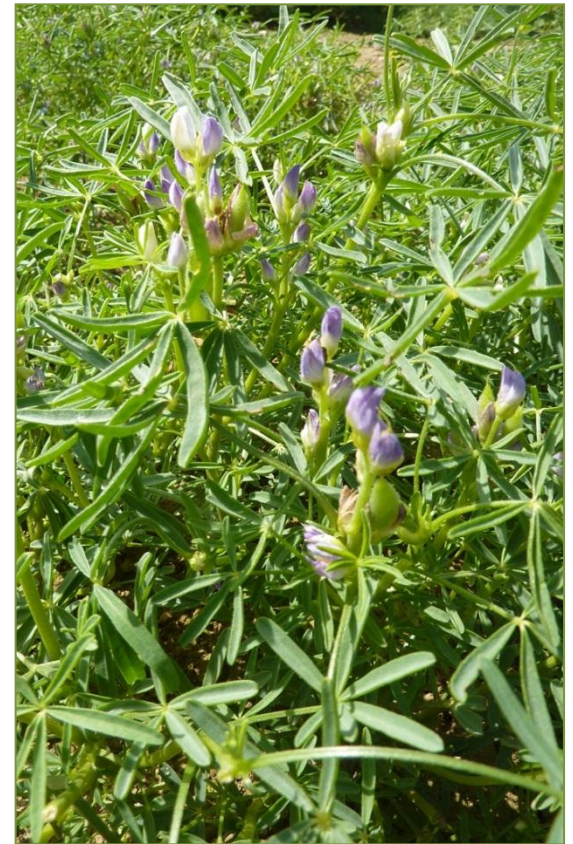




# Lupins in **UK** Agriculture and Aquaculture

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



The project is co-funded by

# Lupins in UK Agriculture and Aquaculture



[www.niab.com](http://www.niab.com)



[www.pgro.org](http://www.pgro.org)



[www.britishseedhouses.com](http://www.britishseedhouses.com)



[www.soya-uk.com](http://www.soya-uk.com)



[www.birchgrove-eggs.co.uk](http://www.birchgrove-eggs.co.uk)



[www.wynnstay.co.uk](http://www.wynnstay.co.uk)



[www.kelvincave.com](http://www.kelvincave.com)

## Project Partners



[www.plymouth.ac.uk](http://www.plymouth.ac.uk)



[www.aber.ac.uk](http://www.aber.ac.uk)



[www.alltech.com](http://www.alltech.com)



[www.alvanblanch.co.uk](http://www.alvanblanch.co.uk)

The project is co-funded by  
Technology Strategy Board  
Driving Innovation

[www.innovateuk.org](http://www.innovateuk.org)



# Lupins in UK Agriculture and Aquaculture

## 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                      Agronomy  
Reducing reliance on fertilisers  
Poultry                          Aquaculture  
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**



# Lupins in UK Agriculture and Aquaculture

## Lupins

**Nutritional composition of Lupin species and how these compare to other grain legumes**

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



# Lupins in UK Agriculture and Aquaculture

## 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



Yellow lupin *Lupinus luteus* (Wodjil)



Narrow leaf (blue) lupin *Lupinus angustifolius* (Viol)



# Lupins in UK Agriculture and Aquaculture

## 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





# Lupins in UK Agriculture and Aquaculture

## 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







# Lupins in UK Agriculture and Aquaculture

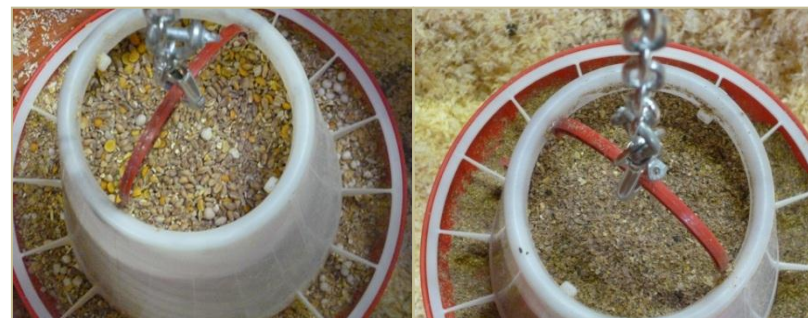
## Lupins – Feed for Poultry

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





# Lupins in UK Agriculture and Aquaculture

## 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





# Lupins in UK Agriculture and Aquaculture

## 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 lupine 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)



# Lupins in UK Agriculture and Aquaculture

## 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

