Hello, I'm Aled Jones and you're listening to Ear to the Ground, a podcast brought to you by Farming Connect. Now we've all heard about the government's target reaching net zero in terms of greenhouse gas emissions by 2050, and the NFU has set an even more ambitious target of farming reaching the net zero position by 2040. But how are we going to get there, what is net zero, and what does it mean for farmers in Wales?

To tackle some of these questions, I recently caught up with a farmer from Brecon, Hugh Martineau, who's a part of a group of farmers who've come together to try and map out the path to net zero. My name is Hugh Martineau, we farm here along with my wife at Treberfydd Farm and just on the banks of Llangorse lake. We are new entrants to farming, we moved here about four years ago back to my wife Sally's family home and initially we took on about 50 acres of land and subsequently at the beginning of last year took on a further 200 acres of land. The journey into farming I suppose goes back a while. I studied agriculture in Edinburgh almost 20 years ago now and then worked for a few years as an agricultural consultant up in Aberdeenshire. You may tell by my accent that I'm not native. Following this, a few years in direct agricultural consultancy working with farmers, I then moved more into the environmental area, specifically into environmental policy. I worked for a company called Ricardo Energy Environment, where I was involved with a number of different sustainability areas around agriculture, so water quality, air quality and greenhouse gases were the main focus there. So I've got a sort of career in agriculture as well as actually being on the farm here now as well and I continue to do that in my day-to-day work working now with a company called Map of Ag where we look at how we can better use data to inform decision-making at a farm level, understanding what the impacts of things around greenhouse gases and water quality are, so it's very pertinent to some
of the work that we're doing through our European Innovation Partnership work on carbon and carbon neutral farming. And tell us a bit more about the farm and your current farming system in Llangorse there near Brecon. Yeah so I can't really say we've got a particular farming system. I've looked at lots of options over the course of the last few years and at the moment given the uncertainty of the impending exit from the European Union and also the lack of clarity around trade agreements I'm finding it very difficult to make decisions into what livestock species to back. We're in a situation where we need to make considerable investment into livestock and it is a livestock farm, it's not suitable for other cropping. I mean we've got certain areas of land which do crop but that we'd probably go into and be run as part of an integrated livestock system. So yeah I've been through a number of different scenarios in my head ranging from everything from a block-calving dairy system through to deer and beef and sheep systems and at the moment we're sort of looking at trying to match the livestock system with what the most sustainable use of the land is and we've got a real mix here of habitat land and wooded areas and some more improved pasture as well and I think it does suit itself quite well to cattle rearing systems so that's probably what we're going to go for and at the moment we're in Glastir, we're making significant investments into the infrastructure of the farm so we're in a place where we can invest when the time is right. I know we are in this climate of uncertainty at the moment where it is difficult to make long-term decisions because there's so much to happen from now until the end of the year. What's interesting as well is that, and as you mentioned earlier on, you're part of this group looking into carbon neutral farming through the EIP, talk to us a bit more about how that group came about. So the group was facilitated and started up by Dŵr Cymru, Welsh Water, I was a bit late coming to the group
actually. The group was originally set up by Welsh Water and I was invited to join by Richard Roderick, my neighbour, slightly later than the others because he was mentoring me through the Farming Connect scheme and we made a good connection. He's been really useful through the mentoring scheme and he brought me in to that group and that's been really beneficial to meet some other farmers and sort of collaboratively work to try and address some of the environmental impacts of agriculture. I think it was set up probably around about 18 months to two years ago. I think my involvement started about 18 months ago. - And how would you define net zero and what does it mean for farmers in Wales? - The way I find easiest to define net zero is it's effectively the balance between emissions from our systems, so that involves the emissions from livestock systems, so enteric fermentation and the methane emissions from enteric fermentation and the emissions then from the subsequent manure that is produced. The emissions from the use of reactive nitrogen either in organic or inorganic forms and the associated nitrous oxide emissions from that and then there are smaller quantities of emissions from things like diesel usage, energy usage on farm as well. So that's the one side of the net zero balance is the emissions and the other side of the balance is the sequestration capability that we have. We have a unique opportunity in agriculture because we have land, a land resource to remove atmospheric carbon dioxide through sequestration into woody biomass and into soils under crops and grass. - So if you're a farmer looking to contribute towards the net zero targets, where do you start and do you need to establish some sort of baseline first? - Yeah the baseline's essential that's really where we all need to start and understanding where the baseline is for our individual farms. And actually for us what's going to be interesting through the study is working out what the collective baseline is as well because we have different farming systems within the group, we've got dairy, we've got extensive beef and sheep, we've got more intensive systems as well so understanding
what the baseline is collectively across those range of farms will be very interesting. But that's not necessarily that easy to do. There's a lot of areas that we need to look at in order to do that and quite a lot of specific activities on farm we need to look at in order to understand what that is and we're going to be working quite closely with with partner organizations in Bangor University, in Forest Research and also a company called Precision Decisions who are going to do some soil sampling for us as well. - And how challenging is it to create a common baseline across different farm types? You mentioned there within your group there's different enterprises, is that one of the challenges that there is around trying to identify the path to net zero farming, is trying to understand what are the tools and what are the common metrics that every farm can use? - Yeah I think that's right. I think you've got to understand that there will be differences between different production systems and there's this balance between production and emissions as well, so we've got to bear in mind that in agricultural systems we want to maintain production. It would be easy to reduce emissions by reducing our production because effectively all of the emissions arise from our biological processes and I mentioned before enteric fermentation, nitrification, denitrification, these are the things that emit and if we stop doing it then emissions would fall but we have a societal obligation to continue to produce. We've got some of the most productive systems globally in terms of our greenhouse gas emissions intensity and we cannot afford necessarily just to export our emissions to other parts of the world by reducing our own production domestically. - So do you think that farmers could increase their productivity whilst reaching that target at the same time? - Yeah undoubtedly in certain areas there are efficiency gains that can be made in order to reduce the greenhouse gas emissions intensity of
production, and by intensity I mean the emissions associated per unit of output whether that be per tonne of wheat or per kilogramme of beef or lamb, so emissions intensity is an important metric that we should be considering because it is effectively the measure of our productivity as well and our emissions associated with the production. The question is an interesting one I think in terms of the efficiency gains that can be made. There is a number of areas which I like to focus on when we're thinking about emissions reductions so fertility in the livestock system is one, reducing calving intervals, thinking about age at first calving, looking at how we use feed in the system, optimizing the amount of forage that can be home produced and minimizing the purchased protein which either coming from other areas of the country or globally as well because the impact of feed globally is quite a big issue as well things like imported soil and the like. And some of that is good husbandry isn't it, it's good stock management and also good business management in trying to lower your input costs. But interesting on the livestock performance do you think there's a role for improvements in genetics to try and help reach this target? Yeah, I know there is. And increasing our understanding of genetics is important in terms of actually understanding which animals emit more methane versus others and that's not necessarily a breed specific thing, that can be a genetic marker for these things and sort of improving our understanding of that and whether we can have effectively low methane animals or lower methane animals would be beneficial. But then also there's a broader genetic picture around how we understand fertility and feed efficiency and the genetic markers for those sorts of traits as well so yeah I think it can play a big role in improving the efficiency of production systems and having a positive impact on emissions intensity. And can you share some examples of the elements
you would measure on farm to assess the emissions and emissions intensity, in terms of measuring the water quality, soil quality, air quality how do you start that?

- In my view, and we'll be working closely with Bangor on this specifically, but we will want to focus on the major sources of emissions first, so what are the key data points that we need in order to understand the impact of things like enteric fermentation so we need to know the numbers of livestock on the farms and we need to know what they're consuming. We need to know what they're producing in terms of calves or milk. So having sort of high resolution data on that is really valuable and then you're able to identify where the emissions reductions can be achieved far more easily when you've got better indicators for things like herd fertility or things like how you actually use reactive nitrogen as well. That's the other key area, how much nitrogen are we using on-farm, either in organic or inorganic forms and how is that being used in terms of its productivity; is it gaining what we wanted it to gain on farm in terms of its efficiency of the use. Nitrogen use efficiency is a really interesting indicator for that as well. So those are the kind of things I'm hoping to look at from an emissions side of things. From sequestration side of things we're looking at some quite innovative approaches here, there's a lot of discussion about the role of hedgerows for example in creating removals from the atmosphere and the assumption I think, in our current measurement, so our national inventory type measurement, is that hedgerows are in equilibrium. Effectively they are neither emitting nor sequestering carbon because of their annual management cycle. Because effectively all the new growth over the course of the year gets cut it gets released back into the atmosphere as it decays on the ground, but what we're looking at are different methods of managing hedgerows so leaving them uncut for a few years and
over the last few years here I've let quite a number of our hedgerows grow and we have got Forest Research that are going to come out and they've got some LiDAR technology so they're effectively going to fire some lasers at our hedges that we've left uncut versus some of them that have been cut, to look at the biomass accrual over time and hopefully provide us with a much better picture of actually what the biomass accumulation looks like over time. And I think it's that kind of information that we need to be able to build up a much better picture of our opportunities to sequester carbon and hedgerows is just one part of that jigsaw if you like. Soils are are the other one and much of our soils here are high in carbon stock. We know that they are because we tested them back in 2016. They're sitting somewhere between 90 and 110 tonnes of carbon per hectare in the top 30 centimetres. But what's the potential for further sequestration when you've already got quite high levels of carbon in the soil? That's the challenge I think we've got, and understanding what the most appropriate management practices are both to protect the carbon stock that's in the soil and then look at opportunities to sequester additional carbon dioxide into the soils in the future. - And a lot of this is about recording and capturing data points across from the emissions to the sequestration and to try and build up an accurate picture of the carbon balance of commercial farming on a farm level. A lot of this data management, do you then use software to try and help make better decisions or to interpret and analyse the data? Yes, this is again something that we're only at the very start of the project but this is something that we're hoping to evolve over time working with Bangor and hopefully using some of my knowledge of the activity data from my career as well, my day job. And so i'm really looking forward to working with the guys at Bangor in terms of how we refine those tools as opposed to try and understand and create better
analysis and diagnosis of actually what can be done to both reduce emissions to increase the rates of sequestration, and hopefully actually predict a bit more about what the key performance indicators we need to achieve in order to to meet that net zero goal in the future. And we hear quite a lot about the opportunities of carbon trading, selling carbon credits to large companies who are looking to offset their emissions.

- Do you think this is a commercial opportunity for farmers could it be a new lucrative income stream?
- This is an area I'm a little bit torn in if I'm perfectly honest with you. We need to be really careful about what we trade outside agriculture as a carbon credit without fully understanding the net zero position. If we as an industry are going to claim that we are net zero then we need to make sure that we have not traded all of that carbon out of agriculture first, so if for example I'm creating a carbon credit here on the farm and decide that another business within the economy is able to buy that or purchase that carbon credit for me I can't then claim that that is offsetting the emissions from enteric fermentation or nitrous oxide emissions from my farm I don't think.

- And that's the challenge isn't it, it's trying to make sure that the sequestration then contributes to the positive balance formula and calculation and isn't traded away and therefore possibly damaging the carbon footprint of farming. - Yeah exactly, we've got to look at the ultimate goal here and why net zero is important is we've got to reverse the impact of global warming. We've got to get to a point where we're not seeing increases in global temperature which are going to have a huge impact on our culture and society. So that's the ultimate goal and we can't sit here in agriculture and say look we're net zero while we traded all the carbon out if it, i think that's disingenuous. - Are there other ways in which farmers could generate more income from carbon neutral farming and could
they use the net zero brand to try and attract a premium price for some products? - Yeah and that's certainly in the forefront of my mind as a new entrant farmer I want to find a way of creating a premium for a product, and I suppose linking this back to your previous question about how we claim carbon credits or how we might benefit from carbon credits, it all boils down to what the market's willing to reward and at the moment my view is that the market doesn't currently reward the true cost of production of food and if we're adding another layer into there and saying we want the market to reward the cost of carbon in there as well then I think politically that is going to be quite a challenge. So as I said, I was a bit torn about how to deal with the carbon credits thing because actually if we can bring additional money into agriculture to reduce the emissions, if we actively invest that into greater levels of sequestration then that's possibly a positive thing to do but it's an incredibly complicated area when it comes down to it really, and we just need to be very clear on our boundaries and the claims that we make I think.

- Do you think the consumers will want to buy into net zero beef and lamb and be prepared to pay that bit extra for it? - I think the honest answer to that is there will be a a group within society which are willing and capable of doing that but I think in the context of a global pandemic where economically we are in a fairly poor position and there will be people losing their jobs and are losing their jobs then it's incredibly difficult to say to people to pay a premium for a net zero product which may be deemed as a luxury to some.

- So there will be a role for future support schemes and the Welsh Government is consulting now and developing their thinking around the Sustainable Farming Scheme with a lot of reference to the provision of public goods and rewarding farmers for producing public goods and clearly adopting carbon friendly practices is a public good.
- Undoubtedly, it's a public good and it's something that we need to be rewarding and incentivizing farmers to achieve greater levels of sequestration and emissions reductions. I struggle a little bit with where the boundary lies sometimes between a public good and what should be rewarded by the market. And that boundary between markets and where market failure lies is going to be a challenge for our policy makers in the future. - And what are the next steps for your group now, the group of farmers that you're working with in the Brecon area, the EIP project is underway, and what's going to be the focus now over the next coming weeks and months? - Get cracking with data collection. That's really where we're at now we're just at the point which we've got everybody appointed and we now need to get some lasers being fired at hedges and we need to get some data collected from farms and think about the best and most appropriate way to collect that information in a way which is not going to add to farmers' daily tasks. We don't want this to become an administrative burden on people, we need to make sure we're collecting information in the most efficient way so we're going to be looking at that first. - What's the length of the project, when do you anticipate you're going to have some results and findings to share with the wider industry? - It's a two year project but I would hope that we will be able to share interim results based on the initial analysis around greenhouse gas emissions assessment on farm and we'll probably be looking at doing that possibly within six to eight months as a sort of emissions base line. We will be doing the initial measurement of hedgerows using the lasers hopefully this winter we've just got to wait for the rest of the leaves to fall off the hedges, and then we'll get Forest Research in to do that initial measurement. So baseline carbon stock should be available and then the soil measurement probably will be happening over the course of the next six months or so.
just depending on ground conditions and things so we should hopefully get started quickly and have some data ready within the year. But ultimately we'll be looking at reporting back in two years from now but definitely sharing information as we go. - And finally as you're aware, the NFU have set a target of farming reaching net zero by 2040. How achievable is that? It's achievable. It will take a bit of thought about how we actually do achieve that and how we actually incorporate the means of creating the removals to offset the emissions. So going back to the point I was making about what is net zero, it's really about this balance between the emissions and removals from the atmosphere. And we need to have a clear view of what that actually looks like, what does it mean in terms of the incorporation of more woody biomass in the form of trees and woodlands, and what does it mean in terms of the management practices in our fields in terms of cultivation, the use of soil amendments and the like. So there's a whole host of things that we need to figure out in order to determine how radical we need to be in order to meet that target. And that is what this project is hopefully partially going to inform. It's about creating a baseline. It's not necessarily going to come up with all of the answers, but it should give us a path for the future really. And from my perspective, specifically thinking about how do I shape this farming enterprise here. I'm hoping that the results will actually inform the stock that we choose and the stocking density that we target and how we manage our habitats. Because that's the other point I think is incredibly important that we shouldn't always just look at greenhouse gas emissions in isolation, we need to consider the sort of wider sustainable management of land. So biodiversity, water quality, air quality, all of the other environmental aspects of sustainability that we need to be focusing on and we will be through this study looking at the co-benefits and risks of different
activities that can reduce greenhouse gas emissions for example, on other environmental areas. - Well Hugh this study is an incredibly important piece of work and it'll be fascinating to follow its development and no doubt we might even want to record a further podcast with some of the findings in the future. But for today Hugh I've thoroughly enjoyed our discussion and thank you ever so much for joining us and all the very best with the study. - Thank you very much. And there we are, we've reached the end of episode number 30. We'll be back in two weeks time with a special edition on turkey farming in the build-up to the festive season. But in the meantime, don't forget to subscribe on whichever platform you use to keep notified of all new episodes of Ear to the Ground. So on behalf of the team at Farming Connect and myself Aled Jones, thank you for listening and goodbye for now. Hwyl fawr.