SAYFC
Agri & Rural Affairs
2022 Study Tour ~ Chile

Report from the SAYFC Agri & Rural Affairs Study Tour visiting Chile from 19th November - 4th December 2022

Contents

1. Introduction

One of the biggest challenges that is facing young people farming in Scotland, and indeed the Scottish farming industry as a whole, is how the agricultural sector will look in a post-Brexit landscape:

1. Farming is currently heavily reliant on agricultural subsidies.
2. New entrants struggle to get their first step on the farming ladder due to a lack of capital.
3. Established businesses are often best placed to reach out to new markets but many are unsure as to how to do so.

With this in mind, we selected Chile as the destination for the 2022 Agri-Affairs International Study Tour. Chile is well known for attracting international investment as well as exporting a large amount of the food they produce to different countries around the world, including Scotland and the UK.

To produce a large amount of food Chile has to be very efficient, particularly with water. They are fortunate in that labour is cheap and does not seem to be in short supply. However, they have also embraced technology in order to help them reach wider and new markets.

The theme for our trip was set as "Adding Value for Agriculture".

With the destination and theme set, all we needed was a group of driven and enthusiastic young people to make the trip and share their experience on their return.

Process

Once the location was announced we opened up applications to all current members of SAYFC. Applicants 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 30 applications, the majority of which were of a very high standard.

Sarah Allison, Duncan Morrison and Iain Wilson (all previous Agri-Affairs Chair's) reviewed all the applications and selected candidates who were invited to attend a face to face interview with a panel of Jim McLaren (Cameron Trust), Nina Clancy (RSABI), Fraser Campbell (past SAFYC member and delegate on the 2014 Agri-Affairs International Study Tour to Argentina) and myself. The panel were all extremely impressed with the quality of all the individuals who made it to the interview process and after a lengthy discussion we selected15 delegates who would join me on the trip of a lifetime to Chile.

The Tour

We set off from Glasgow airport on the morning of Saturday 19th November, flying to Santiago, via London.

After spending the Sunday meeting our tour guide for the trip, Lucas, and settling into our Chilean surroundings by taking in local landmarks we then boarded our coach on Monday morning ready for an action packed 12 days of visits and tours.

Over the course of the 12 day tour, we travelled the length of the northern half of Chile visiting the country's Centro, Centro Sur and Sur Frontera regions (see map on page 34).

This report details the visits and tours experienced throughout the trip. Each delegate came home with different highlights and we look forward to sharing these with you in this report.

Finally, I would 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 would not be possible. I hope you enjoy reading our report on what was the trip of a lifetime for us all.

Catherine Sloan, Agri & Rural Affairs Chairman 2020-2021

2. Group Profiles

All the members of the group are involved with agriculture, some directly farming either on family farms or other farming businesses, whilst others have careers in the industry such as a farm consultant, solicitor, surveyor, nutritionist and events management. Across the whole group there was a diverse background of farming operations including, arable, vegetables, beef, sheep, dairy, poultry, diversification and renewables and we wanted to try and see as much of these enterprises whilst visiting Chile.

As well as the group being from different farming backgrounds, there was representation from a wide geographical spread across Scotland from Orkney in the North to Castle Douglas in the South West. All are members of the Scottish Association of Young Farmers and each members club is noted below.

Throughout the trip the group posted a daily blog on the SAYFC website which was then shared more widely with pictures on the association's social media (Twitter, Instagram and Facebook).

	
Name: Catherine Sloan (Group Leader)	**Name:** Andrew McGregor
Young Farmers Club: Bankfoot JAC	**Young Farmers Club:** Carluke YFC
Occupation: Rural Solicitor	**Occupation:** Dairy Farmer

	
Name: Rosanna Fraser	**Name:** Ryan Douglas
Young Farmers Club: Bankfoot JAC	**Young Farmers Club:** Carluke YFC
Occupation: Rural Surveyor	**Occupation:** Agricultural Consultant
	
Name: Annie Bryson	**Name:** Ally Brunton
Young Farmers Club: Avondale YFC	**Young Farmers Club:** East Fife JAC
Occupation: Livestock Nutritionist	**Occupation:** Farmer

	
Name: Linsey Campbell	**Name:** Hamish Logan
Young Farmers Club: West Ren YFC	**Young Farmers Club:** East Lothian JAC
Occupation: Pharmacist	**Occupation:** Agricultural Consultant
	
Name: Gemma Duguid	**Name:** Matthew Steel
Young Farmers Club: Bower YFC	**Young Farmers Club:** Forfar YFC
Occupation: Trainee Auctioneer	**Occupation:** Farmer

	
Name: Joanna Foubister	**Name:** Angus Dowell
Young Farmers Club: East Mainland YFC	**Young Farmers Club:** BrechinYFC
Occupation: Marketing Coordinator	**Occupation:** Farmer
	
Name: Lucy Mitchell	**Name:** John McCulloch
Young Farmers Club: West Fife YFC	**Young Farmers Club:** Stewartry YFC
Occupation: Events and Engagement Manager	**Occupation:** Farmer

3. Day by Day Reports

3.1. Day 1: Settling into Santiago – Hamish Logan

After a long flight the group arrived in Santiago and got settled in the hotel. The group had a free day in the city and climbed Santa Lucia hill for panoramic views over the city and across to the Andes.

Following a walk around the city, the group met Lucas who was our translator for the two week trip. Lucas had recently finished his agricultural studies in Chile and lived in Santiago but spoke very good English due to his International Rugby career travelling the world with the Chilean Rugby 7s team.

3.2. Day 2: Talca Fruit Farm Tours – Ryan Douglas

We began the tour by heading south from Santiago to Talca, a key fruit growing region. We were hosted by Cesar Beltran Copefruit, a family business consisting of several farming sites, as well as a pack house, processing plant and an export business. We visited one of their apple and cherry farms, consisting of 147ha of orchards set in the shadow of the Andes Mountains.

They produce a range of apple varieties, including Envy, Granny Smith, Brookfield (Gala) and Pink Lady, with about 70% exported to Europe and the rest going to the US and Brazil. Trees are grown at approx. 1.5m spacing with branches tied to wire frames. A 4ha trial was done to test a new method where trees are grown out to alternate sides, rather than vertical. This increases the yield on some varieties from 65t/ha to 85t/ha due to increased light penetration. Following a successful trial, they planted another 32ha of orchards. Apple trees begin production in the 3rd year, peaking in yield at year five and staying productive for over twenty years. Yields are carefully managed since over production one year will limit production the next. Trees are self-pollinating, requiring alternating varieties e.g. three rows of gala either side of one row of pink lady. Prior to apples, kiwi fruits were grown but a difficult export market drove the decision to switch to apples. In each blossom, flowers are removed leaving two flowers to maximise colour and calibre of fruit. Apple production is heavily reliant on pesticides, with twenty applications per year, mostly of fungicides. The key pathogen is venturia – a fungus that affects fruit appearance. Nets are used to reduce the light intensity on the trees, which are placed on the ground nearing harvest to maximise light and enhance fruit colour. All trees are irrigated with liquid fertilizer applied through the irrigation. Sprinklers are traditionally used which supports clover cover crops in alleyways, although to reduce disease risk this is transitioning to drip irrigation. Water is available through a series of canals that collect melt water from the Andes. Fruit harvest occurs from mid February until early June, using migrant labour from Bolivia and Haiti.

Prices are set by the exporters, but growers can typically expect $24 USD per 18.2kg box. Harvest is a manual process, with fruit collected in baskets and sent to a nearby cold store for up to four months. The main specification considerations are fruit size, colour and sweetness.

We also saw cherry production, both newly planted and well-established sites. Young cherries become productive in year three, producing 4t/ha which rises to 12t/ha by year twelve. Production normally falls after year fifteen but we saw cherries that were planted in 1999 and still producing 23t/ha. They were sweetheart cherries, the earliest variety that the farm has, and were planted using an old method of bunds which are no longer used because they require ladders to harvest which adds cost. Cherry harvest begins in mid-December, with fruit picked between 6.30am and 1.30pm as fruit becomes softer and more fragile during the hot afternoons. Nets are used on cherries to protect from heavy rain and high heat and helps ensure the earliest possible harvest. 93% of the cherries are exported to China, with the very earliest fruit transported by plane and later crops on boats.

The main challenge affecting the farm is access to water, which is already limited and becoming less available every year. The government provides support by subsidising irrigation equipment, but much is beyond their control.

3.3. Day 3: Merex Packhouse & Angus Soft Fruits – Angus Dowell

We arrived at Merex Pack house, a local family owned and run business who pack blueberries and cherries. In the afternoon we travelled to see an Angus Soft Fruits blueberry plantation to explore how they link their business in Chile with the headquarters back home in Scotland. The plantation is a joint venture with Merex.

The Merex family business use the best available equipment to grade and pack the fruit. As the season begins, the fruit is picked off the field early morning at 20°C and is instantly chilled through a blast chiller to 4°C. It is then stored in a chill room short term until needed. Both fruits are sent over an optical grader to pneumatically pick out the greens/rots/growth cracks and other defects, typically 10% grade off. This is a massive saving on labour and allows them to process up to 3.5t of cherries per hour and 1.8t of blueberries per hour.

Angus Soft Fruits supply many of the major retailers in the UK. To secure year-round supply and offer themselves as an attractive customer to retailers, they source fruit from different growing climates with varying harvest periods. Chile lends itself perfectly for this, situated in the Southern Hemisphere, where harvest season is December and January, right in the middle of UK winter.

Increased costs worldwide have tripled the price of shipping containers to $15,000 each. The complications of the pandemic have impacted the travel time of blueberries. From when it gets picked in the field in Chile to when it hits UK consumer shelf, it currently takes a staggering 50 days in refrigerated packing and transport! This adds a huge cost to what is a relatively cheap crop to grow with a cost of production of only $2/kg. The Angus Soft Fruits blueberry plantation is 100ha and started in 2017. It is a way to start its 2nd crop with an estimated yield of 5t/ha and a future forecast of 20t/ha in a few years' time. Water here was not much of an issue with two boreholes on site and a river nearby. It is situated east of the main road, towards the Andes where it is easier to access groundwater due to a larger water table below. As the plantation was designated for the UK market, it has to adhere to the global gap and Sedex accreditation schemes.

Buying land in Chile is very difficult with virtually nothing on the market. Prices are varied depending on location and water access. The average farm size is 50ha.

Chilean blueberry farmers' main concern is the competition from Peru. The Peruvian harvest starts at the end of January and lasts for nine months due to their tropical climate. As soon as this happens, the price of blueberries falls dramatically. This gives Chile a very small market window, much like the blueberry market back in the UK.

In the months of December and January, blueberry farmers find it difficult to source enough labour as they have the same harvest window as cherries which are considered easier work. Questions were asked about the minimum wage for the area, with mixed answers, it was understood to be $3.50/hr.

At the end of the visit, we stopped at a 37ha walnut plantation. Harvest is in April with yields of around 9t/ha. 80% of the crop is exported to Asia in 25kg bags, 15% to Europe and 5% elsewhere. Pruning is a major part of the growing process taking place post-harvest. This stops the tree from becoming too big which would then reduce the quality of the nut. The tree needs 30mm of water every ten days via jet-line irrigation. One of the main concerns is heavy rain two weeks prior to harvest, where the brittle walnuts can be destroyed.

It is clear that every farmer and every crop faces their own challenges and it's great to see different remedies and practices to overcome these specific problems.

3.4. Day 4: Earthquakes & Blueberries – Ally Brunton

Day 4 began with a rumble, a 5.0 magnitude earthquake at about 6am which was the topic of conversation at breakfast. After two days in the Talca area, we had one of our biggest days of travel as we headed south for roughly 420 miles to Osorno.

After 170 miles (3 hours) we met our host on the outskirts of Los Angeles to visit S&A fresh produce to see their blueberry production. It was easy to get your bearings when on the road, to the east the view of the Andes was amazing. As we travelled south it was clear to see the change in the climate and landscape. Around Santiago and Talca there is a lot of fruit production due to the hot weather, but very little in the way of vegetation. The further south we got the more trees, grass and cereals.

S&A are a company based in Hereford, England that was set up in 2010. They purchased the farm we visited in 2015 and this is their only farm in Chile. The main reason for this expansion is to secure fruit supply for twelve months of the year to the UK and Europe. Typical harvest is from November to January, then Spain starts harvest January/February and then the UK kicks off after that. So, for S&A they have a year round supply of fruit. Chile was the first country in South America to grow blueberries. Peru has also started but the quality is not as good. In Peru there is not a big enough difference between the day and night temperature, but in Chile it is cold during the night and very hot through the day. The change in temperature gives the fruit good acidity and sugar levels, so Chilean fruit is very sweet and meets the global demand.

The farm we visited was run by the farm manager Rodrigo, his English was very good due to the fact he was in frequent contact with the UK. When they first purchased the farm there was 30ha of blueberries, yielding around 300t a year. But now they grow 54ha and have more than doubled production to 650t.

To set up blueberry production it costs about 50,000 dollars per hectare. Land costs are around $30,000 USD with a further $5,000 on water rights and $130,000 on fertiliser and chemicals. There is no return for the first two years, as it takes three years for a crop to grow on the plants.

Pruning is a huge part of blueberry production. This is where they remove a lot of the older growth, and branches that are at least three years old. This process promotes the plant to produce new growth and this is ideal for keeping a consistent yield. They apply nitrogen in three stages, pre harvest, during and post-harvest, as well as other trace elements.

Irrigation is a huge part of blueberry production, this farm was fortunate to have water rights. They can extract 150 litres per second from the nearby river. They also use the water during the colder nights to prevent frost. This can cost up to $1,000 per night, but fortunately they only had used it twice during that season. In previous years it has been up to fifteen nights. The cost of establishing this frost prevention is nearly $1.5 million.

They had 11 full time staff on the farm, and in peak harvest season they employ 450 pickers. They are all paid a base rate per day, and 50p per kg on what they pick. It is made up of 60% females, with those aged between 35 and 50 being the most productive. The farm hires buses to travel to local towns to pick up the pickers, they can come from as far as 50km away.

Cost of production was around £2/kg, and they receive £2.50 when sold. The majority of the crop was exported by boat to Europe via the Netherlands. It can take up to fifty days from harvest until it reaches the consumer.

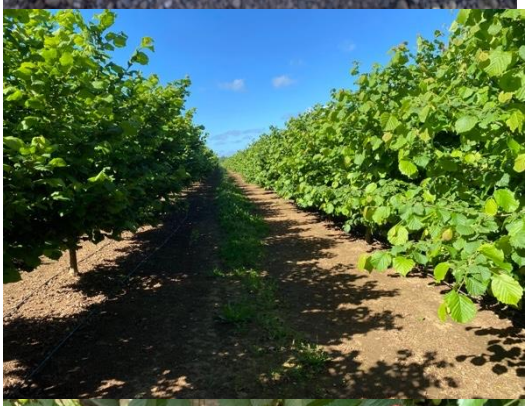
After the visit we travelled further south to Osorno, this region was slightly milder than we had experienced so far and had higher rainfall.

3.5. Day 5: Nuts about Steak and Cranberries – John McCulloch

On the morning of Thursday 24th November we travelled to a farm on the outskirts of Osorno. This was the home of Nefuen Trading, which grows hazelnuts and cherries in the local area.

The farm which we visited first had been within the family for six generations and used to be the family dairy farm. It is now home to the main hazelnut operation after the current farmer, Jorge Mohr, went to university and realised he could grow hazelnuts in this area of Chile. There is currently around 50ha of hazelnut trees on this site, with the first trees being planted when the family first went into fruit production in 2002. It can take $10,000-$11,000 to set up a hectare of land for hazelnuts. There was very little profit in the first few years because production on young trees was low, however when the trees came into full production in year six, yields can increase to four tonnes per hectare.

This farm is only 75-80m above sea level and gets an average rainfall of 1.3m. The hazelnuts are harvested in March/April using specialised machinery and any crop which falls on the ground is raked up and lifted. Due to the heavy use of machinery, labour requirements are typically very low, with a member of staff only being required every 15-20ha.



Hazelnuts were then taken to a gas drier and dried to 6%. They can then be stored for up to 8 months and any hazelnuts which are smaller than 20mm are cracked and sold to Ferrero Rocher. Ferrero buy 90% of the hazelnuts produced in Chile. Hazelnut trees can last well over 20 years and pay back usually occurs in year eight. This farmer makes around $6,000 profit per hectare per year from hazelnuts. A drip line irrigation system has been installed and this is used to water and fertilise all plants. Water rights are bought from the government and paid for in litres per second. Another side to the business is the nursery where they grow new hazelnut plants to sell to other growers. There are around 4,000ha of hazelnut trees planted in Chile every year and this company currently holds a 35% market share of the industry.

We then moved to another farm which was around five miles away. This farm was where the farmer grows cherries in partnership with family members and other farmers. We could immediately see that this was a very different set up from the hazelnuts as the majority of the cherry trees were covered with a continuous tarpaulin sheet roof. They started growing cherries in 2008 and there was 55ha of cherries being grown on this farm. Once we walked under one of the covers, we could see that drip line irrigation was being used. The farmer has rights to pump water straight out of the river which runs along the side of the farm. He uses that water to irrigate the plants and similarly to the other farm, the irrigation system is used to fertilise the plants. The plants under the covers looked overgrown, however they were pruned every 2 –3 years to keep them tidy and also to ensure peak production. Bee boxes had been placed under some of the trees. These are rented to the farm by local beekeepers and ensure that pollination occurs. This is an incredibly important process for the production of cherries.

Cherries were growing on the trees during our visit, but they are not large enough or ripe enough for picking. Cherries were harvested by pickers in mid-late January. 120 pickers are normally involved in this process. Unlike the farms we

had already visited, professional pickers are hired for this process, with some of the best pickers harvesting around 400kg per day. The majority of the pickers were Chilean; however, many are also brought here from Peru for the season. Some of the best pickers typically earned up to $100 per day. The tarpaulin covers ensured that the crop was protected from rainfall. This was important, as the cherries could go soft and split if they got wet just before harvest. This could typically ruin up to 40% of the crop and seriously affect profits. They were careful to ensure that only ripened cherries are harvested as, unlike other fruits, they do not ripen after they have been picked. After harvest, the cherries are put into cold storage on the farm and then transported to outlets when required. Cherries are colour graded in order to decide which countries they are sold to, with each market preferring different shades of red. The UK tends to prefer a deep red.

This company currently has around 700ha of hazelnuts and cherries in production across Chile and currently receives no government support. After lunch we visited a cranberry farm near Paillaco. This is owned by the Ontario Teachers' Pension Fund who bought the farm from American shareholders in 2021.

This was an incredibly flat farm in the valley with lowered seed beds or 'bogs' for as far as the eye could see. This farm stretches over 133ha, and each bog is 0.5ha, featuring a series of drains and channels. Due to the high level of sculpting and inputs required, each bog costs $10,000 to set up. The land was high in nitrogen and organic matter due to volcanic ash and cranberry plants were planted in a 15cm bed of sand which was added on top of the original soil. The plants were planted at a rate of 300 plants per square foot. Cranberries are a perennial crop which lasts all year. Liquid fertiliser and irrigation is carried out through a series of sprinklers in each bog. Similar to the last farm, water is extracted from the river and stored in reservoirs until required.

To harvest the cranberries, they flooded the bog with water to a height of around 15-20cm above the plant. They then used a mechanical structure called a bridge to straddle the entire bog. This bridge has a section on it with tines and it is dragged through the water in order to shake up the plants. Cranberries are then knocked off the plant and rise to the top of the water. A rope is used to drag all of the cranberries to one corner of the bog where a conveyor separates the crop from any water and trash.

All cranberries from this farm go to Ocean Spray to produce fruit juice and dried fruit for fruit mixes. These are long term contracts which have given the farm security and confidence to invest.

The main concerns on the farm were the cost of diesel, paying salaries and the cost of fertiliser. This country also had a new government, and this farmer was concerned that it would not do enough for agriculture. Very similar concerns to home but on a massive scale.

On Thursday evening we visited the first steakhouse of the trip in Osorno. The steaks were cooked on an open fire grill, and it was a fantastic advert for the quality of meat and agriculture in this country.

The fruit was then transported 100km by lorry to a complex where it was processed. The bogs have been designed in a way which allows the water to be moved through channels and used to flood the next bog.

There were ten full time staff and eighteen part time staff on farm and harvest takes two months from April to June. Similar to other fruit crops we saw, the plants require pruning in order to maximise production. Optimum production can be as much as 50t/ha. The farmer explained to us that the demand for cranberries had sky-rocketed since Covid, with people believing that they hold extremely healthy properties, and they are a health food. Due to an increased global demand, this farm has just invested in fifteen more bogs. The value of the cranberries has increased from $32 per barrel to $50 per barrel.

3.6. Day 6: El Reinal Farm & Puerto Varis Auction Market – Gemma Duguid

Friday 25th November began in the very rich green grass fields of El Reinal Farm, a regenerative Beef farm which is all Red Angus Cattle. We left Osorno this morning and travelled for 2.5hrs, seeing a lot more mixed farming practices just like home. The farm was purchased by Matias' father 38 years ago by auction. Originally from Santiago he had no farming background and worked making credit cards. The family wanted to leave the city, so all moved to the farm.700ha of pasture and 500ha of forestry was purchased and split over four farms all relatively close to each other. On one of the Farms, we visited there were 100 grazing paddocks which the stock are rotated and moved every day. The farm has not used fertiliser or any tillage since 2016. They make 3,000 bales of silage to feed the cows which are rolled out across the field not in feed rings. The farm was originally a dairy, but the family stopped production ten years ago because it was not making money. All the cows were retained and crossed with Fleckvieh and now everything goes to the Red Angus bull. He calves 400 cows outside between September and November and weans calves at six months old with the bullocks and heifers split over the different farms. He breeds his own replacement heifers which are bulled at two years old.

To generate income he carried out contracting work for four years to help expand the farm. At that point he analysed the farm and wanted to produce a premium product which he enjoyed not what the consumer wanted. Matias didn't like the thought of cattle being pushed on heavy weight diets at feed lots, he visited Wild Oaks in California which he described as "the Disneyland of regenerative agriculture" to learn about rearing cattle from grass, processing and finding a market for the beef. Matias' goal is to produce the safest meat in the world and for customers to trust him with his USP being "the only way to sell is trust". There were only two slaughterhouses available and he found it very difficult to establish a network but he currently kills twenty bullocks per month which has an increased by a fifth from four years ago. The beef is sold to Jumbo, a major supermarket similar to Tesco, and also sold online.

After the farm tour Matias cooked the group an amazing lunch using his own produce on a Chilean BBQ and fire stove outside. Overall, we took away from this visit that Matias is "not money driven, but money fuelled, and passion driven".

He aims to enjoy what he does on the farm and ensures the family are on the journey with him.

The next stop for us was a home away from home for me, a livestock auction market. They very kindly gave us a tour of the market and allowed me to sell a cull cow which was in the ring and Marcos the auctioneer sold one in Spanish. The sale report for the day was: “Cull cows continue to sell at excellent rates with buyer demand outstripping numbers on offer”. The market was at Puerto Varas, owned by Fegosa. They also own another three auction markets with Puerto Montt being the largest site. They sell 70% of cattle in the region and 25% of the overall market share in Chile with sales everyday between all sites. They have two rings going at the same time with heifers sold atone side of market and males at the other side taking time about. Puerto Varas sells roughly 400 cattle per week on a Thursday.

There were lairage facilities at the market and huge walkways above all the pens so everyone could see the animals. All cattle were EID tagged and read in the mart. The trade when we were there was $2/kg live weight for a fat bullock. Red Angus cattle are most popular breed of animals they sell, and animals are sold by their teeth composition rather than what age they are. Breeding bulls are sold farm to farm, with all classes of livestock being charged a 5% commission and payment on thirtydays after the sale. The covid pandemic was very good for the trade as it was in Scotland however 80% of dairies have stopped production and the large farms have increased in size. They have exported 7000 live cattle to China recently. At the end of the tour, I was presented with the auctioneers’ gavel which was a real treat!

3.7. Day 7: Vergara Family Potatoes – Matthew Steel

On Saturday 26th November we travelled 1.5hrs north from Puerto Varas to one of the nicest farms I have ever seen. Owned and farmed by Matias Vergara it was an 800ha arable farm growing 180ha of main crop potatoes with the remainder being down to wheat; OSR; barley and oats. The landscape flat (prairie like), the soil volcanic and with the water available it is a recipe for some fantastic yields of potatoes. The farmer grew only two varieties of potatoes in the form of Asterisk and Mozart. Both of which were destined for the tables of Santiago in 25kg bags. He was achieving some of the biggest yields I have ever seen, ranging between 75 and 85t/ha.

They plant between September and November and lift between January and April. All of the seed is bought in. The potato planter can go straight into the field once it has been prepared with no need for deep ridgers and stone separation. Once the potatoes have emerged, they then ridge up the ground into the drills as we know them. The blight and irrigation programmes are fairly similar to Scotland with roughly nine blight applications and as much water as the plants need. Water is sourced from boreholes and is applied via pivot, gun and drip irrigation. They can keep some of the potatoes in the soil here to cure and this saves on storage costs. Slightly different from harvest in Scotland where we like to get them out the ground as soon as possible. All of the potatoes were harvested by machine on this farm. Although this is not the case for all of the potato production in Chile with a portion of growers still harvesting by hand.

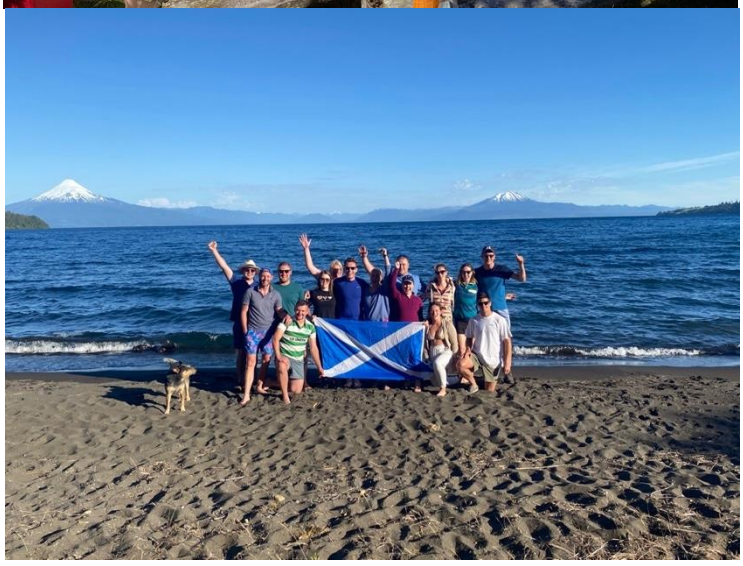
Matias is different from other Chilean growers in that they pack and market all of the potatoes themselves. This means they can achieve the best prices in the marketplace of between $300–$400 per tonne. Most growers in Chile use merchants and do not achieve prices anything like that. His margin per ton is roughly $100–$200 so this means that each hectare will net no less than $7,500. A very impressive figure and this has meant that over the past thirty years the Vergara family have been able to expand from 150ha of ground to the 800ha they currently have.

One notable difference was that they could grow potatoes every one in four years and PCN was not a problem. It could be something to do with the fact that OM in the soils ran between 15–20% but we couldn't confirm this. Powdery and common scab and Rhizictonia are a problem in Chile just as they are in Scotland. With the volcanic soils nutrient block can be a problem and this means that production costs can be slightly higher due to the amount of fertiliser required.

We then went on to talk about the cereals and OSR on the farm where they were also achieving very good yields with wheat at 12t/ha, OSR at 6.2t/ha, barley at 9t/ha and oats at 11t/ha.

We all left very impressed by the figures of the farm, and I am sure there will be lessons learned to take back home to Scotland.

3.8. Day 8: Vicente Perez Rosales National Park–Lucy Mitchell



We started the day off by visiting the Vicente Pérez Rosales National Park which was created in 1926 and it is the oldest park in the country. We walked round the park viewing the volcanoes, mountains, forests of native trees and beautiful lakes. Its wonderful scenery makes the park a top tourist attraction.

When visiting El Reinal Farm on day sixwe met a Dutch farm apprentice. She enjoyed spending time with us and as a result she used her day off work to come join us.

Our tour guide, Lucas, kindly invited us to spend the day at his family holiday home on a local farm so we went to a supermarket to buy food for a BBQ. It was very interesting to see the differences between a typical Chilean supermarket compared to a British supermarket. One difference that stood out was that the meat which was labelled “grass fed” had a separate section within the supermarket and it demanded a higher price. We also noticed that unlike the UK there were no convenience foods, highlighting the difference in our food culture.

The scenery at the farm was beautiful, next to a lake with views of mountains and volcanos in the distance. We had the pleasure of meeting Lucas’ family. In 1892, his family moved from the UK to Chile. When they arrived in Chile, they set up a biscuit company called McKay which in 1988 was sold to Nestle. The brand name remains very well known in Chile. His father started up a blueberry farming business and ran this during his working life.

They cooked the food we brought, and we noticed that they had a very relaxed and sociable approach to preparing the food. On this trip we have all appreciated that Chileans tend to be more patient than us with regards to preparing and cooking food and they place importance preparing it to a high standard.

We spent some time swimming in the sea and overall had a brilliant day. We were incredibly lucky to have been invited into their home and again have the opportunity to speak to and learn from influential people within the Chilean agriculture industry.

3.9. Day 9: Sheep and Cattle Visits – Annie Bryson

Monday the 28th began by traveling just an hour out of Puerto Varas to meet Daniel and Armin Claro, a father and son duo farming 1500 ewes on a 100 hectare hill farm. The farm sits 80m above sea level and receives 1.5m of rain – so not dissimilar to some parts of Scotland. The soil structure is similar to New Zealand; acidic with a high content of volcanic ash which means it is very fertile and free draining.

Daniel studied livestock nutrition and genetics in New Zealand in 1965 and spent 3 years working there with farmers and in research labs studying sheep breeds and productivity traits. It was this experience that taught him to establish his own breed of sheep comprising of 40% Friesian, a very prolific sheep breed which can produce up to 600 litres of milk per year and also produces a very lean meat. The remaining genetics comprise of 20% Texel, 20% Dorset and 20% Border Leicester. The ewes weigh roughly 75kg and resemble a meat merino.

Lambing takes place for the entire month of September and all ewes are put on a hormone synchronisation programme to tighten the lambing period. Synchronisation means the farm can work much more efficiently, utilising staff and grass availability. All lambs are tagged with electronic tags at birth, which allows Armin, an engineer to trade, to record birth weight, daily live weight gains and retain females from good maternal lines. Tup lambs for breeding are selected on 100 day daily live weight gain and are either retained for breeding, sold at the farm gate to dealers and breeders or sold for slaughter.

Females are selected on their tupping weight. The family aim to produce lighter sheep with bigger lambs, roughly 18–20kg dead weight and are continually pushing their live weight gain potential through careful genetic selection and nutritional properties of the grass. Ewes achieve a 190% lambing percentage and hoggs 140%. 200 replacement ewe lambs are kept every year and the rest sold for breeding or fat. High sale season is in December prior to Christmas, so wheat or oats are supplemented to push lambs on and permanent pasture includes chicory to provide energy for growing ewes pre and post lambing.

In the afternoon we met Jordan, a trained veterinarian, who now works as a cattle dealer rearing calves for slaughter and selling farm equipment. He learnt the hard way when he first began farming, after building a feed lot for 800 bull calves to finish intensively on pit silage. Due to the harshness of the summer and his commitments to other parts of his business he soon realised the quality of silage he was making was not good enough to run a productive business. He invested in a McHale baler, to give him flexibility with cutting dates and make a more manageable, higher quality forage.

Across 3 farms, Jordan calves 250 of his own cows, a mix of AA, Hereford and Olbrich genetics, as well as buying in 3,000 bull and heifer calves from southern Chile to finish on paddock strip grazing.

Calves are bought at a weight of between 180-220kg and travel roughly 1,000km from Punto Arenas and through Argentina before arriving at the farm. Jordan aims to achieve 200kg daily live weight gain in one year from grass and sells at 400kg for cattle to go further north and on to feed lots for slaughter. Between the months of April and May prime cattle come inside for 60-90 days to be intensively reared prior to festival time in September. This is the prime time of the year for selling cattle, so it pays to feed concentrates and push cattle on. A diet consisting of baled silage, ground maize, molasses and urea achieves an average 1.6kg daily live weight gain. At the point of our visit the cost of beef cattle was $3.80kg live weight.

Jordan is also a distributor of seven agricultural machinery brands including McHale. He supplies balers all over Chile and employs a team of engineers and hauliers to supply and service them. Jordan admitted that the machinery business is worth 80% of his profit margin and the cattle just 20%.

3.10. Day 10: Dairy Day – Andrew McGregor

The first dairy visit of the trip had been the day the dairy farmers from the west had been looking forward to. However very fittingly it was the first wet day of the trip.

In the morning the group visited Jose, a Chilean, who is in his third year of a ten-year tenancy on a 130ha block of bare land just north of Lake Llanquihue. He was paying £270/ha for this unirrigated land. Jose is a professional hoof trimmer and took on the tenancy of the land three years ago with the plan of being able to oversee management of the farm with one employee whilst he remained hoof trimming full time.

Having been inspired by the low input, New Zealand style system operated by Chile's biggest dairy farming business, Manuka, Jose has rebuilt a second hand 12/24 parlour on this greenfield site. Water, electricity and cow track infrastructure had also been installed but no winter housing had been built due to the mild winters and free draining volcanic soil in the area.

They were milking 160 cows and were buying in all of their dairy replacements. Bull calves were sold on at ten days old while the dairy heifers were being sold to China between 180-300kg for roughly £600. China is buying approximately 20,000 dairy calves from Chile each year, sailing them over the Pacific in boats 5,000 at a time.

In Chile there are five main milk processors, and this farm sold its milk to the largest one called Colon, a farmer owned cooperative, which processes the milk to supply the liquid milk, cheese and yogurt markets within Chile. The milk price in Chile was around 37p per litre. With a total national herd of 400,000 cows, the vast majority of the milk in Chile in consumed within the country.

It was very interesting to see how Jose was managing the farm alongside the hoof trimming business which included selling hoof trimming products and distributing the KVK brand of crushes across Chile.

Our second visit of the day was to the Institute of Agricultural Research of Chile (INIA).This part government funded institute leads the sustainable development of the agri-food chain in Chile. We visited three research programmes throughout the afternoon.

Firstly, we visited a new experiment looking at the impact of climate change on different varieties of grass. Small 2 metre square open top glass chambers were used to create an environment which will be 1.5 degrees warmer than the control plots to simulate the possible effects of a warmer climate. Perennial rye grasses were being trailed against brome as it had been found to grow better in warm conditions compared to perennial rye grasses which show slower growth rates over 23 degrees celsius.

The potential grass yield in this area is 16–17 tonne of dry matter per hectare and with it currently being late spring in Chile they were at peak grass growth.

The second trial we looked at was robotic milking with cows being out all year round on a 60ha ABC paddock system. The 180 cows were being milked through two Delaval robots. These Holstein Friesians, by far the most popular breed in Chile due to German immigration in the past, were giving 7,000 litres of milk per year and eating 2 tonnes of concentrate.

They were very impressed with the robots as the herd was being managed by two full time staff. We were surprised to hear that they managed to get 90 cows milking through each robot, but we found out that it was made possible by using out of parlour feeders to reduce time eating in the robot and the fact they were working on an average of 2.1 milkings per day.

The wide-ranging research institute then took us to a potato plot trial where they were breeding new varieties of potatoes for the growers in Chile. Then onto the research laboratory where they controlled a late blight alert system and did trials on the effectiveness of fungicides against diseases.

3.11. Day 11: History and Wine – Joanna Foubister

The group arrived in Santa Cruz on Wednesday morning after an overnight bus journey. It is clear we had arrived in Chile's wine region.

Having been in the country for ten days, our learnings had been focused on agriculture, so studying the country's culture in the broader term was welcome. The Museo de Colchagua gave us an insight into Chile's history from prehistory to present day, with impressive collections of pre-Columbian art, jewellery and tapestry. The history of Chile is complex and is deserving of their evident national patriotism.

Spain conquered and colonized the region in the mid-16th century, replacing Inca rule, but failing to conquer the independent Mapuche who inhabited what is now south-central Chile. In 1818, after declaring independence from Spain, Chile emerged in the 1830s as a relatively stable authoritarian republic. In the 19th century, Chile saw significant economic and territorial growth, ending Mapuche resistance in the 1880s and gaining its current northern territory in the War of the Pacific (1879–83) after defeating Peru and Bolivia. Some of the architecture is suggestive of German immigration post WW1 to the country. The highlight for many of the group were the exhibits relating to the Chilean miner rescue which occurred in 2010.

We then went on to one of the most anticipated tours of the trip, a vineyard. In the heart of the wine region we spent time exploring this important sector of Chilean agriculture. At the Viña Santa Cruz we were able to explore the vineyards with an amazing view of the valley, with a cable car ride to the villages of some of the native people of Chile. Established in 2003 and making wine since 2005 in Colchagua, Viña Santa Cruz has over 160 hectares of vines which are mainly focused on red Bordeaux and Mediterranean varieties of grapes. The philosophy of the brand "Body and Soul" was evident from the owner and tour guide, Carlos Cardoen, a businessman who loves the land and its traditions. The wines are inspired by the rituals and cultures and people of the Mapuche, Aymara and Rapa Nui.

As the winery is relatively new, the cellar being twenty years old, there are high levels of technology, regulating temperature and humidity during the fermentation process and 10ha of drip irrigation. Most wineries in Chile use American oak barrels, however this boutique business prides itself in French oak barrels, producing 200,000 litres of wine per year.

They grow different varieties of red grapes on this vineyard, including the Chilean native Carmenere. The area had summer temperatures which vary between 38°c during daytimes and 12°c at night, this fluctuation being perfect conditions for sugar production in the red grape.

The Merlot variety is the first to harvest in April, with the Carmenere being the last to mature. Each plant shows off different colours at harvest making the vineyards especially beautiful during this time.

Carlos also described a recent business venture, 10ha of avocado plants, the green gold of Chile. He planted the avocados in August and will realise a first return in three years. The winery used 25% of the 130ha to produce grapes, diversifying in other fruits for export. The avocados were destined for markets in Japan, China and Europe.

Typically, wineries in Chile export around 80% of their product, whereas Carlos only exported 10% (5,000 bottles) to Germany and Belgium. Overall, Chile is within the top five countries in the world for exporting wine.

It is clear that Carlos has huge pride in his product, describing his favourite wine as his blood. His over-arching message: have passion, pride and love what you do.

3.12. Day 12: Vineyard and UN Agricultural Consultant – Linsey Campbell

The 1st of December saw us visit the Montes Vineyard in Valle de Colchagua which was voted the best vineyard in the continent and top three in the world, with the others being in France and Argentina. The vineyard was started in 1987, by Douglas Murray and Aurelio Montes and is now family owned by Aurelio and his son. We were greeted by our tour guide and wine expert Eric. We began outside with a Chilean flag blowing in the wind behind us.

Montes have various vineyards spread all over the wine regions of Chile covering a total of 1,800ha to allow them to make a variety of wines very well. Each grape needs different specific conditions which gives each wine varying amounts of complexity and so dictates how long they can stay in the bottle. 95% of their product is exported to 110 countries with Asia being their biggest market, Brazil taking 15% and Europe only around 7/8%.

70-90% of the grapes were harvested by hand and only 10- 30% by machine, depending on the quality of wine they hope to achieve as hand picking is more selective. 2.5million litres per year of wine was produced in the vineyard with a total of 70million litres of wine in the whole company produced per year.

The main source of water came from a small river, the Tinguiririca River, which was the only source of water for the vineyard at Colchagua Valley. Montes vineyards had been using integrated management techniques in 100% of their vineyards since 2000. This included the continual recording and monitoring of pests, diseases, natural enemies, and nutritional and water requirements to ensure the sustainable use of pesticides, fertilizers, and water. 60% of their vineyards retained a natural plant cover between the rows to decrease problems with erosion and soil compaction. This also encouraged the proliferation of natural enemies of the pests that affect viticultural production. A study was conducted every two years to analyse the condition of the nutrients in the soil. All of the vineyards are drip irrigated and highly efficient in their water use. After years of studies and using the latest technology, they have decreased water consumption by 25% in Marchigüe and 10% in Apalta— a savings equivalent to the amount of water used by 3,200 families each year. They made compost from the pomace (grape skins and seeds) produced during the harvest season and applied it in the vineyards to improve soil structure and reduce the use of inorganic fertilizers by 30%. They have also used grazing animals—llamas and sheep—in the Marchigüe vineyards since 2010 to reduce weeds. By 2013 there were 350 animals controlling 200 hectares of vineyards, which resulted in a 40% saving in the use of herbicides during the winter.

We continued the tour down into one of the barrel rooms, where the temperature is kept at 15c at all times. Here we were met with song of Halo playing. Eric explained that one of the previous owners, Douglas Murray, believed in the vibrations of the music making molecules move within the French oak barrels. This was tested out with water and different genres of music to begin with to see how these vibrations changed how the water crystallised into ice which made him believe this would work with the wines, so now this music plays in all the barrel rooms.

This barrel room housed what they called the Tayta. This was wine that was only made when they have the perfect harvest, the last one was made in 2018 and only the wine maker knows what makes a perfect harvest. Around 85% of the Tayta was Cabernet Sauvignon and the remaining 15% was the choice of the wine maker. One bottle costs around £250 and there were approximately 3,000 bottles per harvest, most of these were exported with only 100 bottles being left in Chile. The wine will last for 20 years in the bottle.

Once the tour was complete we travelled two hours north back to Santiago. In the evening we met with an agricultural consultant working for the UN. Sarah was undertaking her PhD in cherry production, looking at size, colour and marketing information to understand what percentage of each quality attribute is represented in the end price. Sarah explained the UN's role was to provide support for governments, in particular with a focus on implementing technologies in agricultural systems to deal with climate change and sustainable development goals in Chile, Uruguay and Argentina. The Chilean government had incentives to encourage younger people into agriculture mainly focused on innovative projects and sustainable farming.

3.13. Day 13 (final day): Avocados – Rosanna Fraser

Friday morning saw the group depart for the final day of visits, heading north from Santiago to Crisol Farm where we were met by co-founder, Marcella. The drive north took us through another change in landscape where the dry climate and desert is clear to see.

The farm benefits from a microclimate with the Andes to the east and the Pacific Ocean to the west. Crisol Farm extended to 9ha with 7ha planted for organic avocado production and the remaining 2ha providing grazing for livestock, a lake for water retention and a small market garden area growing ground crops including onions and tomatoes for local people. In terms of scale, Crisol is a relatively small property with some avocado farms in the region extending to 1,000ha.

The trees on Crisol Farm were forty years old and were converted to organic in 2007. On average, it was expected each tree would have a productive life span of approximately eighty years.

The farm had three main objectives –
– Biodiversity
– Integration with local community
– Self sufficiency

Marcella had plans for diversification across the farm with the intention to implement a processing and packing plant on site as all fruit was processed off farm when we visited. She is also exploring opportunities for renewable energy across the property.

Throughout the trip, we had become increasingly aware of the pressures Chile faced with regards to water availability and climate change. Water in the northern part of the country was scarce, supplies were privatised, and domestic properties were fighting for the same supplies as large-scale industry and agriculture. Water rights had been held separately to the land in Chile since 1980 when government legislation separated these from farmland. The fifteen year average rainfall in this area is around 200mm however in 2019, only 64mm of rainfall was recorded – this is less rain than fell in one day back in Scotland the day before we had departed on the tour!

The avocado crop blooms from mid October for around six weeks and for every 1,000 flowers, one fruit would be produced. Harvesting of the crop was carried out between September and March meaning two crops are growing at any one time. This could lead to management issues with the ripe fruit limiting the formation of new fruits. The trees were pruned in autumn and spring to encourage fresh growth.

Irrigation was critical for growing the crop with 1ha requiring an average of 8,000 litres of water per annum. The average yield of this organic crop was around 12t/ha however a conventional farm could achieve yields of up to 15t/ha.
Organic farming allowed the soil to retain a higher level of moisture and leaf cover on the ground was a crucial part of this. The roots of an avocado tree are very superficial, and the depth does not support the demand for water. Irrigation was provided by a jet irrigation system at ground level and when required. Organic fertilisers were also distributed via this system.

The farm employed twenty-two people full time with all crops harvested by hand with ladders and poles. The crop was sold through a variety of supermarkets, town markets and individual consumers. The average shelf life of fruit from harvest to consumer is around one month which allowed a sufficient window for shipping to international markets but any delay could be of significant cost to the producers. The fruit was stored at a temperature of 5c for transportation.
The market average for an organic avocado sale was around 2,790 pesos per kilo which equates to around £2.79/kg.

Organic produce benefits from a 20-30% market premium over conventional produce. All fruit produced at Crisol supplies a domestic market only. The optimum fruit for export is over 170g however the domestic market in Chile demands a smaller fruit of around 120g. Over 70% of the Avocados produced in Chile are exported internationally.

In advance of harvest, fruit was sampled by a lab to establish oil content. A fruit's oil content should be over 9% at time of harvest with the later season fruits being well in excess of this level. Disease is also monitored with a contractor checking the crop on a monthly basis. When required, natural methods of disease control are adopted including the use of ladybirds.

Fertiliser was produced naturally with animal manure, grass cuttings and food waste being composted and then mixed with water to create a tea. The farm also grows a small number of bananas for diversification and water retention benefits. Being high in potassium was good for fertilisation of the soil and whilst these fruits were not sold commercially, they were edible when cooked.

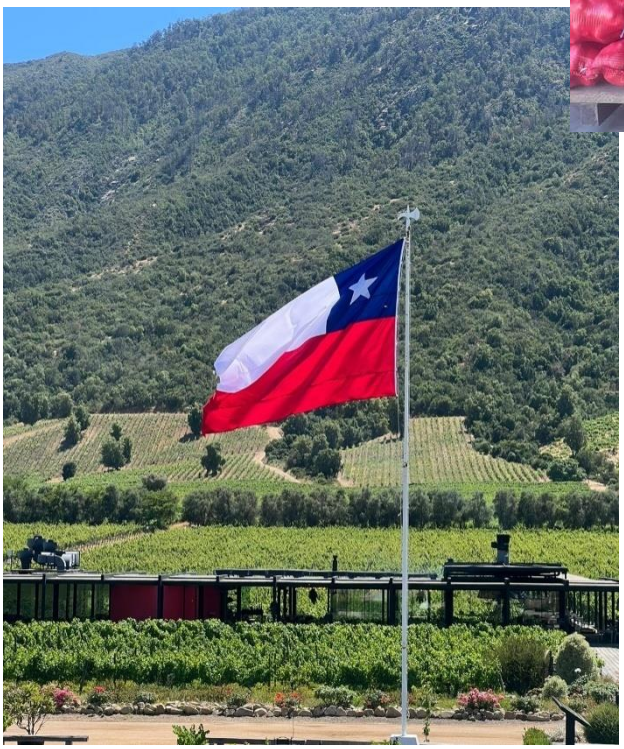
A frost prevention system was in place which is powered by gas via a small turbine. It is hard to imagine a frost as we stood in almost 30c but when required, this system could bring the air temperature up by 2c over an area of 5ha which is crucial for retention of the fruit.

Whilst we enjoyed the opportunity to consume locally produced avocados during the trip on a daily basis, we could clearly see the damage that mass production for the global market was starting to have on the local environment.

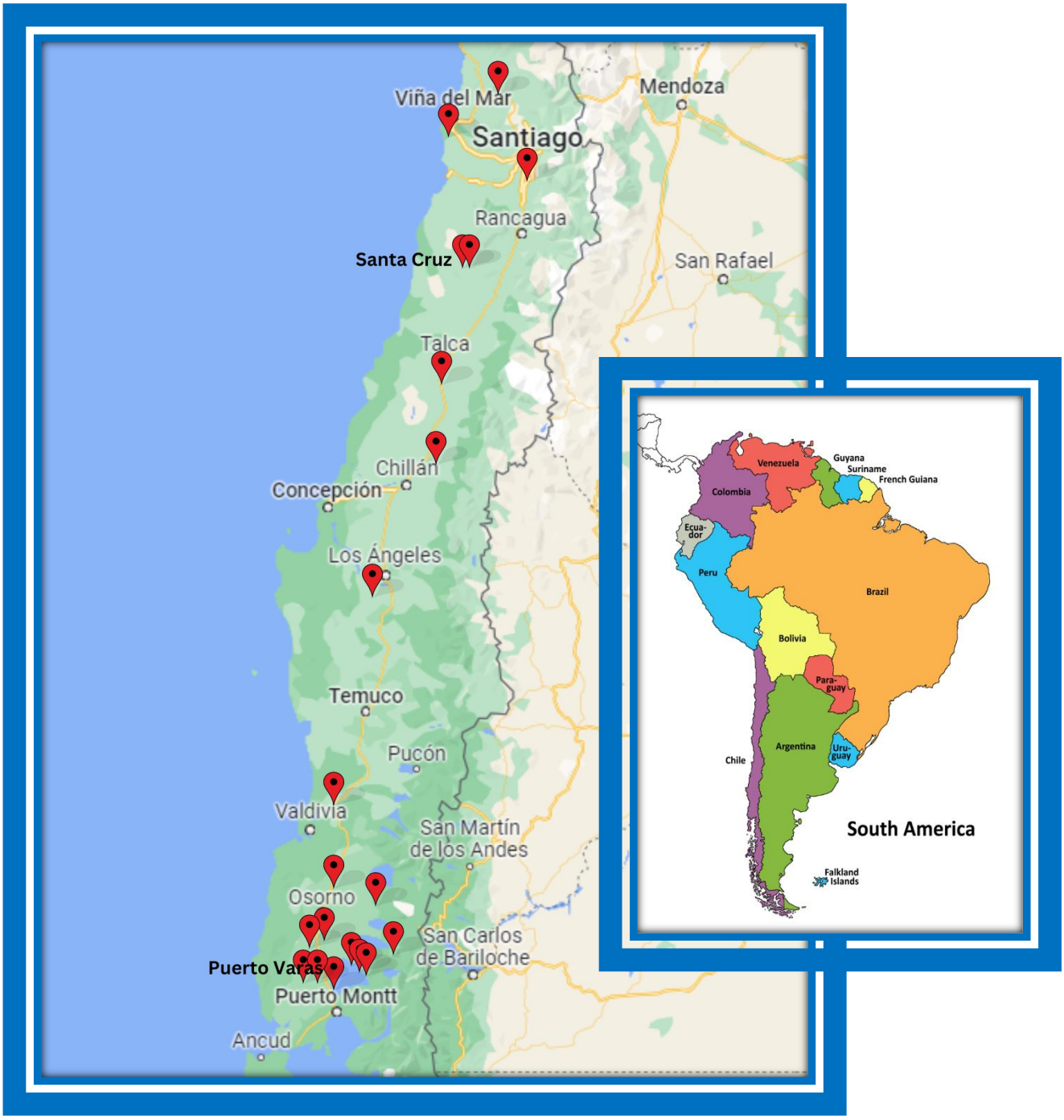
From Crisol Farm, we travelled west through the coastal town of Vina del Mar to Valparaiso. We enjoyed beautiful views over the town below before taking a funicular railway to the lower streets to witness the scale of the port. The number of containers waiting to be loaded and shipped was impressive to see following two weeks of discussing shipping and exportation.

With a short detour for some beautiful coastal views, we were on our way back to Santiago for a final evening before our long flight home on Saturday afternoon.

4. Additional Photos



5. Chile - Areas visited during the tour



6. Sponsor Acknowledgements

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- Cameron Travel Scholarship Trust
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