

Lupins in UK

Agriculture & Aquaculture



Poultry

Executive Summary Results

Lupins for layers

Message: *Yellow and narrow-leaved lupins, fed whole or dehulled, could substitute soya as a dietary source of protein for layer hens without compromising production, intake, growth or health*

Lupins are a high protein, high energy, nitrogen-fixing grain legume with a protein and oil composition that may effectively help substitute imported soya for layer hens. An industry-led consortium examined the opportunity to include yellow and narrow-leaved lupins in the diet of layers through a series of studies at Aberystwyth University and at Birchgrove Eggs.

Point of lay hens were fed one of four diets for 18 weeks (6 week growing phase plus 12 week laying phase), their performance monitored and egg quality monitored. All the rations contained 15-16 % protein with an energy value of 11.4 MJ/kg. The control diet was a standard soya based layers mash and in each of the test diets lupins were included at 150 g/kg, either whole or de-hulled, with or without the addition of a novel fermentation product shown to improve nutritional availability. Lupins were dehulled by Alvan Blanch then processed by Wynnstay Group PLC.

Results with both the narrow leafed and yellow lupins showed that lupins can be successfully fed to laying hens without compromising performance or egg quality. There was no effect on bird growth or weight, no effect on dry matter or water intake, no effect on egg production (number or weight), no effect on bird health. In feeding either lupin species, a significant increase in yolk redness was observed and in both cases neither dehulling the lupins nor adding the novel fermentation product had any significant effect.

Table 1

Layer performance and egg quality, when fed yellow lupins

	Control	Whole lupins	De-hulled lupins	De-hulled lupins + Fermentation Product	Diet differences
Bird weight at 36 wk (kg)	2.03	2.12	2.09	2.07	NS
DM Intake (g/d)	166	151	152	138	0.045
Eggs per day	0.92	0.93	0.97	0.94	NS
Egg weight (g)	60.23	60.38	61.21	60.02	NS
Shell weight (g)	6.01	5.92	6.24	5.83	NS
Yolk lightness (L)	59.85	59.38	59.57	59.55	NS
Yolk yellowness (b*)	35.38	35.33	35.74	36.59	NS
Yolk redness (a*)	6.35	7.81	7.6	7.92	<0.001

A third trial examined inclusion rates in the layers mash of yellow lupins (as whole) at 0%, 15%, 22.5% and 30%. The 30% resulted in complete replacement of soya. Results showed that inclusion of yellow lupins to reduce soya addition had no effect upon bird live weight, dry matter or water intake, egg production (number or weight), egg quality parameters or bird health.

Birchgrove eggs took the research forward as a full scale commercial trial. A shed containing a flock of 3,000 Bovan hens was fed a diet containing yellow lupins for 18 weeks. The experimental feed, supplied by Wynnstay Group PLC, was a balanced layers feed which included a protein replacement source of 15% whole (hulls intact) yellow lupins, in part replacement for soya protein. At 150 g/kg the lupins replaced up to 30 % of the soya in the diet. This was fed to the flock from week 16 through to week 36, a period covering the important phases of onsite bird relocation and growth stage, through to maximum production. The housed weights of the birds averaged 1300g at 17 weeks. The yellow lupins used for the layer trials were grown in Devon and supplied by Soya UK, the Bovans were supplied by Joice and Hill.

The performance of the Bovan hens was compared with the previous cycles' performance in the same house. In line with the results from the University studies, the commercial trial was

successful. The birds performed equally well with yellow lupins. Table 2 compares key indicators from the 18-week commercial trial period in 2013 at Birchgrove with those from a more standard commercial flock at Birchgrove in 2012.

It is concluded that yellow and narrow-leaved lupins, fed whole or dehulled, could substitute soya as a dietary source of protein for layer hens without compromising production, intake, growth or health.

This work was part of a 3-year, business-led project involving 10 industrial partners and two research institutes (Birchgrove Eggs, Alltech, Alvan Blanch, Ecomarine, Germinal Seeds, Kelvin Cave, PGRO, Soya UK, The Arable Group (TAG), Wynnstay Group PLC and the Universities of Aberystwyth and Plymouth). The project is funded by the industry partners co-funded by Innovate UK, the UK's innovation agency, in collaboration with the Biotechnology and Biological Sciences Research Council.

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Table 2

A comparison of results between birds fed a standard soya based feed in 2012 and those fed a lupin-based feed during the trial in 2013

	2012 Bovans/soya fed	2013 Bovans/Lupin trial
Production wk 20	86%	82%
Production wk 24	86%	90%
Production wk 37	90%	90%
Body weight average wk 37	1935g	1950g
Feed consumption wk 37	125g	117g
Egg weight wk 37	64g	66g
Water consumption	Breed guidelines	Breed guidelines

Figures are estimates using standard commercial data collection methods

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