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Who's Next?

How is New Zealand's secondary school education system supporting the pathway to a career in agriculture/horticulture?

Renee Fa'atui

Kellogg Rural Leadership Programme

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Executive Summary

New Zealand's primary industry is a key economic pillar for the country, contributing 5.13% to the GDP in the year to March 2023, and exports of \$57.4 billion with agriculture/horticulture contributing over \$43.9 billion of those exports in the year to June 2023 (Beehive New Zealand, 2023), and there is a goal to boost sector exports to \$100 billion within the next decade (Ministry for Primary Industries, 2020). The workforce to support the agriculture/horticulture sector has consistently had approximately 145,000 people over the past five years, but at the end of 2022, there was a 19,000-worker shortage. The days of relying on skilled workers from overseas to fill the vacancies has reduced so there needs to be a focus on building a local workforce pipeline and this starts in the education sector.

This report **“Who's Next - How is New Zealand's secondary school education system supporting the pathway to a career in agriculture/horticulture?”** examines New Zealand's secondary school education system's effectiveness in guiding students towards careers in agriculture/horticulture to address employment shortages and meet future export targets and prevent negative impacts on New Zealand's global brand.

The report involves a literature review on educational pathways in New Zealand's secondary schools, focusing on agriculture/horticulture careers. It includes reviewing reports both in New Zealand and Australia on similar topics, case studies and surveys with key stakeholders and teachers.

Key findings:

New Zealand's secondary education pathway has a solid foundation offering agriculture/horticulture science as a subject in the NCEA and some strong supporting programmes. However, only 4% of students choose agriculture/horticulture subjects. This report identifies potential areas for increasing student numbers, particularly in major city centres where 14.5% of secondary schools in Auckland, 23% in Wellington, and 49% in Christchurch offer agriculture/horticulture as a subject option.

Whilst there is a strong foundation, growth is hindered by roadblocks identified in the literature review, case studies, and teacher surveys from secondary schools in New Zealand and Australia and the below themes are what the agriculture/horticulture education sector requires to assist in creating a stronger pathway for students to select a career in agriculture/horticulture:

- **Need for Collaboration:** The education sector is seeking collaboration from the government, industry bodies, and the education sector to simplify the educational pathway.
- **Lack of Resources:** A centralised resource centre wanted by the education sector that is up to date with industry resources to utilise for course planning, teaching and upskilling of teachers.
- **Shortage of Teachers:** A simplified pathway to encourage more teachers to choose a career in teaching agriculture/horticulture from within the school and primary sectors, including funding.
- **Perception of Agriculture:** Misconceptions of the industry and agriculture/horticulture courses being perceived as a “dummies or easy” course needs to be changed to assist in obtaining more students.
- **Financial Constraints:** Limited funding spread thinly across numerous programmes is restricting student numbers growth. Funding is required to retain/train teachers and provide New Zealand on-farm/orchard specific resource material.

Recommendations:

Recommendations to help grow a stronger educational pathway in agriculture/horticulture are:

- Re-establish an 'Industry Working Group' to enable collaboration across the educational and industry sectors, driven by Kellogg Alumni to assist in its establishment.
- Establish a 'centralised managed resource centre' for planning, teaching and upskilling of teachers, overseen by Industry Working Group with assistance from MOE and industry organisations/businesses.
- Investigate the creation of a graduate qualification for teachers in industry systems and processes with MOE and a graduate qualification in basic teaching skills for skilled industry people who wish to give back to the industry.
- Implement a 'Sponsor an existing teacher' programme to upskill in agriculture/horticulture by industry organisations/businesses.
- Personally wish to implement an in-school career education programme “Urban Heart, Rural Soul: embracing agriculture/horticulture” focussing on main city centres' secondary schools.

Acknowledgements

I would like to first acknowledge the immense work of The New Zealand Rural Leadership Trust in offering an outstanding programme to guide future leaders of our industry to invest, research and be open to all aspects of our industry and our contribution to the world. The Kellogg Rural Leadership programme is one that I thought was never in my reach, being an urbanite who has only been in the agricultural sector for nine years. The team involved with the programme, including Lisa, Scott, Patrick, and Annie, I'm so grateful for all the support and guidance you have given me and for building my confidence so that I can achieve this, and the PG Certificate in Commerce.

Thank you to Synlait Milk and Dairy Women's Network for investing in my career development and to my current employer SealesWinslow for supporting me on my Kellogg journey, allowing me the time and support to complete this. You have all been great avenues to grow my knowledge, experience and passion for an industry that has become a career that I love, and I'm honoured to be part of.

For this project, I would like to thank all the people I interviewed or talked to, who were very open and shared their time, thoughts, and experience to provide me with insights and perspectives into my topic.

To the Cohort 50 team, you have all made my experience memorable through your support and discussions throughout the course. With people like you in our industry, our industry's future is in great hands.

Finally, thank you to my husband Trevor and my daughters Sahara and Briana, for being so supportive and understanding that I needed the time to work through this project, resulting in missing out on our weekends and nighttime activities together. The past year has been quite a journey for us and even amongst all the craziness of it, you wholeheartedly supported me on this journey.

Foreword

Why I chose this topic

In my urban education during the 1980-90s, agriculture wasn't presented as a viable career. I loved the outdoors and spent weekends riding horses on farms in Wainuiomata, but at school was encouraged towards professions like teaching, administration, law, and medicine.

I worked in administration and event management for 20 years, enjoying it but during this time I lost touch with farming. I even bought into negative media portrayals of the industry like 'dirty dairy'.

In 2014, I was recruited for an Office Manager role in an undisclosed agricultural company. I was hesitant about going into the dairy sector even saying to my husband "as long as it isn't dairy, I don't care", but in the end I took the job working for MyMilk.

Now, nine years later, I love my career in agriculture. I've educated myself about farming, even working on a dairy farm for six months. I've realized the importance of agriculture to me, my family, our communities and New Zealand as a whole.

Over the past few years, I've considered how 'a townie girl' can make sure there are more people like me considering the agriculture/horticulture industry as a career option. I've realised, it starts at school!

Introduction to my report presentation

As part of introducing the report to the Cohort 50 Kellogg Rural Leadership group, the below rap/poem was used:

“Now this is a story all about how my career got flipped turned upside down.
And I'd like to take a minute so just sit right there.
I'll tell you how I became an urban girl with an Ag career.

In Wainuiomata born and raised.
On horseback at weekends is where I spent some of my days.
And during the week, I was chilling and relaxing at school.
So the teachers thought they should give me some options of a career pool.

Lawyer, doctor, admin and teacher they say.
Never was a career in Ag ever pushed my way.
What did I choose when I left my school?
I took their advice; I got in the admin pool.

20+ years I organised everyone's lives.
I was great at what I did, I got heaps of pay rises.
But was I really happy, the answer would be no.
So, what did I do? I decided to give Ag a go.

Well, 9 years on, most days I'm happy as could be.
And in this career, I worry about things way bigger than me.
One of those things would you like to know?
Who is going to be next to carry on the Ag show.

I'm really grown up now and have two kids of my own.
One has left school and one is still there.
Going through their school years, would you like to guess?
A career in Ag is still not ahead of the rest.”

Terminology

Below are abbreviations and descriptions of groups being referred to throughout this report.

Agriculture/horticulture	Includes dairy, red meat and wool, and horticulture
HATA	Horticulture & Agriculture Teachers Association
MOE	Ministry of Education
MPI	Ministry for Primary Industries
NCEA	National Certificate of Educational Achievement
PICA	Primary Industries Capability Alliance
PIA	Geraldine High School 'Primary Industry Academy'
PWC	PricewaterhouseCoopers
SBAE	School Based Agricultural Education
St Paul's	St Paul's Collegiate School

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1.0 Introduction

New Zealand's primary industry is a key economic pillar for the country, contributing 5.13% to the GDP in year to March 2023, and exports of \$57.4 billion with agriculture/horticulture contributing over \$43.9 billion of those exports in year to June 2023 (Beehive New Zealand, 2023), and there is a goal to boost sector exports to \$100 billion within the next decade (Ministry for Primary Industries, 2020).

The workforce required to sustain such levels of productivity has seen agriculture and horticulture employ approximately 145,000 part or full-time workers both on farms/orchards and in the rural professional support network (doesn't include farm/orchard owners) over the past five years but in 2022, due to Covid restrictions and immigration laws changing, the PWC Food and Fibre Insights report (PWC New Zealand, 2022) advised that there was a deficit of over 19,000 workers in the agriculture and horticulture sectors alone.

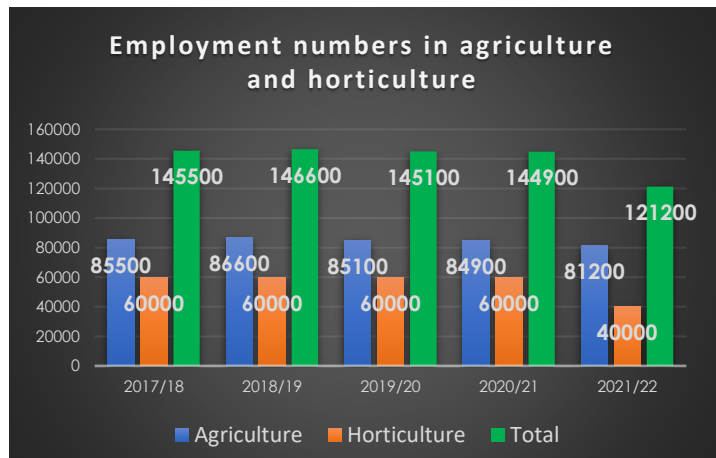


Figure 1: Number of employees in the agriculture industry (Statista, 2023); and horticulture industry (Horticulture NZ, 2023)

This employment shortage has implications for businesses, especially farms/orchards, to operate successfully.

The impact of not having enough employees on orchards can mean that fruit/vegetables are not picked in a timely manner and are lost to the export market. On dairy, and beef and sheep farms, the risk of mistakes happening with the environment, animal welfare and people health & safety can also see a rise and production can be affected. All these implications of a reduced workforce can result in lost profitability for those businesses and New Zealand's export revenues.

In the past, farms/orchards have relied heavily on skilled immigrants to help run these businesses. The subsequent immigration law changes in July 2022 to the Accredited Employer Work Visa (New Zealand Immigration, 2022), made it harder to source these skilled workers, requiring employers to exhaust all options to hire New Zealand residents and prove profitability and a viable business plan before a visa is granted (BlackmanSpargo Rural Law, 2022). In today's environment where farm/orchard owners' revenue is down but farm/orchard operational costs, debt, and regulation costs are at an all-time high, it is more difficult to become an 'accredited employer', therefore shutting off an avenue to source employees to fill the vacancies.

The deficit in employee numbers in today's environment is not limited to farms/orchards. Many organisations and businesses that support agriculture/horticulture are battling to fill vacancies. Senior management, vets, scientists, and food technologists are a few of the roles that New Zealand struggles to fill internally and therefore must look overseas to fill these roles.

With the struggles that the industry is having to fill vacancies, it is no surprise that in the KPMG Agribusiness Agenda '23 (KPMG New Zealand, 2023), which was completed by 161 industry or emerging leaders, stated that 'enhanced immigration settings' (up from 9th in 2022 to 3rd in 2023) and 'coordinated promotion of sector careers' (down from 4th in 2022 to 11th in 2023), were of a significant priority.

The report also covered the need for early exposure to the industry in schools, large-scale investment in education programmes and resources, and better industry-school connections. Teacher shortages were also identified as a challenge and Auckland's talent pool is crucial for the sector's future workforce, necessitating increased efforts to promote the sector in schools and events.

With the KPMG Agribusiness Agenda '23 (KPMG New Zealand, 2023) recommending increased efforts to promote the sector in schools, there is currently a good base of programmes being run by the government and industry bodies/businesses to attract more students to choose a career in agriculture/horticulture.

The options include DairyNZ 'GoDairy' campaign (DairyNZ, 2022) HorticultureNZ 'GoHort' campaign (GoHorticulture, 2023) and PickNZ website (PickNZ, 2023); DairyNZ & Beef & Lamb supporting Agribusiness in Schools programme (Agribusiness in Schools, 2023) ; Primary ITO PIA and the Trades Academy Gateway programme (Primary ITO, 2023), Agri Futures Ahuwhenua ki te Anamata programme (Agri Futures, 2023) and MPI supporting the Girl Boss initiative (GirlBoss NZ, 2023).

Despite the variety of agriculture/horticulture programs available, the industry in New Zealand continues to face labour shortages, immigration challenges, and generational shifts. The multitude of choices may be confusing for students, making it difficult for them to decide the best options. Persistent issues remain despite efforts to attract talent through education and early exposure to the industry. Relying on immigrants to fill vacancies is not a sustainable solution, hence long-term strategies focusing on education need to be considered.

This report examines New Zealand's secondary school education system's effectiveness in guiding students towards careers in agriculture/horticulture, in helping to establish a local workforce pipeline to address employment shortages and meet future industry export targets and prevent negative impacts on New Zealand's global product supply brand.

2.0 Background - the status of students in secondary school agriculture/horticulture programmes

This section presents an overview of the state of agriculture/horticulture education in New Zealand secondary schools as of the end of 2022. It includes statistics on the number of schools offering these courses, number of students taking the courses and a brief description of the courses to see if there is a solid foundation for a pathway to a career in agriculture/horticulture. The section also identifies potential focus areas to increase student enrolment in these courses for the future employee pipeline.

2.1 Statistics of schools and students in agriculture/horticulture

Statistics were obtained from two sources: Education Counts Number of Schools and school subject enrolment (Ministry of Education, 2022), and the advisory team supporting primary industries education 'Sow the Seed annual report 2022' (Agricultural & Horticultural Science Advisory Team, 2022). At end of 2022, there was a slight variation between the two sources as detailed below.

Topic	Education Counts	Sow the Seed
Number of secondary schools in New Zealand	537	501
Number of secondary schools offering agriculture/horticulture courses/ programmes	348	360
Number of students selecting science courses	267,366	Not reported
Number of students selecting agriculture/horticulture science courses/programmes	10,808 <i>(4% total science) (Ag/Hort Science only)</i>	13,520 <i>(Ag/Hort Science & supporting programmes)</i>

Figure 2: Table detailing number of secondary schools and students currently offering/studying agriculture/horticulture.

According to Sow the Seed Annual Report 2022 (Agricultural & Horticultural Science Advisory Team, 2022), of all secondary schools in New Zealand, 42.1% are rural and 57.9% are urban. Urban schools include 92 in Auckland, Wellington, and Christchurch, making up 44.2% of urban schools and 25.6% of all schools. As of July 2022, 14.5% of Auckland's, 23% of Wellington's, and 44.8% of Christchurch's secondary schools offer agriculture/horticulture courses.

Summary

With a population in New Zealand of 5,228,100 in 2023 (Macrotrends, 2023), 2.5 million (47.9%) of that population living in Auckland, Wellington and Christchurch, the above statistics show that there is the potential to strengthen the number of schools offering agriculture/horticulture courses and to increase the numbers of students choosing these courses as their educational pathway to a career in agriculture/horticulture, particularly in Auckland and Wellington, where less than a quarter of the secondary schools offer an educational pathway to a career in agriculture/horticulture.

2.2 Agriculture/horticulture programmes currently offered in secondary schools

Several well-developed and successful options for agriculture/horticulture courses in secondary schools include:

- **NCEA Level 1, 2, and 3 Agriculture/Horticulture Science:** Covers primary production topics and is assessed under the 'achievement standards' criteria – not achieved, achieved, merit and excellence.

- **NCEA New Zealand Scholarship Level:** A challenging exam testing knowledge of scientific principles, processes and issues in two primary production systems from producer to consumer. Successful students may receive a monetary award for tertiary study.
 - **Agribusiness in Schools:** This programme exposes students to a range of skills required in the primary sector from 'farm/orchard gate to consumer plate' including science, innovation, marketing, and management and finance. Assessed under the 'achievement standards' criteria – not achieved, achieved, merit and excellence.
 - **Primary Industry Academy:** A partnership between schools and the Primary ITO, delivering an NCEA Level 2 qualification and a program leading to the NZ Certificate in Primary Industry Skills (Level 2). Unit standards are used for assessments and has two grades - achieved or not achieved.
 - **Primary ITO Gateway Programme:** Includes theory and practical unit standards for students in Years 11 to 13, offering packages of learning across various primary sectors. Assessments have two grades – achieved or not achieved.
-

Summary

There is a strong foundation of courses offered by the MOE and programmes alongside secondary schools supported by the agriculture/horticulture industry and the courses/programmes listed above gives an overview of the stronger programmes set up in the secondary schools but there are other initiatives being set up to attract students. The question is, are all these programmes strengthening the numbers of students choosing an educational pathway in agriculture/horticulture or is this harming the growth as students don't know which way to turn to get the best education for the industry? Does New Zealand have the teachers, resources and funding to support a wide range of programmes or is it better to focus on a few strong programmes? The rest of this report helps to clarify some of these answers.

3.0 Aims and Objectives

The aim of this project is to determine if there is a strong educational pathway for students to consider a career in agriculture/horticulture to assist in filling the employment vacancies now and into the future with the projected growth in industry exports within the next decade. If the secondary school network doesn't have a strong pathway to a career in agriculture/horticulture, then identify the roadblocks that are restricting the success and suggest recommendations to resolve issues.

The objective of this project is to understand:

- The status is of agriculture/horticulture programmes in New Zealand's secondary schools and is New Zealand's education sector set up for success.
- What success looks like and what roadblocks does New Zealand have for increasing students choosing an educational pathway to a career in agriculture/horticulture programmes by what is currently set up in New Zealand's secondary school education sector.
- What can New Zealand learn from other countries if a successful educational path to promote agriculture/horticulture has been established in their secondary school networks.
- Identify what the education and agriculture/horticulture sectors need to change the current pathway to have a more successful pathway for students in the future.

4.0 Methodology

The aims and objectives of this report were investigated and reported on by:

- Completing a literature review to comprehend the reasons why secondary students in New Zealand might or might not consider a career in agriculture/horticulture and highlight key themes, successes, and obstacles in attracting students to these sectors. This was completed by reviewing three Kellogg reports, two university thesis and various other reports, journals, and surveys to allow the research being obtained to be analysed to determine common themes, using thematic analysis.
- Completing two case studies based on semi-structured interviews with key stakeholders leading successful programmes being run alongside the MOE agriculture/horticulture courses. Additionally, a case study was completed at a later stage due to the recurring theme of the necessity for collaboration in New Zealand to achieve success in increasing student numbers. This case study provides a contrasting perspective on a successful government-led initiative in Australia, highlighting what is currently lacking in New Zealand.
- Surveys were conducted via Survey Monkey to get a wider array of New Zealand agriculture/horticulture teachers' perspectives on the benefits and challenges of agriculture/horticulture courses/programmes in New Zealand secondary schools, and how to increase the students' interest and participation in these fields for the future of the country's exports.

The original plan was to interview teachers from around the country but due to time constraints, the focus moved to a structured survey. The survey was sent out to 140 secondary schools at the start of the last term of 2023. 18 secondary school teachers in agriculture/horticulture courses replied to the survey giving a 13% success rate, with 50/50 split of teachers in rural school's vs urban schools. This has been enough to give clear themes across the questions that were asked. Questions 1 – 4 were answered by all respondents; Question 5 by 17 respondents; and Question 6 by eight respondents.

- Thematic analysis was used for the information obtained from the literature review, the three case studies and 18 secondary school teacher interviews.

The 'inductive approach' was used allowing the data to determine the themes identified in this report. Semantic analysis was also used to focus on the obvious content of the data reviewed, staying at the surface level of data, capturing people's viewpoints, and offering flexibility across the various knowledge obtained. Semantic analysis is a process within Natural Language Processing (NLP) that involves understanding the meaning of words and phrases within their context to comprehend the intended message of a sentence or paragraph. It's achieved by examining the relationships between words and extracting key concepts and connections found in the text.

Mind maps were used to help identify these themes and a word cloud was used to help derive and rank in order of importance the overall themes from the literature review, cases studies and surveys.

4.1 Limitations

The biggest limitation observed with completing this project report was time. The initial focus was to research if there was a strong educational pathway for both secondary and tertiary education for students to consider a career in agriculture/horticulture. The focus was narrowed back due to time to the secondary school sector. It would be interesting to see if the same analysis on New Zealand's tertiary educational sector would identify similar issues and recommendations to this report.

Interview/survey limitations

The original plan was to interview in person at least twenty secondary school teachers nationwide, but due to time constraints, only two case study interviews were conducted. A structured Survey Monkey questionnaire was used instead, but it had limitations in that the survey timing at start of Term 4 resulted in only 18 responses, as teachers were busy preparing students for final NCEA exams and some questions were misinterpreted of what information was trying to be sourced, affecting some answers.

5.0 Literature Review

The literature review aims to understand why secondary students in New Zealand would or would not consider a career in agriculture/horticulture. It will identify key themes, successes, and roadblocks in attracting students to the agriculture/horticulture sectors. It will also help to identify conclusions and recommendations for the primary industry, Ministry of Education and Government to consider strengthening, if required, the educational pathway to a career in the industry to fill the future workforce required to meet industry export targets of \$100 billion within the next decade.

The review is divided into two parts:

1. Analysis of previous reports to understand the perspectives of students in secondary schools and what encourages them and deflects them from considering a career in agriculture/horticulture.
2. Analysis of previous reports to understand the perspectives of secondary school teachers/career advisors and what are the successes and roadblocks to increase student numbers choosing an educational pathway in agriculture/horticulture.

This comprehensive approach will provide a broad overview and valuable insights into the current state of agriculture/horticulture education in New Zealand.

5.1 Secondary school students' views on pursuing agriculture/horticulture careers

Over the past 20 years there have been various reports completed trying to understand what is deterring students from a career in agriculture/horticulture considering it is deemed to be the 'backbone' of the New Zealand economy, yet student numbers are not increasing with numbers of students studying agriculture/horticulture in 2008 being 10,536 students and in 2022 it was 10,808 students (Ministry of Education, 2022).

Back in 2001, a prediction was made that "**by the year 2005, another 5,000 people were going to be needed for the dairy industry alone in New Zealand**" (Kuriger, 2001). At the end of 2022, the PWC Food and Fibre Insights report (PWC New Zealand, 2022) advised there was a 19,000+ employee shortage across agriculture/horticulture with the shortage in dairy being between 4,000-6,000 people, so New Zealand dairy is in the same position from two decades ago and no major successes have been achieved to increase the educational pathway to a career in agriculture/horticulture.

Figure 3 mind map delineates the principal advantages and disadvantages for secondary school students regarding a potential career in agriculture/horticulture. It outlines the factors that could attract them to or deter them from pursuing such a path. This analysis is grounded in New Zealand reports spanning from 2001 to 2017, supplemented with recent updates to evaluate whether industry evolutions have the potential to boost the number of students contemplating a future in agriculture/horticulture.

The main themes identified include:

- The agriculture/horticulture industry perception by students and the factors they feel is a benefit to working in the agriculture/horticulture industry and what deters them from considering a career in agriculture/horticulture.
- Influencers on career decision making for students and who are the main deterrers for considering a career in agriculture/horticulture.
- The understanding of the agriculture/horticulture industry with the career pathways that are available and the understanding of the agriculture/horticulture industry's contribution to New Zealand's economy.

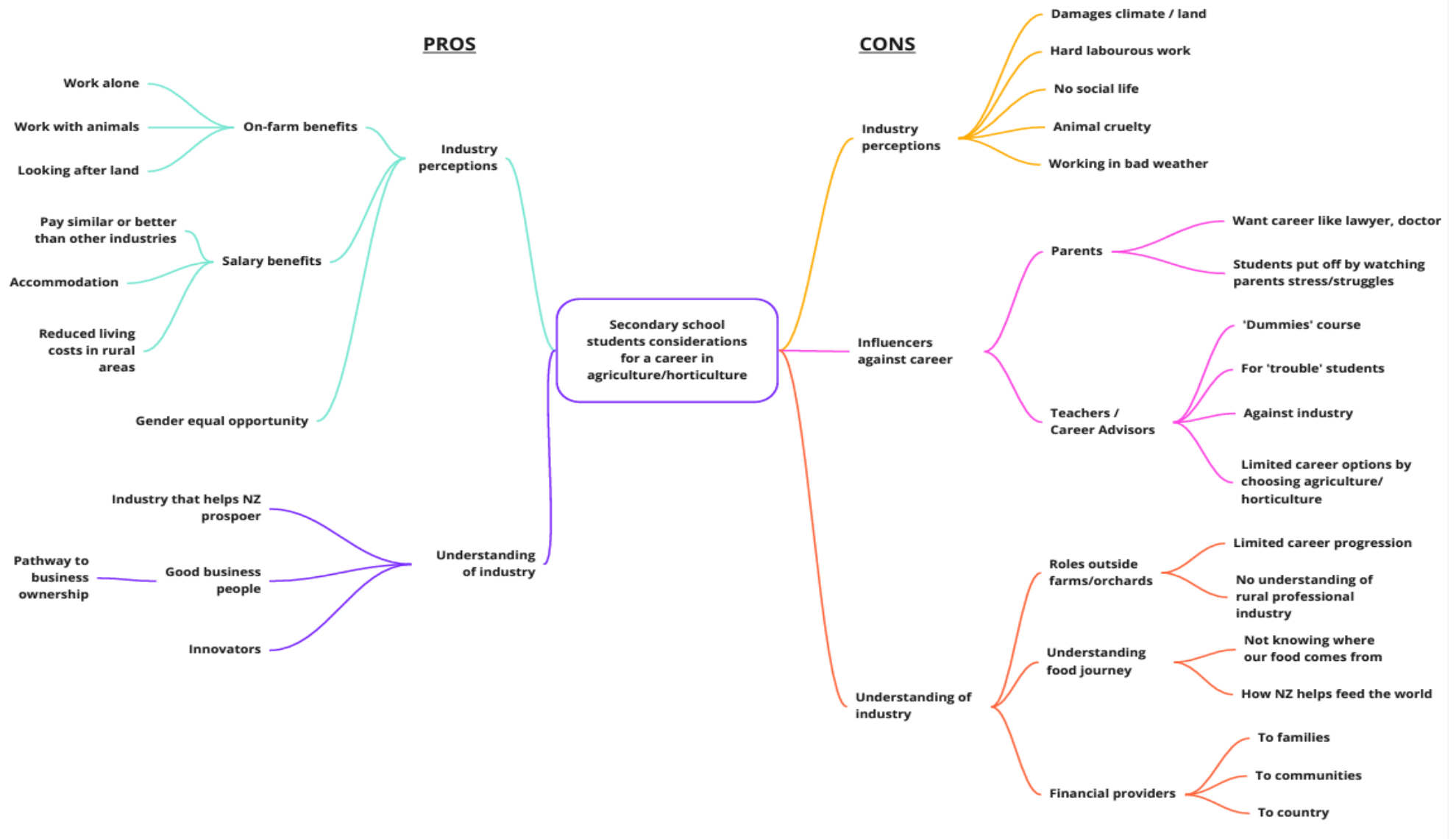


Figure 3: Mind map of literature review of students' thoughts outlining what the pro/cons of a career in agriculture/horticulture are

The agriculture/horticulture industry perception by students

Industry perception is still a major influencer when students are considering a career in agriculture/horticulture. The “Dirty Dairying Campaign” by Fish and Game in 2002 highlighted the environmental impact of dairy farming in New Zealand, leading to the Dairying and Clean Streams Accord (Fonterra & Government, 2003). Despite efforts from farmers, the term “Dirty Dairying” symbolises the industry's environmental issues. Media reports, like ‘Dirty Dairying Declining, or Hidden?’ (Pennington, 2016) and ‘Dairy on the Canterbury Plains: Was it a Big Mistake?’ (Merton, 2022), continue to critique the industry, influencing students' views on agriculture/horticulture careers. The media's influence with a report in 2015 stating that “**news articles portraying the industry in a poor light and pupils don't want to be associated with that**” (Rolfe, 2015) is influencing students selecting agriculture/horticulture as a course to study in schools.

However, there is positive movement in the perception of the industry. In the June 2023 Research First ‘how the public see our industries’ (Research First, 2023) shows that farmers and growers have the highest proportion of respondents trending towards the positive (up 5% on the previous year's report). This is counteracted by the negative perception increasing by only 1% on previous year but the drivers behind that is the environmental impact and emissions, which continue to be at the forefront of New Zealanders minds as detailed in a survey conducted prior to the Government Elections 2023 (The Spinoff, 2023).

Figure 3 also shows that there are positive perceptions from students regarding how the industry financially looks after people, equal opportunity for genders, and that students see the industry as having good businesspeople who are innovators doing better for the future. The focus on gender equality is something that New Zealand has been striving for in the past decade and with agriculture especially deemed in the past to be a male dominated industry, some of the larger agriculture/horticulture organisations in New Zealand like Fonterra (Fonterra, 2023) and Ballance AgriNutrients (BallanceAgriNutrients, 2023) have put policies in place to focus and report on diversity and inclusion. In the past year alone, New Zealand has seen some significant appointments in senior roles in the industry with the first Chairwomen of Beef+Lamb and the New Zealand Meat Board, and for the first time a woman Group Director of FarmSource for Fonterra. Appointments like this will attract more women into the industry as female students will be motivated by these women's career pathways.

Influencers on career decision making for students

Students in the tween and teenager years are heavily influenced by the adults in their lives, with teachers and career advisors having an influence but parents are the dominating factor.

A 2021 international survey on ‘the impact of parental influence: career addition’ (Joblist, 2021) found that 48% of people felt that their parents strongly influenced their career path, while almost 40% felt pressured to follow their parents' career advice. More than half of people felt that their parents forced them to go to college (48% of Gen X, 57.6% of Millennials, and 57% of Gen Z). Almost 2 in 3 parents said they were disappointed that their child did not follow their desired career.

New Zealand also sees the parental influences with our secondary school students. A survey conducted in a 2015 report looking into the influences of career advisors and parents, with the author stating “**I believe it comes down to a lack of knowledge and education of both the schools and the parents involved in helping run them towards the career opportunities available in the primary industry**” (Rolfe, 2015). Another report two years later stated a similar outcome “**this generation of students are battling with parents and teachers that witnessed the time when primary related positions were physically hard and poorly paid. I believe the best way to change the perception of teachers and parents is to create interest and excitement**” (O'Sullivan, 2017).

Another strong influence from parents that has a more significant impact particularly in Auckland is the lack of a continued educational pathway of agriculture/horticulture in tertiary facilities in Auckland, therefore the student would have to leave to study elsewhere in New Zealand. The main universities that are deemed to be the leaders in the agriculture/horticulture sector are Massey University in Palmerston North and Lincoln University in Lincoln, Christchurch.

Reasons for not wanting to leave Auckland for further study included “*need to go outside of Auckland and even with student loans and allowances this requires a family contribution which not all Auckland for further study, especially in Asian families*” (Rolfe, 2015) are also contributing to students in Auckland vying away from choosing agriculture/horticulture as a career. With the Asian population in 2023 estimated to be 23% of Auckland's overall population, if the perception of the education and career pathway can be changed, there is significant opportunity to grow student numbers and fill the workforce pipeline for the future.

Whilst this strong influence by parents and perception of the industry by parents may continue to be more of a negative connotation, there is a recent report in Australia that is showing that this negative perception can be reversed into a positive if the correct work is done to educate both the students and the parents of what a career in agriculture/horticulture can entail.

A case study conducted at Barkers College in Sydney, Australia (Graham, 2021) showed the journey from low enrolments in agriculture courses in mid-2000's when it was nearly removed from the school's curriculum, to now having the largest cohort in Australia with over 300 students selecting agriculture as a course. Barkers College redefined agricultural studies in the mid-2000s, elevating it from a casual to an academic subject, on par with sciences like Biology, Chemistry, and Physics. The curriculum was revamped to resonate with students' urban lifestyles, covering diverse topics from viticulture to alternative enterprises like beekeeping. The college aimed to expose students to the vast 'paddock to plate' job opportunities, debunking the myth that agriculture is just about farm labour. A survey indicated that parents' perceptions significantly influence students' course selection and consequently, efforts were made to consult and satisfy parents perception of the agriculture industry and opportunity available as careers, and today is now one of the highest satisfaction ratings for the agriculture science course in the parent surveys conducted.

The perception of agriculture/horticulture education and the career opportunities available

Public perception plays a significant role in how agriculture/horticulture courses are viewed in New Zealand secondary schools. There's a prevailing notion that these courses are for less able or trouble students and referred as a 'course for dummies' (Rolfe, 2015) or 'agriculture is for dummies' (Muir, 2010), due to the courses being associated to a career on farms/orchards.

Part of the perception that agriculture/horticulture is a 'course for dummies or troubled students' does come from the influence of teachers, career counsellors and parents discussed above but also comes from the students' peers. One student interviewed by (O'Sullivan, 2017) states in Year 10 subject selection, the student asked friends about studying agriculture of which the reply was “a bum subject, a subject you take to get easy credits”. The student continued and selected agriculture/horticulture in Year 10 and Year 11 and was planning a career in foreign trade focussing on agriculture/horticulture. This shows that when researched and informed properly of options available, an educational pathway to a career in agriculture/horticulture can be successful away from the farm/orchard and can compete with the likes of careers in law, health and engineering.

The negative perception is changing with schools now aligning agriculture/horticulture studies with science, making it an academic subject and showing that agriculture/horticulture has a 'paddock to plate' career pathway that doesn't just entail working on a farm/orchard. The introduction of programmes like Agribusiness in Schools (Agribusiness in Schools, 2023) which focusses on science and innovation, marketing, business management and finances, has helped in recent years to change the perception and open students minds to a wider array of opportunities for a career.

Adding to the positive perception of a career in agriculture/horticulture, the Career Choices: perceptions of the good, the bad and the ugly report (Research First, 2023) shows that agriculture/farming is perceived to be one of the most satisfying sectors to work in but is also classified as the fourth hardest industry to work in due to government regulations.

Summary

Whilst the agriculture/horticulture industry continues to grapple with public, media, and internal perceptions, there has been a notable shift towards a more positive view in recent years. This is largely due to New Zealanders' growing appreciation for farming and the industry's efforts to initiate world leading sustainable practices on farms/orchards, with its commitment to climate initiatives and animal welfare.

Despite the challenges posed by negative perceptions, the industry is working hard to be seen in a more positive light as an employer. Initiatives aimed at diversity, inclusion, and innovation are gradually reshaping the narrative and attracting more students to the industry. Key appointments of women to high-level roles, further underscore this positive shift and is an opportunity to attract more female students to consider an educational pathway in agriculture/horticulture.

Parental influence is another key factor that presents a challenge, but there are opportunities to promote careers in agriculture/horticulture by educating the parents and students about the diverse opportunities in the industry. The industry offers a wide range of roles from grass to plate, providing numerous career paths for prospective students to consider from on-farm/orchards to representing the industry around the world. The case of Barkers College (Graham, 2021) in Australia illustrates the potential of education in changing perceptions and garnering parental support for careers in agriculture/horticulture. Additionally, expanding tertiary education opportunities in Auckland could attract more students by allowing them to stay with their parents while pursuing their studies.

In conclusion, while there are challenges due to public perception, there are also positive trends and efforts towards changing this perception and promoting the diverse opportunities in the agriculture/horticulture industry. This shift in perception is crucial for the future of the industry and for the students who will become its next leaders.

5.2 Secondary school teachers/career advisors' views on increasing agriculture/horticulture student numbers

As detailed above for the student analysis, the issue of increasing student interest in an educational pathway to a career in agriculture/ horticulture in New Zealand has not improved with similar student numbers from a decade ago.

Over the past 20 years, numerous reports have been conducted to understand the factors deterring students from these fields. The focus in this section is on the perspectives of teachers and career advisors on how to increase student enrolment in agriculture/horticulture science subjects. The mind map in [Figure 4](#) presents the pros and cons identified by these educators for attracting more students to agriculture/horticulture education. This mind map is based on New Zealand reports and surveys of teachers and career advisors from 2017 to 2021.

The main themes identified include:

- Negative industry portrayal and the belief that careers are limited to farms/orchards deter students from pursuing agriculture/horticulture.
- Teachers believe that more influencers discourage choosing agriculture/horticulture careers than students perceive as in [Figure 3](#).
- The shortage of qualified teachers for agriculture/horticulture is a key reason for low student enrolment in these subjects.
- The insufficient collaboration among education, government, and agriculture sectors in New Zealand is problematic due to overlapping programmes and non-specialised teaching resources.

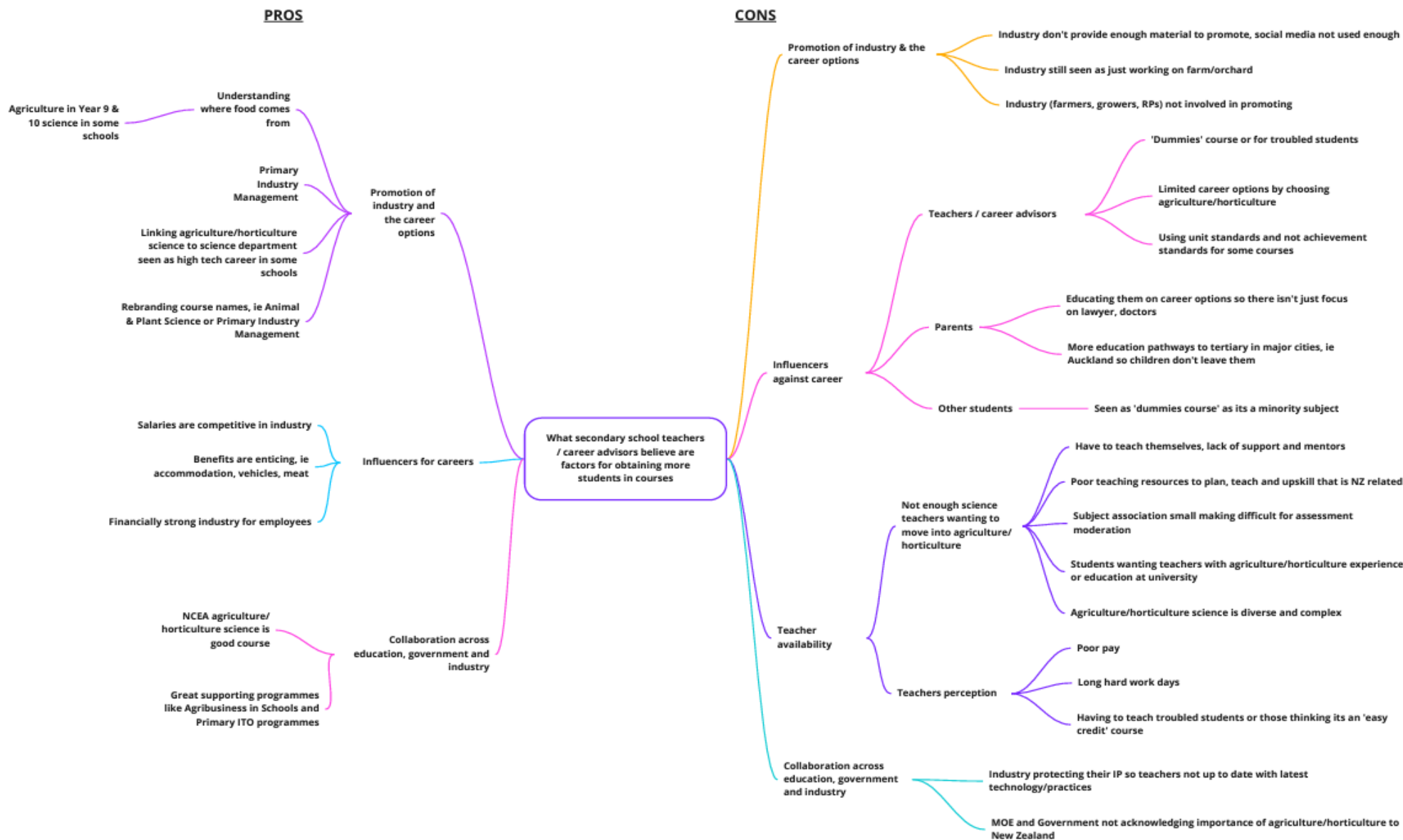


Figure 4: Mind map of literature review of teachers/career advisors' thoughts outlining what the pro/cons of increasing student numbers in agriculture/horticulture courses

The promotion of the industry and the career options available

The understanding from students and teachers of the full array of career opportunities available in agriculture/horticulture was identified in a 'Soil is not dirt' report with 60% of students understanding that career opportunities are available from the 'gate to the plate' and 90% of teachers are educated of the options available (Cloughley, 2020). Whilst a report in 2015 (Rolfe, 2015) had a section that looked at how career options in agriculture/horticulture was promoted in 2015, with options like allowing universities and industry bodies like Fonterra or DairyNZ to speak to students, passing on social media or posters on the industry career options and hosting career nights at schools for parents to attend, the student interest wasn't peaked. Rolfe reported that the best success that some schools had seen in changing student's interest in agriculture/horticulture, was having people working in different parts of the industry from 'grass to plate' come and discuss the different options but this wasn't a common practice across New Zealand.

In today's New Zealand environment, the promotion of the career opportunities in the agriculture/horticulture industry is limited with the main focus still being on working on farm/orchards with sites like DairyNZ 'GoDairy' campaign (DairyNZ, 2022) HorticultureNZ 'GoHort' campaign (GoHorticulture, 2023) and PickNZ website (PickNZ, 2023). There is also the website driven by the New Zealand government that is a tool to help New Zealanders make decisions on what career they should consider. The section on agriculture/horticulture is again focussed on portraying it as an on-farm/orchard option with seven of the nine introduction points about what the industry involved directing to being on farm/orchard. If a student didn't click further into the 'jobs in this area', decisions by students could be made quickly to not consider this career pathway if being outside with animals isn't a motivator (Careers NZ, 2023). However, some organisations within the agriculture/horticulture industry do promote an overview of other roles off farm/orchard but it is very brief, example being NZIPIM (NZIPIM, 2023).

An Australian article titled "Careers in agriculture: the brave new world" discusses how the perception of agricultural careers has evolved (Blackie, 2021). It highlights that jobs in agriculture are no longer limited to owning a farm and driving a tractor. Today, people can study, train, and work in various agricultural sectors in numerous ways. The article mentions roles in ecology, marine science, cell biology, coastal and ocean science, earth science, ecology and conservation, biology, food science, and nutrition as part of modern farming. It also discusses the growing importance of off-farm agricultural careers, such as those in artificial intelligence and information technology, which are becoming increasingly relevant as farmers use technology to gain a competitive edge.

In the article, CEO of Primary Industries Education Foundation stated "*In many schools it is challenging because the curriculum doesn't encourage agriculture. There is still this stereotypical image incorrectly attached to agricultural employment, of a bloke on a tractor. That perception, along with the idea that remuneration levels are too low, and that there are no career paths in the industry. However, research shows that wages per hour in agriculture are higher than hospitality at entry level.*" Australia's agriculture/horticulture education sector is currently in growth due to the change in perception of the Australian Federal and State government and the value of the agriculture industry to Australia's economy. A workplace plan (Figure 5) has been put in place and leadership and funding is being provided by both the government and the industry to support a strong pathway to a career in agriculture and this can be seen in the Barker's College case study (Graham, 2021) where agriculture is one of the most sought after subject selection for students.

Whilst there is some understanding in secondary schools of the wide array of career opportunities, reports identify that there is much needed room for improvement. Career advisors and teachers working alongside the agriculture/horticulture industry, need to be further educated of the roles available in the industry from the 'grass to the plate' so that the secondary school students are given the entire picture and can make more informed decisions as to what career path they may want to take. With 40% of students surveyed in the 'Soil is not dirt' report (Cloughley, 2020) stating that they didn't know the full array of opportunities available, this leaves a good opportunity to help grow student numbers selecting agriculture/horticulture courses to assist in filling the future workforce for the industry.

Influencers on career decision making for students

New Zealand secondary school agriculture/horticulture teachers have identified the same influencers as the students did in section 5.1 Secondary school students' views on pursuing agriculture/horticulture careers. Where in that section, the students felt that parents and teachers/career advisors were the main influencers with a negative attitude towards agriculture/horticulture as an educational and career pathway for students, the teachers have also included 'student peers' as influencers in this section. The negative focus on agriculture/horticulture courses being a 'course for dummies' or 'troubled students' came through significantly in the research. This section will therefore focus on the student peer and course perception.

It is reported that students in secondary schools are highly focused on what the other students or friends are thinking about every decision that is made. This is because students' brains are undergoing changes which make them highly attuned to social situations. Students want to feel accepted (National Institute of Health, 2021). The influence that fellow students can have on a student wanting to select agriculture/horticulture courses can be detrimental to growing student numbers in choosing agriculture/horticulture. With the agriculture/horticulture courses been seen as either a 'dummies course', 'easy credit course' or 'troubled students course' (Rolfe, 2015) (O'Sullivan, 2017) (Cloughley, 2020), this stigma can be seen as a reason for students to divert away from the courses.

The Cloughley report (Cloughley, 2020) interviewed 148 agriculture students who had left school within the previous six years, to determine they key attributes of their agriculture teachers' pedagogy. Whilst in the report, it stated that *'the agriculture industry requires employees with critical thinking and literacy skills'*, two key barriers to effective teaching of agriculture were identified that there is a negative perception within schools that agriculture is a non-academic subject with poor career options, and agriculture classes were to attract students with low motivation, behavioural issues and high learning needs. 65.5% of the students interviewed indicated that agriculture was not seen as an academic subject at schools. Some respondent examples from the survey of the perception noted *"we were not allowed to take it unless we were failing our academic classes"* or *"at my school agriculture was seen as a 'drop out subject' and it was recommended to me by teachers and careers advisors not to take it as it was not 'academic' enough."* These two respondent quotes were two of many similar responses throughout the report.

Therefore, what is required to change the perception of the course. In both the Cloughley report (Cloughley, 2020) and Rolfe report (Rolfe, 2015), there are recommendations to change the name of the course to for example "Animal and Plant Science" and/or to change to a mandatory course with a module in Years 9 and 10 to cover agriculture/horticulture science and then agriculture/horticulture courses at NCEA Levels 1, 2 and 3, offered at the same level as other sciences (ie. biology, chemistry) so that agriculture/horticulture science is not constantly on the same timetables as these other sciences.

Teacher availability and the roadblocks to be able to teach the courses in schools, including collaboration

The situation of agriculture/horticulture education in New Zealand presents a complex set of challenges and opportunities. The reports by O'Sullivan, Cloughley and Low (O'Sullivan, 2017) (Cloughley, 2020) (Low, 2023) all identified that agriculture/horticulture and/or science teachers are in shortage in New Zealand, making them highly sought after. Whilst the government has provided funding in September 2022 with a \$5 million overseas recruitment fund (Low, 2023) and then subsequent additional funding in the 2023 New Zealand Government budget with '\$23.64 million to extend funding for critical teacher supply initiatives that boost Initial Teacher Education enrolment, incentivise overseas teachers to move to New Zealand, assist former teachers to return to the profession and help match graduates and returning teachers to long-term positions' was granted (Ministry of Education, 2023), teacher recruitment is still a major concern in New Zealand.

A report by PPTA which is an annual survey on the teacher staffing situation in secondary and composite schools, identified *“an environment of increasingly difficult secondary teacher supply. Most of the results are the worse we have on record since this series of surveys began in 1996 and show a decline from 2019 (immediately pre-COVID) and a significant decline since 2013”* (PPTA, 2023). Whilst the report could not detail in all statistics to actual subjects, some of the key indicators of the health of secondary teacher supply at 20 March 2023 include *‘the main reasons reported by principals for staff leaving was due to retirement or leaving the profession’* and *‘there has been an increase in the proportion of schools cancelling or transferring classes because subject specialists could not be found’*, which is creating the shortage of teachers in the New Zealand secondary schools network. (PPTA, 2023)

The reports by O’Sullivan, Cloughley and Low (O’Sullivan, 2017) (Cloughley, 2020) (Low, 2023) also identified that agriculture/horticulture is a diverse and complex subject that covers science, business, technology, and practical skills, and teachers must have the skill and knowledge to design their learnings and cover both theoretical and practical-based concepts. Students felt that agriculture/horticulture teachers should have both practical experience and a qualification in the subject, which is not common in other subjects. With these requirements, it can be seen in the PPTA annual survey 2023 report (PPTA, 2023) in the key indicators statistics (which can’t be linked to actual subjects) but *‘48% of principals had to employ untrained or unqualified teachers because they could not find trained or qualified teachers’*.

Therefore since New Zealand is struggling to find qualified and experienced teachers, there needs to be ways to upskill existing teachers and retaining existing experienced teachers but the reports of O’Sullivan, Cloughley and Low (O’Sullivan, 2017) (Cloughley, 2020) (Low, 2023) also identifies other roadblocks that are being experienced in regards to teaching resources. With limited New Zealand based resources, teachers are looking to Australian resources and textbooks to help teach in New Zealand. HATA is one of the central points to obtain resources for teaching in class and a start to a centralised resource pool in New Zealand (HATA, 2023) with 110 members. However, with limited resources, technological advancements, and a lack of centralisation of teaching resources in New Zealand, teachers are spending time finding or creating their own resources due to limited good teaching resources (O’Sullivan, 2017). Also, with agriculture/horticulture science ranked as a minority subject, school principals deem that the lower status affects access to resources and power within the school and influences the support and job satisfaction of the teachers who teach them (Low, 2023).

Without a centralised resource pool, the agriculture/horticulture teachers also need to keep abreast of technological advancements and practices in the industry and incorporate them into their lessons (Cloughley, 2020) and when you have students in classes that come from a rural background, not staying abreast of advancements in the industry practices can contribute to student disengagement. Another issue in lack of collaboration is many New Zealand schools only have enough students to have a single agriculture teacher, which restricts the teacher’s ability to discuss ideas, check student work, and develop new practices with fellow teachers to improve the course (Cloughley, 2020).

There is a need for a centralised resource pool that is kept up to date and teachers are trained in updated technology and practices in the agriculture/horticulture industries and that this should be supported by ‘Ag Technicians’ as is done currently in New Zealand secondary schools for ‘Science Technicians’ (Cloughley, 2020). This would require collaboration between the government (MPI, MOE), agriculture/horticulture businesses/organisations and the education sector.

New Zealand is not alone with teacher shortages and resource issues. The USA has experienced similar teacher shortages as New Zealand as identified in a 2019 report (Eck & Edwards, 2019) which investigated the ongoing challenge of a shortage of vocational agriculture teachers in the U.S., a concern that has persisted since the 1960s. Despite numerous studies, only about half of agricultural education graduates enter teaching, leading to programme closures. The report stresses the importance of teacher preparation programmes, state education departments, and professional organisations in addressing this issue through recruitment and retention strategies, including professional development and induction programmes.

The report also discusses the significance of supply and demand studies for SBAE stakeholders, noting the need for better data collection methods and continuity between research teams. It suggests creating webpages for institutions and state education departments to regularly update data.

Overall, the report calls for a concerted effort to recruit and retain qualified agricultural education teachers to educate future agriculturists and promote agricultural literacy, despite the trend of low entry into teaching. It recommends expanding the pool of potential teachers, addressing career dissatisfaction, and providing ongoing support through professional development to reflect progress in future studies.

Summary

Whilst secondary schools are recognising the diverse career opportunities in the agriculture/horticulture industry, there is room for improvement. Career advisors and teachers need to be educated on the roles available from 'grass to glass', allowing students to make informed decisions about their career paths and therefore helping to fill the workforce shortage in New Zealand agriculture/horticulture.

As with the students' responses in [Figure 3](#), teachers feel that there is still a negative attitude towards agriculture/horticulture as an educational and career pathway. The focus on 'dummies' or 'troubled students' courses can hinder student numbers in choosing these courses. The Cloughley report (Cloughley, 2020) and Rolfe report (Rolfe, 2015) suggest changing the course name to "Animal and Plant Science" or offering mandatory modules in Years 9 and 10 to cover agriculture/horticulture science will help to project agriculture/horticulture courses as an academic subject and will help to entice more support from students, peers, teachers and parents to choosing a pathway to a career in agriculture/horticulture.

Finally, agriculture/horticulture education in New Zealand faces challenges due to a shortage of teachers, with a decline in secondary teacher supply since 2013. Retirement is the main reason for staff leaving and we don't have enough trainee teachers coming into the sector. Upskilling existing teachers and retaining experienced ones is crucial. A centralized resource pool, with technicians supporting teachers is needed for teachers to stay updated on technological and industry practice advancements. This requires collaboration between government (MPI/MOE), industry businesses/organisations, and the education sector.

In conclusion, the teachers feel that there is a way to go in ensuring we have a strong educational pathway to a career in agriculture/horticulture. With the reports used in this section of the literature review from 2015-2023, it shows that the issues in increasing student numbers choosing agriculture/horticulture courses have remained static over the past eight years.

6.0 Case studies

This section provides a series of case studies on agriculture/horticulture programmes that are being run alongside New Zealand's NCEA agriculture/horticulture science. The programmes were selected based on a literature review investigation and due to the success they have had in getting established alongside New Zealand secondary schools.

Additionally, the section reviews the efforts of the Australian government to increase the number of students studying agriculture in secondary schools. Australia is highlighted due to its frequent mention in several reports, interviews with programme participants, and teacher surveys as a successful example of collaborative efforts leading to increased student enrolment in agriculture courses in secondary schools.

A mind map ([Figure 6](#)) provides an overview of the common themes derived from these case studies. An overall summary of the three case studies has been completed to examine the themes identified.

6.1 AgriBusiness in Schools

The AgriBusiness in Schools programme was initiated by St Paul's Collegiate School in Hamilton in 2018. St Paul's is an independent, co-educational Anglican secondary school (Years 9-13 for boys and Years 11-13 for girls) and is one of New Zealand's leading private day and boarding schools. With a roll of approximately 800, half of the students attending are boarders from both urban and rural backgrounds.

An online Teams meeting was held with Kerry Allen, who is the Agribusiness Curriculum Director at the school, and a semi-structured interview was conducted.

Overview of the interview and the Agribusiness curriculum journey

The programme was developed after a survey revealed that the school was not meeting the needs of its rural students and the existing agriculture/horticulture science was limited and did not offer students a pathway to understand from the 'gate to the plate'.

Agriculture/horticulture science was seen as the "second class citizen" for all sciences offered at schools and became a dumping ground for students who want some easy credits for NCEA and the perception of the industry, made it a difficult course to get substantial numbers in.

The school then started running a successful Agribusiness class teaching about 'after the farm gate' and it got to stage where Kerry stated, "*it was bigger than just St Paul's and this was something the country needed*" and being part of their Anglican faith about giving back to the community, St Paul's did just that.

St Paul's lobbied 10 lead schools across the country and workshops were held, along with primary sector organisations, to build a curriculum based on the needs of 'after the farm gate' using existing standards for assessment done for NCEA. The curriculum and standards didn't quite fit so MOE and NZQA were lobbied to get a new subject created. This was the first time a subject had come from the industry rather than from government to the schools.

Finally in 2018, the MOE approved the agribusiness curriculum and the first official classes were being taught at those leading schools. In 2023, 116 schools from around the country are now teaching this course and over 10,000 students have been through it in five years and it's now being offered at NCEA Level 2 and 3.

The success of the programme at St Paul's has seen a similar growth of students choosing to go on and further their educational pathway at tertiary institutes in New Zealand. In 2013, St Paul's had no students going to Massey or Lincoln University but at the end of 2022, 27 students went to Lincoln, 3 went to Massey, and 5 went into other primary sector tertiary education.

In their 2023 school year, 72 students are doing Agribusiness at NCEA Level 2 and 78 students at Level 3. Comparing to their agriculture/horticulture science courses, this year there is only 20 going for NCEA Level 2 and 42 going for Level 3 (55 in NCEA Level 1 but no comparison to Agribusiness as no Level 1). Agribusiness is now the schools biggest non-compulsory subject with at least a third of the senior school taking this course.

Another success for Allen is "even if students aren't going on to further tertiary education or a career in the primary sector, we are changing their perception of the industry. They have a basic understanding of what happens in the primary sector because the industry does things different to other businesses and we are giving them great life skills."

With the success of the programme at St Paul's Collegiate and around the country with the course uptake, the challenges being faced could stump the further growth.

The biggest challenge is being able to find good quality teachers. Some schools won't implement the programme, even if the want is there from students, because teachers can't be found. There are currently four schools that Allen is working with that are struggling to find a suitable teacher and therefore will not implement the programme.

Easier ways need to be identified to give the teachers the resources to upskill into agriculture and make it easier to teach it and New Zealand does not have a great central pool of resources for this, unlike Australia who have made great headway in this area.

The next challenge is the perception of the industry. Allen is currently working to get the programme into more Auckland schools and advised that "sometimes those initial meetings go well and other times, you are shown the door in 10 minutes. However, due to the want of students or the schools' community for the course, some are coming back to further those conversations".

The last big challenge for growing agriculture/horticulture courses in New Zealand is funding. There is not enough funding from the Government nor the industry for teachers, resources and to run these programmes alongside New Zealand secondary schools. Allen stated, "what funding that is available is being given in small amounts to a lot of different programmes as there is no collaboration in the sector anymore".

Allen advised that in the past there was PICA that was set up in 2014 to have collaboration across the primary sector and ensure that everyone was working together towards a common goal but that has since been dissolved. It is now every group for themselves and having one representation was much better in Allen's experience.

6.2 Geraldine High School 'Primary Industry Academy'

The Primary ITO 'Primary Industry Academy' is a programme that offers practical education and training for students who are interested in pursuing careers in the primary industries of New Zealand, whilst they are studying at secondary schools. There is a wide array of skills that can be learnt from fencing, farm bikes, tractors to water supply and animal handling. There is no set structure and schools can personalise what criteria is offered in schools. Students go on field trips, work placements and compete in competitions as part of the course. Being a skill-based programme, the assessments are done with either an 'achieved' or 'not achieved' rating.

An in-person meeting was held with Sarah Foley-Smith, who is a teacher at Geraldine High School and in charge of the PIA programme.

Overview of the interview and the PIA programme being run at Geraldine High School

The programme was set up at Geraldine High School prior to Foley-Smith being at the school but was taken on by Foley-Smith upon her appointment. The school was one of the first five schools to trial the programme. In 2023, there is now 55 schools operating the programme with a waiting list.

Success for Foley-Smith for the students at Geraldine is that “the students have highly employable skills and have the skills to get the job they want, that they learn some life skills whilst enjoying themselves at school, and that 100% achieve NCEA Level 2.”

Presently about 15% of the students are going on to university to study agriculture/horticulture but the school would like to see this increase in future years.

The biggest priority for Foley-Smith is to see the programme be expanded to run a NCEA Level 3 programme as currently only at Level 2; and for the practicable kids who might have learning difficulties, to be valued to the same level as their academic peers. Perception that the industry and the students that take the PIA course is an easy way to achieve credits is frustrating for Foley-Smith.

The challenges that Foley-Smith sees with agriculture/horticulture education in New Zealand is there is not enough teachers and the resources for teachers who might want to upskill is poor (along with resources for the students). When it comes to the practical programmes like PIA, having teachers with hands-on experience is valuable but there is not a lot of teachers out there with those skills.

Another challenge is the collaboration for practical programmes being offered in New Zealand secondary education. Foley-Smith feels that everyone is doing their own thing, and some of the outfits running these programmes to support in-school are “haemorrhaging money” and that if there was better collaboration and leadership, then that money could be used for the other challenges of providing resources for teachers to use and up-skill, and for the students’ resources too. Foley-Smith recommends a “Think Tank needs to be set up to work on the future of growing programmes”.

The last major challenge is funding. There needs to be more for in school, for the students, for the teachers and to setting up a farming apprenticeship scheme so more students choose agriculture for their careers. Foley-Smith believes that the likes of some of the corporate farming entities in New Zealand, like Pamu, should be used as an apprenticeship or cadette scheme.

6.3 Australia’s Federal and State Government engagement in the agriculture sector

The Australian agricultural industry is aiming to become a \$100 billion industry by 2030. To achieve this, the Australian Federal and State Governments are focusing on strengthening the pathway in agriculture education. They are leading the collaboration and providing funding and resources to increase student numbers in agriculture to meet future targets. The education sector and agriculture industry are working closely together to ensure this success. This case study gives an overview of the steps taken to address the workforce issues in the agriculture sector:

- **Agricultural Workforce Working Group:** Established by the Minister for Agriculture, Fisheries and Forestry, Senator the Hon Murray Watt, at the Jobs and Skills Summit in September 2022. The group includes representatives from employer groups, unions, and the Australian Government, and focuses on skilling, attracting, retaining, and protecting workers.
- **National Food and Fibre Leaders Think Tank:** A high-level think tank committed to expanding agriculture’s influence in the Australian school curriculum. The initiative is backed by Hon Murray Watt and Assistant Minister for Education, Sen Anthony Chisholm, and attended by 50 peak councils, and Research and Development Corporations (RDC) senior executives. (PIEFA, 2023)
- **AgCAREERSTART:** A pilot program that helps young Australians start a career in agriculture in their gap year. It provides a full-time paid farm job, a \$4,500 training and engagement bursary, funding to travel to industry events, and a dedicated support team. (AgCareer Start, 2023)
- **Secondary Schools Agriculture Fund (SSAF):** The Victorian Government is providing a fund of \$5.5 million to deliver agriculture skills across the schooling sector. The fund aims to increase awareness of agriculture career opportunities, give students access to training pathways, and ensure the quality of agriculture training remains high.

- The Australian Federal Government has achieved a significant amount of work in strengthening the agriculture industry. A plan was devised working with industry bodies to focus on increasing numbers joining the agriculture workforce by working on initiatives for schools, universities, career expos, and immigration. In **Figure 5**, it outlines some of the key initiatives that have been implemented to date, along with focuses for the next stream of initiatives.



Figure 5: Australia Federal Government – supporting the agriculture sector and its workforce plan – 2023 update

6.4 Overview of case studies

The **Figure 6** mind map identified common themes that the case studies, interview participants and the review of the Australian government-led initiatives to potentially increasing secondary school students selecting an educational pathway to a career in agriculture/horticulture.

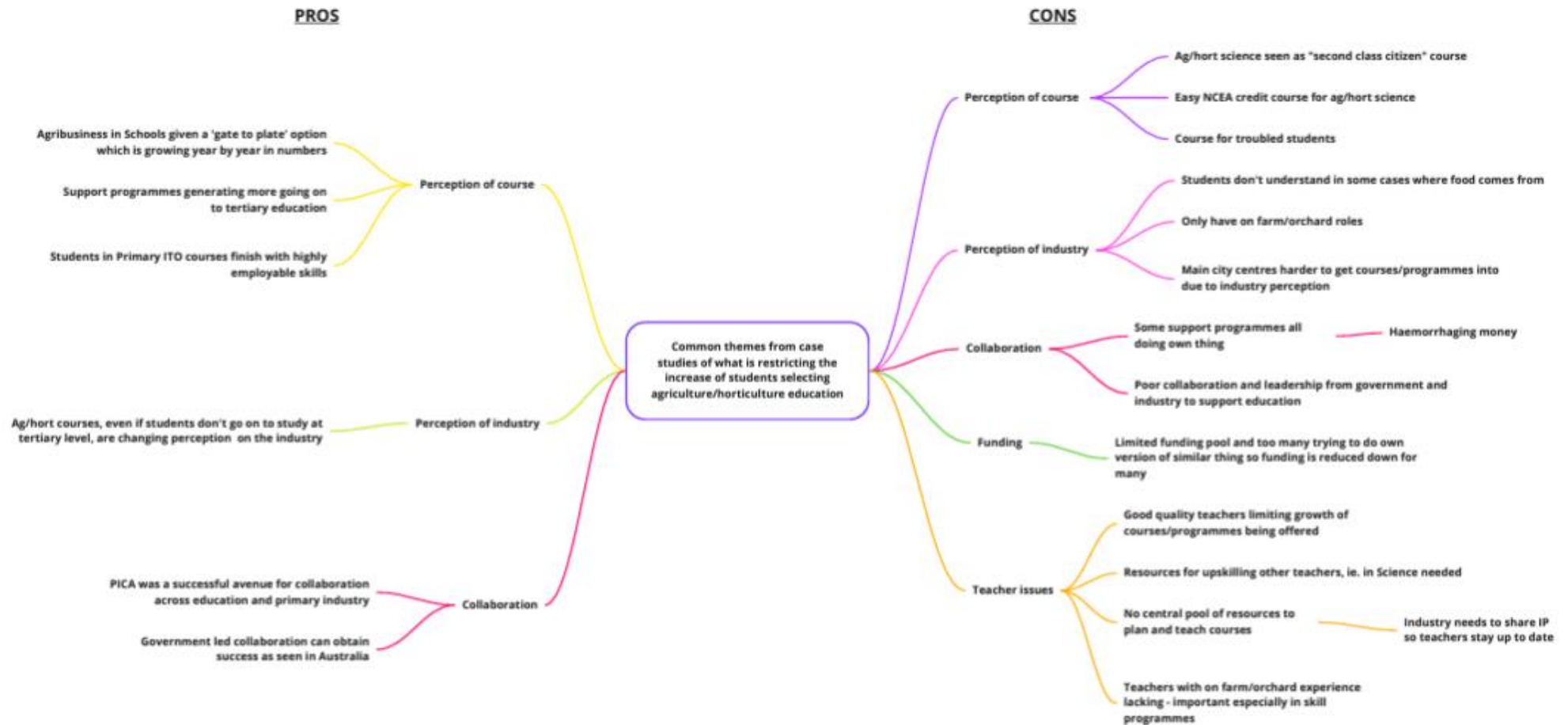


Figure 6: Mind map of case studies outlining the pros and cons of programmes / initiatives working alongside secondary schools

The Agribusiness in Schools programme (Agribusiness in Schools, 2023) developed by St Paul's Collegiate represents a significant shift in the approach to agricultural education in New Zealand in the 'gate to plate' side of the industry. Whereas the PIA programme (Primary ITO, 2023) at Geraldine High School, offers a valuable case study for the state of agricultural education in New Zealand in the 'grass to gate' side of the industry. These case studies show that success is possible with some strong industry-aligned programmes.

The case study on the Australian's agricultural industry's goal to become a \$100 billion industry by 2030 is a significant ambition that requires a multifaceted approach, focusing on education, workforce development, and industry collaboration and is a positive showcase of how collaboration and support by all involved in the industry can generate successful results (Figure 5).

Successes

Agribusiness in Schools has expanded to 116 schools nationwide in 10 years and the notable increase in students pursuing tertiary education in the primary sector, with the example of 27 students from St Paul's Catholic School at the end of 2022 school year choosing to go to Lincoln University in 2023, are positive steps forward. The programme has succeeded in changing students' perceptions of the primary sector, providing them with valuable life skills regardless of their career path.

The Geraldine High Schools PIA programmes success is with the development of highly employable skills among students. There's a desire to increase the percentage of students pursuing university studies in agriculture/horticulture, which is currently at 15% at end of 2022 school year.

All Australian government and industry initiatives aim to strengthen the agricultural workforce and education pathways to support the industry's growth target. The initiatives are well-rounded, addressing both short-term and long-term needs of the agricultural sector and are designed to attract, skill, and retain a diverse range of individuals, from students to young professionals. The recent success with Barkers College in North Sydney reflects the success Australia is starting to have in the secondary schools (Graham, 2021)

Perception of course and industry

St Pauls Collegiate School faced challenges with agriculture/horticulture science being undervalued and seen as an easy credit-earning option for NCEA Levels 1, 2 and 3. The Agribusiness in Schools programme introduced a comprehensive curriculum, making it more relevant to real-world needs. As the roll out of the programme to other schools has progressed, the introduction in Auckland schools has received mixed reactions due to varied industry perceptions. Therefore, changing the agriculture/horticulture course and industry's perception is essential for the programme's acceptance, requiring persistent effort and strategic communication.

The Geraldine High School PIA programme prioritises employable and life skills, however overall, the programme also has a frustrating perception that the course is an easy credit option, which undermines the value and rigor of the programme. This along with the programme only being available up to NCEA Level 2, again diminishes the perception of the programme as being non-academic and an easy credit option. Plans are underway to expand the programme to offer a NCEA Level 3 option but no set date has been identified.

Collaboration

The Agribusiness in Schools programme believes that while the dissolution of PICA initially facilitated collaboration across the primary sector, its absence has since resulted in a fragmented approach and less effective funding distribution. The PIA programme also points out that the lack of collaboration and leadership is causing financial inefficiencies and hindering the programme's success, and a think tank is suggested to tackle the issue of poor collaboration.

Whilst there are frustrations in New Zealand, Australia's recent collaboration in the past decade amongst government, industry bodies, and educational institutions has been effectively implemented so far. However, the long-term success of these initiatives will rely on continued effective implementation, ongoing funding, and the ability to adapt to changing industry needs.

This highlights the importance of collaboration and leadership for the success of agriculture/horticulture programmes and the need for sustained support and adaptability for long-term achievements in the industry.

Funding

Both the PIA and Agribusiness in Schools highlights that insufficient funding from the government and industry is a widespread challenge for agriculture/horticulture programmes. The current funding model is criticised for being inefficient, as it disperses small amounts across various programmes, which diminishes their impact and restricts the growth of agriculture/horticulture courses. A need for a more centralised and collaborative approach with better funding strategies for schools, students, teachers and resources, like the previous PICA model, could improve resource allocation and support for these programmes.

Teacher issues

Agribusiness in Schools identifies a significant obstacle in the shortage of qualified teachers to implement the programme, with four schools struggling to find suitable educators at present for 2024. The PIA programme is facing a similar issue, with a critical shortage of teachers, particularly those with hands-on experience, which is impeding the programme's expansion.

Unlike Australia who has developed centralised resource pools that support the secondary school curricula (Australian Pork, 2023) (Dairy Australia, 2023) (Forest Learning, 2023), New Zealand does not have a centralised resource pool for agricultural education, which is frustrating for teachers who spend personal time to obtain teaching resources.

More robust strategies to attract and retain qualified educators in agriculture/horticulture education, as well as the importance of centralised resources to support the programmes' development is essential for the future growth of students selecting agriculture/horticulture as an educational pathway.

Summary

Both the Agribusiness in Schools and PIA programmes have advanced agriculture/horticulture education, aligning with industry needs from 'grass to plate'. However, challenges like teacher recruitment and resource availability require ongoing support and creative solutions for the programme's sustainability and growth. Also, New Zealand face other substantial challenges, including industry perception and funding. Drawing lessons from past collaborations, such as PICA, could offer strategies for advocacy and resource management, essential for the programme's broader adoption and educational impact.

Australia's strategy to reach its ambitious agricultural industry goal by 2030 is holistic and proactive, combining immediate workforce measures with long-term educational plans. Ongoing evaluation and support are vital to achieve these objectives, which will influence the industry's capability to hit the \$100 billion target.

In conclusion, the key points and challenges highlighted in this summary, emphasise the importance of funding support, collaboration, and strategic planning in advancing agriculture/horticulture education in New Zealand and that there is potential for Australia's initiatives to serve as a model for New Zealand, demonstrating how government and industry collaboration can lead to significant workforce development.

7.0 Structured surveys with secondary school teachers

Surveys with 18 teachers, who teach the MOE agriculture/horticulture course or related programmes, revealed key data and themes from each question below.

The reasons agriculture/horticulture courses / programmes were set up in schools

The first question of the survey was to identify the reasons for why agriculture/horticulture science or supporting programmes like Agribusiness in schools were set up in the 18 schools that responded to the survey.

Whilst a third of schools already had the programme set up when the respondents started at the school, it is pleasing to see that nearly 30% of the schools have set up the programme due to the students requesting the course/programme to be offered.

Comments were made from two respondents (one from a rural school and one from an urban school) that they believed it was critical to make agriculture/horticulture science as a mandatory module in Science in Year 9/10 so that students can understand where the food they eat comes from and the impact that the agriculture/horticulture industry has on the

communities they live in and the New Zealand economy. One of these schools chose the MOE courses due to having a Māra kai resource at their school. The school wanted to teach their students the difference between growing as a culture and nature (leaving it to itself to grow).

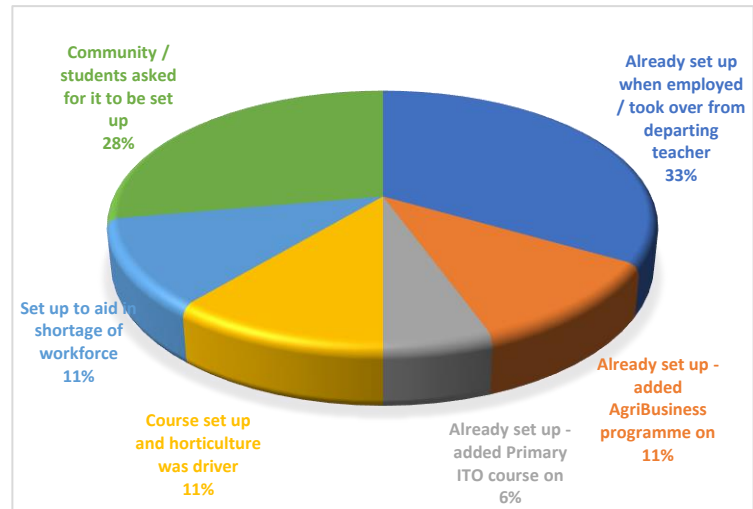


Figure 7: Teachers in secondary school's survey responses to "why was programme set up?"

Overall, no matter what the reasons as to why an agriculture/horticulture programme is set up, the respondents have a real passion to do more to support and grow the number of students that are choosing this educational pathway to support the industry.

The factors identified for a successful agriculture/horticulture course/programme

A question was asked to obtain an understanding of what the respondents saw as the actual success in the programme that was being run today versus what success would look like in five years' time.

The programme's success is largely due to its diverse student base and the practical experiences it offers, which encourage critical thinking about the industry. Despite challenges in finding relevant practical assessments for Year 12 students, more students are meeting course requirements and pursuing tertiary qualifications and careers in the primary industry than in previous years.

However, the programme is often viewed as an 'easy way to earn credits for NCEA grading', which is a challenge. The NCEA system's focus on credit accumulation over deep learning is seen as a drawback, with some respondents suggesting year-round teaching with end-of-year assessments to improve engagement.

Timetabling issues in some schools also pose a challenge, as they limit the options for students interested in pursuing tertiary education in agriculture/horticulture, as it lines up with other mandatory science courses.

Looking ahead, respondents believe that the success of agriculture/horticulture courses/programmes in the next five years would be marked by an increased number of students choosing these courses with improved achievements of merit and excellence grades. The ultimate success would be students leaving secondary schools and pursuing further tertiary education or roles in the agriculture/horticulture sector. Other indicators of success would be the introduction of agriculture/horticulture teaching from Year 9 and fostering a passionate, involved, and driven culture among students and teachers, whilst enhancing the public perception of the agriculture/horticulture courses/programmes, especially among parents of students, as an academic and valuable career option is also seen as crucial.

In conclusion, while the agriculture/horticulture courses/programme has its strengths and has achieved considerable success, it also faces significant challenges. However, the respondents provided valuable suggestions for overcoming these challenges and have a clear vision for the future success of the programme but obtaining the support of the industry and education sectors is crucial for future success.

What happens to the students who study agriculture/horticulture once they leave secondary school?

Of the 18 secondary school teachers that responded, it was identified that 52% of secondary school students who studied agriculture/horticulture programmes/courses in Year 13 of 2022 went on to further tertiary education or employment in the industry. Even though a small subset of student numbers, this indicates a strong interest and commitment to the agriculture/horticulture sector among these students.

A significant 62% of these students graduated from the nine urban secondary schools who responded. This suggests that urban schools are playing a crucial role in preparing students for further education or employment in the agriculture/horticulture sector.

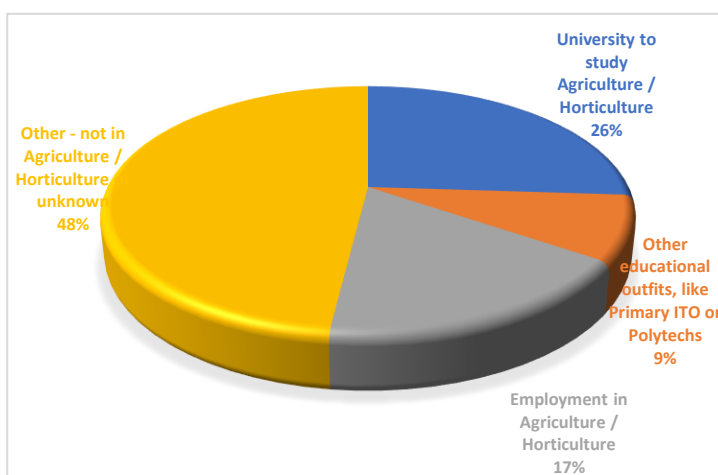


Figure 8: What did 2022 Year 13 secondary school students who studied agriculture/horticulture choose to do in 2023?

While it's clear that many students pursuing further education or employment in the agriculture/horticulture sector are from urban schools, the data does not provide information on the students' backgrounds. It's unknown whether these students were raised in urban cities/towns or if the students left rural areas to board in urban secondary schools.

The conclusion from the data is that there is a strong interest and commitment among students, particularly those from urban secondary schools, towards further education or employment in the agriculture/horticulture sector. However, the data also highlights a gap in our understanding of the students' backgrounds and if the student is raised in an urban or rural upbringing.

In summary, while the data shows a positive trend, with only 52% going on to further education in agriculture/horticulture or employment in the sector, there is ample opportunity to direct more students to follow the same pathway. It would be valuable for New Zealand's agriculture/horticulture and education sectors to conduct a survey to ascertain a more detailed understanding of the reasons why students select other pathways rather than agriculture/horticulture especially after selecting such a specialised subject.

What is needed from New Zealand government departments (MPI, MOE) and the Minister of Agriculture to help with the future success of agriculture/horticulture educational pathways

The respondents clearly identified a significant shortage of teachers who understand agriculture/horticulture is one of the biggest concerns that need to be addressed to help grow the future of agriculture/horticulture student numbers in secondary schools. There are many teachers nearing retirement and few trainees entering this field. Therefore, there is an urgent call for making it easier to qualify as an agriculture/horticulture teacher, such as through Teachers College or scholarships for career changers.

The respondents identified the importance of enlightening careers advisors and students about the vast range of opportunities in the agriculture/horticulture industry, which extends beyond farm/orchard work to numerous opportunities both locally and globally.

Respondents also articulated that the perception of the course as 'an easy credit course' or 'course for dummies' was a hindrance to increasing student numbers along with the promotion of the academic, scientific, and business aspects of agriculture and horticulture. The poor perception of the actual courses is also reflected in the perception of the industry, especially regarding the environment, that needs to be addressed for the sustainable growth of the educational pathway to a career in agriculture/horticulture.

One respondent mentioned in the survey that "*past experiences of teachers criticising the encouragement of the industry due to environmental concerns*" so to have teachers peers criticising is also detrimental to teachers wanting to fill the teacher shortages that New Zealand has.

There is a call for increased funding for courses/programmes to motivate teachers, provide appropriate teaching resources, and ensure practical industry learning. However, the multitude of different programmes/courses can be daunting for students unsure of the best pathway, and there is inefficient use of funding with similar programmes competing for limited resources.

The respondents also believe there needs to be collaboration across the education, agriculture/horticulture sectors and the government departments to address the significant challenges to strengthen the pathway to an educational and career for students to want to be involved in. The respondents felt that leadership by the government was the best way to success but overall responsibility is on all parties involved.

The respondents see the government and its related departments (MOE, MPI) role as crucial in addressing issues in the agriculture/horticulture educational and career pathway.

This includes dealing with teacher shortages, resource allocation, funding, and improving the perception of the industry and its courses.

However, the responsibility doesn't lie with the government alone. Agriculture/ horticulture industry organisations and businesses also need to contribute more through close collaboration and funding/resources.

How can New Zealand learn from other countries who have successful agriculture/horticulture programmes in secondary schools

Due to this being conducted as a survey instead of a semi-structured interview, this question was not answered in the truest context of its meaning intended and therefore some of the responses didn't clearly define what could be learned from other countries but also what can be learnt from other industries and general suggestions to improve student numbers wanting to study agriculture/horticulture.

Respondents saw Australia and what the government led initiatives are doing to drive stronger student numbers choosing agriculture/horticulture as a strong case for what New Zealand needs to consider having to achieve the same success as detailed in the Australian Government's workforce plan [Figure 5](#).

Funding and collaboration of online resources and programmes in Australia that are relevant and specific to different aspects of agriculture/horticulture is seen as hugely motivating for the respondents. Examples of this collaboration and helping to produce programmes and the supporting resources are Australia Forestry (Forest Learning, 2023) and Australia Pork (Australian Pork, 2023) and Dairy Australia (Dairy Australia, 2023).

In New Zealand, respondents expressed the view that agriculture/horticulture businesses and organisations tend to retain their sector's Intellectual Property (IP) instead of sharing it for the industry's future benefit. There is a desire for a resource pool like what exists in Australia. Additionally, respondents suggested the creation of a central educational resource pool for all sectors. This pool would include 'Ag Technicians', like existing 'Science Technicians' in New Zealand schools, who could service multiple schools in a region and provide updates on industry changes that need to be incorporated into the education curriculum. This is seen as the ideal outcome.

Once again the perception of the course being seen as a 'dummies course' was referred to, however suggestions were made to integrate agriculture/horticulture with science and economics, and emphasizing environmental sustainability is an important part of helping with the world climate and to promote being part of the change and solutions, not the tear down of an industry for the good of everyone. It was also reiterated that making agriculture/horticulture mandatory for all secondary schools, ie. in Year 9/10 science as a module (as has been done in NSW where students in Year 7/8 now have a compulsory unit within the technology syllabus which was implemented in 2019 (Logan, 2018)), so all students in New Zealand understand the impacts that the agriculture/horticulture industry has on their everyday lives, their communities, the country's economy and feeding the world will help to change the perception of both the educational and career pathway and be seen as a positive career option like law, health, engineering.

New Zealand can find success by learning from Australia's example, where government-led collaboration has effectively increased the number of students choosing agriculture/horticulture in secondary schools. This success is largely due to the provision of comprehensive resources that simplify the teaching process and better promotion of the industry as a respected career pathway. Respondents offered clear suggestions that New Zealand can adopt similar strategies to enhance the agriculture/horticulture educational pathway. Implementing these strategies could help change the industry's perception and the courses offered, putting New Zealand on the path to success in this field.

7.1 Overview summary of teacher surveys

Teaching New Zealand students about agriculture/horticulture is a passion for the respondents, who want to help them become the future workers/leaders in this field. However, they also face many challenges that prevent student choosing an agriculture/horticulture educational pathway to a career in the industry.

The main challenges are teacher shortages, funding, a lack of a central resource pool for planning and teaching, and a negative perception of the courses and the industry.

The respondents believe that the government and the industry should work together to support the educational programmes and learn from Australia's success. In Australia, the federal and state governments have led the change to a strong educational pathway with the support of the agriculture/horticulture businesses and the education sector. They have also implemented a comprehensive workforce plan that involves education extensively and is supported by generous funding ([Figure 5](#)).

The respondents think that collaboration with a clear vision for the future of the educational pathway, and financial backing from the government, related government ministry's (MOE, MPI), and industry businesses/organisations, will enable a successful future for New Zealand in creating a strong pathway from education to a career in agriculture/horticulture. There are enough passionate people in the industry, but they need strong leadership and respect for the education sector, which is part of New Zealand's biggest exporting industry, to help educate the future leaders of the agriculture/horticulture sectors.

8.0 Key findings / themes

This section summarises key findings and themes from the literature review, case studies and teacher semi-structured surveys to identify whether New Zealand's secondary school sector is strongly established to provide the future employees and leaders that the agriculture/horticulture sector requires to fill the current and potential future shortage of employees to meet future export expectations.

8.1 Findings

New Zealand's secondary education pathway has a solid foundation, with agriculture/horticulture science offered as an optional NCEA subject at Level 1, 2 and 3. There are also well established programmes that run alongside New Zealand's secondary schools like AgriBusiness in Schools (Agribusiness in Schools, 2023) and PIA and the Trades Academy Gateway (Primary ITO, 2023) that are supporting this solid foundation. However, even with this foundation, there are not enough students selecting agriculture/horticulture as an educational and career pathway.

According to 2022 Sow the Seed Report (Agricultural & Horticultural Science Advisory Team, 2022), 360 out of 501 secondary schools (or 71%) offer some form of agriculture/horticulture education that can earn NCEA credits. However, of the 267,366 students who chose a science course in 2022, only 10,808 (or 4%) selected agriculture/horticulture science (Ministry of Education, 2022).

This indicates potential for increasing student numbers, particularly in major city centres like Auckland, Wellington, and Christchurch; where currently only 14.5% of secondary schools in Auckland, 23% in Wellington (excluding Wairarapa), and 49% in Christchurch (including Selwyn and Waimakariri) offer agriculture / horticulture science subjects (Ministry of Education, 2022) (Agricultural & Horticultural Science Advisory Team, 2022).

Whilst New Zealand has a strong foundation in the courses/programmes offered, future growth is hindered by roadblocks identified in the literature review, case studies, and teacher surveys from New Zealand secondary schools. These roadblocks need to be addressed to ensure that future growth in students selecting agriculture/horticulture courses/programmes is improved to meet the current and future workforce requirements in the industry. With the right leadership and collaboration from the government departments (MPI, MOE), education sector and the industry businesses/organisations, success can be achieved.

The themes identified that are providing the roadblocks for New Zealand's future success in growing student numbers are identified in the next section.

8.2 Themes

If New Zealand wants to achieve its goal of an extra \$43 billion in export within the next decade, there needs to be a focus on creating a strong platform for getting students to select agriculture/horticulture as their educational pathway to choosing a career in the industry.

The below word cloud depicts the common themes that strongly came through in this report that are causes the roadblocks for future growth in student numbers choosing agriculture/horticulture course/programmes.

This word cloud is a visual representation that displays a group of words in various sizes, with larger words indicating higher frequency of use. The word cloud was generated from data collected through literature reviews, case studies, and teacher surveys. Four themes emerged with equal frequency, indicating consistency across the data sources. These findings suggest that while there are roadblocks, the issues are the same for all, making it easier to develop strategic plans to strengthen the educational pathway to a career in agriculture/horticulture.



Figure 9: Common themes depicting roadblocks to increasing student numbers in agriculture/horticulture education

Lack of resources

Teachers lack consistent resources for planning and teaching classes, and for upskilling themselves to understand both theory and practical aspects. The industry is divided, and sectors or businesses often keep their intellectual property to themselves.

There is a need for a centralised portal where teachers can go for everything required, with several teachers referring to centralised portals that some Australian states have implemented (Australian Pork, 2023) (Dairy Australia, 2023) (Forest Learning, 2023).

Also, with constant changes in the industry due to regulations, innovation, and technological advancements, there's a need for 'agriculture technicians' to be employed to update in-class resources and train teachers as and when industry processes/practices and technology advancements happen (like the 'science technicians' currently employed in New Zealand).

Shortage of teachers

There's a shortage of experienced agriculture/horticulture teachers, with many nearing retirement and not enough trainees coming through. At present, there are four schools trying to implement the AgriBusiness in Schools programme but qualified teachers cannot be obtained, therefore the programme won't be initiated.

Training courses for teachers who wish to teach agriculture/horticulture as a specialist subject do not appear to exist in New Zealand. Those wishing to specialise either need on-farm/orchard experience or do a Bachelor of Agriculture or Horticulture, and then must complete their Bachelor of Education Secondary. Other specialist subjects can be selected as a specialist subject whilst doing the Bachelor of Education.

The shortage of experienced teachers in secondary schools is forcing schools to either hire teachers from other subjects or to rely on inexperienced teachers. This can have a negative impact on students' engagement, as inexperienced teachers may not have the necessary experience to provide effective instruction and students may become disengaged as a result.

Financial constraints

There's limited funding in New Zealand to support any of the above and what funding is available is spread thinly across many initiatives/courses that are being offered.

There also needs to be a focus on ensuring these specialised teachers are paid enough to want to stay and educate the future workforce. Identified in the surveys, there are currently teachers considering leaving teaching agriculture/horticulture and going into the industry itself as it is financially more viable for those people.

The Government alone cannot be held accountable for funding everything and industry organisations/businesses need to be involved but there does need to be more of a focus to an industry that is such a big contributor to the New Zealand economy.

Need for collaboration

The agriculture/horticulture education sector is seeking collaboration from the government, industry bodies, and the education sector to support the education pathway. However, there is frustration with many organisations trying to do their own thing, leading to smaller funding amounts and less robust programmes for students.

The collaboration between the Australian Federal and State governments demonstrates that great success can be achieved through collaboration by all parties involved. New Zealand teachers, in particular, view this as a strong foundation for New Zealand to consider emulating.

The overall goal should be to simplify the education process and ensure there is a strong educational pathway to a career in agriculture/horticulture.

Perception of agriculture/horticulture industry and courses

The industry is often overlooked as a career path due to public, parental, and educational misconceptions. There's a call from those teaching agriculture/horticulture to rebrand the industry to New Zealanders, focusing on key concerns like climate and animal welfare, rather than the clichéd 'person in front of cows in a rolling paddock' image.

The perception of agriculture/horticulture education as a 'dummies course' or an 'easy way to earn credits' needs to also change. It's crucial to show the public, especially parents who influence their children's subject choices, the wide range of career options in the industry from farm work to scientists, innovators, marketers, and international salespeople.

9.0 Conclusions

When this research started, there was a very clear picture in mind that the reason New Zealand doesn't have high numbers of students studying agriculture/horticulture was because students don't understand the full array of opportunities available in the industry as a career and have a poor perception of the industry.

Whilst this is still true, the other major issues that were surprising, are that New Zealand doesn't have the funding, teachers and resources to be able to teach the curricula to a high, engaging standard and there are too many doing their own thing to get a slice of the funding pie.

The frustrating conclusion is that there is a strong foundation for a bright future in agriculture/horticulture curricula in secondary schools but the research shows that the issues identified back in the early 2000's are still the issues being experienced today.

Henry Ford's famous quote rings true here:

"If you always do what you've always done, you'll always get what you've always got."

To support the growth of exports and attract more students to agriculture/horticulture careers, the primary industry, government (MPI, MOE), and educational providers must collaborate to increase teacher numbers, teaching resource pools, and funding and identify how to do things differently from the past with 'smack you in the face, take notice of us' initiatives and marketing.

This can be achieved by learning from successful examples like Australia, where the Federal & State government has supported the agricultural export goal of \$100 billion by 2030 and are leading the way. The Australian Government and the Australian industry are collaborating and implementing initiatives and providing financial support which has allowed the agriculture education pathway to grow stronger over recent years, in attracting more students to study agriculture. Work has been done on the public in changing that industry perception of it being a bad industry to be involved with. Parents are now supporting their children on that agriculture educational pathway due to the industry being seen as a worthwhile career opportunity, as seen in the Barker College scenario in this report (Graham, 2021).

Nothing can be done without funding but it is crucial for future success. Government (MPI, MOE) and industry bodies like DairyNZ and Beef+Lamb (who already support the Agribusiness in Schools programme), along with HortNZ and FAR and industry corporate businesses need to further invest in secondary education to get students on the pathway at an earlier stage and demonstrate the benefits of a career in agriculture/horticulture. Funds need to be allocated to taking the public onboard the journey through better marketing that so much is being trialled and achieved to farm/grow more sustainably. The stock standard 'cow and person in green rolling hill pasture' is not going to change perception. A farmer saying "my GHG have reduced by 5% in past 3 years" is more effective. Farmers/growers can't be afraid to show New Zealand and the world how good New Zealand is in producing food and fibre.

With New Zealand reliant on food and fibre exports, it is crucial to address these issues now to ensure the country meets its export target of \$100 billion within the next decade and fills workforce shortages in the future, and the educational and primary industry are not sitting in 20 years' time with another report on a similar topic with the same issues and recommendations.

10.0 Recommendations

Recommendations to help grow a stronger educational pathway in agriculture/horticulture are:

10.1 Establish an 'Industry Working Group'

A working group of all parties across the agriculture/horticulture industry and education sector (including MOE/MPI) to help grow a stronger pathway and implement 'a strategy plan' that unites everyone to be on the same page to instil a stronger educational pathway starting in secondary schools. This should be initiated by members of the Kellogg programme who have done their research projects on similar topics due to the desire to see collaboration and change.

10.2 Establish a 'centralised managed resource centre'

The 'Industry Working Group' should help to establish a centralised 'Resource' portal for educational in-class and practical teachings, with specialist 'Ag Technician' positions responsible for updating resources and upskilling teachers. The portal could also be used for listing scholarships, funding, and other resources from industry organisations/businesses, and the government departments.

10.3 Investigate the creation of a graduate qualification for teachers in industry systems (for existing teachers) or graduate qualification in teaching skills (for skilled people leaving the industry)

The MOE could investigate creating a new graduate qualification to train current teachers in agriculture/horticulture, and a separate qualification for industry professionals transitioning to teaching these subjects in secondary schools, potentially through distance learning in their final farm year.

10.4 Implement a 'Sponsor an existing teacher' programme

An industry organisation/business initiative that is 'sponsor an existing teacher's education for upskilling into agriculture/horticulture teaching' programme. The industry businesses/organisations would sponsor an existing teacher who teaches other subjects in secondary schools to upskill into agriculture/horticulture science courses including obtaining practical experience on farms/orchards.

10.5 Implement an in-school career education programme "Urban Heart, Rural Soul: embracing agriculture/horticulture"

Personally, would like to partner with farmers/growers and other rural professionals to start an educational programme in major cities, teaching students about agriculture's advantages, career paths, and its role in enhancing global food security and solving industry challenges.

Other considerations from this report that would be beneficial:

- Ministry of Education need to ensure there is curricula in Year 9/10 in the general science course that dedicates to the basics of agriculture/horticulture so students understand where their food and fibre comes from and the importance of the industry. (Recommended in previous Kellogg reports and is a great idea that has also been initiated in New South Wales).
- Agriculture/horticulture industry organisations/businesses need to be more strategic with the promotion of the industry. Tackling a key issue, ie. Climate, could be done by a selection of farmers stating for example, "I've reduced GHG on farm by 3% in past 3 years and still working on it, how about you?" This needs to be in mainstream media.

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Appendices

A. Appendix 1: Survey Questions – Secondary schools

- 1) What made you set up the agricultural and horticultural science course or Agribusiness course that you have at your school?
- 2) What does the success look like for the school with your agriculture/horticulture course / programme:
 - a) What it currently looks like?
 - b) What would it look like in 5 years' time?
- 3) What % of your students in Year 13 in 2022 went on to:
 - a) University to study agriculture/horticulture?
 - b) Other educational programme providers like ITO?
 - c) An employment role in the primary sector?
 - d) Other (could be other study not related to primary sector or unknown what students have gone to)?
- 4) What do you believe the Ministry of Education, Ministry of Primary Industries, and the Minister of Agriculture should be doing to help grow agriculture/horticulture in secondary schools?
- 5) From your experience / knowledge, what can we learn from other countries who have successful agriculture/horticulture programmes in secondary schools?