

Better Organic Business Links
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Gwell Cysylltiadau Busnes Organig



Better Organic Business Links

An Organic Centre Wales project



**Making organic poultry feed more sustainable:
Dehulling homegrown protein crops**



Cronfa Amaethyddol Ewrop ar gyfer Datblygu
Gwledig: Ewrop yn Buddsoddi
mewn Ardaloedd Gwledig
The European Agricultural Fund for
Rural Development: Europe Investing in
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Llywodraeth Cymru
Welsh Government

Organic poultry rations are heavily dependent on imported soya to meet the protein requirements of the birds. However, organic and GM-free soya is becoming increasingly difficult, and therefore expensive, to source, and the consequent reliance on imports is not in keeping with the organic ethos. This leaflet looks at how, by removing the seed hulls, we can improve the nutritive value of homegrown crops such as peas, beans and lupins, and therefore rely less on soya.

Formulating poultry rations

When nutritionists design poultry diets, they use the nutrient content of specific ingredients and their cost per tonne to arrive at a formulation that meets the target nutritional requirements for the least cost. The table below shows the nutritional composition

of some important protein rich ingredients and it is easy to see why soya bean meal is used so widely. It is very high in protein and has high levels of key amino acids such as methionine and lysine.

Other ingredients can be used instead, but there are problems. Lupins, for instance, also have high protein content but are low in methionine and their high oil content means they go rancid quickly once they are processed. (Unprocessed soya is also high in oil. However, the oil itself is a very valuable product which is usually extracted and sold separately leaving a soya bean meal which is low in fat but much higher in protein, percentage wise, than the original bean).

Anti-nutritional factors can also be a problem. These are compounds that, in one way or another, reduce the nutritive value of feedstuffs and the main ones found in peas, beans and lupins are described in the box opposite. The presence of these factors is the main reason that nutritionists rarely use peas and beans in young birds' diets and limit their inclusion to 5% for older birds.

A comparison of the nutrient content of some protein rich ingredients

Nutrient	Soya bean meal	Field beans	Peas	Lupins (white)
Crude protein %	48	24	20.5	34
Oil (B) %	2.6	2.2	2.4	9.5
Crude fibre %	3.7	7.5	6	12
Sugar & starch %	13.1	39.3	48	8
Lysine %	2.95	1.51	1.45	1.62
Methionine %	0.65	0.17	0.19	0.24
Meth.+Cystine %	1.35	0.47	0.48	0.75
Tryptophane %	0.66	0.19	0.19	0.27
Threonine %	1.9	0.82	0.75	1.22
Arginine %	3.48	2.16	1.76	3.54
AME MJ/kg	10.3	10.7	11.4	9

Source: 'Premier Atlas 2011', Premier Nutrition Ltd, Rugely Staffs, WS15 1RD

Anti-nutritional factors in peas, beans and lupins

Tannins bind strongly with proteins and other large molecules such as starch, cellulose or minerals. Tannins reduce intake by making the feed less palatable and form indigestible compounds in the gut.

Trypsin inhibitors reduce the activity of trypsin, an enzyme involved in protein digestion. This, in turn, reduces growth rate and feed efficiency in poultry. They occur mostly in legumes but are also found in low concentrations in cereals.

Alkaloids: There are many types of alkaloids which are specific to a particular plant species. The one present in lupins, for instance, is quinolizidine. If ingested, they can have a wide range of adverse effects and sometimes cause stock to refuse feed.

Plant lectins are found mostly in legume seeds or beans and have a specific affinity for sugar molecules. As well as causing red blood cells to clump together (a process known as agglutination), lectins may bind to cells in the gut lining. This reduces the action of some digestive enzymes which, in turn, decreases the absorption of nutrients and ultimately slows growth.



Impact dehulling machine. Photo: Alvan Blanch



How does dehulling improve feedstuffs?

The hull (or husk as it is sometimes called) is the outer shell or coating of a seed. It has very little nutritional value and therefore removing it increases the percentage of protein in the feed. Dehulling also increases the quality of the remaining material because the anti-nutritive factors are concentrated in the hulls where their job is to protect the seed from pathogens and predators. This allows the nutritionist to use significantly more of these feedstuffs in the ration.

The benefits of dehulling

The economic benefits of dehulling are difficult to quantify. This is partly because there is little data on the proportion of the seed that is represented by the hull and on the nutritive value of the feed once it has been removed. The other complication is that while dehulling improves the quality of the feed, there is effectively a yield penalty because a portion of the grain is being removed.

We hope that this project will enable us to better quantify these factors.

It may also be possible to derive some income from the hulls once they have been separated out. This would make the process much more attractive economically. For instance they could be burned as fuel or used as an alternative for wood shavings in animal litter (wood shavings cost circa £200 per tonne at present).

In the present situation the main benefit of dehulling is likely to be increased demand for homegrown protein crops resulting from increased inclusion in the diets of poultry and indeed other livestock. This should result in better prices for arable farmers, which will be an incentive to grow more of these crops. In the medium term, it will help to protect poultry producers against increasing feed costs driven by the rising cost and limited availability of organic soya.

Next steps

Organic Centre Wales will be organising a trip to see a dehulling machine in action in the summer of 2012. We will also be working with interested producers and organisations such as the Machinery Rings to facilitate access to dehullers for arable and livestock producers in Wales.

For more information and to get involved contact:

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Find out more

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