VIDENCENTRET FOR LANDBRUG

100 % organic feeding of monogastrics

The provision of nutritionally adequate 100% organic diets to monogastrics is a complex subject. The paper was written before The EU-Commission decided to postpone the date for 100 % organic feeding of monogatrics.

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The feasibility of feeding non-ruminants a 100% organic diet

A practical approach

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The provision of nutritionally adequate 100% organic diets to monogastrics is a complex subject, and this paper attempts to simplify and summarise the essential points for consideration.

There are three major practical stumbling blocks to producing 100% organic feeds:

1. the lack of lysine and methionine in organic raw materials
2. the insufficient quantity of sustainable fishmeal to supply all the EU
3. the insufficient quantity of organic raw materials to supply all the EU

These following issues will be considered:

- the selection and availability of raw materials for use in organic feeds
  - o the amino acid quality of organic raw materials
  - o the quantity of organic raw materials
- the nutrient requirements of healthy and challenged organic livestock (pigs, layers, broiler, turkey)
- welfare and environmental considerations
- genetics
- morality and ethics

The selection and availability of raw materials

The raw materials used to manufacture animal feed, are really packages of nutrients, which are blended in proportions to provide the animal with all the energy, minerals, vitamins and amino acids that are required for a healthy life. Unfortunately the range of organic raw materials is limited, and it is difficult to provide the essential amino acids, lysine and methionine in the correct balance to the different species (see later). An essential amino acid is an indispensable amino acid that cannot be synthesized by an animal, and therefore must be supplied in the diet.

For example, all organic raw materials are deficient in methionine. At the current 95% inclusion of organic raw materials in organic diets, certain conventional high protein raw materials (which contain high levels of amino acids) such as sustainably-sourced fishmeal, prairie meal and potato protein are used to supplement the deficiencies of amino acids in the organic diets.

If Mr Eldridge's interpretation of the legal status of fishmeal is confirmed by the EU (his letter to J. Nelson, AIC, dated 19th June 2008), only sustainably-sourced fishmeal will be allowed in 100% organic diets, because there are no organic sources of prairie meal or potato protein. There are no organic versions of lysine and methionine which are used to balance diets in conventional diets.

There is probably insufficient tonnage of fishmeal from sustainable sources to supply all of Europe. Many UK feed mills are not allowed to use fishmeal, in compliance with the TSE regulations, which will put those companies monogastric diets at nutritional disadvantage. Research work in Denmark has started to look for alternative sources of high protein organic raw materials such as fly larvae, mussels and hemp, but the research will not be finished until 2014.

Discussions have just started about the possibility of culturing organic sources of amino-acids.

There is considerable doubt that there is sufficient tonnage of organic raw materials available to supply all Europe, as we move from 95% to 100% organic. In the UK, the majority of our members have not encountered any new organic arable farms, and in-conversion wheat has not been generally available for several years.

Nutrient requirements of healthy and challenged livestock

Using a broad brush approach, the nutrient requirements of monogastrics, in terms of amino acid and energy requirement, progressively increases in the following order: layers, pigs, broilers and turkeys. Lysine is the first limiting amino acid for pigs, and methionine is the first limiting amino acid for poultry. If the diet contains less of the first limiting amino acid than the animal requires, then the development of the animal effectively stops, and the animal displays deficiency symptoms as the animal and its welfare are compromised. The nutrient requirements of new-born pigs and chicks are very much higher than the adults, so organic turkey chicks have the highest demands for methionine and energy.

In young organic livestock (pre-puberty), fishmeal is essential to meet the nutrient requirements of normal growth and normal organ development. If fishmeal is not fed, then the organs and frame of the chick will not develop properly, and bird may be permanently and irreparably damaged, and be less fit to face the rigours of life on the range.

There seems to be a perception by some that the industry 'should compromise on nutritional specification, to accommodate poorer quality UK raw materials, and let performance slip to a lower level'. There are so many misconceptions in this sentiment; it is difficult to know where to start, suffice to say that the outcome would be detrimental to livestock welfare, and as such is not a suitable course of action for the organic sector.

For the past 80 years, research has focussed on the nutrient requirements of healthy livestock. Nutritionists are only just starting to realise that the amino acid requirements of livestock faced with a disease challenge is very much higher, and that the immune system needs higher levels of lysine and methionine to produce antibodies. The current sub-optimal levels of essential amino acids fed to organic birds may explain their higher mortality, as they are less able to respond to disease challenge.

Welfare and Environmental considerations

To achieve the minimum levels of lysine and methionine in the diet to sustain a healthy animal with good welfare, an excess of non-essential amino acids has to be fed to organic livestock. These surplus amino acids have to be deaminated and excreted. In birds, the droppings contain excessive quantities of nitrogen which makes the litter wet and very alkaline. The net result is that the birds consume valuable energy in the deamination process, and the alkaline litter causes pododermatitis and hock burn. To reduce the severity of this problem, some nutritionists feed sub-optimal levels of methionine, which can cause poor feathering (feathers are high in methionine), stress and lead to poor welfare and cannibalism.

The excessive quantities of nitrogen contained within droppings and manure of organic livestock also presents a real challenge to producers in terms of meeting environmental legislation in particular for those located with the with 62% of England covered by Nitrate Vulnerable Zones. Additionally greenhouse gas emissions, in particular NO2, from storage and application livestock manures is increased where manure contains higher quantities of nitrogen.

For completeness, it should also be mentioned that phytase (an enzyme) which when added to conventional feeds reduces the excretion of phosphorus in animal manure, is prohibited in organic diets.

Genetics

A hundred years ago birds reached puberty and started to lay eggs at about 30 weeks of age, and laid 30 eggs per year. Today the modern bird starts to lay at 21 weeks, lays over 300 eggs per year, and is more docile for improved handling and welfare. The difference in order of priority is genetics, management and nutrition. In the 1920s clean water and formulated feed were instrumental in reducing hen mortality to below 20% for the first time. In the 1950s-1970s, genetic selection increased the egg numbers from 150 to 250 eggs per year and the nutrient density of the feed increased to match the improvement in genetics, otherwise the birds' welfare would be compromised. The genome of a modern hen sets the agenda for health, performance, nutrient requirements, welfare and behaviour. It is just not possible to reduce nutrients that only affect performance. Feed manufacturers must produce diets to match the genetic requirements of the bird, rather than turning the clock back on decades of beneficial genetic improvements. The principle of this argument applies to all monogastrics.

Morality and ethics

Most nutritionists would consider it to be morally and ethically wrong to deliberately formulate diets that would injure and harm livestock. Some nutritionists take the view that formulating 100% organic diets could be ethically and morally wrong due to their nutritional deficiency. Some would seriously consider withdrawing from certain market sectors (egg turkeys), or from the organic market altogether on the basis that welfare-friendly diets are impossible to achieve. Further, the management of the feed companies would not want to be tried by the press for causing distress to livestock.

Although birds do supplement the complete diets that our members manufacture with gleanings from the range, in general the supply of earthworms and plant material is variable, intermittent and of poor quality. Analysis of bird movements prove that not all birds range and are thus totally dependent on the feed for their nutrients.

In conclusion

Adult monogastrics:

It is possible to meet the nutrient requirements of the adult monogastric with 100% organic diets, using fishmeal to supplement the poor amino acid quality of organic raw materials. But there remains a question mark about the quantity of sustainable fishmeal available in Europe. If fishmeal cannot be used, then it is not possible to produce a balanced diet, with consequential poor performance, higher mortality and severe welfare issues.

Young monogastrics:

Feeding 100% organic diets to baby pigs and chicks is not recommended. There needs to be a quantum-change: either we re-introduce the genetics last seen in the 1920's (but the low productivity would make organic production infeasible); or we allow the use of supplemental amino acids.

Recommendations

Option 1

If supplemental amino acids were allowed to be included in organic diets, it would solve two of the three practical issues of 100% organic diets. It would:

a) allow diets to be nutritionally balanced

b) increase animal welfare in the organic systems

c) reduce mortality

d) reduce the excess nitrogen excreted in organic diets

e) increase organic livestock production, performance and efficiency

f) reduce the amount of imported proteins

g) reduce the amount of fishmeal used

h) reduce the cost of the feed

The only question remaining would be whether there are sufficient quantities of organic raw materials (mainly cereals) to supply another 5% to the whole of the EU.

Option 2*

As the Danish research will not be completed until 2014, and as some of the proposed new organic raw materials are not currently permitted for use in feed, perhaps supplemental amino acids limited to a maximum of 1% could be temporarily permitted until 2014. This would allow feed manufacturers to manufacture to 99% organic diets.

Option 3*

As it is not currently possible to meet the nutrient requirements of all monogastrics with 100% organic diets, particularly young livestock, we would request that the monogastric sector remains at 95% organic for a period of time. We need more time to investigate new sources of organic raw materials, and the possibility of culturing organic sources of amino acids promises real hope for a permanent solution. In this interim period, the use of fishmeal will be essential to maintaining the health and welfare of young organic livestock

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*This paper is written before the EU-Commission decided to postpone the date for 100 % organic feeding of monogastrics. The new date is 1. January 2015.

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