Lupins in UK Agriculture and Aquaculture

An integrated programme for the development of Lupins as a sustainable source for UK Agriculture and Aquaculture

The project is co-funded by

Technology Strategy Board
Driving Innovation
Lupins in **UK Agriculture and Aquaculture**
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Project Aims

Home-grown vegetable protein source for farmed animals.

Drivers
High levels of soya imports
Environmental Cost
Increasing Price
Strategic need for competitive sources of sustainable home grown protein

Why Lupins?
high protein
high energy
nitrogen-fixing

Focus
Varieties
Aquaculture
Poultry
Ruminants

Overcoming barriers:
Commercial Growers
Animal and Fish Feed
Lupins in UK Agriculture and Aquaculture

Project Overview

Project Lead: Birchgrove Eggs

Work Package 1: Variety trials

Work Package 2: Agronomy

Work Package 3a: Lupins as poultry feed
Work Package 3b: Lupins as ruminant feed
Work Package 3c: Lupins as fish feed

Work Package 4: Exploitation and Dissemination
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Nutritional composition of Lupin species and how these compare to other grain legumes

<table>
<thead>
<tr>
<th>Grain legume</th>
<th>Crude Protein</th>
<th>Lipid</th>
<th>Crude Fibre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lupins</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lupinus angustifolius</em> (narrow-leaf/blue)</td>
<td>28-38</td>
<td>5-7</td>
<td>13-17</td>
</tr>
<tr>
<td><em>Lupins albus</em> (white)</td>
<td>34-45</td>
<td>10-15</td>
<td>3-10</td>
</tr>
<tr>
<td><em>Lupinus luteus</em> (yellow)</td>
<td>36-48</td>
<td>4-7</td>
<td>15-18</td>
</tr>
<tr>
<td><strong>Soyabeans</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soyabeans</td>
<td>39.6</td>
<td>25.3</td>
<td>12.8</td>
</tr>
<tr>
<td><strong>Faba beans</strong></td>
<td></td>
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<tr>
<td>Faba beans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>26.5</td>
<td>1.5</td>
<td>9.0</td>
</tr>
<tr>
<td>Spring</td>
<td>31.4</td>
<td>1.5</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Peas</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Peas</td>
<td>24.9</td>
<td>1.5</td>
<td>19.5</td>
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Project Objectives

- To evaluate the commercial feasibility of yellow lupin and narrow-leaf (blue) lupin as spring grown, arable break and grain crops.

- To develop and assess weed control systems.

- To test the efficacy of whole and de-hulled lupins and a novel enzyme compared with standard layers mash containing soya protein in poultry diets.

- To determine the benefits of using crimped lupins in lambs diets.

- To examine the use of enzymes to improve nutrient nutrition utilisation of lupins in aquaculture.
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Lupins - Varieties

To evaluate the commercial feasibility of yellow lupin and narrow-leaf (blue) lupin as spring grown, arable break and grain crops

Activities

• Identify new lines for germination testing (from previous crossing programme *Lupins in Sustainable Agriculture (LISA)*)

• Multiply seed from selected lines

• Variety and multiplication trials to collect data on yield, early maturity and increased tolerance of alkaline soils

• Produce a descriptive list of lupins for the UK
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Lupins - Agronomy

To develop and assess weed control systems

Activities

• To assess how different types of lupins compete with weeds over a range of plant densities

• To evaluate herbicide options for weed management in lupins

• Develop weed management systems for lupins and generate updated guidance for UK growers
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Lupins – Feed for Poultry

To test the efficacy of whole and de-hulled lupins and a novel enzyme compared with standard layers mash containing soya protein

Activities

• Nutrition trials to test the efficacy of whole and de-hulled lupins, with and without a novel enzyme to remove risk of NSPs, compared with a standard layers mash containing soya protein

• Record and analyse data on growth rates, feed and water intake during growth phase

• Record and analyse data on egg weight, dry matter intake, shell thickness, bird health, egg yolk colour and growth rates, during production (egg laying) phase

• Determination of appropriate levels for soya replacement by lupins
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Lupins – Feed for Ruminants

To determine the benefits of using crimped lupins in lambs diets

Activities

- Nutrition trials comparing a ration containing crimped lupins and crimped barley with a standard commercial lamb finisher.

- Measure voluntary intake and live weight to assess food conversion efficiency and nitrogen use efficiency for the different rations.

- Barley and lupins will be home-grown and crimped on site.
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Lupins – Feed for Fish

To examine the use of enzymes to improve nutrient nutrition utilisation of lupins in aquaculture

Activities

• Digestibility trial of basal diet substituted with treated lupins at a defined ratio

• Full term nutrition trials to evaluate growth performance and feed utilisation efficiency of experimental diets containing graded inclusion of the lupin test ingredient

• Record and analyse Specific Growth Rate (SGR), Feed intake (FI) and Feed Conversion Factor (FCR) computed from fundamental data and; determine Apparent Net Nitrogen Utilisation (ANNU) or PPV (Protein Production Value) together with Net Energy Retention (NER)
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Exploitation and Dissemination

Results and findings will be:

• Announced via national and specialist media and online through partners’ websites

• Published in industry publications, newsletters, specialist sector journals and through academic papers

• Showcased at industry events, exhibitions and conferences, agricultural shows and farm open days

• Presented at training events and seminars

• Incorporated into new materials including descriptive lists, growers guides and sales materials