

Interview D

Int: When did you start farming?

D: Personally about 20 years ago.

Int: What size is the land that you farm?

D: The whole estate is 2600 acres, but of that we only actually cultivate about 1200 acres. The rest of it is either lowland heath, woodlands, meadows, wetlands, etc. So the actual arable area is about 1200 acres, and all of that is irrigable.

Int: What water sources do you use and is it surface water or ground water?

D: We use three well point systems, so going down about 10-12 metres down into what's known as [REDACTED], which is crushed seashell. We have three of those systems, and then we have one system which is a stream-fed loam pond. It was an old dug out area used to extract loam for putting on the acidic soils and there's a weir system off the stream which feeds water into that.

Int: And do you have any additional reservoirs or?

D: No, that's it.

Int: So you are using groundwater entirely, and then this stream fed system, does that require a license?

D: Yes. All four require EA licenses.

Int: Okay, and in terms of summer and winter abstraction that would just be the stream fed one?

D: They are all summer abstraction, albeit that I argued that a proportion of the stream fed one was actually winter abstraction because it will tend to fill up for a period during the winter. I think it's about 20% is classified as winter abstraction, and therefore is cheaper water, effectively.

Int: So do you know when your licenses will next be reviewed?

D: Off the top of my head, no I don't. I think the closest any of them are to review is about ten years. We did one probably 5 years ago, something like that. And certainly one, if not two of them, are licenses of right at the moment.

Int: So you are not particularly anxious about your licenses changing in the future?

D: Um. Am I anxious about it? Erm. At the moment, this holding has a relatively good licensed amount of water. We rarely get above about 80% abstraction. I expect most of my contemporaries will be clamouring for more water and most of them will get to 100% every year. Um. We took the decision to not go down the route of building winter reservoirs because in my view the best place for that water is underground, where it's kept clean, it doesn't evaporate, etc. etc.

Int: So there isn't ever any problem with the amount of groundwater that is available in this area?

D: It appears that this [REDACTED], I mean the level does go up and down in the well system by one or two metres. And we have a monitoring system in one of the well points so you can see when we are actually abstracting that the level drops dramatically very quickly. But overnight it fills back up to effectively the same level before we started irrigating. The [REDACTED] is very giving of water, so water slides sideways through it very easily. And I guess one of the other things about this area is that the land that isn't farmed is generally dry acid heathland. So it's not as if it requires water.

Int: Yep, okay. So which crops do you grow? You presumably irrigate everything that you grow?

D: Well, our main irrigated crops are potatoes, carrots and onions. Followed by sugar beet and maize if there's enough water available. What I'm saying is that if it is a very dry summer the only things that will get irrigated is potatoes, onions and carrots. If it's a wetter summers so we get enough time we'll go and do some sugar beet and some maize. As a break crop we grow cereals, so very different from inland, and we don't ever irrigate those. It's not worth it.

Int: Is that staying the same overtime... the proportion of your business income that's coming from irrigated cropping, or do you think that it's increasing?

D: I would say it's fairly static. We are like any business looking for other opportunities and we are trying novel crops, but that is our sort of mainstay income.

Int: And the destination for what you produce... is that going straight to retailers or is it processed?

D: It's all going via our own marketing group. So we are in a marketing group with six other farmers. Farming probably a total of 15 to 20 different holdings. But six main farms. We have our own marketing group and then that is distributing predominantly to supermarkets, although we are getting into the wholesale trade as well, and supplying the London markets.

Int: And what percentage is under contract?

D: Close on 90% it would be.

Int: And the other 10%, is that just to reduce risks or is it something that you grow specifically to sell on the open market?

D: It all depends on the season and what we feel is the... if we feel that the packers who are supplying the supermarkets are potentially a bit short, then we will leave more uncontracted. Equally, if the packers aren't, in our mind, paying enough money, then again we will leave more uncontracted because we feel that actually, come the actual season, we'll get a better price. So it fluctuates up and down, but we try and contract as much as possible because that brings certainty.

Int: So thinking about the water related risks to your production and sales, what are the main ones that concern you?

D: Well, legislation driven by drought. So I mean the EA have the opportunity to say... I can't remember even which section it is of which law...

Int: Section 57?

D: That's it, that's the one. They can bring that thing in. They've never done it. We've had years where they've recommended that we abstract every other day, etc. So I suppose that's the main threat. I suppose there's a minor threat in changing from licenses of right to time-limited licenses and the pressure to do that. I suppose, we haven't got a lot of other big water users in this area, in this catchment. So, I don't see other water users as a particular threat. I suppose the other thing is pollutants into that water, whether it be too much nitrogen or too much phosphate or whatever. And also chemical pollutants getting into the water. Those would be the two key areas.

Int: And have you ever had any past negative impacts from those risks to your business?

D: Not in my tenure, no.

Int: Do you feel... So I guess, the issue of the licenses and the legislative risks... are there any things you can do to try to control for those risks?

D: Well, one of the big arguments is build reservoirs and either take that summer and either change your license from a summer license to a winter license, or when you've got surplus water in the summer, put it into a reservoir because then you can use it when you want. But, it's a costly exercise. We looked at it and to build a sensible sized reservoirs was going to cost £400-500,000, and when I look back over the 15 years since we made the decision not to build a reservoir, I think, crikey! I'm very glad we didn't because we'd never have used it, or never HAD to have used it. So that's the obvious one. I guess the other one is to think of different ways of irrigating that could potentially use less water. I'm sure you know that most people irrigating potatoes, onions, carrots, are using guns, squirting water over long distances, and there is evaporation from that and it is, I suppose, not the most efficient way to put water onto your crops. But equally the cost of say a trickle system, and you are moving that every year. Some of our crops are only in the ground for say 80-90 days, so it doesn't really make sense. So at the moment we are irrigating with booms and guns. Um... what else could we do to...? I'm not sure there's much else we really could do, really.

Int: I guess in terms of how you're measuring the water requirement you could become more... I suppose you want to keep that level of sensitivity balanced with the precision of your irrigating equipment. So you are using booms and guns at the moment, has that always been the case?

D: Pretty much, since they started irrigating here.

(Interruption)

D: Um, yes, we, I mean we monitor quite carefully, our water usage. So we've got monitoring stations in 7-8 fields every year, and we are monitoring rainfall. So we are looking to see how much water, when we irrigate, goes below the root systems of those plants, and therefore we will put less water on. So we are monitoring it quite closely. We try to irrigate over the night time on the longer runs so there is less evaporation. And we have noticed from doing that, that for instance, with onions, they have a relatively shallow root systems, and therefore if you put 25mm (an inch) of water on, some of that is wasted. Or it goes below the level that the onions can utilise it. So now with onions we only ever put 15 mm of water on. We just go more often, but we only put 15 on.

Int: And has the way that you schedule your irrigation changed over the last 15 years?

D: It's become more targeted. It's become more efficient. Without a shadow of a doubt.

Int: Can you explain what you understand by irrigation efficiency? I guess there are different ways of understanding it...

D: My understanding of irrigation efficiency is um, only applying the water that the crop needs.

Int: So that is an aim for what you are trying to do with water management?

D: Yes, always.

Int: And do you think that you have managed to increase the irrigation efficiency over time... actually, you've said that you have done by reducing the amount you apply to your onions. So what, having increased your irrigation efficiency, have the water savings been used for?

D: Erm, it probably. We probably haven't saved any water, because we've actually increased our irrigated cropped area over the last, say 20 years. So we are using more water, but over a larger area, and more efficiently. If we didn't use it, it would stay in the ground and I wouldn't have to pay for it. Or I'd only have to pay for 50% of it, because we have a split license where we pay 50% of the license fee upfront and the second 50% is paid upon usage.

Int: So over time the cropped area, or the overall size of your farm, has been expanding?

D: A bit of both. We have expanded it by about 100 acres during my management. Which has given us probably another 20 acres of irrigated cropped area. But on top of that we have probably increased the number of crops that we can irrigate in our rotation.

Int: And do you feel that this... sorry, I should have explained earlier, the project definition of resilience... because resilience can be understood in various different ways. We are referring to resilience as a system that is able to absorb from shocks and is also able to learn and re-organise in order to adapt to changing conditions. So how do you feel that increasing irrigation efficiency has affected your resilience to water risks?

D: It's made us all, and I say all, because all the farmers around here will be in the same boat. It's made us all far more aware of the importance of water, and far more careful how we use it, in essence, and far more conscious of not wanting to waste it, not wanting to pollute it. Because we all recognise that we are in a competitive market where there are other potential uses for that water,

whether it's housing developments, or industry, or the environment, so we've become more aware that we've got to do a good job of it and if we don't, we'll potentially lose it and particularly on these light sandy soils, we might as well all go home and turn the place into one big golf course.

Int: So there's a legislative risks that perhaps irrigation efficiency could expose you more to if you didn't expand your production, is that correct? As in, you want to continue using the same amount of water because if you actually became more efficient and used less water, you'd be in danger of not having that water available anymore?

D: Yeah, this is this difficulty in that if you don't use it you lose it. So there's a sort of an inevitability about the way legislation is that forces us to say well, we want to use it otherwise we'll lose that license and we'll never get it back again. And then, therefore if we want to expand in the future, i.e. farm more land, we won't have the water available to do that. It's not the right way to think about water saving and usage, but it's sort of inevitable, I think.

Int: But it sounds like there's a different perspective on it from farmers vis a vis what the environment agency might think... They might think about irrigation efficiency as a way that you can reduce the water that you are using in order to make it available for the environment, but farmers would have the goal of increasing farming?

D: Yes, but equally we all realise that there are competing uses for that water and we are all only part of a much bigger system involving people and the environment and habitats etc. There's an awareness. I'm not sure farming has really quite got on top of natural capital and resilience and all that sort of thing, but it's coming. And it's coming quite rapidly at the moment. But they do recognise the importance of it for their businesses.

Int: So how do you find out information about new irrigation approaches, or new ways to become more efficient?

D: Interesting... because we all work in a sort of big co-operative effectively, in this area of [REDACTED] a lot of is from talking to our neighbour, when we have marketing meetings or potato growing meetings, or whatever it might be. We talk to our neighbours about, erm, what they are doing. And interestingly, no one has really switched from booms and guns to any other form of irrigation, because we are moving so rapidly when we get to that growing season. Other sources of information... probably the people who... we have an organisation locally called [REDACTED]. It's a business that does all our underground pipework etc. They would have information on what alternatives there are. And I'm sure some of the farm managers do go to events, I don't personally, because I've got too many other events to go to!

Int: Other than building reservoirs, are there any other options that could help you either increase your IE, or increase your resilience to water-related risks.

D: As I say, at a cost, it would be a form of irrigation that did not require us to squirt water up in the air, so to basically put water directly onto your plants. That would be considerably more efficient. Because inevitably when you are irrigating a crop of potatoes, or onions, or carrots, you are also irrigating the bits of ground where those plants aren't growing. Yes, so there's an efficiency there. But there would have to be a considerable increase in the value of the crop to justify going to the expense every year of pulling out hoses.

Int: And what about soil management or plant management options?

D: Certainly soil management. Again, everybody's aware now about organic matter and trying to maintain a certain level of organic matter. I think you've got accept that when you are farming on light sands, we are only talking about 1% organic matter and organic matter burns up, so there's a constant replacement. But yes, there are benefits in terms of water retention, in having that organic matter, and we see it particularly on this farm, because we have a history of livestock, going back about 100 years, so we find that our soils do hold a little bit more water than some other farms around here. So organic matter, green covers, you know, soil is high on the agenda now. Yeah.

Int: Are there any options for plant management, do you use mycchorizal applications or anything?

D: Again, putting fungi into the system... the trouble is, because it's an annual crop, by the time your fungi has established itself it's not... we plant some of our potatoes in February/March, and we've harvested them before June. So there's not the time for anything to be beneficial, I don't think. In fact, potentially, the reverse occurs where that mycchorizal fungi is looking for food and its competing with your crop for food.

Int: So, in terms of the scheduling approach that you use, do you use sensors in the soil?

D: We've got 6 sensors set out every year, and they will move as crops are lifted, they are put into another field. And that's all done online, so the guys who are physically doing the irrigating can look on their computers and see what the soils are doing and therefore think, okay, that fields going to dry out quicker than that field, so I'm going to get over there. And there's rain gauges attached to those sensors as well, so we know the distribution of rain around the farm as well.

Int: And do you do calculations, using computerised scheduling?

D: Not really, no. It's an intuitive thing that someone who has been running irrigation guns for 10-15 years, knows; that in hot dry weather with a full canopy of potatoes you've got five days and then you've got to be back in there again, and it's also crop walking and digging with a spade and feeling the soil, and that is still the best way. There's a risk with scheduling, that there's so many other factors outside of the computer system that can affect the soil moisture, that I would feel nervous relying on a computerised irrigation scheduling program, because you could get yourself into hot water. Pardon the pun! Through not actually going out and digging the crop. I think there's a danger of becoming reliant upon computerised systems to the point where you stop looking at the thing you are trying to grow. And you just lose that connection with it.

Int: You just mentioned having an irrigation manager with 10-15 years of experience. Is it easy to get people with that level of skill and keep them on in your business. What happens when someone with that level of skill moves on? How do you cope with that?

D: Well, I guess we are fortunate in that the system we run here, I have two guys who basically all they do from May to October is irrigate. So, and one of those has done it for 15 years. He will at some point look at promotion to do something different. But hopefully, the guy who's now working with him will do 10-15 years before he moves on. So I've always got someone who's got the experience and will train someone up. That's not the case everywhere. Um. But that's where you also rely upon agronomists and me as the manager walking the fields as well.

Int: So do you feel that you are more resilient to water risks than you were in the past, has there been any change?

D: Ignore the legislation, ignore what policy will do... Are we more resilient now than we were 20 years ago... probably yes. Not by a huge amount, but we are more efficient with our water usage, we have a better understanding of the importance of it. We don't just slap it around in the same way as we don't just slap chemicals around, because they cost money. So we are probably more resilient. But I do recognise that in drought years we are probably depleting the overall system more than we should be. Even when we are taking out groundwater.

Int: I guess every year's not a drought year, fortunately.

D: No. Exactly.

Int: So this next section is going to talk a bit more about the fruit and veg system as a whole. Do you feel that in your twenty years of growing the UK's fruit and veg system has changed noticeably?

D: Well. If polarized is the right word, it's definitely become more polarized. There's fewer and fewer people involved. The farms have got bigger. The packers have got bigger, and the supermarkets have got bigger. Or the main supermarkets. So there's less people in the chain which makes for a more cut-throat business. It probably creates financial efficiency. Whether it creates efficiency when you think about the whole system and think about the environment and society and all that, I'm not so sure. Yeah, it has changed. Not dramatically. We are still pretty much growing spuds in the same way. We are marketing them in much the same way, you know through packhouses, into supermarkets etc. We do it faster, the time from lifting to crops on shelves has got shorter and shorter. And we produce a better quality crop I think probably. There's probably as much wastage as there's always been. A lot of that is driven by the demand for the perfect looking carrot or onion or potato in the supermarkets.

Int: So the whole system has gotten larger and contracted in that there's now a smaller number of players in it. Do you see that trend continuing into the future, or will there be a way for it to become more diverse again? What do you feel is likely to happen?

D: I think, because of legislation, I think it's going to retract so there's going to be less and less people in the system. Certainly on the farming front. You know, we, I know we are drifting off water and we are getting into subsidies and all of that stuff, but inevitably, subsidies are going to reduce and eventually disappear. Rightly or wrongly they are going to disappear. And at the moment I can only see one output of that, which will be larger and larger farms. Or rather, large growers. The farms may stay owned by the same people who basically give up farming, so they sell all their machinery and they get rid of their work force and you have what's called parachute or helicopter farming where someone comes in from another county and farms your farm with people from another county who have no connection with the land and the community in that area. So that, I think, is the inevitability of it. It's slightly worrying.

Int: Yeah

D: Certainly, from an environmental point of view, if you have no connection with the land that you are farming, that you are ploughing or irrigating, or whatever you are doing to it, you don't care. It's just somewhere you come to work, you plant a crop, hopefully it grows and then you sell it. So you care less about where you are. And the other, for me the other concern is the social impact. But it's been going on for a hundred years. There are less and less people in a system where you've got very large growers. All your local guys who used to work on the farms no longer work on the farms, so that community connection with that farm and that environment. So that for me is the bigger concern. That's the bit that needs to be addressed when we get rid of subsidies.

Int: So you gave some indications that you think the implications for water use... that you think people are likely to be less careful with the environmental impacts of their water use...?

D: Potentially, potentially. But not entirely because they will recognise that that water is, certainly when you are growing vegetables, it's critical. If you lose it you stop growing vegetables. You grow wheat and barley on marginal wheat and barley land. Therefore you make no money. So people I think will remain careful with water. And I think everybody recognises that you are not going to be able to go to the EA and say, "I need some more water", because they are just going to say, "So what? You are not getting it!". So they are going to have to become more efficient with it.

Int: I was going to talk next about other stakeholders within the system. You obviously have the regulators from one side and then the retailers on the other side. Which do you think has a bigger impact on your water use on farm.

D: Well, at the moment, the one that has the impact is the demand from the supermarkets. It's the retailers. They are saying, well, we want the perfect looking crop. Erm, and therefore we will irrigate not just to water the crop, but we will also irrigate for disease control. So for instance, common scab, if your crop is affected by drought at tuber initiation stage, when you get that swelling at the end of the ligules or whatever it was, that, at that point, that's where common scab comes in if it's not watered. So, yeah, I think at the moment it's the demand that's driving water usage.

Int: And do retailers do anything try to affect how efficient you are with your irrigation?

D: No.

Int: Do you think consumers and retailers are particularly interested in the amount of water used in their food?

D: No. The supermarkets will pay lip service to it through the auditing system. So when I have a Tesco's audit, or a Waitrose audit, or whichever supermarket it is. One of the questions will be, you know, "Do you schedule your water? Do you monitor soil moisture levels? How do you check that you are not putting on too much water, etc. etc.". There'll be a whole raft of questions relating to irrigation. Which I suppose in some ways does make us make sure that all our irrigation guns have got stop off controls on them correctly and you know, efficient dials, so that we know how much water we are putting on. So there's maybe a benefit from that. But actually, no, they don't!

Int: So you don't think they genuinely care?

D: No.

Int: So, the Environment Agency, how... apart from the threat of making you pay a fine if you use too much water, what other approaches do they use to try to encourage you to use water carefully, or to be efficient.

D: I'm not sure they do particularly. I mean they've recognised that if we can switch some of this summer abstraction to winter abstraction that will potentially ease up the pressure on the whole system, because we are generally not watering over the winter so there's surplus water so we might as well capitalise on that and put it into reservoirs. So I suppose there's that element of it. They do, certainly in this area, the Environment Agency and the farm managers have a good relationship, have a very good relationship. Not just on irrigation, but on riparian ecosystems and all that sort of stuff as well. I don't think they do a great deal. They leave it up to us and they recognise that water costs money and it's become more and more expensive every year, so that forces us to be efficient.

Int: And are you satisfied with how they evaluate environmental water requirements? Do you think that they get it right? Do you understand how they make those judgements?

D: Not entirely, no. I don't. They've got lots of very complicated models. I am quite heavily involved with the Environment Agency, I have regular meetings with them over various environmental stuff. Erm. But no I don't.... I think it's extremely difficult to calculate how much water the environment needs, how much water farming or food production needs, how much water industry needs, housing needs, etc. Um. Maybe they have got it right. I don't know enough detail about it to say yes or no.

Int: Okay. And within the fruit and vegetable system who do you see as your main competitors, are they other UK growers, or overseas growers?

D: In terms of what?

Int: In terms of who are you competing against for market share.

D: Good question. It's probably about 50-50, because if you take spuds for instance, we will have spuds imported from Israel and Spain, erm, and the Mediterranean islands, Egypt, and then Jersey. It depends on what time of year it is. Once it gets into May, June time we are probably competing with Jersey and Cornwall, those would be our main competitors. Later in the season when we are say, doing baked potatoes, we will be competing with the West Country, or Norfolk, or Lincolnshire. So it depends what time of year. I would say our competitors are 50% UK and 50% abroad.

Int: And do you think there's a... I guess comparing the water use to produce potatoes here with that in Egypt, the water scarcity implications would be that much higher. Do you think consumers do care or are they interested in that in terms of making decisions about where to buy from?

D: I don't think they'd have any awareness of the environmental impact of abstracting water in Egypt as compared to the environmental impact of abstracting water in East Suffolk. They would have no awareness of the... I don't know enough. I know that there are problems in Egypt, and not just the irrigation side of it, but the building of Lake Nasser and all of that sort of stuff. But, no. I don't think the consumer's got the slightest awareness and I doubt actually if most of the supermarket buyers have any clue.

Int: And do you think it should be up to consumers making decisions about what to buy or it should be up to the retailers, or it should be up to national governments about what is okay?

D: Yeah, that's a big debate.

Int: Yes, sorry, you probably need time to think about that one!

D: Well, it's an interesting one, because take for instance the growing of mini sweetcorn and beans in Kenya. That's having massive impacts upon say lake Naivasha in Kenya and is taking up land that should potentially be used for local produce, for people who live locally, and that is flown by aeroplanes to the UK and elsewhere in Europe. And you think, "oh, that must be a bad thing, and we should be growing it over here", but if we grew it all over here suddenly we'd kill off a huge number of jobs in East Africa. So there's this whole debate. So... should the government get involved? I think there needs to be an awareness.

Int: I mean, is it down to... so the government regulates water use in our country here, but governments in other countries may not be regulating water use and the environmental impacts as effectively. But do you think it should be left up to those governments to make decisions about what's correct for those environments? Or is it something that consumers should be thinking about when they are purchasing their food.

D: Thinking holistically, I think we should all, farmers, supermarkets, consumers, governments, should be making everybody aware, in third world countries of the impact they are having. If it comes from farmers it will just be, oh farmers are moaning again, because someone else is growing stuff that they want to grow. I suppose the ideal is if the supermarkets and the consumers say, no, we are not going to buy from Egypt because of how they irrigate for instance. Um, but it's not black and white. It's not a question of saying, "you must not buy potatoes from Egypt and green beans from Kenya because it's having an environmental impact", because there's all sorts of other impacts that might be associated with not buying their produce. So I think probably it is all about awareness, um, and inevitably, if something is a big enough issue, if there's enough pressures groups out there and people shouting about things, that actually the public do become aware, and actually, the you know the whole, if you take for instance, clothing, you know, I think the general public is more and more aware of the impacts of buying cheap clothing and what that's doing with slave labour and

child labour and in other parts of the world. I'm not sure it's yet changed people's buying habits particularly, you know they'll still go to Primark because it's cheaper.

Int: But people have definitely become more environmentally aware in terms of their food preferences and consumption habits than they used to be.

D: I think that is true.

Int: So if you have a particularly good year and make a lot of profit, do you put that back into agriculture or do you seek to diversify?

D: A bit of both. This is actually a very diverse farm. We've got the cropping, and then we've got a holiday let business, we've got lots of cottages. We've got business lets. We are involved in a big anaerobic digestion scheme, with the other farms that are in the same vegetable co-operative. So we've done quite a few diverse things as well. In all, the vast majority of that gets fed back into the estate, the farm, as a whole. Whether it's diversifying or purely into agriculture, it all comes back in.

Int: And conversely if you have a really bad year, do you bear the cost of that entirely yourself, or is there any way in which that cost is distributed along the supply chain?

D: We bear it.

Int: So the retailers really aren't impacted? So water risks don't really affect retailers?

D: No, not in the slightest. I suppose the only way it would affect them is if a section 57 notice came in for the whole of East Suffolk in May June time and suddenly they find themselves very short of small new potatoes. The impact of that would be they'd have to go abroad and buy at much higher prices, and the consumer would pay more. But we wouldn't see any benefit.

Int: But it would be unusual of the whole county to be equally impacted?

D: There are times of the year, and I suppose, early June would be one of them, when the supermarkets make the decision to switch from say Cornish production to East Suffolk production, where something like 80% of the small new potatoes in the supermarket would come from East Suffolk. So in theory, if we could not irrigate in the two or three weeks prior to that there would be a significant hole in the small potato production going to supermarkets. You'll notice it in the early spring you'll see Jersey Royals galore, and then it will switch to Cornish, then it will switch to East

Suffolk, then it will go up to Norfolk. So they are quite reliant upon certain areas. Now, if there was going to be a section 57 notice in this farm it would affect all the other farms in East Suffolk, because we are all on very similar soils, we'd all be in the same boat, so, it would, yeah it would dramatically affect production. It's unlikely to happen, because we are talking about very early production so, if the EA is going to bring a water restriction, it's unlikely to happen right at the beginning of the growing season, and it would have to be 2 weeks before we start lifting that crop before they turn the tap off.

Int: So you talked about how the supply chain has got less players in it, maybe farmers are becoming larger and also you concerns about the future that you might find people are farming less in their local areas and people may be less connected to local areas, so it sounds like there's some ways in which you're concerned that resilience might be declining in relation to those changes...?

D: I think overall resilience, not necessarily resilience for the land owner, because the land owner, if he's got a decent acreage, he or she's got a decent acreage, they can just entice someone else in to grow the crop and they'll probably have more money at the end of the day because they are not buying their own machinery, they are not employing labour, so they can just sit at home and drink gin and tonics and take the rent. Um, but I think the resilience of the overall system is potentially at risk.

Int: Are there any solutions that you can think of or ways to reduce that.

D: Yes, but we are not there yet. What I mean is I don't think we've worked out a system of environmental management yet that caters for all the elements of natural capital and all the risks to it, what's impacting on it and why are those things impacting on it, and what can we do to solve the problem. I'm sure we'll work it out. Whether we work it out in time to save the environment is a different matter. Sorry I've slightly drifted off irrigation in that one.

Int: That's okay - these things are all related.

D: Certainly if water becomes scarcer, more of us will build winter reservoirs, and some, on the higher value crops will start going towards a more efficient way of irrigating that crop, so it will be trickle irrigation.

Int: Who will be the ones who will do that?

D: People who are growing high value, niche crops where you can justify sending men into a field for an entire week to lay out bits of plastic pipe.

Int: And would that be the larger businesses?

D: It could be any size, it's more likely to be the smaller crops actually. If you are growing strawberries, a high value crop on a small area, you can justify sticking a little thing in each strawberry pot or next to each strawberry plant. If you are planting 50 acres of potatoes a day and you are trying to put trickle irrigation pipes over that as well, we are talking about employing another three or four men, and you won't get any more for that crop at the moment, and your saving in water won't be great enough, nothing like great enough, to justify those men.

Int: So it might be that the crop mix that UK farmers concentrate on might shift towards higher value crops?

D: In some instance yes. I think generally, at the moment we've kind of got a model that works, growing bulk potatoes, onions, carrots, supplying the supermarkets. We are relatively efficient in doing that. If you were to say to me, why don't you grow courgettes? I'd have to say that 50-60% of my income is from those three crops, that's the mainstay of this business. If I start focussing on a small area of novel crop and I take my eye off the ball with my core business, you know, this could all go wrong. That ain't going to make any money for another ten years, so I'm slightly nervous of doing that.

Int: So you don't have much head space to change. This was what the person I previously interviewed was also saying, if you take your eye off the ball, you are in trouble very quickly.

D: Yes, very quickly.

Int: So it's not like you have a lot of time to experiment with other things.

D: No, I don't. Having said that we have done a lot of diversification and a lot of other things, and we are trying a few novel crops. Erm, but on a small scale where, if we lose a bit of money on it, it's not the end of the world. It's that point at which you'd go, okay I'm going to scale up. But I would never rule out growing anything. We've got water, we've got light sandy soils which we can work at any time of year, and we've got a warm climate. We could grow anything we wanted to. We could switch out of potatoes. It will be other things that force us out of those mainstay crops. And the thing that will force us out of it, I suspect, will be disease pressure. I don't know if anyone's talked to you about potato cyst nematodes? That's the big threat to this estate. Big threat. And yes, we are now growing varieties which are tolerant, but inevitably when you start growing something that is tolerant, one of those nematodes is going to work a way around it and then you create a new population of PCN that is no longer killed off by growing Maris Piper for instance. That's our biggest

threat. White rot in onions, arm, that's 20 years of not growing onions. So that wipes that out. Carrots, I don't actually do the carrots ourselves, this is classic. The carrots here are grown by a huge grower from XX in the XX and they will grow carrots all over the UK.

Int: So when they do that will they bring their equipment from somewhere else?

D: They bring their equipment and their labour from elsewhere, so they don't employ anybody in this village or the next village, or the next village. So there's no connection. They just come down here, there's the field, that's our factory, we'll grow the crop, we'll pay a rent and we'll high-tail it. I'm not saying it's wrong, but that's just the way it is.

Int: Well, it's functional I suppose.

D: Yeah

Int: I think I've gone through all my questions. That was very good, thank you very much. Stayed on topic more than some! Do you have anything you'd like to ask me?

D: Only, do I get to see anything at the end of this?

Int: Well initially I can send you the transcript of the interview...

D: I don't need that.

Int: But hopefully we'll be getting some publications, I'll be writing some blogs and we'll be trying to publish some articles in the popular press as well (description of different project components)...

D: The thing that I suspect we've got to appreciate as a country is that if you did turn the tap off in East Suffolk, that production is not going to go anywhere else in the UK. We are already maxed out on potato land, so 10% could go to Norfolk for instance, but then they'd start over-producing and they'd start getting disease issues and so on. So, if you turn the tap off, that production goes abroad, where potentially the environmental impact is greater. So there is an argument for keeping it here and working out how to get this whole system working in a resilient manner.

D: The only thing I was going to ask you is if you have talked to Tim Derby etc. etc.