



## Farming Connect Management Exchange

Llŷr Jones

Reducing Ammonia levels in free range units.

Netherlands, Scotland, England and Northern Ireland

### Background

I am a 40-year-old fluent Welsh speaker. I live at Derwydd, Llanfihangel Glyn Myfyr with my wife, Emma, who is an equine vet. We have a 3-year-old daughter, Dwynwen and a 15-month-old son, William.

I have been farming Derwydd on my own since 1999. I run a closed flock of 1,500 ewes, split into three groups of Nelson Welsh Mountain, draft Nelson and Welsh Mules. All lambs are sold through Tesco cost of production (COP) contract. I buy in 100 calves a year and sell them fat from forage.

Renewable energy is very important to me, therefore, in 2012, I installed a hydropower generator which produces enough electricity to supply 30 houses. We also have 24kW of solar panels and a 60kW ground source heat pump to help reduce the farm energy costs.

I am co-owner of Blodyn Aur, a Welsh rapeseed oil company. We sell around 6,000 bottles per month of Blodyn Aur to small food retailers throughout Wales and to ASDA, Sainsbury's and Morrisons in Wales.

Most recently, I have developed a new free-range egg unit, which received its first flock of 16,000 hens in 2016. Eggs are sold to Anglia Free Range Eggs, who supply Tesco. I employ two full time members of staff for the daily running of the unit and the farm. While building our shed, it was always in my mind to build another shed to bring the number up to 32,000 hens. But last year, while I was applying for my second shed, it came to my attention that ammonia levels produced in agriculture was high. I then decided to look into what was the best practice to reduce our levels but also keep to the same production level.

### Itinerary

The first country I visited was the Netherlands. The reason I chose the Netherlands was that, per square mile, it is the most densely populated with livestock in the world. Holland comes second (after the USA) as one of the top agricultural producing countries, exporting 90 million Euros of agricultural

produce in 2018, which is very impressive to think it's only 1.8 times bigger than Wales.

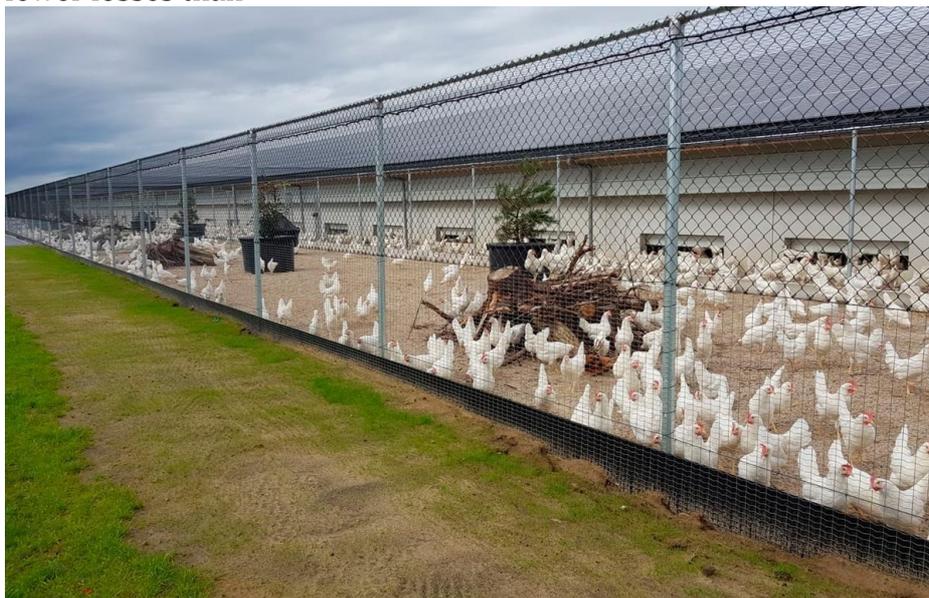
Due to the high livestock numbers in such a small country, they have a strict phosphate quota system that farmers must abide by. Most large dairy, pig or poultry farmers pay other farmers to take the muck away, and some farmers pay for lorry loads of muck to be taken to Germany.

**My first visit** was Kipster, a free range egg unit, producing the first carbon-free egg farm.



First impressions are of a good welfare system. But on closer inspection, I noticed that hens are not truly free range as we know it in the UK. There are four main differences between Dutch farms and UK free range rules.

- 1) Hens are only allowed small outside areas to explore - see picture 1. In the UK, 16,000 hens must have 20 acres, so Dutch farmers experience fewer losses than



UK farmers from diseases and predators. A British 16,000 hen unit can expect 300 hens to vanish from foxes per flock.

- 2) Dutch farmers are allowed to keep 22,000 birds in one airspace or shed rather than 16,000 as UK farmers must abide by. Therefore, making Dutch farms more efficient with having 37.5% more birds per shed, spreading capital cost and labour over more hens.



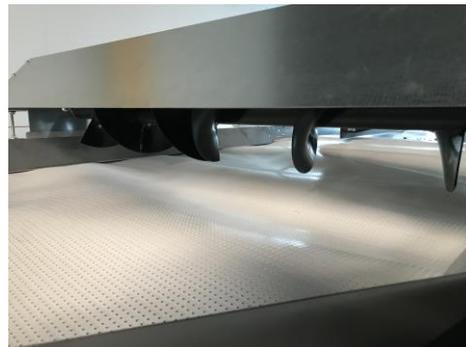
- 3) White hens lay white eggs, but white eggs are on average smaller by 2g at 62g each. On average, a white hen eats 118g/day to produce a 62g egg; a brown hen eats 125g/day to produce a 63g egg. 40t less feed a year to produce only 5t of fewer eggs. White hens last on average 80 weeks old, not 74 weeks as the brown hens.
- 4) Dutch feed companies are allowed to use human food waste from the factory to feed the hens. This was the reason they had such a low carbon footprint.

**My second visit** was to Jansen Poultry Equipment.

I was well aware of this company as this is the system I have at Derwydd. The reason for my visit was because I knew that they manufacture ammonia-reducing machines. This machine dries the hen muck from 30% DM to 60%. Reducing ammonia levels by 30%. The drier uses very little power as it runs the muck over 200m of belts. The belts have small



holes, so the warm air from the hen shed passes through and dries the muck.



The drier costs around £45,000

The second machine is a chemical ammonia scrubber. This machine reduces the ammonia by 90%



A stainless steel shed was built at the end of the hen shed, so air from the hen shed is pushed into the chemical air scrubber, where sulphuric acid is sprayed on to the air so acid then attaches itself on to ammonia then water is added to reduce the pH level to neutral. The farmer can produce 60m<sup>3</sup> of fertilizer with a N value of 20%. The saving in the cost of buying in fertilizer easily paid for the running cost of the chemical air scrubber.

The disadvantage of the chemical scrubber is the cost of build. Due to the need to use stainless steel, the building cost is £90,000, and the running cost per year is £5,000.

**Third Visit** was to Edinburgh, to the UK farm woodland development strategy conference for clean air and wider benefits.

Spending two full days with civil servants and scientists made me realize the impact that British agriculture has on the pollution in the UK. 88% of all ammonia produced is from agriculture, which is emitted during storage and spreading of manure and artificial fertilizer. Air pollution has become a priority for DEFRA because of the tragic death of 9-year-old Ella Kissi-Debrah who was the first person in the UK who died of air pollution.

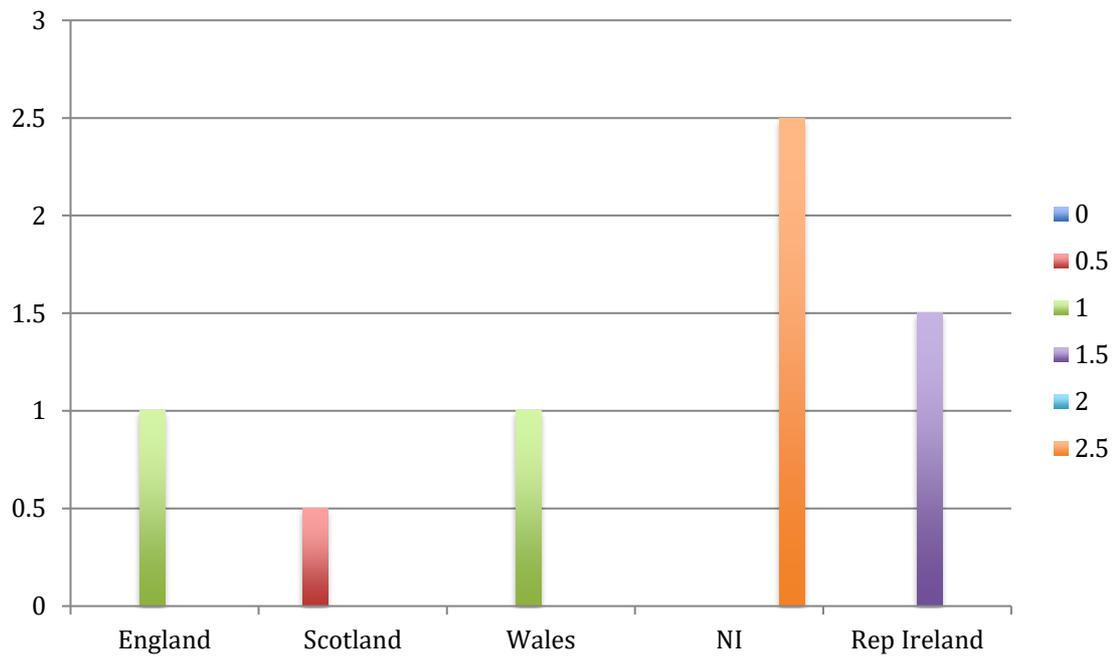
I listened to people who wanted to plant 25% of all the agriculture land to trees - paid by the NHS! The argument presented for this was that in 25 years, most of the NHS budget would be spent on helping people with air pollution related illness. What was encouraging, at no point did they mention UK agriculture should produce less food. They understood the pressure that the supermarkets put on UK farmers trying to produce more food for less and it was in agreement that this culture should stop as consumers were benefiting at the cost of the environment.

**Fourth Visit** was to Northern Ireland to visit the Agri Food and Biosciences Institute.

I sat next to Dr Rodrigo Olave in Edinburgh, and while we chatted about what we both wanted to achieve, he invited me to Northern Ireland. AFBI have done much work on tackling ammonia emissions.

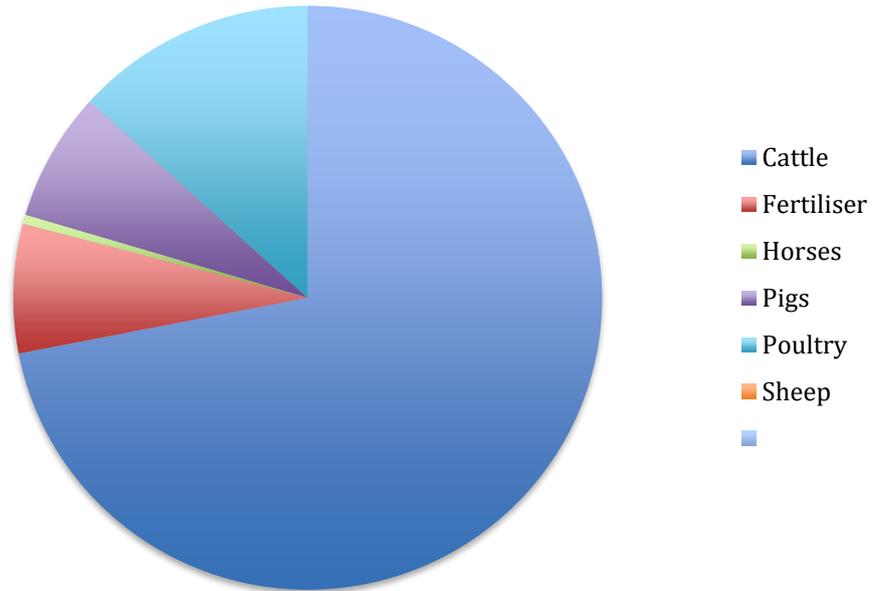


### UK Agricultural NH3 Emissions (Tonnes) / Km<sup>2</sup> of Land Area



As illustrated on the graph, NI emissions are far greater per Km<sup>2</sup>.

### Ammonia Emissions by Species



The pie chart shows that cattle produce over 70% of the ammonia but fertilizer is also 7%. In NI, 75% of fertilizer is used to grow grass for cattle bringing the grand total for cattle emissions to 75.25%

Dr Rodrigo Olave checking ammonia-measuring equipment.



AFBI have only been measuring ammonia for the last three years and results will take many years to evaluate. However, what they have found is if 100% of farmers:

- Use low emission slurry spreading could reduce ammonia by 10%
- Use acidification of slurry could reduce ammonia by 16%
- Extend grazing and not house by one week 4%
- Reduce crude protein diet 4%

## Key messages to the industry

- 1) We, as an industry, have responsibility to reduce the air pollution we produce. NFU have set a target that the agriculture industry should be carbon-free by 2040.
- 2) Just by making small changes in our daily farming routine, we can reduce air pollution e.g. mucking hens out every day rather than twice a week reduces ammonia by 25%. Planting trees on the range helps bird and air pollution.
- 3) I feel that this could be a financial opportunity on most farms in Wales by growing trees on poor agriculture land. 70% of land in UK is for agriculture, and I believe that farmers will be a vital link in a chain on reducing air pollution in the UK. Also, a new way of selling food by saying that the food produced is low miles, or helps in combating air pollution, could have a premium.
- 4) New technology will be needed to help reduce air pollution by using genetics, reducing ammonia in slurry, or different feed fed to livestock will help reduce ammonia in agriculture. We could see farms producing their own fertilizer from building chemical air scrubbers or using better methods to apply slurry on fields.
- 5) In my view, this is the most important. We are all in it together, so supermarkets and consumers will need to 'dig deep' and pay a higher price for goods and food that are not bad for the environment. Consumers may need to do small changes such as buying white, slightly smaller eggs rather than extra large brown eggs and buy local seasonal food rather than flying it from the other side of the world so it can be sold fresh.

Llŷr Jones 17/07/19

