

Interview with participant F – 16<sup>th</sup> February 2018

F: Now I'm a participant here as an individual. I'm not a member of the farm, as I've now retired.

Int: That's fine.

F: What's the date?

Int: The date is the 16th of January.

F: Now the person taking consent, that's you.

Int: Yes, that's me. Do you want to keep a copy of this?

(chat and introduction)

Int: How many years were you farming for?

F: I've farmed since 1956

Int: That's good, you must have seen many changes on the farm.

F: It's funny, I just wrote a letter for the [REDACTED] and it's been published in there [REDACTED]! And I mentioned several things in there that maybe you'll pick up during the time. And one was robots by the way. I think yes robots are good news for farming as long as those working on the farm can achieve more.

If we are going down the process of people losing jobs you can forget it because we are drastically short of people living in the countryside. We really are. And I think it's becoming a serious problem. All the advisors all they want to do is say, "oh you've got to cut the labour". Which in fact is a load of rubbish. Because in fact what you should do is use your labour so efficiently. They are valuable people, and as soon as we get the message across that those working on farms are valuable people, the better!

Int: Yes, another person I interviewed was saying that they were worried about there being less people in the countryside.

F: Yes, we are getting so, we won't have a vote soon. In 1920 this village had 114 people, 80% worked on the farm, or in service - 80%. Now I don't think we have anyone who lives in the village who actually has anything to do with the farm, except for me. Okay! Go on!

Int: The next one is, what size is the farm?

F: The farm is about 600 Ha, and we farm some on the periphery, about another 100 Ha.

Int: Okay, so the cropping area is about 700 Ha?

F: Thereabouts.

Int: And is it all owned or is some of it rented?

F: It's owned peripherally by a trust. It's owned by my son. We're short-term tenants of some, we are yearly tenants of another. But basically 80% is within our control.

Int: And what area is irrigatable?

F: All of it, and the peripherals.

Int: And what water sources do you rely on? Is it surface or groundwater?

F: We have five boreholes

Int: And do you have surface water as well, or all groundwater?

F: No surface water.

Int: And do you have winter fill reservoirs and licenses?

F: Funnily enough we do. We have a reservoir fill license, which we don't actually use, because we haven't got the reservoir yet, but we do have a thirty million gallon one, which is quite, you know. But we don't actually use it. It's up our sleeve you know.

Int: Are you planning to put the reservoir in?

F: At the moment we aren't. At the moment we've actually just turned down a chance to build a reservoir. Um... we rather tend to feel that the aquifer is our reservoir. Yeah. And um, reservoirs have problems, the water has to be treated now to be grown for vegetables. But that's easy, that's done via infra red, that's easy, there's no problem about that. But it's just another bloody added thing isn't it? And of course you don't always know the thing is bloody working. That's another thing. And we are at the moment considering treating our liquid digestate with a microwave system. Ideal, you would get rid of everything. But you wouldn't know that it was working every single minute of every day. So there is a danger there, so we decided not to go down that route, to just say that the right stuff's got to go in in the first place.

Int: Yes. And so you have licenses for the groundwater, are they time restricted licenses?

F: We've just had two of them renewed, and they renewed them on the same terms as before, and left everything. I can't remember when they go to, they go to not very long, 2021 I think. So at the moment yes. But we are one of the people who are disputing the fact that they are taking our license of right away. And we think that is breach of human rights. It's a boiling issue at the moment which has not been resolved. Government's just said yesterday that in fact licenses of right are going to disappear. I think we probably have a legal problem there.

Int: So what would be the impact if you were to lose your license?

F: Well, you just don't know what's happening. With the license of right we knew it was there, and now your licenses are coming up for renewal and you never know what's going to happen when you come out the other end, do you? And we in this area are not in an area of environmental danger. So there's no, in our, well this is another thing. What is the area? They keep on changing the lines! In the olden days the [REDACTED] catchment... Run into the [REDACTED] catchment group yet?

Int: No

F: Oh well you see the [REDACTED] catchment group was founded here in the year when, I have to go back to the day, it was about '76 I think it was. They suddenly came out of the blue that the river flows were below quality. Below quality is the word there, rather than quantity. And they banned everyone drawing water from within a kilometre of the river, stopped irrigating all together, regardless of what they'd use, and then two kilometres they weren't allowed to use more than 50% of their license. And that in actual fact in our [REDACTED] group, which was about 64 abstractors about. It cost about £10,000,000, to the actual abstractors. And we went through a case where we took advice, should we go to law about it or not? Because they would possibly have stopped it illegally, but the reason, we actually discovered afterwards, that the river was foul due to the breakdown of the sewage system at [REDACTED]. And as a result of that they then spent about £5,000,000 on the [REDACTED] sewage works and the river quality since then has been okay. But they were actually stopping us because the quality of river was wrong, rather than the flow.

Int: And were you compensated?

F: No never. We did not, we were taking advice and we were told that the chances of winning was fifty-fifty and it would cost us about 3 million to go. And so it was decided that we'd have a better relationship with the EA. And they have registered something, doing what they did, they didn't realise the consequences of what they had done, until they did it. And erm, they now recognise that they would not like to see something like that happen again, and they've almost said it would not happen again. So we now enter into a situation where the [REDACTED] group, if the water tables are low, which in fact we were at the beginning of December, the tables around here were getting a bit low, and rather dangerously low, but since then it's gone up. So now we meet about the end of March, and they say, "the water tables are too low" and we volunteer to cut our licenses by 10% or whatever it is. So that's our contribution to the whole thing. And that is vitally important to the whole thing. Okay, if you know you are not going to use 15% of your water, you take certain crops out of it, and you just don't use it. Okay. But when we were cut off the damage done was there were potato crops not quite finished, there were carrot crops not quite finished. Sugar beet was certainly not finished, and I mean all these crops, we'd spent what 80% of the water had gone on the potatoes, on the carrots, but the crop wasn't finished so we lost, and some of the crop had to be written off.

Int: What year was that again?

F: I can't remember, '76 I think. It was a major drought year.

Int: Yes.

F: It's interesting that that's what happened, and I think as a result of that happening, I think we have a good relationship with the EA. Erm. And as I said, our licenses are not subject to any

conservation problems, or shall we say they haven't come with any. But if the boundaries get changed suddenly we might get encompassed.

Int: So you are relatively confident that in 2021 the licenses will be renewed to the same amount, and it's not likely to change?

F: If you ask my opinion now I think yes, but you never know what's going to happen. I mean they've just suddenly given irrigation licenses to drip feeders, they didn't quite know what they'd done. Okay, you've given them water away which might not even have existed!

Int: Can you explain that situation, the gave the licenses...

F: Well drip feed was never licensed. But people were drip feeding and telling the environmental agency they were drip feeding, and were using such and such amount of water and expected to get a license. That's what they kind of went ahead and at the end of the day Government went ahead and has given them the license.

Int: So now you need a separate license for drip feeding?

F: You need a license like anything else.

Int: So which crops are you growing here?

F: We grow carrots, potatoes, onions, sugar beet. We used to grow cereals for seed, but now longer, now we grow a large hectarage of maize for the AD plant.

Int: And is all of that irrigated?

F: Everything is irrigated?

Int: And looking to the past has that always been the case?

F: No, the acreage we've had, or any acreage we've hired we've always been able to get our irrigation to it. So in the olden days you had a mark around your map of where you could irrigate.

And that's now gone, so that's quite an important point. Because we can now take the water wherever we like, but we cannot alter the abstraction point.

Int: So even cereals you would irrigate.

F: Oh yes, we don't now... we have a rye crop we grow for seed. Yes, we would certainly irrigate that in March April if we wanted to... we could build up. We use enviroscans. Do enviroscans come into your line?

Int: Not so far...

F: Oh no! We have a probe in the ground which tells us where the moisture is.

Int: Ah yes, well people have been talking about tensiometers and so on.

F: Well, let's just enlarge on that one because it's one of our means of managing water and it's quite an important point. And that's what our graphs look like from the Enviroscan okay. That's the total usage of up to 10, 20 30 centimetres. There are five probes in the thing, but that happens to be the graph reading, and that's the reading of each probe.

Int: Okay.

F: So you can see, here we are the crop is growing, using water. We had that heavy rain in early December and some of it went into the lower and we consider this possibly gone to aquifer.

Int: Too low to be used by the crop.

F: And that's what we don't like to see. No I mean technically when we are irrigating we do not try to achieve that, because it could be water down the drain, it could be fertiliser down the drain and everything else. And we think enviroscans an extremely important part of our management.

Int: And when did you introduce them?

F: Oh they've been here for years, 20 years. But we have probes. I think we have at the moment about 10 probes, and we try to put them in a specific crop with a specific kind of structure, light land field, or a slightly better land field. The holding capacity of our sands is in the bottom top 50 mms is about 2 inches max. It will go to 3 in the better soils. And it can go down to one and a half if it's very light. And you know if it starts doing that... And we have drought lines and so on in this, we have them built in here, look. Yeah we have. Okay? Okay we find that only by having the enviroscan's fitted can we find what the full point is. And the full point is identified when things like that happen. Okay? So it must have been full about there. And we know how much went in there, because you can put probes in there and it tells you that about 3 mm has gone to waste there. You might call it waste or not. Whatever you like. Erm, so we, and I say once again, we consider this is one of the most important things we run on the farm to save us from wasting water and we use this as evidence that we aren't wasting water. Okay, there some people will say you have wasted water, and we'll say, okay we have. But that one, if that had been caused by irrigation, we always put the probes in the first pool of irrigation, and if that happens we then tell them to give it 5 mm less the next time.

Int: So the destination for the produce that you grow, is it...?

F: Basically all our produce goes to packers. We don't pack ourselves in any way. We turned that down years ago.

Int: Is it sold as fresh?

F: Okay, potatoes fresh, carrots fresh, onions fresh, sugar beet contract. Basically those are the major crops. And then your rye happens to be grown by seed contract, so it's vitally important that we grow a decent crop of rye, you know it actually pays to irrigate rye. It does pay. Yeah.

Int: So is it 100% forward contracts or...

F: Ah, interesting. Potatoes are seldom 100% contract, I would think most of the time it's about 15% free market.

Int: And is that your preference?

F: Okay, that's an interesting point. I'm going to grow potatoes for you. You as the buyer want to know that what I promise you I will get. Very important. So we, we don't want to be involved in under-supplying someone or breaking the contract. Breaking a contract has now value in law. You just haven't achieved it, but you lose your customer in the end, and your customer... there's a good old saying, "an empty shelf is a disaster for a supermarket". And it is. And between the two of us at

the end of the day going through our pre-packers, nearly all the pre-packers are packing 90% for supermarkets. So our major, at the end of the day, is to the supermarkets, whoever they might be.

Int: So the 15% is really a safety, you are putting that in just in case you get a lower yield than you might expect.

F: you don't want to upset your customer!

Int: But you don't deliberately grow some with the aim of thinking we want to have to sell on the open market?

F: We always grow with the aim that we'll have more than we've committed. Oh no, we definitely do that. I mean, okay, our maize crop happens to be committed to them on a hectare basis, but they thought that we were going to produce them 5000 tonnes, okay? We in fact this year have produced them 6,500. So it's good news for us. It might be... I suspect they'll come back and say that we are growing too many hectares for them. We don't know. But we have a 5 year contract on that at the moment, on the maize.

Int: So moving on to talk about the water risks that concern you in your production, which ones are do you think the main worries? Obviously there's water scarcity but then there's various other water-related risks that might affect your production. You talked a little bit about runoff and that being problematic. Are there any other water risks that you're concerned about.

F: I don't quite understand what you mean by water risks, sorry.

Int: So I guess, um microbiological pollution or chemical pollution in the water that you apply, flooding, waterlogging...

F: Well, we are using. Our aquifer is the same water supply that is used within Anglia water, so technically we just hope that it's... But of course you can pollute boreholes, by someone upsetting a whole lot of bloody chemicals next to borehole, and that is bad news. That is bad bad news, because we would be killing our own crops. And it might be drawn in straight away. So okay yes the rules about not having water tipping out within 20 metres of boreholes, we definitely obey those. We mustn't contaminate our boreholes.

Int: And it sounds like apart from in 1976, when you had that problem, you haven't had that many problems with water scarcity?

F: Since that day I think we've volunteered to restrict our application about four times, but it's never been more than about 10%.

Int: And has it had a major impact on your profits in that year?

F: Well it hasn't in fact because each year there's always been plenty of water. So erm, it hasn't cut in as you might say. But there is that, okay, say you make a 10% cut, okay I suspect that year you'd say, give the cereals a by pass, we'll keep the rest of the water up our sleeves for the crops that are essential. And the crops that are essential are potatoes, potatoes probably 100%. Once you've got scab in pre-pack potatoes you are finished. They are unsaleable. So that's very important with the water there. Carrots, we actually let our land to carrot growers, so it's very important that we keep them happy, because at the end of the day they want good carrots, and you don't get very good carrots if you are short of water. Onions, it's an interesting one. We are just doing a survey on our onions and how it's. Onions, there's no doubt about it if you run out of water even from the word go, it's bad news. First you'll get poor germination, you know when you start talking about germination, that is quite critical. A bad germination in sugar beet caused by not irrigating them when you had a real dry spell and you hadn't drilled them into the moisture, I mean a lot of these moisture problems can be caused by drilling at a different depth, and that can be resolved. But if you drill sugar beet at 2.5 inches, it won't come up. Because sugar beet basically doesn't germinate. We don't believe wild beet germinates over about 1.75 inches, so anything that goes above 1.75 inches (tells dog to go back), um, what were we talking about, oh germination of wild beet yes, this is a fascinating problem because it goes back to the blackgrass problem. We don't have blackgrass here, well basically we do, but we have the odd bit, but our rotation here, blackgrass is not a problem to us, we get rid of it very easily. But you know where does black grass germinate, all we do know is that one black grass germinating now stops others germinating, because it doesn't like competition. So it's inherent in its upbringing that one stops the rest.

Int: Quite a lot of plants exude stuff from their roots that will inhibit germination. Walnut does doesn't it.

F: Oh yes, lots of things, lots and lots. You go and drop a handful of carrot seed on the ground, every one will germinate. Every single one!

Int: So compared to the other risks that you worry about on farm, how important is water in the grand scheme of things?

F: To us, we would not be farming here unless we had water. I think that's a very important point. We would not be employing people, we would not have a farm, and basically a light-land farm without water, (between the door posts) in the modern day and age, is not worth farming. Yuh.

Int: So after the experience that you described in 1976 where you weren't allowed to irrigate within two kilometres

F: 1st of August. Two Kilometres and one kilometre. One kilometre was total, stop. Two kilometres if you've used 50% of your water, stop. If you haven't used 50% of your water go on up to 50%.

Int: You said that following that you changed the way that you engaged with the Environment Agency.

F: Oh very much so!

Int: But beyond that, were there any changes that you made to the way that you managed your water on farm?

F: I think there's a bit of pre-planning goes in. Of course if you volunteer to use 15% less water, you've got to plan where you are not going to use it.

Int: Yes, but for all the farmers that were affected by that, did any of them put in reservoirs, or change anything about how they managed water...?

F: Oh, a lot of reservoirs have been built in our [REDACTED] area. A lot have been built. Especially the river boys. The river boys are the ones who have built reservoirs. Borehole abstractors, not quite so many. As I say, once again, we treat the aquifer rather as our reservoir.

Int: And I suppose there's less of a restriction between summer and winter with groundwater, it's not the same at all as with winter abstraction from the river?

F: Yes, that's right. See our rivers here ran furiously about Christmas time. And all the boys around here you know were going like hell to fill up their reservoirs because in fact the rivers had been very low up until then and they hadn't been able to fill. The flow restrictions on the river abstractors are really quite well policed actually.

Int: And what do you understand by the term irrigation efficiency.

F: Okay, let's start the other way around. We know that water coming from a gun, probably 30% evaporates before it even gets to the ground, so we in actual fact basically only irrigate through booms, which makes it more efficient, there's no doubt about it. So that is one thing, well I wouldn't say we haven't got any guns, we have. Because as a matter of fact when I was thinking of irrigating our trees with anaerobic digestate liquid. Why not? Trees are suddenly worth a lot of money. Trees are now, were worth £15/tonne roadside 5 years ago. They are now worth about £60. Because they are going through biomass heaters. Okay, not every tree can go through a biomass heater, so that market is good so long as you can get to a biomass heater. Okay, we have a biomass heater here, and we have a lot of timber, we have 200 acres of timber which was valueless basically 5 years ago. You couldn't actually afford to cut it down, because it wasn't worth the amount it would have cost to cut it down. So that's revolutionised our forestry now, so we are considering actually, why shouldn't you add fertiliser to trees? Because they've got to grow off something. And when you see what our... therefore we have... we take all the digestate that goes into that place, so we see what comes out. And what comes out of the maize crop is amazing. There's every trace element, phosphate, potash, nitrogen. Okay, there's every. Okay, where did it come from? The plant used it. It's come out of the ground. We are worried about, can we over-use the digestate? On nitrogen, yes, overuse, a danger. We've got to be careful there. But you could over-use phosphates. Well yes, the problem about the digestate is that it's quite alkaline. It's about 8.5, which is quite high, and we are slightly worried about that at the moment actually. We haven't been at it for a year yet, so it could be cumulative problem. Might be spraying hydraulic acid, you never know. Why not? You could use ammonium sulphate in quantities, that would help a bit. Never mind. Hardly water, but it is water, because what's, in our case, putting 40 tonnes of digestate on is about half an inch of water. So it is actually going to be part of, possibly, our irrigation system. Okay, I've got a crop of sugar beet, it doesn't look, I haven't got it quite right. Okay, let's go and put a dose of digestate on. It's got to go on sometime, we might not have put it on before, so it could be part of our...

Int: I guess it's quite a big change to how you manage things.

F: Oh yes, it's a complete change. The farm has completely changed as a result of it, yes.

Int: So do you think that increasing the irrigation efficiency of your water applications is something you try to do.

F: Well, let's say, politically it is essential.

Int: Why do you say that?

F: Well, we have enough people moaning that we are wasting water. People spray it on the roads, using booms. Okay, we get back to suggestions you can only irrigate at night. Well, from our point of view, that is totally impractical. It is not possible for us to only irrigate at night. We just would not get round. So that, why do you say you can't get round? Because you haven't invested enough

money. If you are only going to irrigate at night you've got to have double the amount of irrigators, don't you. And double the amount of staff at night, and etc etc etc. So we go back to efficiency right, we go back to booms, so we say that we think we are using the water as efficiently as we can. Of course the drip-feeder boys say that they are virtually 100% efficient, which they are. If the drip feeder is underground it's almost 100% efficient, it doesn't evaporate at all.

Int: And have you used any drip on this farm at all?

F: We have, but it's a very time-consuming job. And it doesn't work very well on potatoes. No it doesn't work on potatoes. You've got your potato roots like that, oh that's another interesting one. We only grow potatoes in beds now, because of this grossly inefficient system of irrigating on a ridge, most of the water ran off the sides and disappeared down here, and nowadays it sits on the top of there and these beds are slightly domed but not really, now that's a bit of an exaggeration. They are not peaked in anyway. Basically, the water falls on there and stays on there. But that's another thing we've definitely done that we've changed, and we changed how we grew potatoes what 25 years ago. Erm, due to experimental work done on here by Cambridge University Farm.

Int: And so do you think that in terms of increasing your irrigation efficiency are you trying to reduce the amount of water that you use overall, or are you trying to increase the productivity of the water that you do use?

F: Shall we say we are one of the lucky ones whose licenses are quite adequate. We can justify every single gallon we have licensed, but we are not on the borderline of not having enough water with what we grow. Obviously as we extend our acreages, which we do, every chance we have we try and extend I don't deny, erm, okay you could get to a situation here you haven't got enough water. We haven't got to that stage yet. No.

Int: Could you expand a little bit on expanding your acreage?

F: It's always in the back of your opportunities like that don't appear only (inaudible) once every twenty years.

Int: Why would you want to farm on a larger acreage? Is it to make more profit?

F: Oh, well, what are you farming for? To live? We can go to this major question, what is the size of a new market farm. If you'd have asked me that question 20 years ago I'd have said 500 acres, and then it went to 700, and I think you are now getting to about 1200 acres. Why? Okay, we have a heavy land farm as well, so I know exactly what the answer to that is. In the olden days you'd start ploughing in the first week of September and you finished about the end of March. Now you go in

there, we've got big enough machinery, it goes quicker, and we've probably ploughed the whole bloody field in about 2 weeks. You know, so as it happens in our carrot business here. Carrot business is in the hand of about 8 growers in the whole of Great Britain. And they arrive here with about 12 tractors, 12 men, 12 everything, and we plough for them, they arrive, ridge up, destone, drill, weed control, polythene on, and they come here and it will all get done in a day. The whole job, from start to finish. You, as an individual, you would have a job to do that, wouldn't you? And timing is once again a very important thing. See this is why heavy land farming has taken quite a turn for the good, in the last twenty years, ten years, but they've picked up this problem of blackgrass.

Int: So do you think that's driven by the need to compete?

F: Actually, just to survive. In the 1930's heavy land farms did not survive. They went bankrupt. We have a farm down in Essex which in those days had about ten tenants and they all went bankrupt, and the land was let to Scotsmen who came down and brought their cows with them, and nearly all these Scots arrived by that change, and they decided that the milk. In the olden days milk was produced in the town. So all the cows were in London, and the Scots came along and said, "that's ridiculous... we'll have the cows outside and take the milk into London", and that happened in the 20's or 30's. And why did that happen? Because one lot had a system that they couldn't make work. As I say they weren't dairy farmers anyway. And they disappeared. As I say, in those days a lot of those farms were let rent free for about 4 years, yes to get the Scots to come back it.

Int: So if farms are getting consolidated and larger, farmland is getting consolidated, and businesses are controlling more farm land and the number of businesses involved overall is shrinking (as you say with carrots there's only a few), um, what does that mean for agricultural water use?

F: (long pause). I think we should go back to the original question. Why do we irrigate? We irrigate so we can guarantee our customer with the product of a quality, at a price that we can afford to grow it. And if you sold carrots for £80/tonne for example, and you grow ten tonnes, you only turn over £800, if you grow 30 tonnes, you turnover £2,400. That is the difference between... And efficiency, there's no doubt about it. This is a fascinating year that is happening this year. The yields of our sugar beet varied from 50 tonnes/ha to 120 tonnes/ha.

Int: Because of?

F: And this is the big question. Why, why why why? What has actually happened. We know germination was poor in some fields, wild beet was appalling. Okay, those are some of the reasons, but don't ever go away thinking there's only one cause. Like the RSPB, they said farmers destroyed all the small birds, and they go away and think they've got the answer, they've only got one tenth of the answer, between the doorposts.

Int: With environmental things there are always multiple causes.

F: Oh yes. We don't talk about RSPB here. Um, they are very unwelcome.

Int: With fewer businesses involved and farming on a larger scale, that's driving increasing irrigation efficiency?

F: Yes, yes, basically there's a very good reason that an irrigated farm, farming 500 acres, and he then goes to 1000, and he's relying on the water, he's only probably expanded on the extra land because he thinks he can irrigate it, you know. You are either an irrigated farmer or not. I think. There's a lot of people who grow potatoes and vegetables and so on. Basically you can say that, 90% of potato acreage in Great Britain now is irrigated, or guaranteed water. Put it that way. Yeah. Sometimes they know it's coming from the rain. And I think, I would almost say that hardly a single carrot field is grown without irrigation. And onions I would think probably 50% are grown with irrigation. Cereals, 5%. You know it's so you can get the kind of importance. And if you put those in importance you know why you in fact have to be on those potatoes every ten days at an absolute max. Yuh. Maybe you should be there ever 5 days.

Int: And so thinking about resilience (gives defn). In terms of that change you've seen in agriculture where farms are becoming larger and controlled by fewer individuals in the supply chain I suppose, what do you think that means for the resilience of the food system more broadly...

F: I think management is becoming quite a major issue, I really do. And if you ask a guy to look after a thousand acres instead of 500, he has many more responsibilities and responsibilities can distract a guy at critical times of making decisions. And does he look at the thousand acres enough. I think we are getting to this interesting point about management, I'm not going to say what I'm going to say because you are going to record it, but there are okay certain overall managers who look at average returns and fail to notice the very bad and fail to notice the very good, and I think those are the people to be seriously aware of. There's nothing worse than covering up the bad with the good. There's nothing worse for the management of the place of covering up the good with the bad.

Int: So do you think that people are becoming more reliant on the enviroscans and those technologies?

F: It's one of the things I said in my [REDACTED] letter, I farmed for nearly 70 years, or seen farming, and in that time one's seen phenomenal changes. Oh yes, and I said the phenomenal changes basically were due to scientific knowledge and when you think that a wheat crop now produces twice what it did, and it only produces twice because you've got the right genes working, you know, and um, potatoes, you've got potatoes that are now scab resistant, and then you've got powdery scab resistance, you know. When you think of the progress you've made scientifically, it's phenomenal.

And I go back to why the sugar beet this year, some 50, some 120. I know some of the reasons... (expands on this). WE survive on Moritz. Moritz showing here, basically transpiration, so it's 1mm a day, and these are showing now 1-2mm even now, and these are the actual graphs of the aquifer, where they are. And the black line is what's happening and the dotted line is what's happened. And the green line means we are okay, but if this goes into the red, and this was starting to go into red in December, people were beginning to get a bit alarmed, were they going to have enough water this coming year?

Int: So this is supplied by the EA?

F: No, we go to Moritz, they are...

Int: Do you pay for this?

F: No, it's free. That's beginning to show that we are getting a bit short of water. We were beginning to get, in one area, north of us, we were getting quite worried, in fact in October it was beginning to get into dangerous levels, but we've had quite a lot of water in December, things are changing. But the danger of when you get, that's an interesting one, I don't know whether it comes into your survey, okay, outpours of rain, some of it just goes straight to runoff. And here we have no exists for surface water over, 2,500 acres. Well, that's not true, we've got one small ditch over here and another small ditch at the other end, but basically we have no runoff, and we have a catch pit here on one corner of what we farm, which takes the overflow from an enormous catchment, [REDACTED] and all that are, and it goes into this pit, and with luck the pit, if it does overflow it flows back into the farm a bit. But all that either evaporates or goes into the aquifer. And we are not paid a penny for that, and one day we would like to say... I think there is an argument soon, we catch the water for you, and you charge us for using it. Anyway, there's no reward yet for that.

Int: How would you go about negotiating something like that?

F: Well, it's a major issue isn't it, which it hasn't. I mean there are people who think, "hey hey hey, we've collected the water for you, you don't pay us a penny for collecting it", and then they will say, "well you let it run off", you know. It's between the doorposts. It would never stand up, I don't think it's ever going to stand up. Water has always been treated as the property of all. There's no doubt about that. And those that own that property, it's the environment agency, technically, or the government, or the country owns the water, and there's been laws, and so you distribute that water. Which is one of the assets of the country, isn't it. One of the assets of Great Britain is water. Not the slightest doubt about it.

Int: So thinking back to throughout your history as a farmer what have you introduced in terms of either scheduling or application that has had the biggest impact in terms of increasing your efficiency?

F: Scheduling, that's an interesting point. Okay. On these graphs there are stress lines, manually put in. Showing us when we think a field will suffer...

Int: So you think the enviroscan is one of the most important things you've introduced?

F: Yes. And then are you allowed to take the weather forecast into your thinking? We make a rule here that you do not stop irrigating until you've got half an inch. Or you look like you are going to get half an inch. That's the next stage of progress. That's a managerial decision. Stop irrigating now for god's sake because we are going to waste water. And these are major decisions that managers have to make. That's another point. The rainfall in this farm can vary by 50% from one side to another, in a day. You can have 2 inches over there, and over here, never had a penny. And you've got to know that?

Int: Would you have complete faith in the readings that you get from the probes in your field?

F: The enviroscans? They are bloody near a hundred percent accurate.

Int: And do you make decisions based on that information alone or would you go and check manually?

F: Don't think that a man mustn't cross check. First of all he goes to that enviroscan and says bloody hell, we've had 2 inches of rain there. Huh-uh. Did that two inches of rain fall on that field over there? I don't know. We do have rain gauges around the place, but I personally think we don't have enough to be quite honest. But you know, reading rain gauges takes a lot of time. So there are systems now we can have built in rain gauges to that system, and some of our enviroscans now they have built in rain gauges. And they record it. And that's that reading there. Okay, that's actual rainfall within 24 hours, and that's read by the enviroscan site here.

Int: So it sounds like you are quite comfortable with increasing technology on farm?

F: Where do we go next?

Int: Can you see a point where you would be uncomfortable with it?

F: I think the question is, where are we missing out... I think we go back to this girl at Cranfield once again, okay we think we're putting water on, and we think... if I say to you transpiration is proportional to growth, who comes out, bloody Cambridge University, and says, that's not true! I said, how inaccurate is it? Oh about 4%. I mean when you get that sort of argument going round, you should say yes it is, exactly proportional to growth, except for 4%.

[Off topic]

There's a lot to learn, there really is.

Int: And as you rely more on technology, do you feel that this changes the kinds of risks you are exposed to?

F: Okay, why is there a difference, you must have been exposed to a risk. Something didn't happen which should have happened, did we not put enough fertiliser on... I think science, over 70 years, science has basically changed agriculture, and how we use that science, the guy who uses it is successful, the guy who doesn't use it is unsuccessful.

(off topic)

Our biggest risk is losing our water. No doubt about that. If we didn't have irrigation on this light land farm you wouldn't be farming it. Well, you might have grass or something. But you certainly wouldn't employ anyone, you couldn't afford to employ anyone. You'd use an outside contractor for anything you did, but even then I think you'd fail. When I first cut my first crop of wheat for my neighbour when I came here, it didn't cover the cost of the combining. I mean the yields on this light land 40-50 years ago were just awful. They didn't exist really. And you had a drought they were even worse, and if you had a lovely rainy season they were quite good, you know.

Int: So thinking about the fact that in the past when you started farming, farms were smaller and there were a lot more farms about and there were many more supply chain options. Now there's a few big retailers, there's a smaller number of farmers, farms have grown enormously. What are your feelings about those changes?

F: Well it goes back to the original thing here, the large farm here he grows his farm larger like that, and okay he's got one borehole, so the water is becoming even more important to him than it was, because he's taken over an exercise, added irrigated acres to the kitty, so the demand for him is critical. And conversely it's putting greater pressure and instead of being 50% used, it's now 100%

used. Another thing, so long as you are using less than 20 cubic metres a day, you can put a borehole down anywhere. And I can take you to a street near here with all big houses, and 5 of them have all put down boreholes in their gardens. EA hasn't a bloody clue where they are...

Int: Are you worried about how much groundwater is being used

F: Well, nobody has a bloody clue.

Int: Which of retailers or regulators is more powerful.

F: Okay, unless you've got a market... any bloody fool can grow anything. You need a genius to sell it. Therefore the supermarkets are taking probably 90% of our produce now. Supermarkets now cover a lot of people, it used to cover only about 4 but now it's Aldi and Lidl coming in, there are more supermarkets appearing on the scene, so technically they've increased in number. And then you go and get bookers taken over by Tesco, that was a shame from our point of view, just another blasted customer gone out of the window. And these customers can be very tough. When things are good for them and they can get anything they want, they become almost impossible to deal with. But when things get really short, then they come crawling round the doorstep begging you. There's no doubt about it, a surplus is a disaster, a shortage is a disaster for the customer. There's this terrible difference between over supply and supply.

Int: And are they interested in how you use water on farm.

F: Oh, some of our contracts, we have no contract with a pre-packer unless we have irrigation. That's an interesting point that.

Int: And do they specifically address what application methods you are using?

F: No, they just. Okay, they are also interested at the end of the day, back of the scene they are also quite keen that you are going to go there and remain there, so they are willing to help, yes, or come up with advice about how use water. Yes.

Int: And do you think they are more effective in instigating change in terms of how farmers irrigate than the EA.

F: EA is overall, they control the whole damn thing. And they are going through the process now of really finding the water that's committed, is it available? Go to Kent it ain't available. There's more

water being licensed there than actually water exists. Isle of Wight's exactly the same. They've licensed more than actually exists.

Int: Does the EA doing anything specific to try to get you to use different irrigation techniques.

F: It doesn't appear in the license, but we are always all talking really. It's a major issue to us all. We want to be seen to be using it efficiently. Okay, we want to use it efficiently if we are short of it anyway.

Int: And so when there is water scarcity that impacts on production, is that risk shared evenly along the supply chain? Do the retailers take on some of it?

F: Retailers take none of it. Retailers take not a penny of it.

[on abstraction groups]. We have a meeting this coming March. There's plenty of water, I'll bet we get about 8 of them will turn up out of 64. Water shortage, every one of them will be there.

Int: Was the abstraction group set up in response to that 76

F: It was set up on that 76. On that disaster?

Int: Was it easy to set up?

F: Well, we had a really good reason for setting it up, because here we were with 50% of our members, well actually it was more than that, we even had arguments about a fellow being 20 yards over a line drawn in the sand... in actual fact he was outside it so he was okay. But his future was at stake. I mean £10 million quid.

Int: Did anyone go under after that?

F: Some people suffered seriously. Yeah.

Int: And do you think that the way the [redacted] abstractor's group has operated over the decades has changed, is the social network getting bigger?

F: No, no, our group will never get bigger, but it has divided into two groups. One who are the aquifer abstractors and one who are the river abstractors. See the river abstractors have very very strict rules. The river is either flowing fast enough or not. And in 76, it was flowing, but it was flowing dirty, and therefore they said there wasn't enough spring water coming into the river to bring it up to a standard, and since you are part of the series at one end it was unlikely it was ever going to happen. The case hinged upon, the water company wins this case, being sued, for dirtying up the river. The whole thing was a highly complicated case and people just said, well, we've lost £10,000,000. I don't think we can afford to spend another 3 million, you know, which is what the case would have cost. Which was wrong, we'd have got our costs at the end of the day, but you know you've still got to find £3,000,000.

Int: So at that point it sounds like the EA didn't understand farmers' positions very well.

F: No, they did not.

Int: Would you say they are better at understanding things now.

F: Oh yes, this was a learning curve for them. I definitely think. But there again, there were people there who learnt and those people who are no longer there have definitely taught the ones who are there now, but remember, it's now 76, which is now 40 years ago, it's a long time ago. And I hope we don't have to go through another reminder. That would be awful, if this incident happened again.

Int: Are you satisfied with how the EA determine environmental water requirements?

F: Ah, that's the big big question. And none of us are going to know the answer until they come up with the final papers which are due in either '21 or '23. This is what they are working very hard on. And if they are using the right criteria or not, that is a debate. No, I think they are an efficient lot. I think we've got to give credit where credit's due, and I think they run the licensing system as well as they can. I don't think there's been many cases, in fact I can't quote any case, where they've sued anyone for over-use of license, but I quite believe it does happen. No. Shall we say, I think people are frightened of having their license damaged in anyway. There's not the slightest doubt about that, no there's no doubt about that. And therefore I think they tow the line, because they don't want to lose any bit of their license. I should say the license to 90% of abstractors is critical.

...INTERRUPTION...

F: We're going to a lovely farm in a really wet area and they grow strawberries and they grow small trees for sale, you know little ones like that. And they have an irrigation system actually there on this far even though the rainfall there is appalling! But there are times when they use that irrigation and it is essential to them.

Int: Are they growing strawberries under cover?

F: No, no they are open, and that's going to the wall, that business has ceased, but they also had a big dairy business. No, they had a tenant who had a big dairy business, who relied on, okay when the grass got short he wanted water, you know, but most of the time he never did. But you know if he did... And he had a quota and they spent a great deal of money on developing this dairy, to make it bigger. There's a good example, spending money for some tenant, and the day they opened up for the tenant, he took the quota and left. So they had spent about half a million pounds in developing this dairy, and what happened out of the blue is someone said okay, we'll come and grow a goat unit here.

Int: That's lucky.

F: And the goat units loved the rota milker, they kept on falling off it, they are just dying to get milked and anyway they've now got 5000 goats. It is a big business. There's a change of something that happened.

Int: So how long are contracts with tenants?

F: Well, you have life tenants, with a succession from one person who's working on the place to one more generation. But most tenancies are basically coming to a grinding halt. Because there tax rights are treated differently, with inheritance tax they only get 50% relief. And most tenancies are becoming either short term, 5 or 6 years or something like that, or they get taken back into hand. Yuh that's what happening. Okay, what's a tenant there for? He's there to earn a living isn't he. He's only there to live, it's a job, you know. He ends up at the end of the day not much better off. Unless he's got more cows than he started with. All the money he's put in keeping the buildings up goes to the landlord. Okay, that's how it works and it as a system has worked quite well, but it's becoming outdated.

One thing I want to say is that the relationship between the irrigators and the EA is what I would call good. We are living in total fear of what's going to happen to our licenses in 5 year's time. We've been through one of those fears and had one of those renewed. Okay, I think seeing it renewed as it was rather implied that our area was not in trouble. But I think in the course of our enquiries you will find some people who have renewed licenses and they are not renewed as they were, and those are the fellows you want to find. You want to find them you really do. And then they will tell you the

consequences to them, what it is. I think the consequences are that you will employ less people, where we are I think it's worth saying now, we are in a stage now with Brexit coming up that I think more stuff will be produced at home, okay? I think we only produce 60% and I think as a result a lot of that stuff will be upgraded at home, and therefore it leads us to use more people in agriculture which I think is good news. You know, why don't we have a small packing station on the place. Okay, it doesn't actually work that way and I don't think it ever will. I think there will be large packing stations who are separate units. But there's no reason why, okay, one of the things happened here. By putting our timber boy heater which we sell timber to 7-8 houses around here, as a result of that we've got a job for the chaps in the winter - cutting trees down. That just is a consequence of. Otherwise technically with the speed of efficiency now happening, everything's done, there was nothing to do from the first of October until you started looking at the crops again from the 1st of February. And that's a long time. And this is where farmers are suffering at the moment. Okay, contractors are very much part of the farming scene now. Contractors looking after large acreages under what is known as farm management schemes. The farmer's still a farmer, that's important because if he doesn't remain a farmer he doesn't get inheritance tax relief, and one of the things I think is worth saying there... people complain that farmers are getting inheritance tax relief on their land. Remember, small businesses get exactly the same relief. It's quite important that. Because what would happen to... I don't know, if they lost that relief different people would start farming, there's not the slightest doubt about that, but at the end of the day what are we here for? To produce food! We really are. And do you realise in September 1940 one million tonnes of shipping was sunk by the U-boats in the war, and that was food coming to this country, not all of it, but everything. How dependent are we on our own food. We are not at the moment because you can bring it in here from anywhere. Will you always be able to do that? I don't know. It depends where the tax falls. If we go Brexit where the tax will be.

Int: The future is a big unknown at the moment.

F: I think you'll see more grown at home, I really do. And we'll bring in more staff to run our places...

Int: With more contractors doing more farm work, how do you feel about that

F: I think it's a natural sequence of life, I think basically that it goes back to the size of the farm. A 500 acre farm really basically hasn't, well okay, to achieve what you can achieve with a contractor, who comes in and does the whole thing in a day or two, timing is critical, that's why the timing becomes a factor. And that is the reason why the smaller enterprise uses contractors, because he gets the job done quickly and on time. I think that's probably one of the big differences. Our heavy land farm in Essex, I'll say we could not, it's only about 700 acres. We haven't got the wherewithal to run it as efficiently as you can run it with a contractor who comes in with 5 tractors instead of when you can only afford one. That's the difference. And it's interesting. I think the contractor is here to stay and he might even get bigger. You know, a fellow can spray 10,000 acres in a year, whereas you have a sprayer that can only do 500. There is a difference somewhere at the end of the day. Someone's had to buy the sprayer in the first place haven't they, and then the sprayer runs out, you get what is known as a cash flow farmer - a cash flow farmer is a cash flow farmers. He knows

the in and out exactly, and the men and the buildings and his machinery are the assets of his business. Okay what you are earning with the variables here, close margin, you hope is contributing to the fixed costs of your business. If it doesn't contribute to your fixed costs, the business goes bankrupt, hmmm.

Int: Thank you very much.

F: Can you provide me with a summary?