several farms feed the layers with silage. One farm tested pressed luzern hay which is easy to handle and contributes with somewhat higher protein content. Analyses also suggested nettles, cikoria and dandelions as alternative forages or dried for the winter. A hypothesis is that crops in the out door run also must contribute with methionine content to the diet. Growing poultry, Ross or Cobb have been fed a total mash diet with success.

References:

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Enclosure 1

Composition of Layers diet, mixed on farm including 4 % mussel meal

Composition			**Nutrient content / kg**		
wheat	20,0	%	Energy	10,4	MJ
oats	20,0	%	Protein	17,0	%
barley	20,0	%	fat	4,0	%
peas	10,2	%	Crude fibre	7,0	%
Sunflower cake	3,0	%	Ash	13,8	%
calcium	9,6	%	Lysine	9,8	g
fish meal	1,9	%	Methionine	3,3	g
mussel meal	4,0	%	M+C	6,2	g
lucern	5,2	%	Calcium	38,5	g
potato protein	3,0	%	Phosphate	5,5	g
brewers yeast	1,5	%	Sodium	1,5	g
salt	0,1	%			
premix	1,5	%	Water	12,0	%
Total	100	%			

Composition of Layers feed, mixed on farm 100 % organic feedstuff

Composition Layer 1			**Nutrient content / kg**		
			Energy	11,0	MJ
Wheat	22,9	%	Protein	16,4	%
Oats	22,9	%	fat	5,5	%
Barley	22,9	%	Crude fibre	6,0	%
Calcium	9,6	%	Ash	13,5	%
Fish meal	6,8	%	Lysine	8,7	g
Concentrate	14,8	%	Methionine	3,3	g
	100	%	M+C	6,5	g
Concentrate			Calcium	38,0	g
Rapeseed cake, heat treated	53,5	%	Phosphate	5,5	g
Soya cake roasted	17	%	Sodium	1,6	g
Rapeseed	8,3	%			
Brewers yeast	6,7	%	Water	12,0	%
Soya oil	3,3	%			
Luzern	3,3	%			
Premix	7,9	%			