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 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.