1st	February

[Starts with introduction and explanation of work packages]

Int: How many years have you been farming for?

H: Forty-five, or more than that probably. I've been here for forty years and this estate is 3600 Ha, all in.

Int: And what is the cropped area of that?

H: That is the cropped area, I'm crop production manager, that's the area I look after. There's woodland and there's all sorts of weird and wonderful things like grass for car parks for pop festivals... But that's the cropped area, that's what I'm actually looking after.

Int: And so the land is owned by the estate?

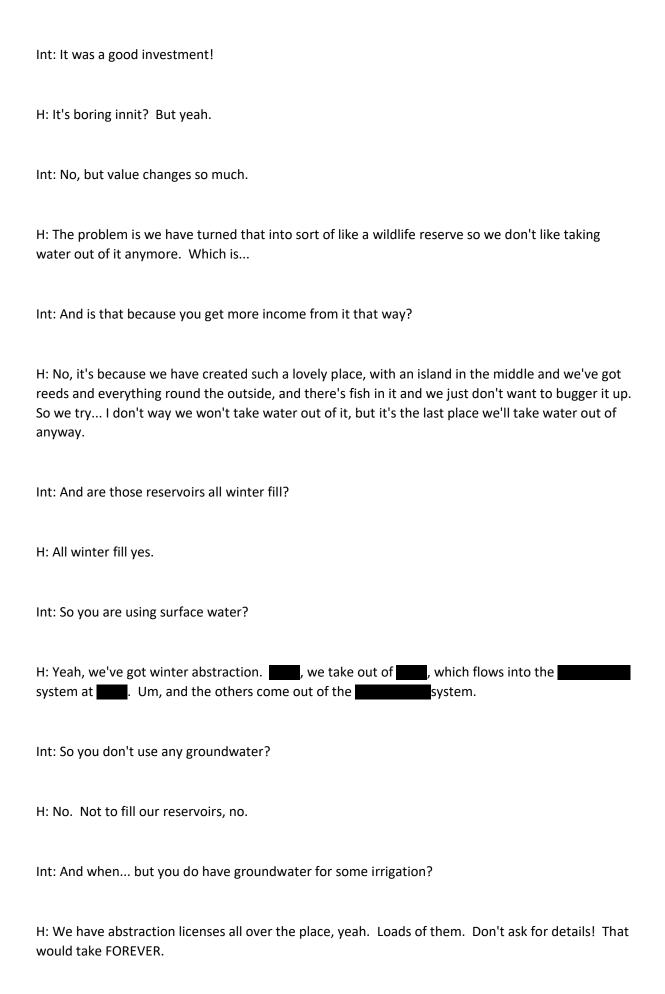
H: We are fifty/fifty. We own about half of it and the other half is tennanted. Rented from Winchester College most of it.

Int: And how much of it is irrigatable?

H: We can actually get water to pretty well all of it. Um, we are restricted in some areas... how we can move it, where we can move it to, how much we can move. But we could if we needed to, we could pretty much well water everything.

Int: And what water sources do you have on the farm?

H: We've got 5 reservoirs. Yeah, I built 4 of them. No! We've got 6! Because there's two... yeah, we've got 6. I built 4 of them. It's interesting because one of the reservoirs, the first reservoir that was built by the estate in 1963, cost three and a half thousand pounds to build. And basically they took a 5 acre field and pushed the middle to the outside to form a bank and filled it. It holds 5.5 million gallons. I now rent that for fishing for £3,600 a year. So I get every year what it cost to build the bloody thing! I always find that fascinating!



Int: Oh, I was just going to ask you about your licenses! Um, roughly, do you have how long remaining on your licenses, and are they licenses of right or...?

H: We have about, talking million gallons, we've got about 5 million gallons as a license of right. But we've got something like about 25 million gallons of abstraction licenses out of the which are restricted. So in theory we've got quite a lot of water. Our reservoirs at hold 40 million. We've got 15 million at We've got 5 million in the old one I told you about, and we've got 20 million at So we've got quite a lot of water available to us. Yeah.

Int: So the time restricted licenses, when are they going to be reviewed by the EA?

H: Some of them we've just done. Fortunately I didn't have to do that, did that. But we've got some... some seem to come up every year, because we've got 20 licenses or whatever.

Int: Okay, so they are not all...

H: They are not all lumped in together, no.

Int: But they are all within the same catchment?

H: Oh yes.

Int: Sounds quite complicated!

H: It is complicated! And in theory it should be simplified. But my own cynical, personal view is, while it is so complicated it's easier to get them through. Because the Environment Agency don't understand it any more than we do, and they just see this big pile of paper and they just think, oh sod it, just sign it off! (laughs).

Int: So you are relatively confident in that case that you are not going to have your abstraction restricted?

H: I'm sure that they will try and restrict us in some shape or form in the very near future. Whether it's going to be a use it or lose it thing... so. It seems a bit crazy but we would tend to use our

abstractions licenses from rivers and drains before we use the reservoirs. The reservoir water's much cheaper, and the old estate manager used to say, well why don't use the reservoir because it costs less than... but it's all peanuts anyway... water is not expensive. Um, but if you don't, if you keep submitting returns or you haven't used anything off this license, someone somewhere is going to sort of say, hey hey they are not using this. So I tend to... It might be the wrong way. Sensibly, for the environment and everything else it's probably the worse thing we could do, isn't it? Because we are abstracting when we have no need to be. We could move it from other places, but... we are trying to keep our permission. It's the way it's regulated. It seems to make sense to do it that way.

Int: So when you say lose it or lose it you are conscious that you need to try to use the water up to as much of your licensed amount as possible?

H: Yeah! Yeah. Because that's been mooted, you know. But fortunately because we've got so many licenses. Erm, licenses of right will disappear. Because as they come up to be renewed and everything else, they'll say, "Oh, well you've got 3.5 million gallons on this license. How about we give you 5 but we put you on a....". That's how it works! [laughs]. Whis is fine, because, you've got, you've also got the... what's the word, it's not political element in there, but it's sort of like good neighbours and everything. Because we've got a license of right there. Because we can irrigate when other people can't, you get an awful lot of bad feeling. I mean in 1976, which is when I wasn't here then, I came the year after. But one of the managers at was physically attacked in the supermarket because they were irrigating, because we had the licenses. And a lot of the smallholders around, it was a very very bad drought year, there really was suffering, you know, they drained the forty foot basin. And it's... there's still an element of that, you know. If... even though we've got a license of right and we've got reservoirs, if there is a restricted period we tend to go along with it. If we are desperate we won't, if we're really getting... But if no one else can irrigate we tend not to because we are a big estate, when the supermarked because we are a big estate, when one else can". So there's that which is...

Int: So there's goodwill.

H: I'm sure in South Africa they'll farm the same, because they'll shoot them down there! But it's one of those good neighbourly things where you think... oh I don't know, we really ought to be irrigating but if we stop for a couple of days it'll help, the levels will come up a bit quicker to help everybody else.

Int: But you sound like you would probably be able to cope without the licenses of right, or do you feel?

H: Yeah... we have got loads of water. I mean we used to grow over 800 acres of potatoes, and now we are down to about 330-350. We are well served... when they really went into irrigation in the sixties, erm, a lot of underground mains were put in. I mean this farm where we don't grow

potatoes at all, is covered in underground mains, because they used to grow potatoes here, with these big reservoirs. And the same at where the underground mains are. They are all taking water to places where we no longer grow potatoes because the soil's not, you know it's mineral soil and we tend to keep potatoes to so that's an interesting one, it's just how everything's evolved. We maintain and we keep them going and we use them whenever we can. Um, and they are always there if we have to irrigate a field of rape or a field of sugar beet to get it started, it's there.

Int: So most of that's gone over to rape and sugar beet then?

H: Most of it yeah. Well, we've just actually reintroduced potatoes on this farm, just because we think it'd be a good idea. And we were running... we have a market for early potatoes for fish and chip shops, so we've been growing on what we call the high land at , mineral soils, rather than the fens. And basically we've been round them a few times and we've run out. We don't want to over-crop it, so we looked at some of this land at , we thought, well, we used to grow them here so we're... and now we are declodding and everything's much easier, so we are coming back this way again.

Int: But overall you've reduced the amount of potatoes you are growing?

H: We've reduced the amount of area, we've got the same amount of water we've always had. But we've reduced the area.

Int: So irrigated agriculture is becoming less important to your business over time?

H: No, potatoes will always be very very important to us, but less than, yeah. We used to grow too many and basically we used to cock it up. We've come back and we've sort of, we've got a manageable level. We've got problems with soil pests like eel worm and everything else, and we've lengthened the rotation. It helps no end. We are growing... we are like the rest of the country, we are growing half as many potatoes as we used to do, but tonnage-wise we're growing more. You know, we're growing more tonnage than we used to off half... off double the acreage. And everybody's doing exactly the same. We are not particularly clever. It's just the way that agriculture has gone, yields have increased and varieties have improved so.

Int: So, talking quickly about the contract arrangements that you had when you were growing a much larger area of potatoes, are those different to the contract arrangements you have now?

H: Yeah, we didn't used to have any contracts at all. And we still don't... About half our area is grown for chipping varieties which we sell in 25 Kg bags to fish and chip shops. No contracts on that

at all. The pre-packing stuff we contract about a third of it as a fixed price contract. Our King Edwards and Desiree go to on fixed price contracts for Waitrose. The rest... they will... merchants will say, "yes, we'll have a thousand tonne of whites" and we'll price them up as and when, because they are crafty you see. And it tends to suit us very well. We've just had two years of very high prices, and this year we're getting a real good kicking because it's been a really good summer and there's a lot of potatoes grown, everyone's had good yields, good quality and they are a job to shift. That phone had better stop.

Int: A lot of the other farmers that I've talked too are much higher in terms of the percentages that they produce for fixed price contracts, and...

H: Yeah, no we don't. Our attitude, it's not my attitude, it's the collective attitude. Our attitude is if we contract we can give the bloody things away any time we like! [laughs]

Int: So you prefer to...

H: Yeah, I mean if we'd been contracted at £180/tonne for Edwards the last two years we'd have caught a serious cold. But, and, no... we've got good storage, we've got plenty of storage, we've got cold stores. We know what we are doing. People come... We've got a reputation for fish and chip shop stuff, so people tend to come to us now. The farm has worked very hard on that.

Int: Yes, I was going to ask about how you... do you have people doing a lot of marketing in order to ensure that you can...?

H: Nah.

Int: So it's just case of having developed that reputation?

H: It's just me and People tend to, what happens is people tend to come to us now. They know how we work and it just seems to work, you know. I mean the fish and chip shop job, we are supplying potatoes to fish and chip shops pretty well 12 months of the year now. And we've got a name, we've got a brand, and they just ring up. We argue about the price, and that's about it. As long as the quality's up they are going to come to us anyway.

Int: Yes, but you had to invest quite a lot in storage along the way to make that?

H: Yeah, it's been an ongoing thing right from... They started building potato stores in the late sixties. And you know we are still building or converting potato stores as and when we think we need them. Recently in the last few year's we've actually put low grade chiller units in two of our chipping potato stores so we can actually store them for longer so we can keep the market supplied for the 12 months of the year.

Int: So what are the main water risks you worry about here? Scarcity, quality, impacts on the environment?

H: Ooh, the environment! Ooh that's the E-word. You'll have me swearing again. Yeah, obviously shortage of water during the growing season is our biggest challenge, and we've done our best to cope with that. We've moved away from rain guns, which just throw everything up in the air and you watch it and it will fall wherever it falls. We've now moved to boom systems. So we actually put the water where we want to put it. We use less water too. We are not wasting so much. We tend to irrigate at night, not during the day, so we do all the good stuff. We irrigate at night so people don't know we are doing it basically! [laughs]. No, but you get less evapotranspiration and everything else. We are using tied ridges to stop the water running off. So we are doing all the good stuff. We haven't gone to trickle. We've looked at it but it just seems to me an enormous amount of work. We used to be sprinklers and you'd move and sprinkle, and it was just a bloody nightmare so. We don't want to go back to those days again. So that's our main risk. Water quality is an issue with all this brown rot stuff and we sample regularly. The where we get most of our water from is sampled regularly, so we know where it is if it's there at all. So we've got that covered. Tesco want water quality information, so we have regular tests, take water to the lab and they will test it and give us a sheet. I mean I don't understand what it's saying most of the time, but Tesco like that. Erm. There's also an Environment Agency website where they test and there's also water quality information on that so we collate all that and pass it to anyone that wants it. It covers us for red tractor and everything else. So that's the water quality sorted out. Yeah we've got drought issues. We have infiltration issues. That's our biggest... because some of our soils we have to be a little bit careful because with these booms we can actually put the water on a little bit too fast, we create ponding, you increase runoff and everything else, so we have to be quite careful. So we'll go 12 mm a time, with a boom, where we go 25 mm in one hit with a rain gun, so um, that's what we do for that one. I can't really think of too much else.

Int: And have you had any negative experiences in the past related to those risks that you are describing?

H: Sometimes the bloody irrigators break down and you get flooding, you get ponding in the middle of the field, which isn't great. We've had no disease water quality problems, not yet anyway. It don't look as though there's any on the horizon either.

Int: And has water scarcity caused problems.

H: I mean we do get issues with water levels Because the water levels are checked for the and once they've fallen a certain length they will put restrictions on, either irrigation two or three days a week, or irrigate at night, and we tend to adhere to those. Or we'll then swap to irrigating out the reservoirs. And that's not quite as easy as it might seem because we use open dyke transfer. Have you dealt with that one before?
Int: I don't know about that no.
H: Right, the here and we can take 90% of what we put in out in here and we can take 90% of what we put in out in here and we can take 90% of what we put in out in here. It's called open dyke transfer. We put water in at here and we built three reservoirs at hoping we could feed our farm with it but apparently water doesn't turn left out of it only turns right so we can send water to the from but we can't send it to hot, which is don't ask me - I don't understand it! So we put water in and we take it out. The problem is when the is restricted we can put it in, but they can't open the slackers to get it out. We've got more pumps than we need so then we have to physically pump it so we metre it in. We metre it out of the river, into our dykes, we metre it there and there and then we have to metre it again at the irrigator. We've got a yeah we have to tell the EA what we are doing and it always has to be completely (inaudible) and it's a bloody nightmare.
Int: Yeah, that sounds complicated.
H: Mmm, but that's how we move it about. It's the only way really we can move water large distances. It's called open dyke transfer and there are places we can do it and there are places we can't. We've got an area at called and try as we might we can't get permission to move any that way.
Int: So you said that you think you've become more irrigation efficient over time?
H: Yeah, we've got, the booms are getting better, the hose reels are getting better, the pumps are getting more efficient so, yeah no, it's world's different from what it was 20 years ago.
Int: And how do you think that has changed your risk exposure. Has it exposed you to any new risks?

Int: I guess in terms of having made the investment do you feel any less flexible now than you were in the past having invested in the technology to permit you to do it that way?

H: No, it's reduced the risks enormously. No I don't think it's exposed us to any new ones.

H: No, I don't think so. I think we are as flexible or more flexible than we ever have been so. Yep, no, so I think we are alright.

Int: What do you think is the next stage for the development of irrigation efficiency more generally?

H: Oh ho ho, that's a hundred thousand dollar question isn't it? I think booms have gone as far as they can. We did invest many years ago in a linear system. There was one which just moved itself up and down the farm. And that wasn't a great success, and eventually it just walked itself into the river and destroyed itself. So, but that was great when it worked, but it was just phenomenly difficult to keep running. It's not like a centre pivot where they just go round and round and round. Because they are relatively easy. This was a linear which had to have bridges over dykes, and there were 9 sections which used to go...

Int: So what happened, was it getting clogged up when it needed to move across or?

H: Yeah, it would miss bridges and turn itself off, and because you've got all these sets of wheels, they've got sensors on there and if one set of wheels gets in front of the others it stops those and the others catch up and they were forever going wrong and it would tie itself in knots and you don't know what shape at the end of the day... And er, no one was too disappointed when it walked itself into the river. Sorry about that. But the er... we would like to sort of think there would be something to do... we could make trickle work. Basically. The other thing we'd like to do is probably fertigation. You know about that one because you are nodding your head so you've heard about that one before. So we'd probably like to add fertiliser or whatever to the water, just to make us more efficient. It's all down to precision agriculture isn't it. We get very excited about precision agriculture, but as long as we are putting fertilizer onto a spinning disk and hurling it 36 metres, and we are squirting water in the air and it falls wherever, we can't be that precise can we? We are more precise with booms, but they are still affected by wind and temperature and all sorts of things.

Int: And what about scheduling? How do you schedule your irrigation?

H: You want a start date, the most important thing is a start date, that's why we are going out with the spade, fork and everything else and looking at the crop. We are now starting far far earlier than we used to do because we actually realised that potatoes initiate on the root quicker than we though they did, sometimes even before the damn things are through the ground.

You get these little hooks at the end of the root which are the start of the potatoes, and because our pre-packing crops it's important to keep scab off them so they have to initiate into wet soil, so we are starting much earlier.

Int: And is it just mainly checking with a spade, or using a probe?

H: Oh god, no we don't use probes, we don't use neutron probes they are too expensive and no one seems to relly know how to interpret them, and where do you put them? And how many do you have? And everything else. So, it's a bit more scientific than by eye. We run irrigation balance sheets, so we start when the potatoes go in the ground in April and we record all the rain and we record evapotranspiration and we photograph (this is clever stuff this is)...

Int: Using what?

H: Using a mobile phone, send them off to Potato Growers Association. And they'll tell you what your groundcover is. It's surprising how wrong you can be. "We've got 50% cover". "No, you've only got 30%". "We've got 50%". "No, you are nearer 70%". And that alters the evapotranspiration rate, which alters... Basically once you've got a start date we put in 12-15 mm on a week, unless we've got a big rain event. We just carry on. The most important thing is the start date. There's an awful lot of science, a lot of money wasted and everything else on people monitoring, and there's weather stations which we've all got and everything else. But the most important thing, the key is the start date, and then keep up with it.

Int: And do you think that using anything like drones or satellite impagery or thermal imaging or any of those things.

H: That's going to come. I mean drones exist. Farmers are very interested in drones, some farmers. I've had presentations, I've been to demonstrations, they've been here, we've looked at them. We've got these things and no one really knows what they are for yet, do they? You know the fact that they can fly over a field of lettuces and we can count the plants is all very interesting, but pretty bloody useless to me! But I think, going back years and years and years. We used to photograph all our potato fields with infra red film by a light aircraft. This was to identify eelworm patches, pcn patches within the field, they used to show up very well. And fertiliser company used to pay for it and it was all wonderful. And then all of a sudden we couldn't get the filim (I think the military wanted it all from Kodak), so that all stopped. But what we did find from looking at those, you could actually see where the irrigation runs were, you could see where we were using rain guns then and sprinkler systems, you could see where the water had gotten and where it hand't. And thinking back to those times, yeah I think it would be brilliant. I'm sure someone can work out an algorhythm for a camera on a drone that's going to say, look, these potatoes are wilting at such a rate, or these.... you know. And do it from that way. And it's very exciting and it will come. But it's not there yet.

Int: Do you feel completely comfortable about increasing dependence on precision technologies?

H: No, not really, I'm not uncomfortable.

Int: You don't feel that you are becoming too reliant on computers, or something like that?

H: No. They are here aren't they? You know, I mean I spend too much time sitting in front of this thing, I do all my field records on it, I do all my recommendations. Yes I'm old fashioned enough to want to print off a paper copy so I can look at it, but we use mobile phones for everything now. No, you've just got to embrace it don't you. I don't understand it... My grandchildren have to set my video recorder. Video recorder! That's going back a bit! Or my DVD player, or, they had to set my smart tv up! But you need a 6 year old to do that.

Int: It's terrifying, we are becoming obsolete. I can't do any of those things.

H: It's brilliant!

Int: So what about something like wastewater re-use, do you think that would be something you might be interested in moving into the future?

H: What, saving it off our roofs?

Int: No, more like getting water directly from sewage treatment plants and using that water to irrigate.

H: How are you going to move it about? Logistics are the big problem. You can't use tankers can you?

Int: Well I think it would be a case of if there was within a couple of miles a sewage treatment works...

H: A pipeline would be the thing. I mean we have for the last 13 years there's been a pop concert here in mumber of people come, they've got showers, drinking water and everything else. And the water supply was the biggest nightmare. What we ended up doing, we put storage tanks, black storage tanks down the farm, and there were two articulated lorry tankers running 24 hours a day from Anglian Water's water tower at mumber, just to keep that all supplied. And that is number of people who are showering and drinking water and... To be honest most of them are drinking beer most of the time. Just to think, can we have three quarters of a million gallons by 12 o'clock please? And then you set the whole job going and it rains. And say, ah don't want it today. And then what

are they going to do with it? I think what you'd probably need, you could tanker it, but you'd need on-farm storage. You'd think alright, that reservoir there will hold 5 million gallons. Don't put any water in there, we will come with tankers over and we'll fill it up. And then Tesco's is going to say, "No no no, we ain't buying them potatoes off you". Because that's wastewater - we aren't having that.

Int: Do you think that wouldn't be acceptable to consumers?

H: I think if it got out that the potatoes in Tescos had been treated with water from a sewage works, it doesn't matter how many tests and everything else and assurances you've got... they aren't going to have it are they? That's where we are at the moment. Now, 5 or 10 years time down the line, people might get real and realise. In South Africa they are turning the taps off aren't they. I've been reading up about that and I'm not saying we want that here, but it would tend to focus the mind. All of a sudden in South Africa water is getting very very important. You know, you can watch all the adverts you like about how this poor guy has to walk 15 miles to this polluted stream with this gallon bucket, and everyone... yep you see it and it's all very sad and everything, but once it happens to you! Once you turn the tap on and nothing comes out. Then you'll. But they tell me that, well, the water in London does taste disgusting, but they reckon it's probably been through about 8 people before it gets to you.

Int: I thought that was all water everywhere! I thought some of the water that you drunk each time is meant to have been drunk at some point by various famous people in history.

H: I'm sharing a glass of water with Henry the 8th!

Int: So what sources of information do you use to access information about new irrigation technologies.

H: We are members of NIAB, so they are quite useful. We buy most of our irrigation equipment from either Bower or Briggs irrigation and they keep us well up to speed with anything new that might be coming along. We look at UKIA, We are members of that so we get bulletins. Obviously there's farm visits and everything else about the place. So we just go to everything we can. We are in the so we, well all farmers sit on drainage boards, but we want to get away from that and say we are water level management boards I think, because our role is about how much water we can put into the system when it's dry, rather than how much water we can take out of the system at this time of year. And basically the whole country, we are crap at storing water aren't we?! You know you see all these floods and all this water running through the streets and everything else, and next thing you know... It was a few years a go a river over here got flooded and it was on the local news, there was a guy paddling a canoe down the main street and there was a guy leaning out of his window

with water just under the window sill, and he says to the bloke paddling past, "There's still a hosepipe ban you know!". But we are as a country, as a nation as a government, we are crap at storing water.

Int: I guess the risks have been changing because there's been more development, there's a larger population now so people are more exposed to areas that maybe previously...

H: There's more roofs, there's more concrete, there's more roads, there's more opportunity to save water. Because it doesn't soak away, it runs off, it runs away. In the middle level we are dealing with water coming from Northampton and Corby and everywhere else. And then in the summer time, oh the flows too low, now we've got to... because we let water into the middle levels... we've had to shut that off.

Int: So you put in four reservoirs you said?

H: I've dug 4 reservoirs, yes, we've got 6, but I've personally since I've been here with my little spade I've dug four.

Int: And were they all done at the same time?

H: No, they were done, the first one was done in '84. The three at were done in 98/99.

Int: And can you tell me about the decision-making process that led to this, it sounds like it would be one of your biggest investments in terms of water use...?

H: Yes, the farm at had no storage at all, and we were on restricted licenses and there was no licenses of right there. So in '84... We'd had a pretty good year to be fair in '82 and '83, so there was a bit of cash flowing around, and yeah we just sent someone out there with, "Can you find us a site? We want to put a 10 million gallon reservoir in". And construction made a bit of a Horlicks of it and there wasn't as much clay there as they thought there was, so they had to go down deeper than they thought they'd have to, so we ended up with 15 million gallons. So that was a relatively easy decision. And that sorted out the problem. We didn't have to borrow any money and we paid for it. When we dug the three reservoirs at yeah, we had... we've got a farm at and the soil type is such that they can't build a reservoir there, unless you are going to line it with polythene or whatever, butyl lining, which is just ridiculously expensive. So there was a clay site at right next door to the river. One field away. And plenty of clay there and everything else. And the guy who designed it said, "why don't you build three reservoirs instead of having one big one, because if you build three smaller reservoirs you haven't got so much legislation to get through, you haven't got spill-aways and all this sort of rubbish. Which is what we did. And we are allowed... we

put the water in the river there, and they wouldn't let us take it out in \_\_\_\_\_, but we've got round that now.

Int: It sounds like it must have been a big investment to build the reservoirs? And most years are you not using them for irrigation?

H: Ah, no, we'll take water out of them pretty well... if we don't take any water out of the reservoirs it means that we are not doing any irrigating. I can't remember the last year when we didn't do any irrigation. Oh no we will always use them. In fact we have an arrangement with the reservoir for a neighbour for 4 million gallons. So we will sell him 4 million gallons.

Int: Okay, so it's not just an insurance policy against not being able to take water out of the rivers...? It is sort of financially making sense to have the reservoirs?

H: Yeah, no, we are flogging them 4 million gallons, erm. It wouldn't make a fantastic difference to the farm budget if we didn't sell them any because it's not that expensive, but my attitude is, what you are actually... because what they do is, they pay for the water they take out that they ask us to put in the reservoir, in the system. " My attitude is you should just pay us every year for 4 million gallons of water", "well we perhaps we need them every year"... Well, you are actually buying the right to 4 million gallons, you are not actually buying the water are you? So I think you should be paying it every year, but my boss is friendly with them and it's a bit more a friendship arrangement.

Int: Are there any other opportuniteis to do that with other neighbouring farms, or is it...

H: No, we rent some land out for onions, and we will allow the onion grower to use our water should he want to and he'll pay us £25 an acre inch, which is probably a lot less than it's worth. So there are opportunities. There is a local farmer that built a big reservoir, he's a county council smallholder and he built it on council land, and he has got a big manifold at the end and he can just send water to 5 or 6 different places, and he's got people that want to buy water off him. So that is a, he's actually using that as a business. And I'm sure that would come... we would have the opportunity to do that I would think.

Int: So moving on a bit more to the fruit and vegetable system, how do you think it's been changing over time from the perspective of a grower. It sounds like demand for potatoes has possibly gone down a bit?

H: Yeah, I mean we are, yeah the demand for potatoes is getting less and less every year, but we are quite good at it and we are in an ideal situation, so we are not contemplating not growing potatoes. I mean we are not into fruit and veg anyway, so we are purely potatoes. We may irrigate sugar beet

if we are desperate. We might irrigate things like oilseed rape in August to get it established, but that's a very very minor use. So we are really all potatoes, and we have got load and loads of water.

Int: And how do you think the pressure from retail in terms of the potatoes that you are selling them has changed over time?

H: It is... quality's everything isn't it? All they are interested in is in what the thing looks like. And no one... they are not... yeah, you might as well say it if you believe it: They don't give a monkeys what it tastes like. They really don't care. It's how much bruising you got? How many surface cracks there are. Is the skin nice and shiny? Has it got any scab on it? Yeah that's fantastic, oh, eats like shit... doesn't matter! And that is right throughout the board. We grow King Edwards but that market for that is getting smaller and smaller. It's an old variety, everyone knows it, eats quite well, doesn't yield that great, not too easy to get quality, but Waitrose have got a niche market. We grow a few desiree because Waitrose want them. Other than that it's... everything else is a white, if you know what I mean. We grow a variety called Melody which is fine, looks lovely. Doesn't eat too bad... but you know the guys on the farm, "I'm going to get my mum and myself a bag of 'taters", you don't even have to ask them which store they are going to. You know they are going to go for the King Edwards. That's just where they are going to go, they aren't idiots are they. But having said that, we, in the last 20 years, we are now, everything that goes into supermarkets has been put in a cold store, because you can't use chemicals to stop the things growing, so we are now keeping potatoes at 1 degrees C, which is pretty bloody cold. And you know what happens to a potato when it goes less than 8 degrees, it thinks, "Christ it's winter!". Because it's a biennial isn't it. It thinks it's winter, so "Crikey, all this starch we are storing...". That uses a lot of energy up so it turns the starches into sugar, so the housewife takes them out of the supermarket shelf because they've been stored at 1 degree. Before anyone can touch them over a packing line you have to warm them up to 10-15 degrees, so they don't damage when they go through the line. So the potatoes thinking "shit... what the?!". You run it through a packing line, you cover it in water, you put it in a plastic bag, you stick it in a lorry and cool it down again. It goes in a cool store in the supermarket. It goes on the shelf in the supermarket under flourescent lights.

Int: You are making me feel sorry for the potatoes - it sounds like torture!

H: You should feel sorry for them! And then the housewife goes, "Ooh, look at those lovely potatoes". She takes them home. She tries to boil them and they just go to mush because the cells break down and they just turn to soup. She says, "Oh, I'll make a few chips then". And they'll go black. They burn if you try and roast the bloody things. So you'd better only do them in their jackets because that's the only way it's going to work.

Int: Well, I do like jacket potatoes.

H: It's just as well, because you can't eat them any other way!

Int: But it sounds like quality in terms of the aesthetic, superficial appearance...

H: Yeah, that's everything. People ask me for a bag of potatoes. I'll get them from the chipping shed which is kept at 8 degree centigrade. We fill it full of chemicals to stop the damn things growing, CIPC and everything else. You give them a bag and they say, "Cor, where can i buy these from, these are wonderful, much better than what you buy from the supermarkets". It's because they haven't been buggered about! But we have to store them at 1 degrees because that's just you know the market. And what we did, it's very very noticeable. Yeah, it's several years ago now, when supermarkets started getting really... because they've always been important. When they started getting really, really important, they paid a little bit more for potatoes, so everyone rushed in, "Oh we've got to do pre-packing potatoes because they are paying all this extra money and everything". And we all rushed like lemmings to get the extra money. And when they've got everybody trying to grow pre-packing potatoes they said [laughing and rubbing hands together] "Here we are so we can shaft them now".

Int: So it sounds like you are not that happy with the power of the supermarkets in some ways?

H: Tesco's are bastards.

Int: Right.

H: No two ways about it, and I suppose if you ask their potato buyers, they would agree. M&S, you can sell anything to M&S if it looks right. They are not interested in what water was put on it, what fertiliser... they are not interested in any of that. They are just... does it look right? If you've got the right stuff they are an absolute doddle.

Int: That's funny because their reputation is that they are really pro-environment and they are making all these checks and everything...

H: No, it's fine. Not a problem at all. Tesco's we have to do a thing called nurture. Some of the others use Red Tractor. Waitrose has got its own set of PCN controls and things like that. So we've all got lots and lots of hoops to jump through and Marks and Spencers have nominally a similar sort of thing. Most of the M&S stuff is packed at foods at and if they are right they are right. But yes, we have to go through all this stuff and it's very challenging in a year like this (I'm a cynical old bastard aren't I?). It's very challenging in a year like this because even though quality's good, they are tighter. They are much much tighter on the quality. The last two years, when the yields have been down and they haven't had the choice, "Well, yeah, we'll take that, we normally wouldn't but we'll take it". It's marketing, it's the name of the game. But what they have stopped doing is

this year... I don't know if you noticed it before Christmas (my boss never picked it up), there was a survey about the Christmas dinner. The dearest thing on the Christmas dinner, in the vegetables anyway, but potatoes aren't a vegetable are they...

Int: Well they are in this project

H: We've got to be careful with that one... erm... The dearest vegetable on their was potatoes. "Oh but of course it's not... bloody great crop, prices are much lower than everything else". I said, ,"Yeah, but what you haven't twigged is supermarkets have stopped promoting them". "Oh why have they stopped promoting them?!". "Because they are not one of your five a day". So they've said, Aldi have said, ooh you can have a bag of carrots for 29 pence, parsnips, broccoli, brussels sprouts, everything else, taters and they will pay of the make up.

Int: But you'd think parsnips wouldn't be very different to potatoes in terms of their health value?

H: Well, carrots are 94% water or something like that.

Int: I guess carrots are orange so they've got something special in there that's good for us.

H: Because I've sat on several committees over the years and I've sat on the potato committee at and and when 5 a day came out, the slogan was going to be "Eat your five a day..." and they wanted to put "Except potatoes"! on the end of it in like brackets. "Well no you can't do that! Don't include them in the pictures, don't do anything else, don't mention bloody potatoes... just you need your five a day. Then there's the guy on the radio on a phone in that actually insisted that a big mac was one of his 5 a day, because there was a slice of lettuce in a it and a bit of tomato, and he wouldn't have it any other way that it wasn't! People aren't going to have a can of Tango coz it's part of their five a day. We've got some educating to do.

Int: Apparently 5 a day's not enough any more, it's got to be 10 a day otherwise you are not getting all the health benefits, or that's what a study says.

H: It's a miracle we are not all dead innit!

Int: So has this farm been the same size since you've been here?

H: It's slightly bigger than it was, but not very much. We've taken a bit of land, because on this estate we farm what we farm but we also own some other land... some tenants have given up and

we've taken it back in. And we've rented land off other people, the neighbours round us have decided to give up the unequal struggle... but no it's not really altered that much.

Int: Do you think that contract farming is increasing and I suppose the amount of land that businesses are responsible for...

H: Yeah, I suppose we've got a critical mass haven't we. So we can cope with most things. And I understand why the smaller farmers would either amalgamate together or they would go off to work and let somebody contract farm it or whatever, but we've got... we are big enough. We've bid for a few contracts in the past, but we haven't been successful because we rather like to be able to go and make money out of doing it. Some of the things that people quote to take on farms on a contract basis is just... don't make sense. But they might make sense to somebody who's got a lot of machinery and who's an owner-occupier so he doesn't pay any rent at all, "ooh, we can afford to pay lots for this because they spread it over the entire acreage", and that doesn't seem to make sense to me either, but there are business models out there that seem to fit that.

Int: So it sounds like the power of the supermarkets has increased and the number of retailers who you are interacting with has gone down from the sixties or so...?

H: There are more retailers out there but there are less packers. So when we deal with the packers, if we go to foods at they are now packing for, I think they are packing for Aldi and they are packing for ASDA. What happened in the past was that they've got three packhouses on site. They pack... there's a company called which packs for Marks and Spencers, and then there are two packhouses, a Tesco packhouse and a Sainsbury's packhouse. And Tesco's came and said, "Look, we don't want Sainsbury's being packed on the same site because we are Tesco's and we are more important. We don't want Marks and Spencers because they don't shift very many potatoes". And so they kicked Sainsbury's out of the old packhouse, and so they've got an empty packhouse, and then Tesco's ditched them anyway and went to Branston potatoes because they are only packed by Branston potatoes AP now, and so then they had, now they are packing for Asda and Aldi. So you know you've got this investment, you've got pack-ins, packhouse and everything's there, so what are you going to do.

Int: So there's a smaller number of packers, farms are generally controlled by a smaller number of farm businesses.

H: Yeah, people tend to be... potato businesses are getting bigger. You've got less of them. You've got people like the grows, I mean grows a couple of thousand acres of potatoes. His brother grows, probably 2.5 or 3 thousand, and you know, so they are in it in a big way. You know that's grow em cheap, dig em and they are mainly chip shop and processing stuff. And then you go out on the marshes, on the silt lands you've got some big growers out there.

Int: So what does that mean for the resilience of the supply chain overall? Does that mean that the supply chain is less flexible?

H: No, I don't think it's made any difference really. Because they are getting bigger they've spent the money on storage, the storage is getting better, they've got cold stores and everything else. Because smaller growers simply cannot afford to do it. Erm and so now I think that's what's kept quality at the level it is, and the supply where it is.

Int: And so in terms of agricultural water use it's also driving farms to be...?

H: More efficient, it's you know licenses are very valuable. You know the licenses to actually pump water. You go to they've got salt, they can't water at all. They are using tap water! They are putting mains water in the reservoir! That's expensive.

Int: That must cost a lot!

H: That's expensive. A group of farmers have got together and they are digging a river from where it they don't get silt, and they are going to build a canal through that's really something... That is millions of pounds.

Int: And how is that... Is that just because the company's so big...?

H: No, farmers got together. It's the only way it can be done. It can only be done as a co-op operation.

Int: So there's more incentive for farmers to invest in social networks than there was in the past?

H: Yeah, you go out to then you can talk about recycled water, collecting water of roofs, because they collect water off roofs and they put it in reservoirs. They collect water from the potato washing plants, they do all of that and put it in the reservoir.

Int: But it depends on the immediate pressures as to whether farmers will invest?

H: Yes, we are lucky where we are. I mean they've got the best land on earth, you know that's why it's worth so much bloody money, but it's all got problems you know.

Int: I'm conscious we've talked for a long time, I've just got a few more questions...

H: Well you can't stop me so just carry on!

Int: Right, I was going to say, who do you see as your main competitors, is it other potato growers in this area, or is it...?

H: I don't know as farmers have competitors... do they really?

Int: In terms of overseas?

H: Overseas, you've got the bloody French, but they are not very good at it. Germans... probably. The Dutch used to be a bloody nuisance but they've sort of become less and less important. Yeah. Yields and supply within the UK have got better, so Mcains aren't suddenly throwing up their arms and saying you know you are all bloody crap so we are going to get a few boats in from Holland. It doesn't seem to happen any more, and then you've got the haulage thing. You know I think it costs more to get potatoes from Fleixstowe to Whittlesea, where the bloody factory is, than it costs to get them from bloody Holland to Felixstowe! I mean it's just bonkers. Yeah, you can run lorries over the channel and through the channel tunnel and everything else, but it's bloody expensive and they tend not to do it now.

Int: There was a time, the first work package showed, that we used to get a lot more potatoes from Egypt, and that's declined a bit now, I suppose with there being less demand for potatoes.

H: Yeah, and they were grown on the same and they were never very good. And we grow potatoes under polythene and (we don't do it for maincrop but there's lots of specialist growers doing that), your Lincolnshire new potatoes now will come on the market in the middle of May, and that's a fairly new thing. It's all down to polythene.

Int: And do you think the consumers are particularly bothered about the water that's used to produce their food?

H: No. Done these surveys before, stood in supermarkets with my badge on and talked to shoppers when they go in and they go, "Oh no no we like the idea of organic and we like free range eggs and we like this and we like that and everything else, and yes we want these potatoes and all that". And you look in their basket when they come out and it's all price innit? It's all down to price.

And people sort of say that people who go to Watirose are more.... But no they are not. They go to Waitrose because it's the closest.

Int: I guess people go to what's closest and the one they are used to. I hate it when new supermarkets get built and I can't find anything.

H: But they are going to do that anyway. Fruit and veg will be the same place but they'll move cornflakes and they'll move beans and they'll move... So they are making you go down the aisles you woudn't normally go down... and everything you want... your baked beans are up there, your breakfast stuff is down there. And everything you don't really need is right at a high level, above all the expensive stuff. And the music... it's the music! You'll notice, at 2 o'clock on a Wednesday afternoon it'll be [sings slow calm tune]. At 5 o'clock on a Friday afternoon it'll be [sings fast pumping tune]. Next time you go to the meat counter ask, "would you mind turning off that red strip light so we can see what the meat actually looks like?". Over the veg... "would you mind turning off that green one so we can actually see what colour the veg is?".

Int: Yes, I guess we are being manipulated! So do you think consumers should care more about the water that's being used in their food? So for example, looking at potatoes that have come from Egypt as opposed to potatoes that have come from the UK?

H: Well, the Nile's filthy innit (laughing)... Yes they probably should [reluctantly]. My governor thinks it's very important that we go into schools and we tell children where the stuff comes from you know. I don't know as I 100% agree with it. If you ask somebody where does milk come from and they say Tesco, that's fine by me. They don't have to know that it comes from a cow. They don't have to know it's been fed on grass and whatever and everything else. They need to know that's good for them, that they like it, what the nutrition is and all.

Int: But I guess... What the first part of this project showed was that the water scarcity implications of our fruit and veg supply in the UK is going up because we are sourcing more of our fruit and vegetables from overseas from areas that don't have very much water. So who should be responsible for trying to reduce the impact that our consumption has

H: Corr! Jesus!

Int: I mean is it for consumers to decide, or for retailers, or for governments?

H: Now we're getting onto G's lettuces in Spain and draining all the reservoirs and... God you don't ask any easy ones! So should we as a consumer be more socially aware of other countries that might be disadvantaged by supplying us with their produce? I mean I can see the food miles thing... That's

Int: So it's more a case of incentivizing people to have a richer experience with their food because it's more... you know encouraging them to eat seasonally, rather than thinking they have to regulate things from the top down...?

H: I would love that because I remember as a child looking forward to different parts of the year because and then also, you think, "oh christ, it's November... bloody sprouts!".

Int: I love sprouts! They are my favourite!

H: But you know it's... as you get older, it's just the way I think. But I'm as bad as anybody else. I go to, if I feel like having strawberries for tea we'll go and have some strawberries. I'll moan because they've come from Spain and they don't taste very good, they don't taste like strawberries.

Int: They look nice. But I guess it'd be hard to get through the hungry gap if you were eating purely seasonally and you had four months of just parsnips and cabbage, you might feel a bit hard done by.

H: That's what we used to have. You can store cabbages for a long... Yeah we've got these cold stores, so there's quite a lot you can do. But yeah, you are not going to get a lot of this stuff here. Yes they grow asparagus in tunnels and everything else, but that's sort of like the Harrods market and it's bloody expensive.

Int: So finally, moving onto the regulation. What impact have the EA had on your water use over time?

H: They've been little diamonds to be honest. They've been actually really good. You might not know but the guy who set up the Environment Agency sits in that office next to me. And he had various battles with the regulation authorities and everything else over this sort of thing. But I don't think that other than the fact that they prosecuted me for over-abstraction because I, with the last three reservoirs I built we were allowed to fill them in February, which I duly did, and we actually got

a license for 15 million gallons, and I managed to get 17 million into the bloody things. And they did me for that!

Int: How did they find out?

H: They read the metres. I just sort of filled them up, thinking, that's what we are going to fill them to. But you know, we'd built them one year and they'd been there all summer and they'd dried out and cracked and they needed a lot of water to resettle the clay. So I think I'd got a pretty good case, but they still fined us. And the boss was chairman of the environment agency, and we had to go to court... and it was the boss of the environment agency... So er, yeah. But other than that, no I think they are very good. I mean they are only at \_\_\_\_\_\_, because we are only here, they tend to, and it's a numbers game for them isn't it. "Oh, we want to go and do... your target is you've got to sort out so many irrigation licenses this week"... "Let's go to \_\_\_\_\_\_ farming company. I can spend three or four hours in there and I can meet my target for the month!". And they are only up the road.

Int: So you see a lot of them?

H: So we see a lot of them. That's actually good because we know what they think, we know the people on the ground. They have unfettered access to all our metres. They know where they are. We tend, we are very strict on where we take the water from, because we are restricted on where we can abstract from, we've got abstraction points. And it works really really well, so I'm not going to criticise the EA at all.

Int: And do you think that, do you understand how they make a judgement on how much water is required for the environment? Do you understand the measures they are using? Or is it kind of...

H: I don't think they do... Made you laugh. Do you think they do?

Int: I don't know.

H: I'm not saying they pluck numbers out of the air. What I'm saying is it's a bit more of a guestimate than... I mean what we as farmers have got to be aware of is the fact that we are abstracting water at the very very worst time of year aren't we. So 70% of the water abstracted in the summer months goes into agriculture. And somebody, Michael Gove, or whatever, is eventually going to have to do something about it. So we are going to have to be smart, which is where things like trickle will come in. Water storage, they should be incentivizing people to be building reservoirs. Don't you think so? I'll go back to what I said earlier... We are crap at storing water in this country.

Int: I guess the thing is then that you need to have reservoirs that aren't full up all the time, but it sounds like reservoirs are often kept full, because there's a priority to keep the reservoir full in case you have a dry year, but then there's nowhere for the reservoir to go.

H: All our reservoirs will come at the 1st of March, full, so will be at full capacity on the 1st of March. And I've no idea sitting in this chair now how they'll look in October, I just haven't got a bloody clue, because we just physically do not know. I can have a pretty good guess, and I'd be very surprised if we didn't take 20-25 million gallons out the reservoirs somewhere along the line, because that is what we are planning to do anyway. But we will still continue to abstract. Because I think if we stopped abstracting from the system someone somewhere is going to notice we are not doing it and say, "Well what do you need all these licenses for?". Because they are not going to issue any more. They are not going to say, "he's not using his license, and that chap over there hasn't got one". No, they are not going to do that. They are just going to take them off you and they are just going to go back in house, aren't they. And I'm sure... And there is a lot of pressure to reduce the volume of water we take anyway. And someone's going to address it sooner or later. They are going to look at us and think, "Christ, why have they got so many irrigation licenses". It's because we've amalgamated small farms into bigger farms and everything else, and they originally wouldn't let us... We sort of... Why don't you amalgamate all these licenses into a super-license, so we've got on license for 55 million gallons. Here's the map, here's the abstraction points, now wouldn't that be simple?". And you think, yeah, it would be simple, but once you've got a big map with 50 million written across the top of it, and all these abstaction points, it becomes a little bit obvious. Someone is going to have it pinned on their office wall and they are going to look at it one day and say, "Jesus, they've got all that?". Just like I look out there and think, "huh, do we farm all this?"

Int: Well, hopefully it won't happen too soon.

H: No, but it's got to happen and as farmers we can't not, you know I can sit here being very smug saying we've spent a lot of money over the years in irrigation storage, which is all very nice and some other farmers haven't done it. It doesn't mean to say they shouldn't do it. There's been schemes floated in the before where they could, there was a scheme where they could divert water to before where they could, then supply farmers and everything... well, that never got off the ground. There's been all these schemes floating around and it all boils down to money at the end of the day. Drainage is a lot easier. If people get wet feet, oooh yeah, you can have some money to do your rivers out and this that and the other, but to let it in the other way, it's not quite so good is it? And farmers, we've got to be honest, farmers are viewed as 'driving about in better cars than I've got, living in better houses than I can afford', and it's not a bad lifestyle is it? We've not got a great press have we.

Int: I don't know, it depends, I think the supermarkets maybe get a worse press.

H: But I think the consumer will trust Tesco more than they trust me because at the end of the day, I'm a farmer, so I've given salmonella in eggs, everyone's going nuts because of BSE, and all these things come... and it's all down to us isn't it? It's all down to farmers, because Tesco's, "ooh no, we dumped all the eggs from these nasty rotten farmers. We wouldn't have beef from these nasty rotten people. We are buying it from Argentina now and so you'll all be healthy.". And so they are viewed as, whereas the NFU used to be very powerful, had a hell of a lot, really powerful lobby, very very important in parliament. That's largely gone now, and you know, safe food is in the customers, is in the supermarket.

Int: They spend a lot trying to ensure they are trusted and trying to keep their reputation a certain way I suppose.

H: What irks me is we do Tesco's nurture, which is the strictest one we do, but no one knows about it, do they? I mean, if I walked into a supermarket (I keep saying Tesco because they are the biggest), any supermarket. There used to be a bloody great sign in the car park, because it used to be called Nature's Choice, and I thought, what a brilliant slogan, Nature's Choice! Why didn't someone else think of that? Nature's Choice, this is what our farmers have to do to supply YOUR fruit and veg to Tesco, and they'd just list a few things like, you know clean water... I'd love to see that. But no one... Nature's Choice, it doesn't sit on a brand anywhere, it doesn't sit on a packet, and nobody knows about it. And I think that's really sad.

Int: I think it's difficult because there are so many different accreditation schemes so as a consumer, you don't know what the difference is...

H: But even then, I would use that as a marketing ploy. "Look, we are better than Waitrose because, look what we make 'em do!". "Farmers hate us because...!". So there's lots of ways, but the brand is very important and they don't want to mess that one up do they.

Int: And I think consumers have much less to do with farmers, so there's less familiarity and less trust there.

H: Well, there's less of us, the country's being more urbanised isn't it? And they don't get out on farms. It's phenomenal how popular Open Farm Sunday is, how many people come. But you know, we get a couple of thousand here. But how many people live in the surrounding areas? So it seems like it's a lot of people, but... Schools don't want us anymore. I used to go into schools, when I was farm manager at I used to go into the local school if ever they wanted me, and I used to give a fortnight up in end of June, July and we used to have sort of like six bus loads of kids around every 2 hours and I'd put them on a tractor and drag them around the farm showing them all this. But it all stopped. The geography teacher, there was two geography teachers, one left and one died, and it just disappeared. Whoever took over the job just weren't interested.

Int: Oh that's a shame, sounds like a good thing.

H: Well, I enjoyed it. I think the kids enjoyed it. I got in quite a lot of trouble over it because I picked sugar beet out of the ground, peel it with my pen knife and said, "Here you are, try having a suck on that, this is where your sugar comes from". And then it go so... "how many toilets have you got". Well actually we haven't got any! Well, we've got to have a girls' toilet. So we started putting these portaloos up which no one ever used, and it got really, you know, health and safety gone bloody mad. Like, "What facilities have you got for washing their hands".

[chatting off subject]

H: Because I don't come from a farming background at all. And when I went to school in because we lived in then. I wanted to get four O levels so I could get into college and I wanted to do advertising, because I was really keen on advertising because Tiger and the Tank was on there and all this sort of stuff, and I thought that was fascinating and where I want to be and I've got really brilliant ideas and I can be a big success. But I didn't get enough O-levels. And... Shit... I don't want to go to work. And everyone was getting apprenticeships in Ercol and all the furniture manufacturers and I was going, I don't want to bloody do that. And I used to help a little old lady milk a few cows at the weekends and I thought, this isn't too bad. So I went to agricultural college for two years, so that stopped me going to work, and it all came from there really. And I've lived in houses... Well I was very lucky, I went to work for at and while I was there I did evening classes at agricultural college, and the guy came in one night and said, there's a farm foreman's job going, and are you interested? And I was like, well I ought to be, I was only 23. And gave me 1200 acres at 23 with six wizened old fenmen to look after it, and they did lead me a merry dance for the first 12 months, but they didn't after that. And so I was very lucky, so I've lived in houses I couldn't afford to live in all my working life and you know just before Christmas I bought a bloody bungelow and moved into it, which is probably the daftest thing I've ever done, but I now own property! I moved out of a massive great... that bunch of keys there is from the house I've just given up. That tells you how many doors there were, it was massive! Bloody lovely! Fantastic bloody place, but right in the middle of the farm I was running, and every time you look out of the bloody window you are at work. Now I've moved away from the farm and the fields I look after are some bugger else's problem!

Int: Thanks so much I think that's all my questions.

H: You can come back any time you like!