









# SAYFC AGRI & RURAL AFFAIRS

## STUDY TOUR 2018: CALIFORNIA

**24th November to 14th December 2018**

YOUNG FARMERS

# INTRODUCTION

As an industry we are entering very uncertain times, no one knows what effect Brexit will have in the short and long term. But for me two things seem very clear

1. Farming businesses are going to have to adapt to reducing subsidies and will have to become more efficient, streamlined, innovate and in many cases cut costs

2. Labour is going to become more difficult to source, the likely removal of the free movement of people from EU countries will leave many businesses struggling to find both permanent and seasonal workers

With these likely situations in our mind we picked California as the destination for the 2018 Agri-Affairs International Study Tour. California is well known for being one of the most advanced and productive agricultural areas in the world. With over 76,000 farms and ranches they generate more than $100 billion worth of agricultural related activity annually, producing over 400 different plant and animal commodities, the main products being Dairy, almonds, grapes and beef. They produce more agricultural produce than any other state in America and have done so for the past 5 decades. They currently supply two thirds of the US fruit and nuts, and a third of the nation's vegetables.

To produce this quantity of agricultural products the Californians have to be very efficient, particularly with water, which is a scarce resource out there, but more recently the other main resource that is becoming scarce is labour, The election of Donald Trump as US president, and his policy to halt Mexican immigration into the country has left all sectors of agriculture in California having to adapt to no longer having an unlimited pool of seasonal or manual labour

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So with Brexit on the Horizon, we felt there was no better time to go and see what could be learned from Farmers in California. They have productivity and efficiency that we can only dream off, and are facing a labour shortage like we too may face once EU workers are no longer available.

So with that in mind the theme for our trip was set as:

*'Improving efficiency by embracing technology'*

So the destination was set, the theme was set, all we needed now was a group of open minded and enthusiastic delegates to make the trip, then come back to Scotland ready to share what they had seen!

## Process

Once the location was announced we opened up applications to all current members of SAYFC.

Potential delegates had to initially submit a written application form detailing why they wanted to go, what they hoped to see and learn, why they would be a suitable candidate and finally how they planned to share what they had seen with the wider industry. We were delighted to receive over 60 applications, almost all of which were an impressively high standard.

Sarah Allison and Duncan Morrison (both previous Agri-Affairs Chair's) then reviewed all the applications and narrowed it down to 25 candidates who were invited to attend a face to face interview with a panel of John Cameron (Cameron Trust), Robert Neil (Agriscot), Robert Ramsey (SAC) and myself.

The panel were all extremely impressed with the calibre of all the individuals who made it to the interview process, however we came to a unanimous decision as to who the 15 representatives would be to join me on the trip of a lifetime

## The Tour

We set off from Glasgow airport on the morning of Saturday the 24th of November, flying to San Fransisco, via Dublin for USA immigration pre-clearance.

After spending the Sunday settling in to our US surroundings and taking in local landmarks such as the Golden Gate Bridge we then boarded our coach on Monday morning ready for an action packed 12 days of visits and tours.

Initially we headed north east out of San Fransisco towards Napa and the northern livestock/dairy region spending the first week doing a loop round the north of the state before ending up in Yosemite national park for the middle weekend, offering a chance to take in the breathtaking scenery, and even some snow! This also gave us a couple of days to actually take in all the amazing places we had seen and visited during week one, then we were straight into week two which involved a southern loop taking in the

more productive arable and vegetable growing areas of the state before ending up back where we started in San Francisco on the evening of Friday the 7th of December (see map on page 29)

This report will detail all the amazing, thought provoking and educational visits and tours we were lucky enough experience over the two week study tour. While I have no doubt every one of the delegates on the tour will have different highlights, have learned different things, and taken different messages home there was a few stand out take home messages that we all seemed to agree on.

The first was regarding labour and its importance to any agricultural business. Ultimately success or failure of a business can be dependent on its workers, both how they are managed and how they perform. Throughout our tour we saw many different forms of management styles and techniques and different ways owners and managers were trying to attract and retain the best workers, there is no doubt like us they have a real shortage of skilled workers for their industry, so the farms we visited were all trying different ways to make themselves more attractive to potential employees.

Some were working hard to improve conditions for workers, while others were trying to retain them by providing incentives such as healthcare, paying for any prescriptions and even offering to pay for school or college of their workers children. The one common theme was the acceptance that good workers are becoming harder and harder to find, so you have to make yourself more attractive than the rest to new employees, and once you have them you need to make sure you keep them!

The second was not at all what we expected to find, we all went out expecting to see robots everywhere and a level of mechanisation unlike back home. In most cases this wasn't the case at all.

Many of the machines were bigger than we would be used to at home due to the sheer size and scale of the operations out there but we were surprised by the amount of manual labour in the fields and yards. Many of the farmers told us stories of how they had dived into technology in the past, but had run into difficulty either finding skilled enough workers to operate the machine, or the technology wasn't quite ready for doing the whole job itself. In many cases they had tried technology and had reverted back to more human input again. The main message was technology should adapt to help the workers become more efficient, not replace them altogether. As technology alone did not appear to be the answer.

Out of all the farms we visited the most successful seemed to be the ones who had slowly added technology once it had become more advanced and affordable, rather than the ones who dived headfirst into the newest, fanciest machines who then found they had teething problems or in some cases complete failure, then didn't have the staff any more as backup.

So perhaps these two messages together come as a timely reminder to Scottish farms that investing in technology alone is not the golden bullet to efficiency, instead should be used to aid the workforce, and that looking after existing workers will pay dividends in the long run, as finding new employees is only going to get harder for all sectors of agriculture in years to come!

Finally, as leader of the tour, I would just like to say how delighted I was with the group and how well we all got on over the fortnight of living in each other's pockets. Couldn't have asked for a better group of people to go on study tour with. I think I can speak for the whole group when I say we are now not just a group of delegates that went on the 2018 Study Tour, we are a group of friends for life.

I would also like to take the opportunity on behalf of the whole group to thank each and every one of the sponsors, without your support trips like this wouldn't be possible.

I hope you enjoy reading the report on what really was the trip of a lifetime for us all

**Iain Wilson**
Agri & Rural Affairs Chairman

**BACK** – Andrew Taylor (Crossroads YFC), Robert Campbell (Crossroads YFC), Angus Elder (East Lothian YFC), Stewart Lawrie (Brechin YFC), Rory Stodart (Forfar JAC), Charlie Mitchell (Strathmore JAC), Daniel Fleming (Forfar JAC), Iain Wilson (Mearns YFC), Alistair Brunton (East Fife JAC)

**FRONT** – Odiel Evans (News Correspondent, Irish Farmers Journal), Anna Sloan (Bankfoot JAC), Jillian Kennedy (Aberfeldy & District JAC), Romy Jackson (Bankfoot JAC), Mhairi Dalgliesh (Bankfoot JAC), Nicky Wilson (East Fife JAC), Scott Bourman (Carluke YFC), and David Black (Kinross JAC)

# THE GROUP

All members of the group are involved in agriculture, some directly farming, whilst others are in careers supporting those at grass root level such as agronomists, consultants and sales merchants. Between the group the member backgrounds cover sheep, dairy, beef, poultry, arable including vegetables, diversification and renewables.

All are members of the Scottish Association of Young Farmers, and represent a wide geographical spread of Scotland

| Name | | Club |
|---|---|---|
| **Iain** | Wilson | Mearns YFC / Agri Affairs Chairman |
| **David** | Black | Kinross JAC |
| **Scott** | Bourman | Carluke YFC |
| **Alistair** | Brunton | East Fife JAC |
| **Robert** | Campbell | Crossroads YFC |
| **Mhairi** | Dalgliesh | Bankfoot JAC |
| **Angus** | Elder | East Lothian YFC |
| **Daniel** | Fleming | Forfar JAC |
| **Romy** | Jackson | Bankfoot YF |
| **Jillian** | Kennedy | Aberfeldy & District JAC |
| **Stewart** | Lawrie | Brechin YF |
| **Charlie** | Mitchell | Strathmore JAC |
| **Anna** | Sloan | Bankfoot YF |
| **Rory** | Stodart | Forfar JAC |
| **Andrew** | Taylor | Crossroads YFC |
| **Nicky** | Wilson | East Fife JAC |

Throughout the trip the group posted a daily blog on the SAYFC website to share their experiences. These posts were also shared via the Association's social media pages (Twitter, Instagram and Facebook) which currently have over 10,000 followers collectively.

## Day 1: Olive Oil & Wine Production

**Monday 26th November 2018 Writer – Mhairi Dalgliesh**

The first day of farm visits on the trip had arrived and tour first stop was the **Olive Press** where we would learn the process of olive oil production. Once our guide Claudia had got over the shock of the fact we had travelled from Scotland we got on with the business of the day! After a walk through the process we soon appreciated the simplicity of the process and the few machines involved.

A family run business, the Olive Press, choose to hand harvest their olives to prevent bruising and damage. The harvest period was from October to December with no olives being stored as olives. All olives are processed within 24 hours of harvest and can be stored as oil for over a year as long as it is blanketed with gas. For 15 gallons of oil, 1,000lbs of olives are required. Another interesting fact was that all olive oils start green and then fade as time goes on.


The Cline Family chose not to use any pesticides in the field. Instead they used a natural clay product for pest control which is applied using a helicopter and coats the olive trees in a product which the flies don't like. However, despite no use of pesticides, the family is not prepared to move to organic production. This is because organic farming is very expensive in the USA and can also affect the shelf life of the oils as gas would not be able to be used. In line with the topics of sustainability and health that will be discussed at the Dairy Conference we will attend tomorrow, the Cline Family expect the olive oil industry to grow massively in the next 20 years as the population becomes more concerned with their health.

In Scotland we face fluctuations in crop yield and this is no different for olive production in California. In the first year the tree will produce a lot of olives as it is stressed. This production will then decrease for the next 1 – 2 years before increasing back to the level of initial production. From virgin, extra virgin and cold-pressed oils, we learned about them all and, of course, got a taste!

From olive oil it was on to the next visit (where the group were much looking forward to a sample!), the **Robert Mondavi Winery** in the famous Napa Valley.

Napa Valley is a huge wine region of California with the land being bound within the Napa Valley Agriculture Preserve. This is to prevent the area becoming commercialised with rules set that certain buildings cannot be erected and the land must be used to produce something.

Our tour guide, William, wasn't far into the tour when he hit us with the bombshell that land in the Napa Valley costs $1 million per acre to buy without bonds. The cost of the land is due to the premium name in terms of wine production and also the fertility of the ground. 50% of all soil types in the world can be found in the Napa Valley.

The company aims for a yield of 5 tonnes per acre and makes 1.5 million bottles per year but in order to do that they have to purchase 30% of their fruit on top of what the 437 acre vineyard produces.

Grape vines are a low input plant and nutrients are only provided in the later stages of winter. Those nutrients are provided by the sowing of 30 cover crops across the vineyard. These cover crops include barley and mustard and once established are uprooted and left to mulch. If the vineyard was hit by frost, hot air is blown into the rows of vines to warm the trunks.

I am sure that many of you think that rose wine is a mix of red and white wine which in some cases it can be but at Robert Mondavi rose is created as the skin of the grapes is in contact with the liquid for a much shorter time compared with that of a red wine.

I think it is safe to say that we left understanding much more about wine production and the labelling of wine.

## Day 2: California Dairy Sustainability Summit

**Tuesday 27th November 2018 Writer – Robert Campbell**

Day 2 was spent attending the **California Dairy Sustainability Summit** in Sacramento. It has been very interesting to hear the challenges faced by Californian dairy farmers and how the industry is making changes.

It was very clear that the state values its dairy industry and is prepared to support agriculture and encourage farmers to become more sustainable by becoming both more efficient and environmentally friendly. Karen Ross, Secretary of California Department for Food and Agriculture openly stressed just how important the dairy industry is to the state.

During the previous 12 months the state had invested $700 million in agriculture as a whole with a lot of that being channelled towards the dairy sector. $112 million has been used to fund the construction of 63 on farm digesters to allow dairy farmers to utilise the waste product on farm. There is a clear mind set within the industry where change is incentivised rather than over regulating and forcing farmers to change against their will.

It was also interesting to hear the challenges faced by Californian farmers that are relatable to Scottish farmers. One of the most relatable points was the increased pressure on dairy farmers by the general public who are often armed with inaccurate facts and do not want to hear the truth about how environmentally friendly and efficient the dairy industry is becoming. With veganism becoming more topical, it is important that the industry comes together to publicise the true story surrounding agriculture.

California is a true agricultural powerhouse, producing more than twice the agricultural output of any other state, employing 189,000 people and producing over 20% of the country's total dairy produce. However, it was clear that the dairy sector was still striving to increase output and become more efficient while protecting the environment, creating more sustainable businesses.

It was interesting to hear how much the industry as a whole cares about public perception and how this plays a role in decision making on farms across the state. Overall this sustainability conference has highlighted to the group just how open the industry is about its problems and we can all learn from the positivity expressed by all the speakers and delegates.

## Day 3: Red Angus & Cheese Production

**Wednesday 28th November 2018 Writers – Charlie Mitchell, Nicky Wilson and Andrew Taylor**

The **McPhee Red Angus Ranch** is a family run business based in Lodi. Rita McPhee operates the herd alongside her sister Mary and their 85 year old mother. They have had Red Angus cattle since 1971. They started with 5 cows and 1 bull and by the late 80's had 650 mother cows. However, as land has become increasingly difficult to lease, due to olive growers and vineyards, numbers were reduced to 250 cows. Rita and Mary's father started their Red Angus herd as it was the 1st breed that required performance data to register a calf.


Rita and Mary do the day to day running of the farm such as feeding and tagging. Their 85 year old mother is very much involved with recording of data and Rita and Mary also get a helping hand from their children at the weekends.

The McPhee's sell 100 bulls a year. These are all sold to about 30 buyers, most of which are sold on farm in one of their sheds at an internal sale in October. They have the facilities to allow them to set up a ring in their shed for the sale. They also sell bottom end heifers to commercial breeders where they are bought as replacements. This year their bull sales averaged $5300. As a whole, bull sales in California in 2018 were down because of the drought this year.

The Ranch itself is 80 acres (owned) but the McPhee's farm 3000 acres, most of which is leased. Calving starts in July and ends in September. In December the cows and calves are out wintered until May and are supplemented with Hay. Mineral supplements are also used as the area is copper and selenium deficient. They can put 50 pair of cattle on a 1000 acre hill costing $25 a unit. The rest of the year the cows are on irrigated clover pastures. Before the cows are put on to these pastures the McPhee's will make hay from the pasture.

The herd is well known for its high performance traits such as carcass and growth from birth to weaning. Rita uses the red angus EPD database which is an equivalent to our EBV's. She uses this to help communicate with farmers to see what they are looking for when buying a bull. So if a farmer is looking for anything in particular when buying a bull Rita can show them each bull's traits.

There are no government rules for tagging and records in California. They are not expected to notify their department of agriculture when a calf is born and are not given a unique tag number linking the animal to the farm. The McPhee's use their own tagging system which is just numerical and used for their own records such as performance records. They have different colours of tags so they can identify the different families within the herds.

(Charlie Mitchell)

**Hilmar Cheese** was founded in 1984 by 12 dairy families who were getting increasingly disheartened by the price they were getting for their Jersey milk, they are now the largest single site cheese plant in the US, producing 2 million lb of cheese every day. Hilmar cheese is still owned by 11 of the original families and now run by the 2nd and 3rd generation, managing over 1200 staff.

The scale of the operation is quite astounding and was apparent early on when we started by doing a bus tour of the plant. Hilmar cheese is sold entirely business to business, so the end consumer never…

## Day 3: Cheese Production Continued

…sees a Hilmar label on their cheese. This allows Hilmar to focus on innovation and efficiency and leave the marketing to the bigger brands that they sell to.

What became very clear is the level of efficiency and sustainability Hilmar have created throughout their processes. They are sourcing milk from 200 nearby dairies, milk is tested and retested to check temperature, composition and cleanliness to prevent any tanks being rejected. Everything is cleaned in a 24 hour cycle and farmers are rewarded financially for high quality milk.

Cheese making requires water, and when you're making as much cheese as Hilmar, you need a lot of it! Milk is 87% water, which they capture and recycle during the process so that nothing goes to waste. Their water reclamation plant cleans the water in a 27 step washing process which lasts 21 minutes. 640 hectares a year worth of water from the plant is given back to surrounding farms for irrigation.

During the cheese making process, milk is split into 4 parts, all of which have an important role in the make up of Hilmar Cheese portfolio. Nothing is wasted and everything is thought through to create efficiency.

- Curds: become cheese; Hilmar currently have 25% of the US market
- Whey: used in products such as protein powder and baby formula milk
- Lactose: milk 'sugar' is a popular alternative to the traditional cane sugar, the majority of which is exported
- Water: used to clean plant equipment and facilities as well as irrigation.

The families that make up Hilmar cheese have strong links to the community and really care about the agri industry. Every year sees Hilmar welcome over 17,000 school children to the visitor centre to learn about cows, milk, cheese and the industry. Education is a vital part of the Hilmar model and it's clear to see they spend a lot of time and money to create a space that encourages curiosity.

(Nicky Wilson)

After Hilmar we visited **Jones Dairy**. Austin, the farm manager showed us around this 800 cow farm. Two Delaval VMS robots were installed in January to milk 100 cows while the remainder are milked through a flat level parlour, taking 20 hours per day. A further 8 robots will be installed in the coming years. This is to improve cow comfort and help ease the Labour shortage issue. Eleven people are employed on farm. The farm would historically have several people a week coming looking for work, now it is only 1 or 2 a month. A neighbour is going to fit 110 robots to milk 8000 cows due to a lack of labour.

The herd, compromising of 45% heifers, is averaging 46.8kg per day. Cows are grouped according to stage of lactation. Fresh cows are milked 4 times a day, the main herd 3 times a day and late cows twice a day. Cows are on deep bed cubicles, bedded with almond hulls.

TMR is based around maize silage and alfalfa hay, with corn distillers, corn gluten, cotton seed, almond hulls and minerals. Rations are altered every 2 weeks based on price of raw materials and cow performance.

Milk prices are under pressure at the moment in California. However, there is a positivity around the dairy sector as shown by the investments being made.

(Andrew Taylor)

# Day 4: Focus on Water and Almond Production

**Thursday 29th November 2018 Writer – Iain Wilson & David Black**

This morning we had an early start, leaving the hotel at 7:45 to head to the headquarters of **TIC (Turlock Irrigation District).** The company is a publicly owned business and was the first irrigation district in California when it was formed in 1887 by a group of forward thinking farmers who realised how important a sustainable water supply was for agriculture in the area, the company now has over 500 employees. TIC has a government licence allowing them 64% of the water rights of the Tuolumne River which it uses to fill massive manmade lakes created by building dams in the mountains to catch rain water and snow melt in the winter then distribute to farmers through a 250mile network of concrete lined canals.

We were then driven to see the largest of the lakes (Don Pedro) and were blown away by the sheer scale. Don Pedro dam is 580 feet high and the lake has a surface area of just over 10,000acres holding a staggering 2,030,000 acre feet of water (2,503,964,400cubic meters!)

TIC has a board of 5 elected directors who decide annually how much water they have collected and then notify farmers in January what their allocation will be for the coming summer. Every farmer is given the same amount of water per acre, its then up to them how they use it and when. The water is transported to the farms by canal then in most cases used for flood irrigation of farmland, without this water supply production just wouldn't be possible.

This summer the area received less than an inch of rain between May and November, but through the TIC they were all given an allowance of 48 inches per acre allowing them to grow high value crops such as Almonds and also forage crops for the many dairies in the area. Each farmer is charged $60/acre annually whether they use their allowance or not, then charged $2 per acre foot used up to 48 inches, if they go above 48inches they are then charged $15/acre foot. The water rights stay with the property rather than the owner so it has meant that any properties with these water rights are now worth significantly more money. Irrigated land in this area is worth roughly $35,000/acre, while unirrigated land in more likely to be $5-8,000/acre

Currently there are 150,000acres irrigated by TIC, and interestingly despite this year being one of the driest summers in memory their farmers benefited from a constant and reliable source throughout while many other farmers who rely on wells or boreholes ran dry. TIC does work with farmers to ensure water is used as efficiently as possible. The favoured approach is flood irrigation as it also helps to replenish groundwater levels rather than trickle or sprinkler irrigation which is also costly to set up.

The system is totally gravity fed and no pumps at all are required until it gets to the end user, the farmer is responsible for maintaining his own infrastructure.

To avoid huge peaks and troughs in supply the farmers must state their preferred time to receive water then TIC puts together a program telling the farmers when they are allowed to extract from the canal network and for how long

It was also interesting to hear how the increased voice of the environmentalists is having a big impact on TIC, firstly they said building any scheme of this scale simply wouldn't be possible now as it would be seen to be causing far too much damage to the environment. TIC are also facing a battle to hold on to their 64% water rights from the river as various environmental groups want more water released

downstream to help the native Spelt fish population which has seen a reduction in numbers the past few years. If this was to happen the extra water released would just be wasted as it would flow down the river, past all the highly productive farmland and into the ocean. However TIC are fighting this very strongly with a team of scientists and experts who claim other measures such as controlling predatory species would be a more sustainable approach.

But the key environmental point TIC were keen to stress is the fact that the supply of water they offer means that farmers don't then need to rely on groundwater supply which is becoming a real issue in California as Groundwater levels are now dangerously low.

TIC also utilise their dams by installing hydroelectric schemes to produce enough power for 101,857 residential and business customers, this brings in an additional $257,495,000 of revenue annually which helps with reinvestment and maintenance of their canals and dams while still maintaining competitively priced water to the farmer owners of the company.

The size and scale of the projects were truly impressive to see and it really drove home to us just how reliant the agriculture industry of California is on a reliable water source. California is one of the most productive agricultural areas in the world, but it certainly wouldn't have achieved this without schemes such as TIC. Definitely one of the best visits so far!

(Iain Wilson)

After our mornings visit exploring the vast irrigation network of the district we then headed to **Blue Diamond growers** which is the world's largest almond Co-op. With over 3000 growers and 1500 employees it became apparent how large a scale the co-operative, which was established in 1910, was operating on.

With California having over 1.3 million acres producing 83% of the world's supply of almonds Blue Diamond puts itself at the top in terms of looking after and maximising profits for its farmers. Although they have had to stop accepting new growers at this moment due to lack of capacity, the normal pricing structure they adopt is designed to allow farmers to join the co-operative with minimum financial strain on their business. There are no large capital joining fees but instead the co-operative takes 3% of the farmers almond income for the first 3 years. This accessibility along with the growing demand for almonds has allowed Blue Diamond to expand rapidly over the last 20 years reaching its first billion dollar crop in 2002 and they are now on target to be up to 2.8 billion in 2019.

There is a lot to be learned from working together in a Co-op the way Blue Diamond operates. Due to their large networking campaigns and processes to add value to more than 2/3 of the almonds they receive they can consistently offer their growers above market value. Last year they were able to pay growers over 26 cents/kg more than their competitors. Growers understand how important marketing is and pay fluctuating amounts to an almond marketing board depending on how short they believe they will be on demand. A proactive approach like this has allowed there to be minimal waste in this sector meaning farmers do not have to dump crops. Husks are also sold to local dairy farmers as a fibrous feed stock helping to maximise crop income.

When it came to discussing the actual growing of almonds the figures were quite staggering. At 6-7k dollars an acre to establish plus 3-5k/acre irrigation set up this was starting to look like a very expensive

crop to grow. Not only that but variable costs can be as much as 3.2k a year then labour, machinery and water costs on top of this. To make this huge start up fee even more overwhelming it will be 3 years till the first crop then 8-11 years to break even by the time the plant gets up to full production.
In terms of agronomy farmers face big challenges growing what turned out to be a very sensitive tree to its surroundings. They are well suited to the Mediterranean climate of warm summers and low humidity to produce the crop and cooler misty winters to allow them to regenerate and bloom. The pollination of almond trees is the largest pollinating event in the world with vast amounts of farmed bees being used. Once they are in growth the trees can use as much as a staggering 90 gallons of water a day most of which is received from large reservoirs catching snow melt up the valley or underground aquifers. Weather is key as to cold or warm can affect the crop dramatically. Frost can be a big problem in the winter so farmers have had to adopt methods to help reduce this. These include keeping the ground around the trees bare to be used as a natural heat bank for the sun's rays and also use of mist irrigation during frost to try and help insulate natural heat within the plant.
Overall it was a very interesting trip which I think we can take a lot away from. The very proactive approach they take working with large companies to produce new products and deal with market supply and demand is vital. This allows them to maximise profits for their growers whilst building a sustainable and ever growing market for their products.

(David Black)

# Day 5: Egg Production, Auction Market & Sheep Farm

**Friday 30th November 2018 Writers – Rory Stodart & Romy Jackson**

This morning we visited **Gemperle family** farm which was established in 1950. Today their operation expands to 5 million laying hens and 2400 acres of almonds. The family business is part of a bigger Co-op that controls 22 million birds. We were there to explore one of their egg processing plants which was situated beside 1million of their 5million hens. The private business produces eggs in 4 different states- Oregon, Washington, California and Hawaii. They have 2 feed mills, one Organic and one conventional. Biosecurity was a major concern for the business. They used their Almond orchards to completely surround all of their sites as a way of stopping domestic flocks being located so close that they could pose a disease risk.

They explained to us that Avian Influenza was a major risk due to the migration of geese from Alaska to Mexico every winter. To mitigate this risk all birds were indoors, with the exception of Organic birds which had 'access' to the outdoors.
All of the eggs that we saw were white and during the processing process were washed and refrigerated, quite different to what happens at home. This was done for food hygiene concerns. All birds are vaccinated for salmonella and birds are tested throughout their lives. California has not seen a salmonella outbreak in 25 years. Red mite was not a big problem for them due to the warm dry climate.

## Day 5: Egg Production, Auction Market & Sheep Farm Continued

Organic eggs are major part of their business. They explained to us how they introduced organic eggs into to grocery stores in the US and as this market expanded so did they. A major part of their growth has been organic eggs. Today they sell 80 different brands of eggs.
This was an extremely interesting visit which demonstrated to all of us how a family business can expand into a hugely successful producer processor.

(Rory Stodart)

On Friday afternoon we visited **Turlock Auction Mart**. We saw the weekly dairy sale which sees the market sell 1100-1200 head of cattle. Unlike in Scotland's markets, the cattle are bought in all day from 11-4 pm. Due to the ad hoc arrival of stock, the ring lots do not follow an order of type and can vary from bulls, freshly calved heifers and young stock.

We heard earlier in the week that the average number of lactations in a California dairy farm is two. Staff explained that due to the poor trade, poor quality second calvers have no market at all and we saw a number unsold. Overall trade was cheap with freshly calved heifers selling for as low as $450 and peaking at $1300.
We saw the booking in process and heard how the country is moving towards compulsory ear tags but currently rely on branding to identify stock and verify its legitimacy of source.
After trying out the market cafe and comparing it to our local market cafes at home, we moved to Jacobsen Ranch.

**Richard and Lesanne Jacobson** farming 50 pedigree ewes on their 10 acre farm. Rich is a former agricultural teacher and 4th generation sheep producer of competitive livestock. They show at all major shows and sales. When we visited they had just got back from Kentucky (North American international) at which they had been very successful.
Their primary breed is a Montadale - an American breed which originates from a Cheviot and Columbia cross. Lambs weigh 12 pound at birth with ewes reaching around 250 pounds and rams being 350 pounds. Fat lambs are creep fed from birth until they reach 160-180 pounds at 6 months old and are killed for slaughter.
In an effort to utilise their stock not fit for the pedigree market, Lesanne began selling at farmers markets. She currently attends 2 markets a week and sells direct to three local chefs.
We heard how USA lamb consumption is low, which is believed to be due to a historical bad reputation for taste. Lisanne explained that her customers tend to be younger and suspects that a generational trends explain recent increase. It was particularly interesting to hear that lamb is not available in all supermarkets.
The farms wool is donated to company called "wool for worthy causes" who make items for the blind. The wool is donated as it is considered to be of average quality (similar to a Suffolk/ Hampshire type wool) and as such has no retail value to the farm.

(Romy Jackson)

# Days 6 & 7: Yosemite National Park

**Saturday 1st & Sunday 2nd December 2018 Writer – Jillian Kennedy**

Not without warnings of Black Bears breaking into our bus and a major effort to empty it of all our potentially bear-tempting snacks, we arrived in Yosemite National Park! The darkness meant we had no idea of the landscape that surrounded us and by the next morning the heavy snow meant we still didn't have a clue!

The troops were rallied though and we set off to the valleys visitor centre to gain an understanding of where we were and what we could explore. After a walk through the extensive and very informative Yosemite Valley exhibit, we watched the park's historical documentary in their onsite theatre.

The park has an incredible history, through its formation, preservation, vitality and its people. So many incredible influences have made Yosemite what it is today. Three major ice episodes allowed glaciers, the last of which would have melted 20,000 years ago, to carve and polish Yosemite to the spectacle it is today. Since then water has continued to erode and deposit sediment throughout the ever fluent landscape.

As much as glaciers created Yosemite, people have played a crucial role in preserving it. The parks first natives, the Ahwaneechee, set fire to the forests to enhance future growth by allowing greater light intensities down to the forest floor, thus allowing better grass growth for making baskets. As much as there has been some devastating news with regards to the recent wildfires in California, it is a natural process here. Fires reduce the accumulation of forest debris, helps recycle nutrients and are crucial in allowing the germination of Giant Sequoia seeds. Thus, prescribed fires are still carried out in Yosemite to enhance this process to ensure that the spectacular tree establishment here (some individuals are 2000 years old) can continue for centuries to come.

The park will be ever indebted to one of our fellow Scots, John Muir. A keen adventurer, he travelled to Yosemite in 1868, the first of many visits over the next 40 years. His love for Yosemite could not be mistaken. He not only unravelled the glacial story behind the park, but made its beauty one which everyone could share.

President Lincoln took time out during a period of civil war in 1868 to ensure the area as a site for Federal protection. This was the first of its kind with 60 square miles of land transferred to the care of the state of California never be offered as private ownership. Lincoln himself had never seen it in person.

Lincoln listened to John Muir, as did his successor Theodore Roosevelt. Tourism had developed long before the Yosemite had National Park status with visitors travelling long days on Indian trails to cast eyes upon all areas of the park. Entrepreneurs were soon competing to establish hotels and stage roads to cater for Yosemite's audiences, with a rail road up the Merced Canyon serving visitors between 1807 and 1845. Muir laid out his concerns to Roosevelt with regards to this increasing commercialisation of the park.

## Day 6&7: Yosemite National Park Continued

Uncontrolled deforestation was destroying spectacular trees with the source becoming increasing public as up to 20 people were posing for pictures standing round the circumference of a fallen tree stump. Yellowstone had been made the first every National Park as it didn't belong to a state for protection. Muir who spent three nights camping with Roosevelt in Yosemite, enlightened him to the beauty that it was, resulting in the Yosemite undisputedly becoming a National Park in 1906. The National Park Services took over the running of the park.
The park covers 1000 square miles, encompassing two major watersheds, the area which Muir had mapped by October 1890, within 6 years of it gaining World Heritage Site status. Yosemite truly is the lasting legacy of John Muir.

The National Park status not only protected Yosemite but allowed people from all corners of the world to explore and enjoy it. As well as the publicity created by John Muir, alongside Lincoln and Roosevelt, photographers and artists, such as Albert Beirstadt, helped spread imagery of the unique landscape to the people.
Yosemite's snowfall, along with that which falls across the rest of the Western mountains is a vital source for farmland across the state. It provides the summer melt without which irrigation would not be possible and California wouldn't be the agricultural powerhouse it is.
After an adventurous day experiencing what many had before us, and being advised of a prime photo spot, we once again rallied together and made it to Sentinel Bridge with a view of the park's infamous Half Dome in time for sunrise on Sunday morning. After a stormy Saturday we had a stunning Sunday with Yosemite showing us everything it had to offer! Demonstrating perfectly why sites like it should remain protected. There are 84 million acres across the US protected through National Park status, once which has travelled the world.

A picture perfect experience was enjoyed by all, including close encounters with a coyote, but snow chains on and we made the long drive south to Bakersfield for the start of our second week.

(Jillian Kennedy)

# Day 8: Carrot Production & Citrus Packing

**Monday 3rd December 2018 Writers – Angus Elder & Stewart Lawrie**

The group were lucky enough to be invited to **Grimmway farms** near Bakersfield (Kern County). This country contributes 7.25 billion dollars to the United States economy every year, highlighting the productivity of agriculture in the area.

The business specialises in growing, processing and marketing carrots both organic and conventional. The business grows around 35000 acres of carrots across the US every year as the mainstay of their business. They have also ventured into organic vegetables mainly to large wholesalers. Where they grow 12000 acres a year of around 50 different crops.

First we were given a tour of Grimmway farms 160 acre processing plant of carrots both conventional and organic. Grimmway farms were the first processors to grow large carrots and chop them up into baby carrots for sale. Almost all of the waste from this process is taken into their juicing plant or sold as part of a pack of smaller carrots. The factory packages over 4000 tonnes of baby carrots every day using and recycling nearly 6 million tonnes of water in the process.

Afterwards we were taken to see the harvesting operation in which 4 row top lifter harvesters were used to put carrots into 25 tonne lorries for shipping back to the factory.

The carrots are grown in a 3 year rotation with flood irrigation as a key tool for controlling diseases and weeds in the soil. The ability to plant and harvest carrots all year round gives them a huge opportunity to supply fresh produce as well as giving an extremely large output for every acre.

Again the irrigation of these crops is absolutely key in areas of the country with an annual rainfall of 2-3 inches a year. The sprinkler system used in field has a very high labour cost, which with rises in national wage will present a massive increase in costs to the business.

The scale of the business and efficiencies over such a large area were what impressed the group most as well as being the chance of a lifetime for myself as an organic carrot grower!

(Angus Elder)

After a busy and extremely interesting morning looking at the processing and field operations of Grimmeway Carrots it was quite refreshing to spend the afternoon with a tour of **Wonderful Halos** which is the mandarin packaging factory for the larger company Wonderful Citrus.

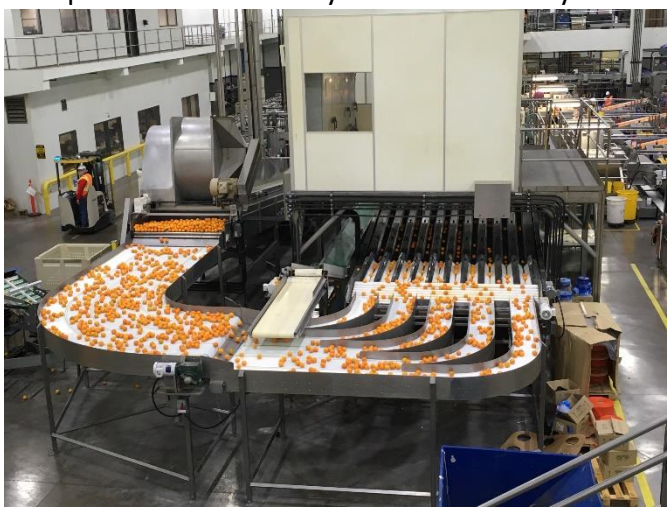
The company as a whole Wonderful Citrus owns 60,000 acres and there are also outside growers used to grow a variety of citrus fruits including Mandarins, Lemons, Limes, Oranges, Blood Oranges and Grapefruits. They have three pack houses, Wonderful Halos which is situated just south of Fresno in California and two more in Texas. They also boast an impressive workforce of around 2000 at peak times of the season.

We were greeted by our tour guide Nicole who had been involved in the marketing and package design within the mandarin factory Wonderful Halos for 2 and a half years. This sight was built in 2012 and covers an impressive 940,000 sq/ft. This is made up of various sorting and packaging lines as well as storage and ripening rooms.

## Day 8: Carrot Production & Citrus Packing Continued

The plant runs 24hrs/day 6 days a week with 4 hours set aside for cleaning each day. It is the largest of its kind in North America and one of the largest in the world. Mandarin season is from mid November through to May so it is a seasonal processing plant with only office and a few other full time staff kept on through quite times.

The process starts with mandarins being picked from some of the 25,000 acres grown by the company and only being picked from the trees when they are dry to stop rotting and disease build up when in storage. They are brought to the factory in plastic containers carrying about 900lbs of fruit each by large trucks. These containers are then tipped onto conveyors where the fruit is sorted through to remove any foreign objects green or rotten fruit. They are then washed in chlorine to sterilise the fruit from and disease and pests. After being washed the fruit passes under a series of cameras where 25 pictures of each piece of fruit are taken to remove any further rotten or green ones. The green fruit is then placed into storage and surrounded by ethylene gas to aid ripening. And rotten fruit goes for cattle feed so waste is kept to a minimum. Next it's on to one of the 70 312ft sorting lanes which contains cups to weigh the fruit into 9 different sizes and colour checked into 4 different categories. Any fruit too small for packing whole is sold on to other companies for juicing. Before leaving the sorting line the packing fruit passes over a conveyor to be sorted by hand for a final check for quality.



After this a final wash at 120 degrees and dry is completed before a food grade wax is applied to improve the shelf life and retain the moisture in the fruit. It also gives the bright orange fruit a shine to make it more appealing to the eye. The shelf life of the wax treated fruit is doubled to 7 days when unrefrigerated and quadrupled when refrigerated. The fruit is packed into various different bags depending on grade using high speed weighers to get each bag the same weight. Bag sizes are 1, 2, 3, and 5lb with between 30/50 bags being packed every minute. The bags are transported in cardboard boxes made by a robot which are then robotically stacked onto wooden pallets to be transported to mainly Californian outlets with some being transported to the east on America for distribution. The factory aims to run at a minimum of 75% production at which it can pack around 1 million 5lb bags in 20hrs multiplying up to around 25 million lbs of mandarins a week. 1lb of mandarins typically is worth about $2.99 which helps aid the company to their huge 53% market share with the next closest being 32%.

With 150/200 people working per shift safety on the factory floor is paramount. With special walkways and forklift safety being implemented. Staff health and wellbeing was definitely at the top of the companies priorities with this factory boasting a gym, doctors and healthy food canteen attached. The use of these facilities was completely free including work hour doctors appointments where flu vaccinations were offered and gym sessions after work or during breaks. The healthier they ate the cheaper the canteen was and prizes are given out for weight loss and heathy eating. All of these measures are put in place to encourage staff seasonal and permanent to be healthy and stay in employment at the company.

This was an extremely interesting visit and really got us all talking about how they put so much effort into keeping the staff happy and healthy. A real eye opener which we will definitely remember.

(Stewart Lawrie)

# Day 9: Large Scale Beef & Dairy Production

**Tuesday 4th December 2018 Writers – Daniel Fleming & Scott Bourman**

Today was the day for one of the most highly anticipated visits of the trip, **Harris Ranch.** The ranch was set up by founding member Jack Harris in the 1960's when it was home to 10,000 head of fattening cattle. By the 70's the cattle were coming in as fast, that they couldn't build the pens quick enough. The business is now under the management of Jack's son, John and is currently home to a whopping 111,000 cattle with the capacity to hold 120,000 head.

The business is split into five main sections:

Finishing Beef Feedlot

Slaughterhouse & Packhouse

Restaurant with Bar and Overnight Accommodation

Thoroughbred horses

Harris Farming

We started our tour at the feedlot. The sheer scale of the feedlot has to be seen to be believed. The pen sizes vary from 10 cattle to 1000 cattle, with batches made up according to breed - either Native or Holstein, weight, height, size and sex when they arrive onto the ranch. They only fatten steers and heifers here, no cows or bull calves as they don't believe the consumer wants to eat the tougher meat produced by the entire males plus they are more dangerous to work with when handling for slaughter etc.

Cattle are sourced from anywhere up to the Rocky Mountains in the west with 10% coming from Mexico. These cattle are all grass reared. 30% of the cattle found on the ranch are Holsteins as there are 1 million milking cows within 80 miles of Coalinga. Harris Ranch are known for producing high quality beef so only purchase the best of cattle. Any cattle that arrive onto the ranch that don't meet their high specifications are sold onto other finishing units. Harris Ranch have a number of ranchers who they contract buy animals from. They work with these breeders, giving them feedback on how their cattle perform on the feedlot and through the slaughterhouse to help improve their genetics for the future. One example of a genetic trait that they have helped breeders improve, is the ribeye area within the animal. This works well for both the ranchers and Harris as the producers receive a premium for calves that meet the high requirements set by Harris. Any other cattle are outsourced through video auction markets where just last week, 10,000 head of cattle were bought within 5 hours from the comfort of the office.

Within these feedlot pens there are "hospital" pens throughout the ranch. Each day, a team of 20 cowboys and girls will carry out a visual inspection of the feedlot and place any animals that require treatment into these "hospital" pens. Any animals that are treated for illness are tagged with a yellow tag so that they can be tracked through the finishing system.

The livestock on the ranch will receive 1 of 3 diets , 3 times a day from one of the 7 feed trucks onsite. This operation takes 11 hours a day as over 1,588 tonnes of feed are distributed. Each animal consumes around 14kg of feed and 38 litres of water each day. All rations are mixed up on the sites own feed mill. There is a Starter, an intermediate and a finisher diet. The animals receive the starter diet for 10 days

before being shifted onto the intermediate diet for 10 days before finally being put onto the finisher diet for the remaining 100 days that they are on the feedlot. The finisher diet is 85% concentrate and 10% hay. The main components of this diet are:
Corn, Alfalfa hay, Vitamin A & E, Copper, Molasses, Limestone, Condensed Distillers Solubles (CDS)- a liquid byproduct of ethanol production and lastly a bacteria that promotes gut health.
With irrigation costs in this area of California sky high, it is cheaper for the Harris family to buy in these components to make up the diet than grow them themselves. They receive two cargo trains each containing 13,000 tons of Corn, twice a month all the way from Nebraska to meet the corn demand of the diets they use. They can go through up to 40 truck loads of corn onsite each day.
These diets enable the Native breeds to average a daily live weight gain (DLWG) of 1.81kg/day and the Holsteins to average 1.27kg/day.
Once the cattle have been on the feedlot for 120 days and at around 20months of age, they are sent to slaughter at the businesses own slaughterhouse. All the animals in each feedlot pen are killed together, there is not cattle drawn out of these pens, they all go as one lot. Once killed, all the data from that batch of animals is analysed. The will look at DLWG, health, kill-out % and number of deaths within the group before slaughter. This data is then passed onto the breeders where the cattle arrive from to help with genetic improvement.
These animals will average 567kg when sent to slaughter. 63-64% of this meat will end up on the rail and of which 70% will end up in the box resulting in around 181- 227kg of meat from the original carcass being used in the family's fully integrated beef company. Of the 275,000 animals that Harris Ranch finish every year 10% is exported to the Pacific rim with the remainder being used within the United States, helping to supply fast food chain "In and Out" with 1/3 of their beef amongst others. This makes Harris Ranch the 15th largest producer of beef in the U.S with only 3 other feedlots bigger than themselves.
With a unit of this size, scale and intensity there will always be welfare concerns. The pens are only mucked out twice a year and being located so close to the freeway, it's easy to see how animal rights groups take an interest in these types of farming systems. As the area had received considerable rainfall recently we turned up when the feedlot probably looked at its worst. Having said all that, looks can be deceiving, with the majority of animals looking fit, happy and healthy. Usually the pens are very dry with sprinklers installed to spray water onto the pens at night to help keep the dust down and with it the risk of pneumonia. With California known for its high summer temperatures, Harris Ranch have constructed shelters to protect the cattle from the sun. These are positioned north to south so as the sun moves east to west each day, the cattle need to get up and move around and into the shade as the day progresses. If the temperature doesn't drop below 80F at night this can cause major pneumonia risks. If this occurs the cattle are placed onto a maintenance diet until the temperature drops and they can be pushed back onto the high concentrate finishing diet. Other key things that Harris Ranch look for when monitoring animal health are:
Noise levels of the cattle - of which there was very little
Movement within the pen to ensure they are not walking continually along the fence line - a key indicator of stress
Cleanliness - All animals are washed before entering the slaughterhouse by a variety of jets and a firehose.
To keep a feedlot of this size, plus their fleet of 70 trucks used to transport animals and feed supplies, moving, requires 200 staff, with 2000 staff employed overall throughout the 5 Harris Ranch enterprises. All trucks are washed out in the company's own truck wash after every load to help prevent the spread of pathogens such as E-coli and Salmonella.

## Day 9: Large Scale Beef & Dairy Production Continued

After visiting the feedlot, we briefly stopped in at Harris Farming headquarters where we were shown round the yard and were able to view some of the machinery that helps to farm some 14,000 acres compromising of a variety of crops from Almonds to Pistachios to Processing tomatoes.
The last stop on the tour was the Harris Ranch restaurant where we got the opportunity to sample some prime Harris beef. It's safe to say our DLWG on this trip will be able to compete with that of the native cattle we had viewed earlier!
All in all Harris Ranch was an excellent visit. It was a once in a lifetime opportunity to see a large scale family owned feedlot. The weather in Scotland would certainly need to improve before a system such as this could be implemented!

(Daniel Fleming)

A short trip South took us to **Dairyland Farms** near Tipton. Well planned infrastructure to allow for easy cow movement and management along with reliable staff members were some of the key points the group left with after visiting William Van Beek and his impressive 3000 cow dairy herd in Tulare.
Cows are milked three times per day through a 72 point De-leval rotary with a typical hourly output of 430 cows. These robust, medium sized, genomically bred Holstein cows averaged 40.8kgs per day 3.7 butterfat, 3.3 protein.

Listening to William as he showed the group around he was keen to highlight the cubicle sand bedding and floor flush system as he was certain that this played a big role in keeping mastitis levels low, which currently sits at 1.5%, with a yearly average of 1%.
At present, the Californian dairy industry is going through tough economic times, with each cow on this farm losing $300 per year. However, Mr Van Beek was clearly confident this would end in the near future after recently spending a cool $14 million on a 640 acre block of land providing him with the capacity to increase cow numbers to 4000.

To ease the business through these tough times, a recent investment in 5 acres worth of solar panels was installed with a payback of 11 years which after this, would eliminate electricity purchase required to run the dairy.
To further ease the current financial trauma in the dairy sector, the farm grows 23 acres of pistachio nuts with this years harvest generating a gross income of $286,000.
The group was highly impressed with his optimism in the dairy sector along with the size and scale of the farm, similar to most other farms we have visited within our time here so far. Additionally, the complex water networks which are required to sustain such an amount of cows are particularly interesting. The group is looking forward to the rest of the trip is going to bring.

(Scott Bourman)

# Day 10: Field Crop Production

**Wednesday 5th December 2018 Writers – Alistair Brunton & Andrew Taylor**

Today we travelled west of Fresno into the San Joaquin valley to visit **Del Bosque Farms**. Joe L. Del Bosque founded the company in 1985. They farm around 2000 acres, where their main business is growing organic crops such as cantaloupes, honeydew melons, watermelons and asparagus. They also grow non-organic conventional cantaloupes, almonds and cherries. They grow around 1000 acres of melons which therefore means they are the largest organic melon grower in the state. They have around around 660 acres of almonds and the rest of the land is used for their other crops.


Joe gave us an interesting insight into the agricultural industry in California as well as explaining what is grown in each district and why. He then showed us on a map how California's water supply works. Most of the water comes from the snow that falls in the winter on the mountains in the north of the state. By the use of canals it is transported down the state all the way to Los Angeles and San Diego. Farmers usually find out in march what water is available for the following year, this makes it difficult to select what crops to grow as they will most likely be in the ground by then. Joe stated that water supply is the main issue in Californian agriculture, a common theme among most of our hosts. Del Bosque Farms is situated in the San Joaquin valley with mountains to the east and west. The mountain range to the west prevents marine air reaching the valley during the day which therefore causes the valley to dry out and raises the temperature, this also causes the valley to become cool during the night.

At Del Bosque they used to grow cotton, cereals and potatoes but these are low value crops. The reason for growing higher value crops is due the price of water. To access water they have to contact the water district to release water down the canal and what they pump out is measured. Water used to take up 10-20% of their budget but now takes up 50%, it can cost them up to $3000 an acre for almonds. Although this is expensive Joe has managed to reduce the amount of water they use by 35% and increase their yields by 35% since the company started.

Another big issue for Joe and other farms across the state is labour. Similar to home it is getting harder to source staff to pick fruit and veg. In the valley the population is too low for locals to work seasonally on farms. Those living in urban areas such as Los Angeles and San Francisco aren't interested in travelling to the valley to work as the conditions are difficult. Joe requires around 300 seasonal staff for around 3-3½ months of the year, with a further 20-25 year round staff. Staff usually travel from Mexico into Arizona and pick for a couple of months then travel to California to pick for 3-4 months then travel back to Arizona to pick for a further 2 months before returning home.

## Day 10: Field Crop Production Continued

A big issue with staff is that the minimum wage in California is rising, it currently sits at $11 an hour ($7.25 federal minimum wage). Over the next 4 years the minimum wage with rise to $15 with a working week of 40 hours.

Del Bosque Farms grow for the fresh fruit and veg market so it is all picked by hand. With mechanised picking of melons you need new varieties that are tougher, the negative side to this is that they are not as juicy and the taste is poorer. Joe uses 12 crews to pick and pack the melons. They are packed in the field so that it reduces the amount of handling of the fruit. The melons are planted 20' apart, although this can vary on what the desired size of melon is. Joe uses transplants instead of seeds as they have a greater chance of thriving. Melons are planted in 15-20 acre plots with hedgerows between them. The hedgerow typically contains sunflowers, corn, and radish. This is used as a habitat for beneficial insects.

The number of asparagus growers in California is reducing, Mexico is now the main area with some Californian growers even moving down there. Asparagus is cut by hand and then taken to a packhouse. In a 35 acre plot there will be 10-12 workers cutting the asparagus into bundles and a further 3-4 picking the bundles and transporting them to the packhouse. The cherries are harvested mechanically in other states across the US, at Del Bosque they pick by hand. The reason for this is that mechanical harvesting often results in the cherry losing its stem which will reduce its shelf life.

Fertiliser is a big issue for a lot of organic farmers, Joe uses poultry manure in the form of compost or pellets. He also uses a by-product from the fish processing industry. These are usually applied to the soil pre sowing/planting and once harvest is complete. Joe finished by explaining how he is an advocate for the agriculture, he believes that the urban population do not fully understand how the agricultural industry works but are very quick to judge. I believe this is an issue that Scottish agriculture shares with California.

(Alistair Brunton)

**Bowles farming company** operate 12,000 acres of irrigated rowcrop in Merced county. Cropping is predominantly cotton and tomatoes, with 18 crops in total. 80% of the farm has sub surface drip irrigation. Moving to drip irrigation has increased electricity use, so 1MW of solar is installed, with another 0.5MW to be completed in a few years, supplying 80% of the farms need.


Bowles farming company has a big focus on using new technology to improve margins. Danny Royer, Vice President of technology, met with us and showed the software they are using for greater management. His aim is to reduce input costs by 15% while maintaining or increasing yields. Ag World software is used to integrate data from other platforms to give meaningful data for decision making.

## Day 10: Field Crop Production Continued

Every employee on the farm has a smartphone to use the app. The software can tell the employee, the tractor and the manager what task is to be done and can log the data. Every task has the cost calculated and this allows benchmarking of each field. They have also invested $40,000 in a soil sampling machine that reads pH, organic matter and electric conductivity of the soil. These readings are allowing massive savings already in costs by applying variable rate fertiliser. This data, along with harvest yield data is all fed into Ag world and the profitability of each field can be calculated.

Another piece of software recently installed can completely control the irrigation system in the pistachio orchid. By reading the soil moisture levels and comparing to what is desired by the crop at that point in the season it will turn the irrigation on for the required time.

14 tractors are running Greenstar, with the rest getting it as they are replaced, allowing communication between the tractor and the manager. The collection and analysis of data has shown that some of the largest tractors are no longer required based on the number of hours they are running, so they will not be replaced. Instead tractors will be hired when required, reducing running costs significantly.

60 full time staff are on site, with some of the best conditions we have seen. Some have houses on site, with a rent that reflects working hours. During December and January the field staff take a month off. Bowles has a scholarship programme to help fund employees children through college. Pensions are also far greater than any other agricultural company in California.

Danny's background is in systems management. He is of the strong opinion that we need more data analysts in farming going forward. We have the ability to collect this data however we lack the ability at a farm level to process it to increase profits. This will be an issue for the smaller farmer to justify the costs. The average farm size in the area is 2000 acres. Cooperation between small family farms will be required in order to compete and stay profitable.

(Andrew Taylor)

# Day 11: Innovation Technology & Training

**Thurs 6th December 2018 Writers – Anna Sloan and Mhairi Dalgliesh**

Thursday morning saw us visit the **Western Growers Centre for Innovation and Technology** situated in the town of Salinas. The centre provides a big share workspace for any technology companies working on technology for agriculture.


Western Growers is a grower organisation which represents growers in California, Arizona and Colorado. Western Growers launched the Western Growers Centre for Innovation and Technology to help their members do more with less. It was created to help identify industry priorities, set up testing, facilitate industry feedback and communicate progress to fresh produce farmers. Salinas is an agricultural centre often referred to as "the salad bowl of the world" so agricultural technology companies want to be located here to have access to growers and be able to talk with them.

When the centre was first launched in December 2015 there were 4 companies working out of it, this is now up to 54 companies today showing how much it has taken off. $26million was raised to fund the launch of the centre from sponsoring companies and the centre continues to receive sponsorship. Currently they are up to a total of 28 different sponsors.

The agricultural issues that the centre is trying to combat includes water supply and use, water quality and ensuring safety, inadequate labour supply with a focus on robotics and crop production.

In addition to the above, during our visit we spoke to two different companies who currently work out of the centre. The first was iTrade Network who are a supply chain management company who tackle the complexities that occur at all way points of the perishables supply chain, from procurement and quality to full traceability and spend management. Essentially their supply chain solution suite connects the buyer and grower and allows full traceability of say a head of lettuce right back to which field and lot it came from.

Next we heard from Intelligent Wireless Network who are working to combat rural broadband issues. They have come up with the world's first mobile virtual network operator hybrid to serve rural communities. What differentiates then from other service providers is that they are a hybrid between the macro network of the wireless world and underground infrastructure.

## Day 11: Innovation Technology and Training Continued

They provide two main products:

1. WiFi-In-Box which provides internet access.

2. Communication towers which can send out internet access across your whole business to connect your home, office, vehicles and outdoor farming operations.

The way this works is providing signal at a lower level than a typical wireless network to provide improved internet speeds and greater connectivity options for multiple devices. They start by forming a cluster of towers to create an umbrella of coverage and from there they can go on and sell internet in that area. People who have a tower get free internet access and 1% of revenue from the tower.

As an example, there has recently been cherry picker technology released where by each individual picker in the field has a device that records the weight of each punnet they bring in and pays them instantly based on the weight. This facilitates real time accounting with no delay and is supposed to help motivate staff as they see the money coming in for their work. This wireless network makes it easy and straight forward to connect every individual device to the network.

We all thoroughly enjoyed this insightful visit which opened our eyes to the scale of investment and focus on agricultural technology developments in this area.

(Anna Sloan)

The outskirts of Salinas is the base for **Hartnell College** this is a community college with an average student age of 30. The college was established in 1920 however an E-coli outbreak in lettuce in 2006 prompted the local agricultural industry to create a relevant agricultural tech program within the college. As such; courses on food safety, agricultural production and business as well as welding, diesel and automotive technology now exist.

Particularly unique attributes of Hartnell are that every classroom has a donor with a classroom costing around $50,000 for equipment and furniture. A large proportion of the funding that the college receives from the industry is due to the expectation that they will provide employees for the industry. For example, it is expected that diesel technology and auto-motives will turn out 35 students to the industry every year. Industry partners also provide materials for manufacturing students to build trailers.

Feedback is received from growers on the material that is being taught, showing the vested interest that the industry has in the college.

### Day 11: Innovation Technology and Training Continued

Additionally, the college offers short courses for skills which employers require staff to have in order for them to develop. For example, a 6 week course on industrial refrigeration for veg growers.

A stark difference between Hartnell and colleges at home was that the agricultural courses consisted of a 50/50 split between theory and practical. The theory of the College Dean was “Theory is great for life long learning but if you can’t go and do it, nobody cares!” On site, Hartnell has 200 acres of farmland which they can utilise however a good chunk of that is currently leased out for a monthly rent.

A fantastic facility Hartnell has is their tax funded welding simulator which gives students instant feedback.


The most striking aspect of the visit was the extreme gang culture that surrounds the area. One third of all students at the college have had a relative murdered. The college offers extensive counselling for students and aims to be a platform for students from troubled backgrounds to gain skills and be able to progress with their future.

A first class example of an educational institution which is integrated within its local industry.

(Mhairi Dalgliesh)

# Day 12: Brussel Sprout Production and Packing

**Friday 7th December 2018 Writer – Angus Elder**

Just to get us all in the mood for Christmas, the last visit of our trip was to a muddy field of brussel sprouts. The company was **Boggiatto Produce** who grow 250 acres of sprouts, 3300 acres of romaine & Iceberg lettuce, artichokes, kale and broccoli. As well as vacuum cooling, packing and storing fresh produce under contract.

The harvesting process was done with a self propelled machine on tracks worth nearly 1 million dollars having been specifically built for the job. The whole process had extremely high labour cost to it with more than 20 workers in the field at any one time de-leafing, cutting stalks, loading the harvester, stripping the stalks and carting the product back to the pack house for cleaning and packing. There were also a further 40 workers in the pack house and storage area.

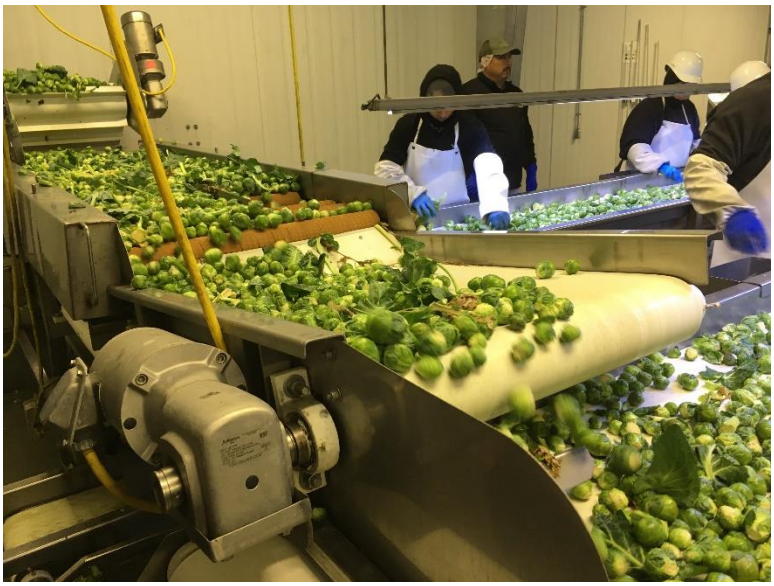
Jeff Hitchcock (Vice President of Boggiata Produce) and his team had done a fantastic job of sourcing workers through a government run scheme called the H2-A scheme in which they can source workers from areas deep into Mexico. Boggiata Produce made an application at the start of the season for their

required number of workers before sending transport to Mexico to pick up the workers having specified gender, age and medical health tests. This scheme solidifies the company's workforce for the coming season all be it at a slightly higher cost than minimum wage at $13.85 / hour. This ensures all workers are legal as they are issued a social security number for the duration of their 6 month work contract.

It has become very clear throughout our trips that traceability of food is becoming very important in the US after a recent E.Coli outbreak in Romaine Lettuce. This was something Boggiata Produce took very seriously with very detailed labelling providing information on where, when and who cut that individual box of produce.

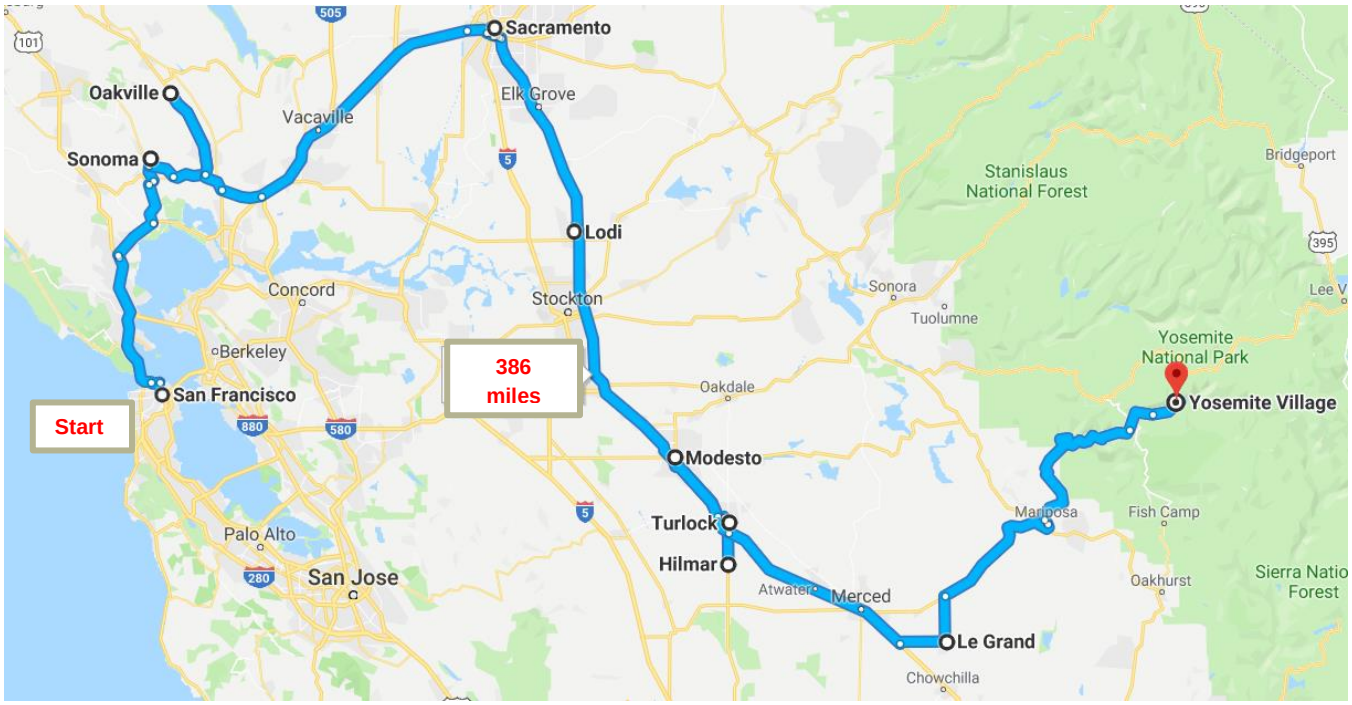
All of the company's produce is sold to wholesalers and the catering market in order to obtain a higher sale price and not compete with larger farms. The company were pioneers in creating the baby iceberg lettuce specifically designed for the catering industry. The company are in a very unique spot being able to grow their produce in the salinas valley because of the proximity to the sea and quality of land available gives the produce a chance to thrive because of some slightly cooler weather.

The extremely high use of labour was something that the business could improve on with the use of some more mechanised systems. The focus of the business was really based on the food safety and traceability of the product with monthly training of staff taking place. All in all the trip gave us a fantastic insight in to how some very similar labour issues in our country could also be solved as well a fantastic opportunity to see some of the innovations in the fresh produce industry.

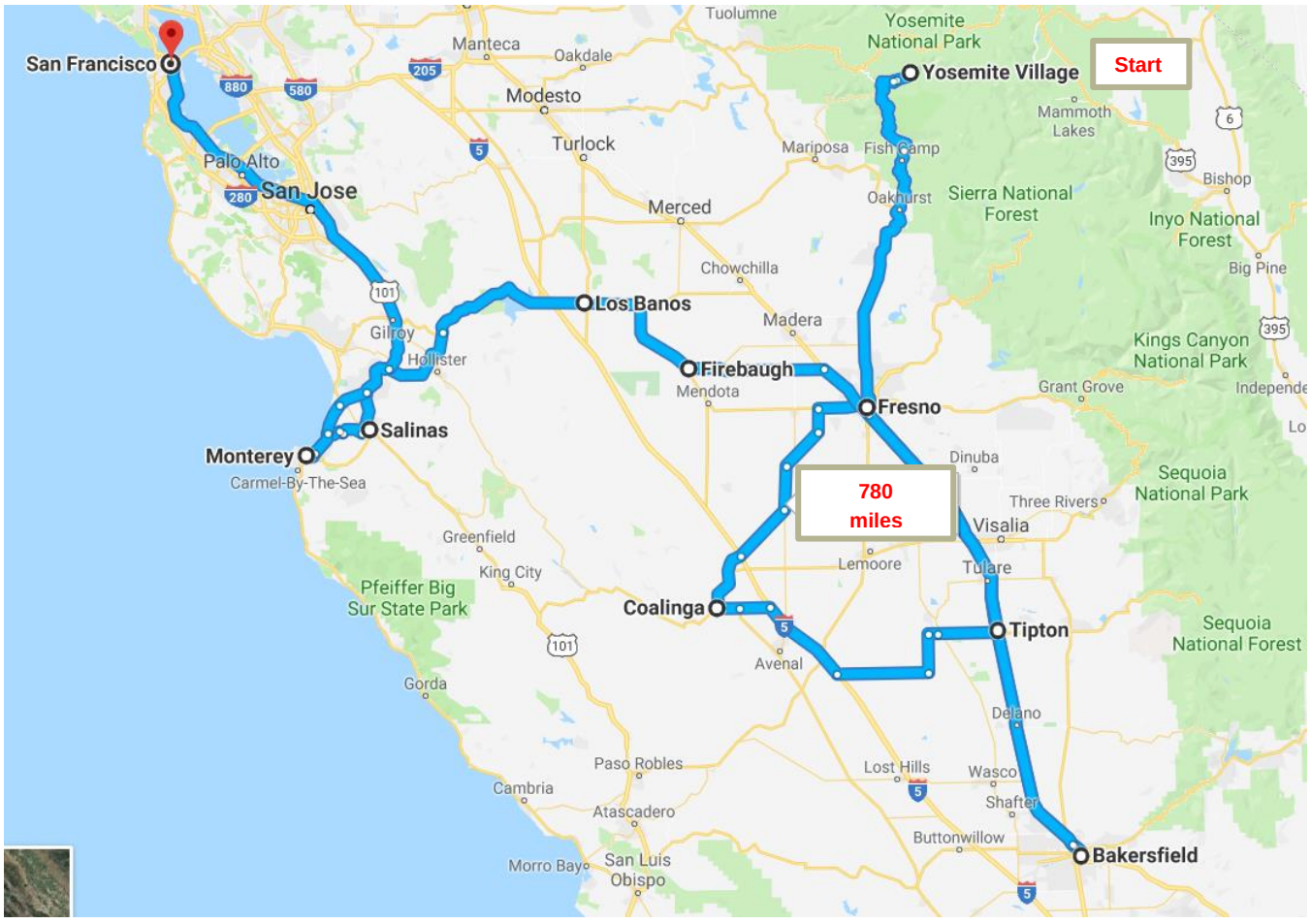


# Route Covered During the Tour

## Week 1




## Week 2



## Sponsors Acknowledgments

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* Cameron Travel Scholarship Trust * AgriScot * International Trust *RHASS

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