

# The quest for home-grown protein



## Pulse Progress

Having addressed substantial energy costs across its poultry and arable enterprises, Woodend Farm in Berwickshire is looking to home-grown pulses to reduce reliance on imported soya. CPM visits to get an insight.

By Rob Jones

**There are still one or two flowers bracing themselves against the early November weather in John Seed's margins that surround his field of cover crops and edge a new woodland planting that slopes down to a burn.**

"We used to farm right up to the edge of that burn, but it made sense to take this bank out of production," he notes. "The way we farm now is far more resilient and sustainable. It benefits the environment and communities, but it benefits our business, too."

You can tell from the tone of John's voice and the conviction with which he speaks that his views are not based on ideology nor political affiliation. Everywhere you look at Woodend Farm, near Duns in the Scottish Borders, are signs that these have been

followed through with substantial and measured changes that have set the farm on a course to net zero and improved profitability.

There's a 75kW solar array on the roof of the poultry unit that houses the 32,000-bird laying flock of the farm's free-range egg business. In the range in front is another 25kW array for the cottages, and there are plans to expand this.

### Biomass boiler

Heating Woodend's farmhouse, cottages and poultry unit on a district heating system and drying the grain is a vast 950kW multi-fuel biomass boiler that takes in large round straw bales to heat a 100t hot water accumulator.

Set aside from the buildings is a 75kW Halus V17 wind turbine. "We bought it second hand, so it's already 43 years old, but generates about 140kWh of electricity per year."

John used to work in the renewables industry before he returned to the 214ha farming partnership he runs with wife Louise and son Donald. It was there he acquired an acute awareness of the effects of global warming.

"The thing that drives me is climate change," he says. "When I started in the renewables industry in the mid-90s it was already accepted that global CO<sub>2</sub> emissions were far too high, yet they're still going up. The elephant in the room for agriculture is nitrous oxide, coming from

*“Home-sourced protein is what we grow and it's what the nation needs.”*

fertiliser use that itself is generated from fossil fuels."

The other side of this is the cost, he notes. Woodend Farm used to spend



*John Seed is seeking to reduce reliance on imported feed, and in particular looking to the value of home-grown protein.*

£125,000/yr on fuel and electricity before the farm implemented its own renewables enterprises — “It’s dead money, and these are costs my grandfather never had to find when he farmed this land,” says John.

On the arable side of the business, there’s been a similar focus on costs and energy reduction across the 178ha of Grade 3 arable land that lies at the edge of the fertile Merse of Berwickshire, just before it rises up to meet the Lammermuir Hills. “This is the first year we’ve



*Purchased feed – largely in the form of soya – is responsible for 82% of the farm’s entire GHG emissions.*

established everything without the plough,” states John, entering one of his sheds.

He gestures towards the now-redundant implement that’s gathering dust on last year’s coating of oil.

## Reduce imports

This sits beside a Lemken Solitair 8 power-harrow combination drill. “We used this mostly for establishing cover crops this year. We’ve tried a range of drills, and it’s a neighbour’s Horsch Avatar that’s brought the best results — we have stones the size of rugby balls, and it’s the only one that doesn’t bring them up,” he notes.

But it’s the heap of beans we’ve come to see. John scoops up a handful and inspects the sample. “Our focus now is to reduce our reliance on imported feed, and in particular we’re looking to home-grown protein.”

The poultry enterprise started in 2009, and while previously all feed was bought in, they’ve now switched to selling their eggs through Glenrath Farms, which allows Woodend more flexibility to use its own crops as feed. Currently 55% is home-grown — mainly cereals — but 17% of the diet is bought-in soya while 10% is sunflowers.

The farm has monitored its carbon balance since 2016, and linked to



*Beans could play a critical role in helping John to move away from soybean in the diets of his 32,000-bird laying flock.*

deforestation, imported soya carries a high carbon cost — purchased feed is responsible for 82% of the farm’s entire GHG emissions. But it’s the economics that really channels John’s determination to drive down the soya inclusion. “It’s trading at £508/t, with soya oil at £1400/t. Sunflowers cost us £440/t.”

In terms of protein levels, soya is the best source at 41%, while beans are the highest home-grown source at 25%. John notes that switching out one tonne of soya for two of beans would still be a saving, ▶

## Pulse quickens as pioneers sign up

John is one of 200 farmers who have joined PulsePEP, the farmer-led community at the heart of the Nitrogen Climate Smart (NCS) project, which was launched in June this year.

Reducing GHG emissions by 1.5Mt CO<sub>2</sub>e per annum (or 54% of the maximum potential for UK agriculture) is the primary goal of the project, which could be achieved by replacing half the imported soya used in livestock feeding rations with home-grown pulses.

Led by PGRO, the £5.9M Defra-funded project hinges on the consortium of 18 partners and a network of farmers who will carry out trials over the next three growing seasons.

There are a number of ways to get involved with the project:

1. **Join PulsePEP** — think of it as a farmer-led information exchange on all aspects of growing and feeding pulses with science at its core. PulsePEP was launched at CropTec last month and brings together a knowledge hub, hosted by ADAS’ FarmPEP, and a discussion forum, hosted on The Farming Forum and moderated by the British On-Farm Innovation Network (BOFIN).

2. **Establish your carbon baseline** — help and support is available from Farm Carbon Toolkit, with the aim to get 200 farmers on board and their carbon balance monitored through the duration of the project. The data feeds into the life cycle analysis being prepared by the James Hutton Institute to give an accurate picture of the impact of pulses across the rotation.

3. **Become a Pulse Pioneer** — BOFIN is recruiting up to 40 farmers who will be paid to carry out on-farm trials throughout the course of the project. Growers must commit to growing a pulse crop for each year of the project, enter crops into ADAS YEN to get detailed analysis of their performance, and closely monitor crops, particularly soil nitrogen levels.

Having established the farm’s carbon baseline, John has also applied to become a Pulse Pioneer. “I want to ensure the project meets the unique demands and nuances of our farm, especially since we already have a dual enterprise model of eggs and arable crops,” he says.

He has some specific questions he’s looking for the project to answer, including:



1. How will the introduction of field beans affect the existing soil quality and structure on the farm?
2. Will legume rotation systems require additional interventions such as tillage or specific pest management?
3. What are the nutritional differences between field beans and imported soya, particularly for free-range hens?
4. How will the change in feed impact egg quality, if at all?
5. Are there pilot farms to visit to see the impact of this change in livestock feed?
6. How does replacing imported soya with home-grown protein like field beans affect overall operational costs?
7. Are there market studies to suggest the commercial competitiveness of this shift?

For more information, visit [nscproject.co.uk](https://nscproject.co.uk)





*Winter and spring-sown beans provide the main breaks in a rotation that includes winter wheat, spring barley and spring oats.*

▶ with beans trading at £180/t.

But the equation isn't that simple. The feed ration is carefully balanced to sustain the 31,000 eggs/day the laying flock produces. "Hens are like athletes — they're managed and fed to perform at peak ability. The more you learn about their diet, the more you realise how much there is to know. It's a science and you can't afford to experiment and make mistakes — if they go off laying because of a change in their feed it can cost you hundreds of thousands in lost revenue."

Layered into this is the need to maintain the correct type of protein — soybeans are a good source of methionine and lysine, two essential amino acids in the poultry diet that contribute towards flock health as well as egg size and quality. In addition, John is looking to improve the resilience of the flock.

"Our current laying period is 87 weeks, and we want to extend that to 100 weeks, to improve both our carbon footprint and productivity. We may be moving away from the Lohmann Classic breed we currently have, but if we change the diet as well, we have to be sure it'll take us in the right direction," he notes.

"We're putting as much beans into the diet as we can, based on the information we have. But we need to know more, for example, what would be the effect of de-hulling or heat-treating the beans?"

While there are limits on how much John is prepared to experiment with the flock, he's taken a freer hand with the arable rotation to make it more resilient. Potatoes grown on land rented out were dropped. "The revenue simply didn't cover the cost of damage to the land. Oilseed rape is a high-input crop and we stopped growing it

in 2013. I get FOMO (fear of missing out), but overall have learnt that no brassicas in the rotation is a good thing.

"What's interesting is that what we now have in the rotation is largely back to what my grandfather grew in the 1930s. But I'd like to think we have a far more scientific approach."

## On-farm trials

Winter and spring-sown beans provide the main breaks in a rotation that includes winter wheat, spring barley and spring oats. John's been taking these crops through various on-farm trials, looking not just at yield, but quality of the crop, particularly its protein, effect on biodiversity and soil health across the rotation.

"There's an enormous interest in intercropping at the moment. We've tried every which way with beans, peas, spring wheat and even with lentils. We've found the best way to get home-grown protein is to grow beans on their own," he concludes.

Last year he grew beans alongside a beans and peas mix in the same field. "You have to have a 2ha minimum trial size for a proper farm-scale comparison," he insists.

The beans yielded 5.2t/ha with the beans and peas together at just 4.3t/ha. "But the beans and peas had a lower protein level than beans on their own."

What he's noticed is a symbiotic effect they have with biodiversity. "We have margins surrounding all of our fields with beetle banks too. I'm convinced the pollinators have a beneficial effect on the beans as you notice a thicker crop when combining near the margins."



*Last year John grew beans alongside a beans and peas mix in the same field to compare yields and protein contents.*



*John has noticed a symbiotic effect between beans and biodiversity and is convinced the pollinators have a beneficial effect as he has noticed a thicker crop when combining near margins.*

Beans make up 20% of the rotation and John feels that's about as far as it should go — any closer together and there may be problems with soil-borne diseases. "We're also working hard to improve the feed value of cereals in the rotation," he continues.

"You're trained to grow barley with low nitrogen for malting, but this year we've grown Skyway spring barley for a higher crude protein, and actually achieved a higher level than we get from the wheat. We process the oats with the very best going for human consumption and the lighter fraction kept for hen feed."

For John, however, there's a limit to how much he feels he can achieve on his own farm. "There simply hasn't been the research that's looked at how we can maximise the production at a holistic level and utilisation of home-grown protein. If we're aiming for a transformative shift in UK agriculture, my concerns centre around scalability, efficacy, and adaptability."

He believes it's not necessarily about doing lots of small-plot trials but bringing together the knowledge and making sure the outcomes and learnings are genuinely beneficial for farmers like him. "Home-sourced protein is what we grow and it's what the nation needs," he says.

In the meantime, John's spending less "dead money" on energy, his GHG emissions are reducing year-on-year, the farm's biodiversity and soil health is improving, and so is profitability. "It's farming that makes you happy," he concludes. ■