



Digital Agriculture Technology

Adoption & Attitudes Study

NOVEMBER 2019



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“ This report reflects how farmers view digital technologies, how they are using it, and the real barriers we face in accessing the technology and skills needed in modern farm management and practice. ”

FOREWORD

Agriculture plays a unique role in our society. It is the lifeblood of our rural communities and a major economic driver for the country, being responsible for almost 8% of both GNI (Gross National Income) and employment. It is an industry underpinned by innovative and resilient farmers who are facing into an increasingly complex and challenging landscape where we will see significant change in market dynamics, consumer demand and policy.

We in the IFA are preparing for these times of great change by looking at the challenges that family farms face. We will continue to highlight to policy makers in Ireland and the world over that the family farm is the best way for us to deliver on the goals of feeding more and more people in the most environmentally sustainable way. We recognise the role that digital technologies have to play in helping us achieve these goals and in fact, we see it as an immense opportunity.

This is the reason why IFA's Farm Business Skillnet undertook a significant research project which was funded and supported by Skillnet Ireland. We surveyed over 750 individual farmers and conducted focus groups and interviews with IFA committees and industry stakeholders from the agri-business, research, advisory and technology sectors. We are very grateful to all those who took the time to complete the survey and speak with us.

As with most sectors, digital technology has surged into agriculture, challenging long-held assumptions and changing our understanding of what is possible. Technology promises improved productivity, outputs, quality, enhanced sustainability, reduced wastage and increased efficiencies, and the ability for farmers to make better decisions. This in turn will lead to better economic benefits on-farm, and as a consequence, in our rural communities. We, as farmers, recognise this, as is evident in this research which shows that 86% of farmers surveyed are already using digital technologies on the farm or plan to embrace it in the near future.

For us to build a vision of how digital technologies will change our industry in the next 5 years, 10 years and onwards, Farm Business Skillnet has produced this report which gives new insights into how digital technologies are currently used on-farm, how they are viewed by farmers on the front-line, and what can be done to help all members of the agricultural community adopt and benefit from the advantages these technologies can bring.

Agriculture also offers a rich opportunity for developing high-growth technology businesses that have the potential to bring Irish agricultural technology solutions to a global market. As a leader in agriculture, Ireland can build on the traditions of quality and dedication that we are renowned for, to become a leader in the next wave of technology that will drive agriculture forward.

However, in order for us as an industry to take full advantage of these opportunities, we need to understand what are the best approaches to help our farmers upskill, what environments and mediums work best for us and what kind of advisory and support structures are required to help transition into the digital agricultural era. The results show that current practices such as on-farm Discussion Groups are resonating with farmers (40% of farmers picked this as the learning environment that works best for them), but there is an increasing demand for new approaches such as online learning (41% of farmers under 35) and potentially a role for dedicated 'ag tech advisors' (37% of those surveyed).

This report reflects how farmers view digital technologies, how they are using them, and the real barriers we face in accessing the technology and skills needed in modern farm management and practice. Policy makers, agri-businesses, research organisations and the industry as a whole, should take heed of the key findings and work together to provide the policy guidance, tools and supports needed to fulfil the sector's aspiration and ensure a legacy for our farmers, rural communities and the country as a whole.



Joe Healy
President, Irish Farmers' Association



“ One of the core aims of this report is to analyse and define the digital skills gaps and requirements. ”



EXECUTIVE SUMMARY - FARM BUSINESS SKILLNET

As farmers, we are central pillars of socio-economic activity in every part of Ireland and are often the glue that holds rural communities together. Digital technology innovations hold a lot of promise for the sector but will also bring about changes to how we farm and run our enterprises.

With this in mind, Farm Business Skillnet set out to find out how technology is impacting farm businesses and what challenges and barriers we are facing in this time of digital transformation.

This Farm Business Skillnet research project has been funded and supported by Skillnet Ireland, as part of its Future of Work and Workforce Development series¹. This comprehensive research provides us with a range of views on how digital technologies are changing our industry – from agri businesses, technology companies, research organisation but most importantly from farmers themselves. This will aid us in developing education and learning programmes so that everyone, regardless of experience or competency, can develop the skills they need to participate in the digital transformation occurring in agriculture.

We know digital skills are becoming ever more important in today's economy. Agriculture is no different, with digital skills becoming an essential element of modern farm management, as an increasing amount of digital technologies focused on the agricultural sector come on the market. On top of the sector-specific challenges, digitalisation is having a major impact on the labour market and the type of skills needed. There has been an increase in the need for people with ICT and digital skills, but there is a very definite skills gap in the economy, and that is felt even more acutely in rural areas. As jobs and entire industries are changed through digital disruption, those affected should have the appropriate supports required to adapt.

One of the core objectives of this research is to analyse and define the digital skills gaps and requirements. This will give our Farm Business Skillnet network new insights into understanding the best ways to help farmers upskill and reskill in the digital era. We can see from the results of the research that 60% of participants include access to support and training in their top three barriers, after the critical matters of internet availability and making the initial investment in these technologies. Confidence in using digital technologies is seen as a key driver for many, and the approaches to training and education highlighted in this report are how we build that confidence.

Lowering the adoption hurdles by incentivising new technology uptake through policy instruments and programmes will also be critical, including the establishment of 'lifelong learning' models where learning is ongoing and self-motivated, but also enhances social inclusion and personal development. This is evidenced through the preferred forms of support that farmers have identified such as tailored face-to-face training, continuing the Discussion and Knowledge Transfer Group structures and also highlighting the crucial role of agri-advisors. By placing our focus on longer-term, systemic models of education and skilling, we can fortify the existing culture of continuous improvement already in place on Irish farms and will be critical for our international competitiveness now, and into the future.

Nigel Reneghan
Farm Business Skillnet Chair

¹ Future of Work and Workforce Development, Skillnet Ireland: <https://www.skillnetireland.ie/about/developing-your-skills/developing-irelands-future-workforce/>



“ The agricultural sector in Ireland is increasingly becoming more technologically advanced, and a key area of interest for Farm Business Skillnet is to equip farmers with the knowledge of how to use this technology and in turn increase technological adoption on farms in Ireland. ”

1. BACKGROUND

1.1 About Farm Business Skillnet

Farm Business Skillnet¹ is the training division of the Irish Farmers' Association (IFA), providing training and up-skilling to both the IFA volunteer structure and to groups of IFA members. Farm Business Skillnet is part of Skillnet Ireland². Skillnet Ireland is a national agency dedicated to the promotion and facilitation of workforce learning in Ireland. The Farm Business Skillnet network focuses on developing bespoke solutions to meet existing and emerging skills needs in Irish agriculture.

The agricultural sector in Ireland is increasingly becoming more technologically advanced, and a key area of interest for Farm Business Skillnet is to equip farmers with the knowledge of how to use this technology and in turn increase technological adoption on farms in Ireland.

In light of this, Farm Business Skillnet commissioned independent research consultancy Amárach Research to survey farmers and relevant stakeholders in Ireland.

The main focus was to establish:

- Current awareness and usage of farm technology.
- Barriers and positives to using farm technology.
- The most effective approaches to training and education and any additional support requirements.

1.2 About Amárach Research

Amárach Research carry out social, behavioural and policy related research. Established since 1989, we specialise in providing high quality full service and societal research, consulting and analysis.

Amárach holds the international quality standard for market, opinion and social research, ISO 20252. We strictly adhere to all guidelines set out in the ISO 9001 and ISO 20252 protocols.

1.3 Research Methodology

Farm Business Skillnet commissioned Amárach Research to undertake a national programme of independent research with Irish farmers, with support from Irish Farmers' Association members.

Research was carried out early in 2019, following a series of seven preliminary consultation meetings with IFA Committees and five in-depth one-to-one interviews with agri-industry stakeholders, representing agri-businesses and extension services supporting the sector.

This preliminary work informed the survey design, led by Amárach Research in collaboration with Farm Business Skillnet and the IFA.

Irish Farmer Survey

Farmers were invited to complete a self-completion survey of 30 questions. Given the importance of including farmers with low digital exposure in addition to those who are more digitally confident, and to ensure all farmers had an equal opportunity to participate in the research, taking a mixed methodology approach was critical. Farmers therefore had the opportunity to complete the survey online or as a paper-based questionnaire.

To facilitate online completion, a link to the Amárach hosted web survey was made available across various digital channels between 13th and 22nd February. Channels included a campaign on the IFA website, IFA App and promotion through banner ads on the agri-digital media. The survey link was accessed by 954 individuals and completed by 710 of these.

¹ Farm Business Skillnet: www.ifa.ie/skillnet/

² Skillnet Ireland: www.skillnetireland.ie/

In total 768 farmers participated in the research survey, 710 online and 58 via hard copy.

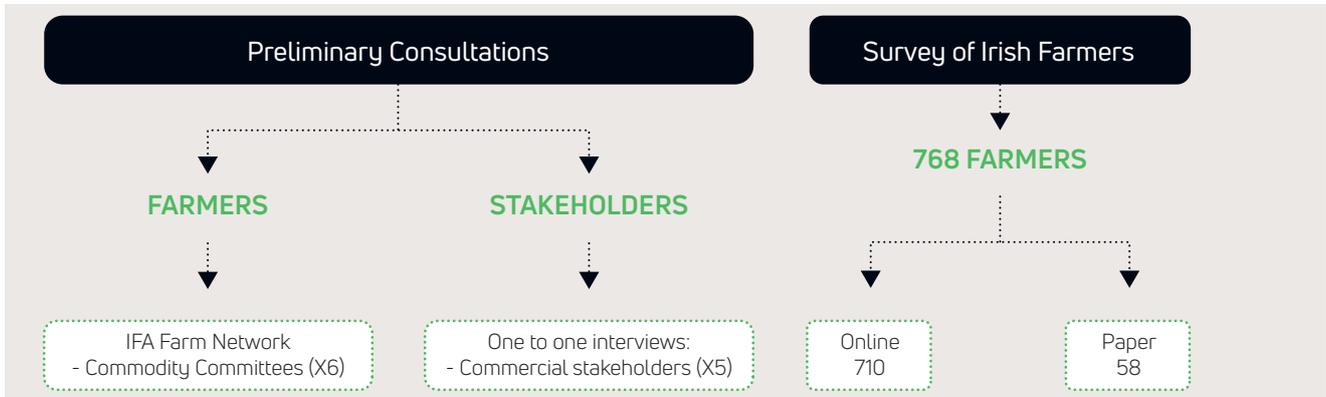


Figure 1

The overall sample size of 768 within the Survey of Irish Farmers provides an estimated margin of error of +/- 3.5% with a Confidence Interval of 95%.³

This report summarises the key findings of the Survey of Irish Farmers and includes additional commentary provided via the preliminary in-depth interviews with industry stakeholders.

NOTES:

Where data has been summarised in charts / tables, multi coding and rounding may have been used. Percentages may not therefore total 100%.

Base sizes are quoted per question. Where 'BASE : All respondents' is shown and the base is less than 768, this indicates some participants declined to answer the question.

Where base sizes are derived from filtered data/routing this is described alongside the base number.

1.4 Profile: participating farmers

Beef, dairy, sheep and tillage farmers dominated the sample, with representation of other farm enterprises also included but in smaller proportions.

Coverage across all regions and differing farm size was achieved. 56% of the sample were farming 30-99 ha. 15% of participants were female, 85% were male.

Just under half were aged 55+, 28% were 45 to 54 and 27% were under 45.

³ Margin of error calculated using Teagasc National Farm Survey data for Farm Population: 92,720. <https://www.teagasc.ie/publications/2019/national-farm-survey-preliminary-results-2018.php>

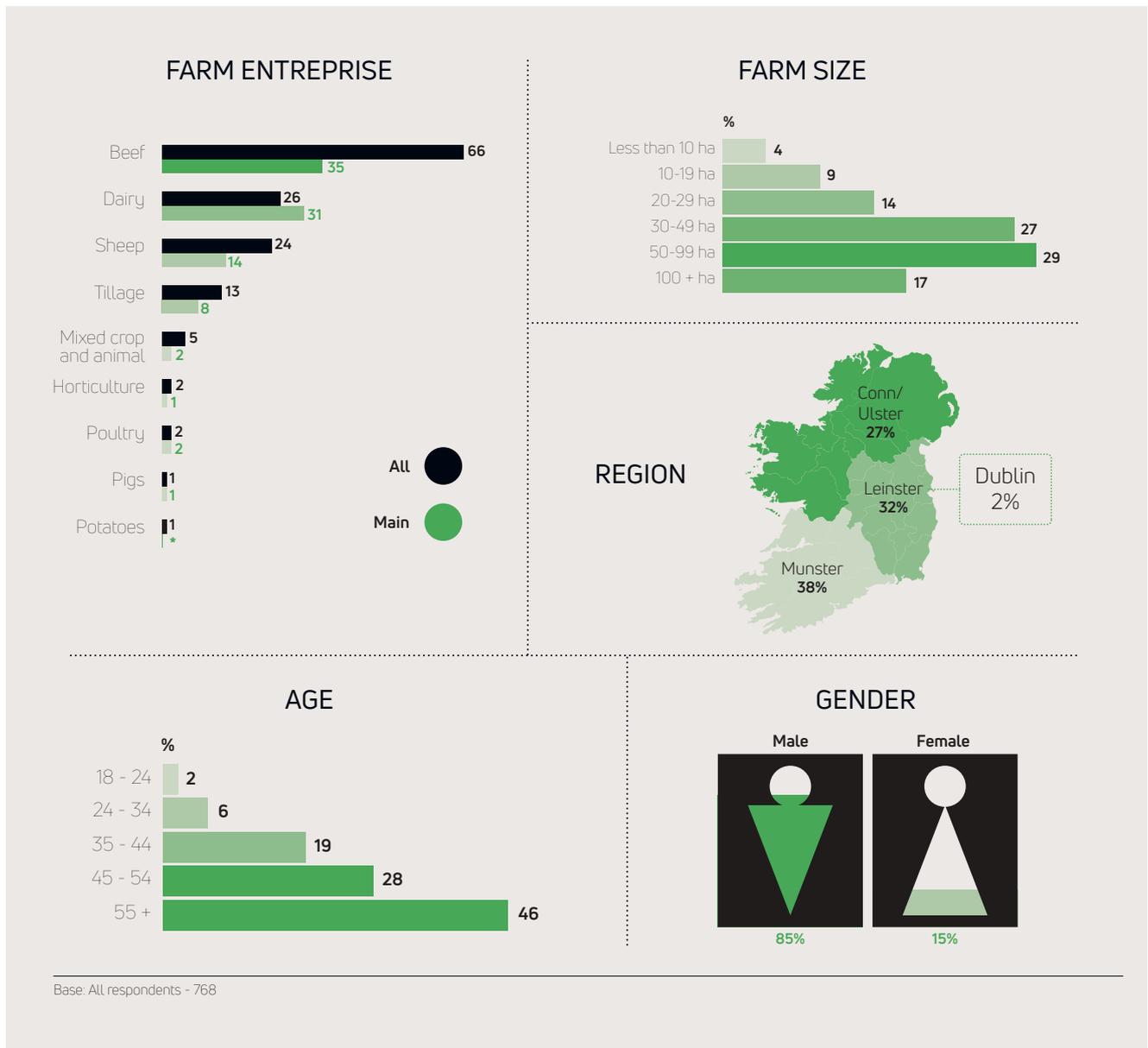


Figure 2

Three quarters of farms had a least one additional person working on them, either paid or unpaid, with an increased incidence on dairy and tillage farms, and those with larger acreage. Female participants were more likely to say they had other people working with them.

26% of farmers said they worked alone.

Q31 How many people, work on the farm with you in any capacity, either full or part time, whether paid or not?

(BASE : All respondents – 762)

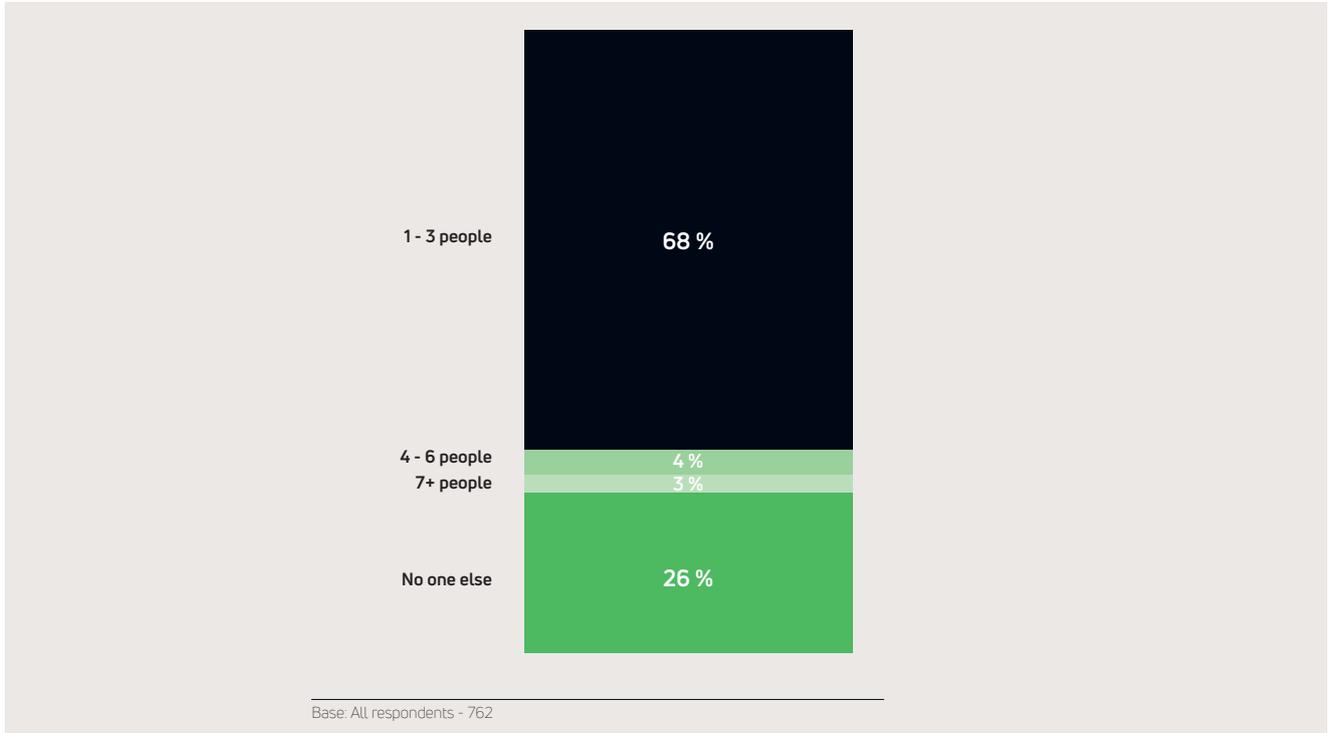


Figure 3

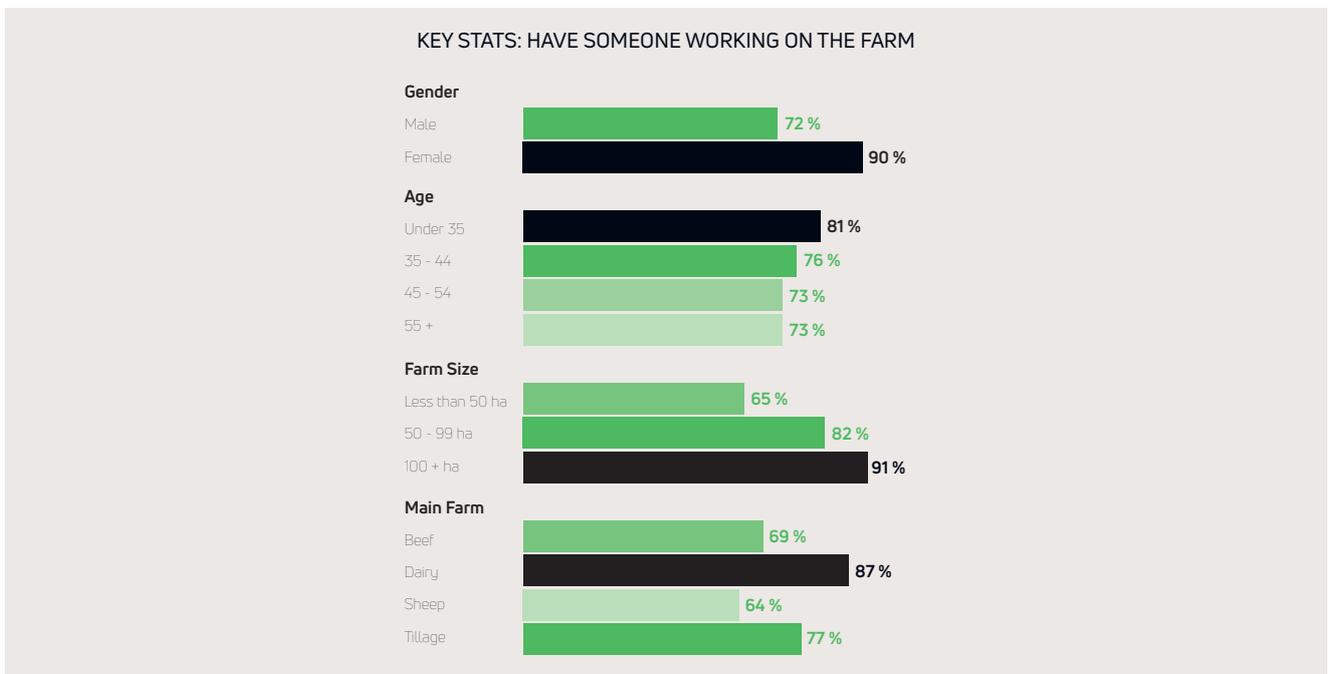


Figure 4

Over half have some other form of employment or income apart from farming, less commonly among dairy farmers. Nearly 7 out of 10 of under 35s and 7 out of 10 of those farming less than 50ha have other employment or income.

Q30 Do you have another source of employment or income apart from farming?

(BASE : All respondents – 761)

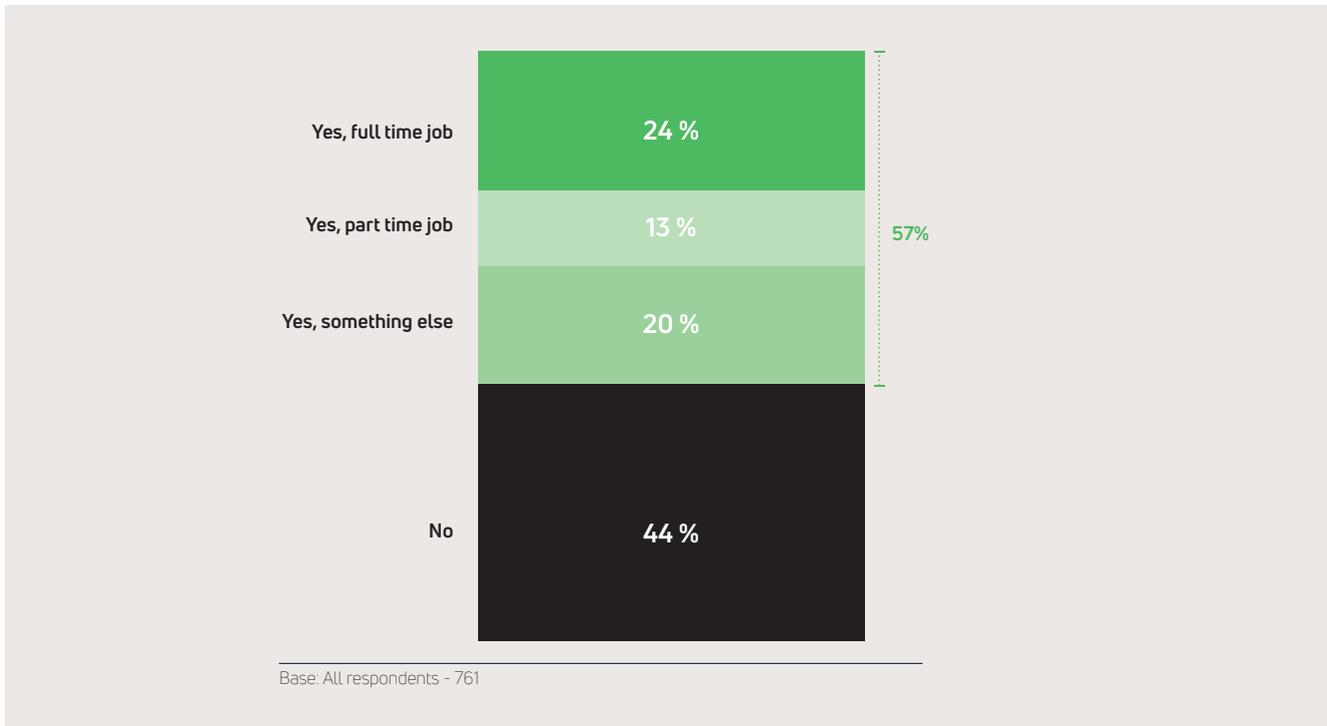


Figure 5

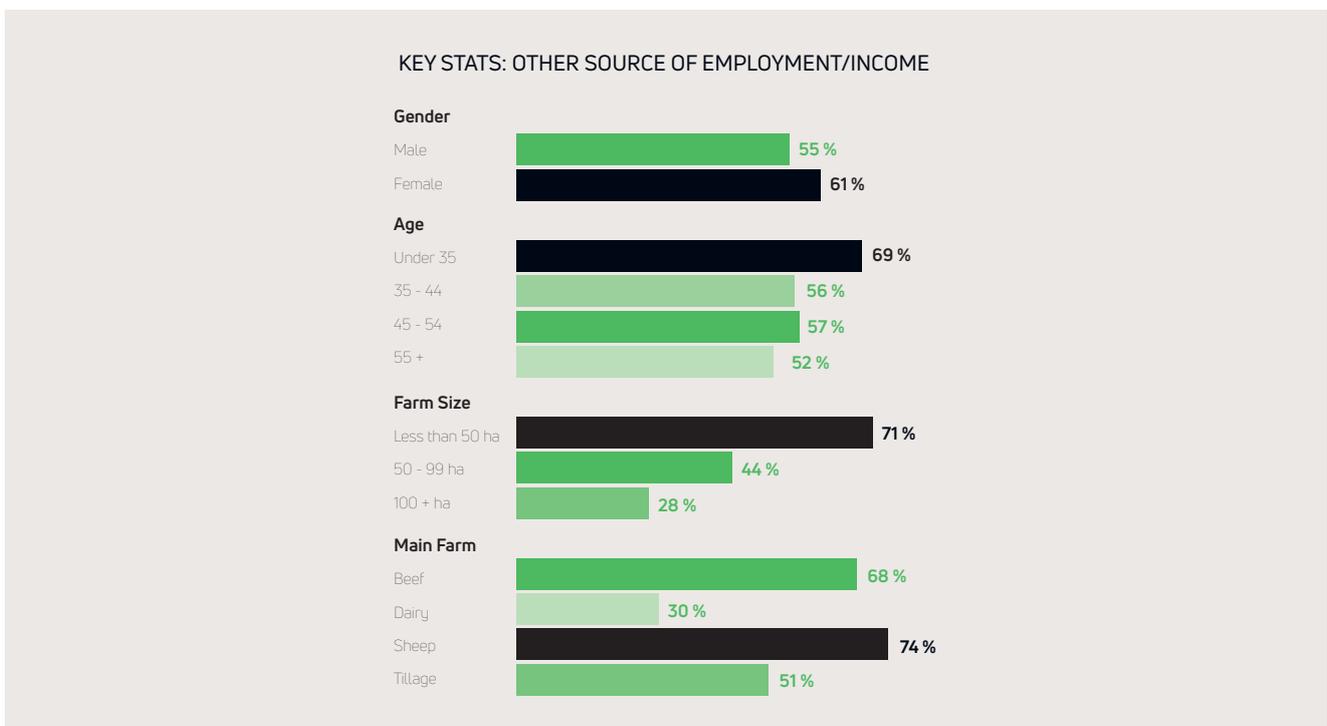


Figure 6



“A smartphone is a farmer’s office computer - software/apps and other technologies should be designed and managed through the smartphone.”

2. KEY TAKEAWAYS



Technology confidence

- Nearly half (49%) of farmers surveyed said they feel confident in using technology in general – half do not.
- 84% of all farmers use a smartphone.



Current farming technology usage

- There is a positive attitude towards farming technology. Although only 46% of farmers claim to be already using technology on their farm, a further 40% plan to embrace it in the future.
- Overall, technology awareness is currently limited, with only 10 individual systems and pieces of equipment registering awareness among one third or more of all farmers.
- Only two systems have over 75% adoption in a relevant sector, Calf Registration and GPS for machine guidance and steering.
- Presently dairy farmers seem to be most engaged, and if not using technology are most likely to adopt it.
- The majority of farmers use someone else to submit their Basic Payment Scheme online.



Comparing Ireland to international adoption of technology

- Two thirds of Irish farmers believe that Ireland is in line with the average compared to other countries when it comes to farming technology.
- Three quarters of Irish farmers believe the dairy sector is leading the way. One third highlighted the tillage sector.



Barriers

- 6 out of 10 include access to support and training in their top three barriers, after the critical matters of internet availability and making the investment.
- Confidence in use is key to many.
- Those who are not confident in everyday technology are more likely to see access to support and training as a barrier.



Leveraging current farmer experiences

- Agricultural related media has a strong influence on farmers.
- One of several face-to-face environments had been influential on many: farm advisor or agent, other farmers or farm Discussion Groups.
- Technology users were advocates of technology in saving time day-to-day.
- Dairy farmers and those farming 100+ ha cited reductions in administration, increased livestock knowledge and wider access to information and data to support decision making.
- Tillage farmers were conscious of the impact on reducing input costs and usage, and acknowledged improved yields and confidence in knowing more about soil and crop conditions.

Education & training



- 60% of farmers have completed a diploma or third level or higher education.
- Three quarters of farmers have completed farming related training courses.
- One quarter of those who have completed training, have completed courses in digital farming technology.
- Those who have completed digital training courses are more likely to invest in technology in the future than those who have not.
- Those using technology on their farm are more likely to have completed on-farm Discussion Groups and evening classes than those not using technology.
- In an ideal situation, farmers feel on-farm Discussion Groups are a better learning environment, with evening classes the most suitable time.
- Under 35s are most likely to have completed peer led and online training.
- Under 35s feel most comfortable with online learning but still are just as likely to value on-farm Discussion Groups.
- Those who are likely to invest in technology are more likely to feel that on-farm Discussion Groups are an ideal learning environment when compared with those who are unlikely to invest.
- Farmers are open to encouragement through training, particularly training in how to utilise the technology.
- 61% of under 45s in particular are looking to be more strategic - understand the financial impact, get the most value and see measurable improvements.

“As a one-man setup I find time my biggest problem. If there was something that would get me set up at reasonable cost and then someone to show exactly how it works on a one-to-one basis. In such a case you organise yourself to have the hours available for this project.”



Supports & incentives

- Tailored face to face training, Discussion or Knowledge Transfer Groups and dedicated agri-tech advisors would be the preferred forms of support to help farmers use technology.
- An openness to video-based training is also evident among certain cohorts.



Sharing data & future investment

- 40% of farmers said they would be happy for their data to be collected in exchange for a reduction in the cost of on-farm technology.
- A further 44% say more information or assurances are needed.
- 6 in 10 Irish farmers say they are likely to invest in digital technology on their farm in the future.
- The majority considering investing are planning to do so within the next two years, with those in tillage and the under 35s claiming they are most likely to act within the next 12 months.

“Information is the key. There is a distinct lack of readily available information. The info needs to be directed at people who need it most and more could be done to achieve this. Many older farmers feel excluded and something should be done to encourage them to engage in tech.”



Closing the gap

- Facilitating set up and providing on-going support are the two priority areas in increasing digital agriculture adoption.

Key requirements

- Increase confidence.
- Build appreciation of cost vs benefits.
- Provide a hands-on practical and peer-led approach to learning and support.
- Support through financial incentives – these are valued – and also provide support through training.
- Better broadband is key.

“It has to pay its way! If it makes financial sense, it will be of benefit.”



“ It’s not only big or full-time farmers benefit from technology. There is a certain level of stigma and ignorance from older generation to younger generation about the role of technology. ”

3 TECHNOLOGY CONFIDENCE

Confidence in technology varies by age and farm type and is positively influenced by adoption.

Almost half (49%) of farmers surveyed said they feel confident in using technology in general.

Nearly 40% described their confidence as 'average', whilst just over 10% were not confident.

Q4 How confident if at all would you say you are in using technology in general?

(BASE: All respondents - 766)

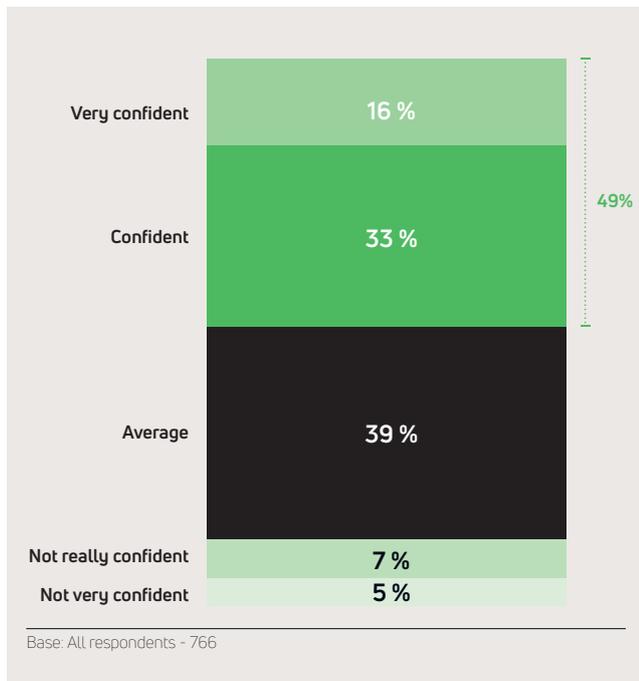


Figure 7

The percentage confident increased to 88% for those aged under 35, and to 74% for 35-44s.

"Get an iPhone and practice using it. Get tuition from family members."

Tillage farmers were more likely than others to claim confidence, 66%.

Tech confident farmers were more likely to:

- Have completed digital farm training (60% completed vs 48% not completed).
- Already be using technology (54% using vs 38% not using tech).
- Invest in farming technology in the future (59% likely vs 43% not likely to invest).

Q4 How confident if at all would you say you are in using technology in general?

(BASE: All respondents - 766)

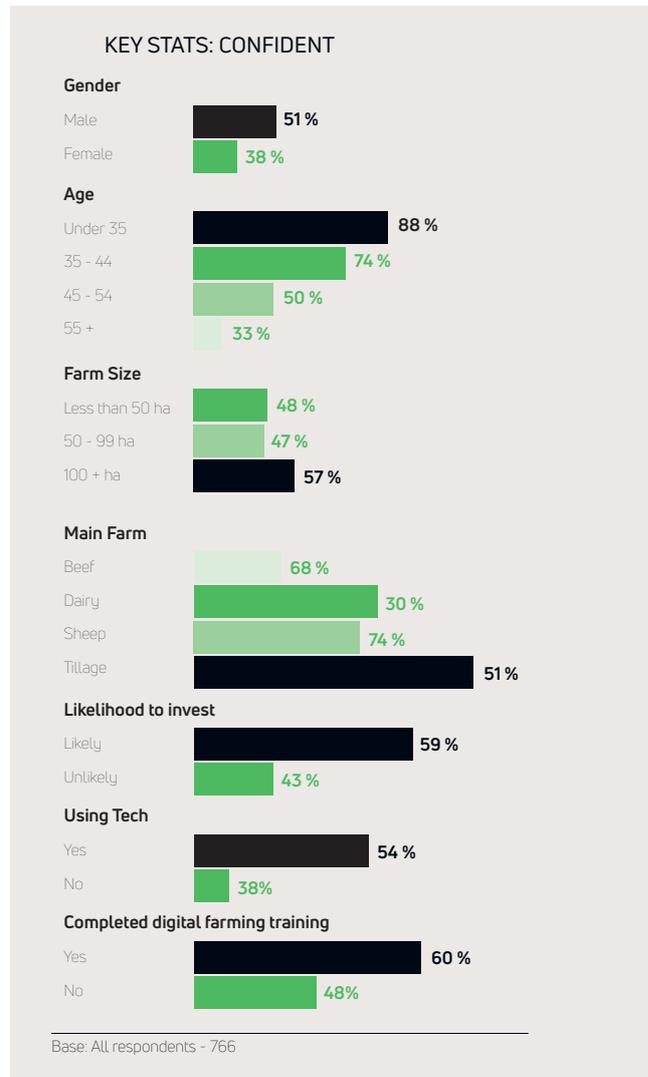


Figure 8

Smartphone usage is high, although extent of usage is variable and tied to confidence.

84% of all farmers use a smartphone (e.g. Apple iPhone, Samsung Galaxy) in everyday life, not limited to those claiming to be 'confident with technology', since 66% of those 'not confident' do use a smartphone.

Q1 Do you use any of the following technologies in your everyday life?

(BASE: All respondents - 766)

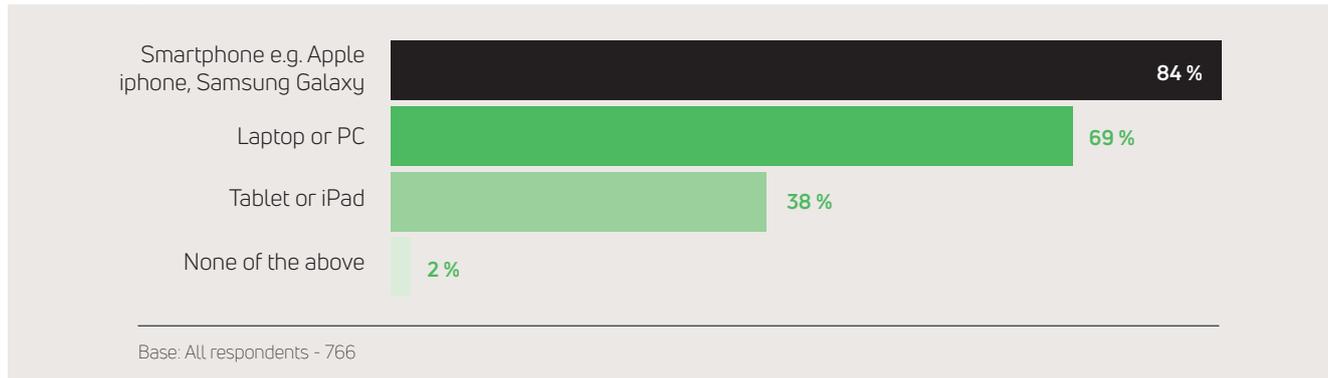


Figure 9

IT confident farmers over index on smartphone usage at 93%. This is in line with smartphone usage amongst all Irish consumers, according to the Deloitte Ireland 'Mobile Consumer Survey 2018, the Irish Cut'.⁴

%	Total	Confident with technology	Not confident with technology
Smartphone (e.g. Apple iPhone, Samsung Galaxy etc.)	84	93	66
Laptop or PC	69	75	49
Tablet or iPad	38	44	25
None of these	2	*	11

Table 1

Tillage farmers and those with larger farms, 100+ ha, over indexed on their usage of all devices.

%	Farm Type				Farm Size		
	Beef	Dairy	Sheep	Tillage	Less than 50 ha	50-99 ha	100 + ha
Smartphone (e.g. Apple iPhone, Samsung Galaxy etc.)	82	89	84	94	83	84	89
Laptop or PC	64	72	65	83	65	70	80
Tablet or iPad	37	40	32	47	36	37	45
None of these	2	2	2	0	2	3	2

Table 2

⁴ <https://www2.deloitte.com/ie/en/pages/technology-media-and-telecommunications/articles/global-mobile-consumer-survey0.html#>

Smartphone usage amongst the under 55s age cohort was in line with the higher national consumer picture, with 9 out of 10 using a smartphone in everyday life (91% 45-54, 93% 35-44, rising to 95% of under 35s). In comparison, 75% of over 55s used a smartphone.

PC/laptop usage for the over 55s was aligned with all 35+ age group farmers. PC/laptop usage was highest amongst the 35+s. Those aged 35-44 indicated the highest usage of tablets/iPads.

9 out of 10 farmers with a smartphone say they use it for checking the weather, 8 out of 10 for checking the news and 5 out of 10 for checking livestock prices.

There is widespread use of smartphones for daily farming activities with 48% using their smartphone for farm records management, highest among dairy farmers where 7 out of 10 say they use their smartphone for this purpose. 28% check input prices, predominately tillage farmers

%	AGE			
	Under 35	35-44	45-54	55+
Smartphone (e.g. Apple iPhone, Samsung Galaxy etc.)	95	93	91	75
Laptop or PC	73	67	69	69
Tablet or iPad	39	48	36	36
None of these	2	0	*	4

Table 3

Q2 Do you currently use a smartphone for any of the following activities related to farming?

(BASE : All that use smartphone in everyday life – 645)

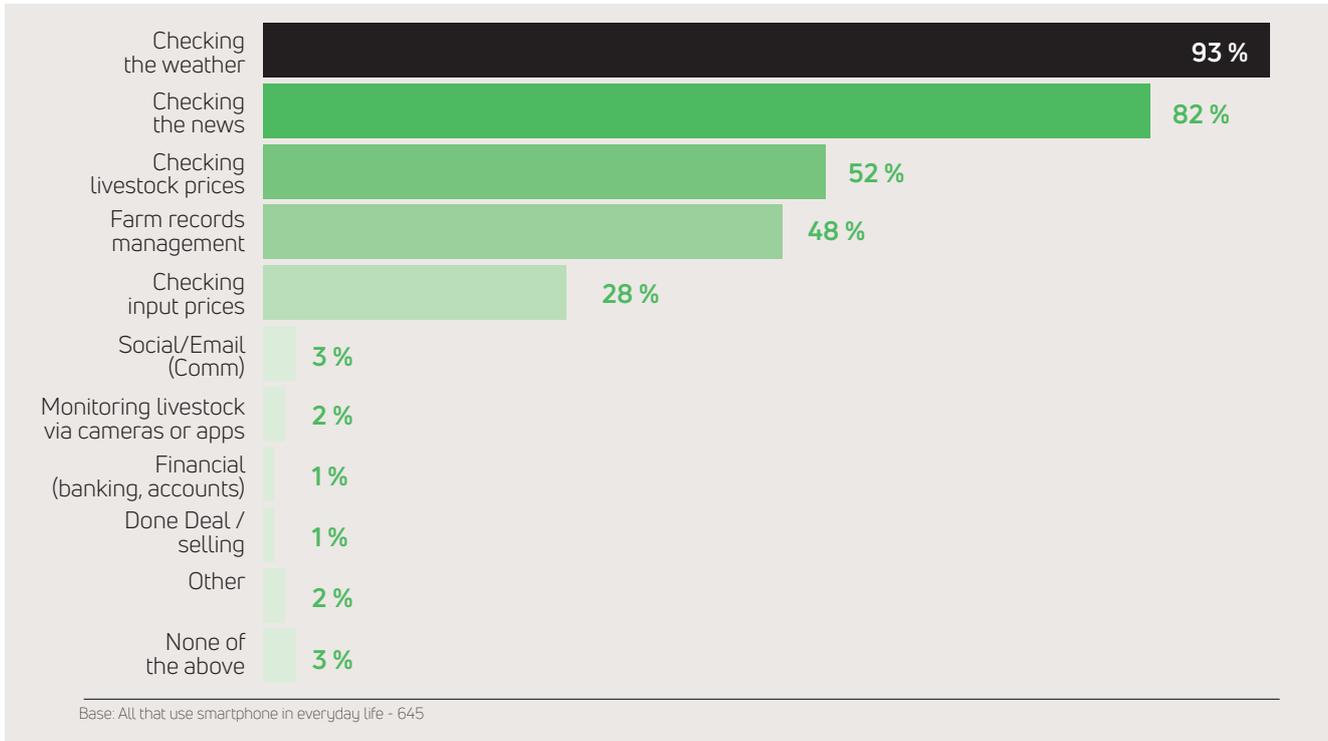


Figure 10

4

“ Those least engaged were those lacking in confidence in using technology in general. This group is more likely to have a negative attitude towards farming technology and most likely to find it too difficult to use. ”

4 CURRENT FARMING TECHNOLOGY USAGE

The majority of farmers appear open to technology.

There is a positive attitude towards farming technology, with 86% either already using technology on their farm or planning to embrace it in the future.

Within this overall figure of 86%, 46% are already using technology on their farms. Incidence was highest amongst dairy and tillage farmers, and those who had received training.

Whilst over half of the 35-44s said they were already using technology, nearly 60% of the under 35s planned to embrace technology in the future. Reassuringly, around one third of those in the older age groups were also open to technology in the future with 43% already using it.

Those least engaged were those lacking in confidence in using technology in general. This group is more likely to have a negative attitude towards farming technology and most likely to find it too difficult to use.

Q8 Which of these statements best describes your attitude towards using farming technology?

(BASE: All respondents -761)

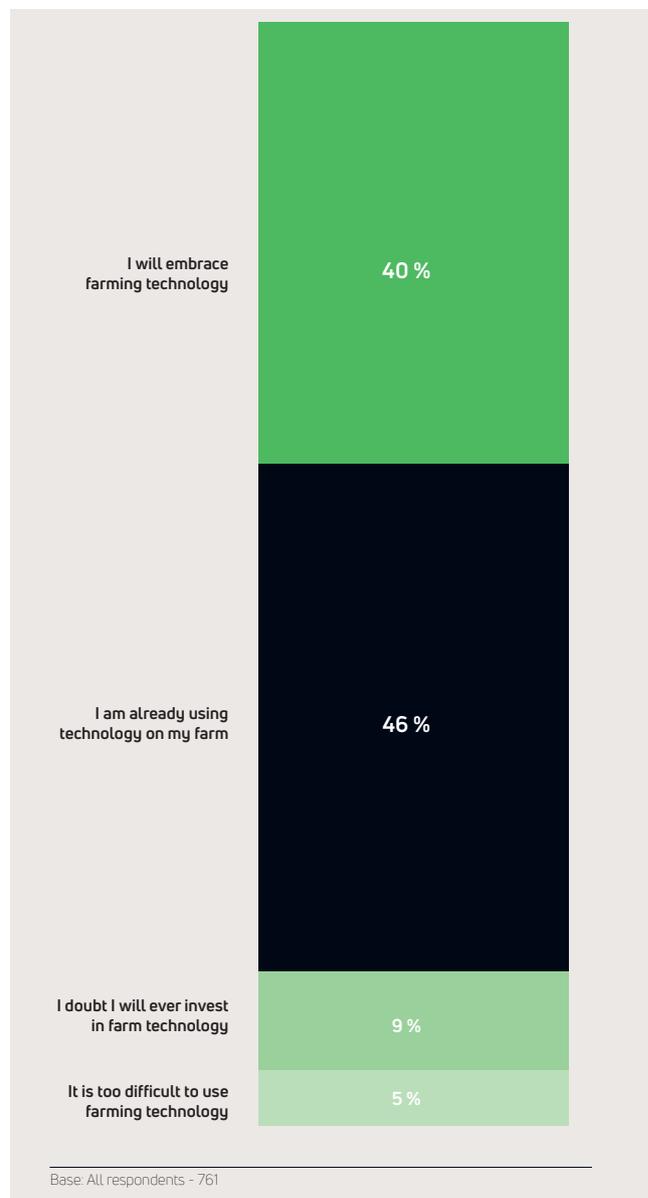


Figure 11

Q8 Which of these statements best describes your attitude towards using farming technology?

(BASE: All respondents – 761)

%	TOTAL	Main Farm				Age				Location				Likelihood to invest		Received Training		Tech confidence	
		Beef	Dairy	Sheep	Tillage	Under 35	35-44	45-54	55+	Dublin	Leinster	Munster	Conn/ Ulster	Likely	Unlikely	Yes	No	Confident	Not confident
I am already using technology on my farm	46	40	61	30	53	37	53	49	43	54	45	53	37	57	35	63	42	58	18
I will embrace farming technology	40	43	32	54	32	59	41	38	38	38	42	34	46	39	27	35	41	38	38
I doubt I will ever invest in farm technology	9	11	4	11	9	3	4	8	14	8	8	9	11	2	30	2	10	4	20
It is too difficult to use farming technology	5	6	3	5	6	0	2	6	6	0	5	4	6	2	8	0	6	0	24

Table 4

Overall, technology awareness is currently limited, with only 10 individual systems and pieces of equipment registering awareness among one third or more of all farmers.

Survey participants were presented with a list of 32 available farming technologies, 15 livestock and 17 arable, and asked to indicate those they had heard of, those they are using/ have used and those they plan to use in the future.

Only one system, Calf Registration, was currently being used by more than half the sample, with around one third using three of the others in the ‘top four’:

- Camera monitoring
- Herd management
- Remedy recording

Future intentions for these three types of systems remain at a limited level.

Top 10 farming technologies

Q5 Have you heard of any of the following farm technologies?

Q6 Have you used or are you using any of them?

Q7 Do you plan to use any of them in the future?

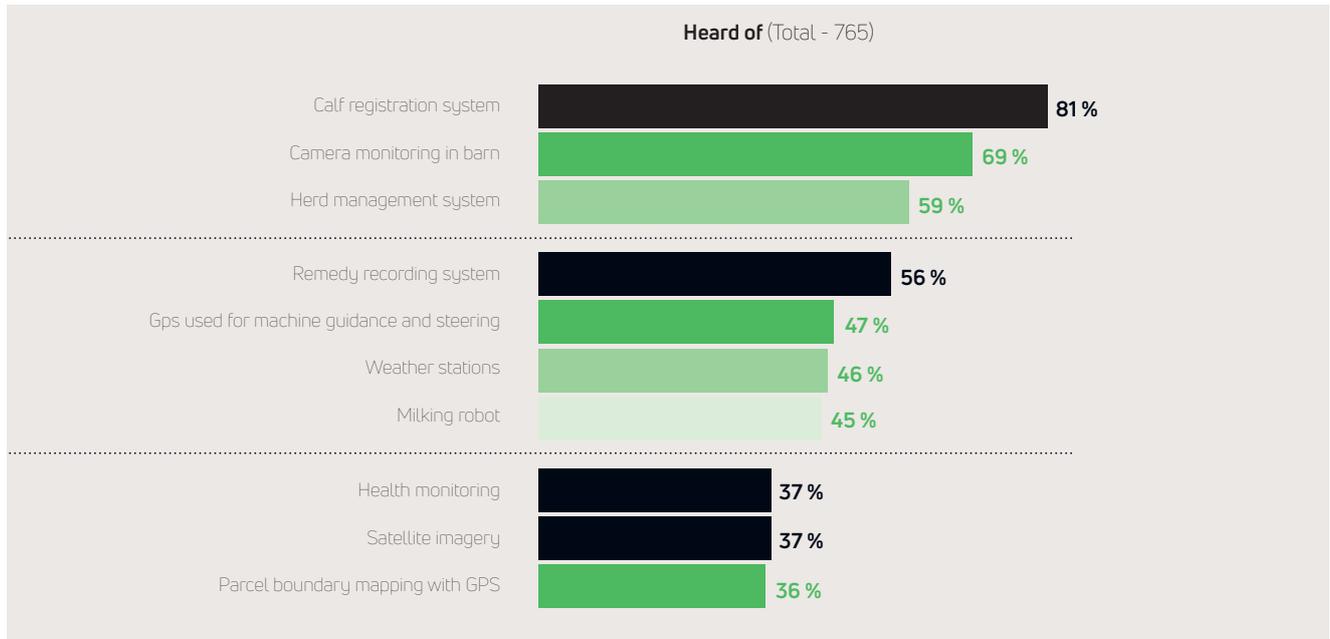


Figure 12

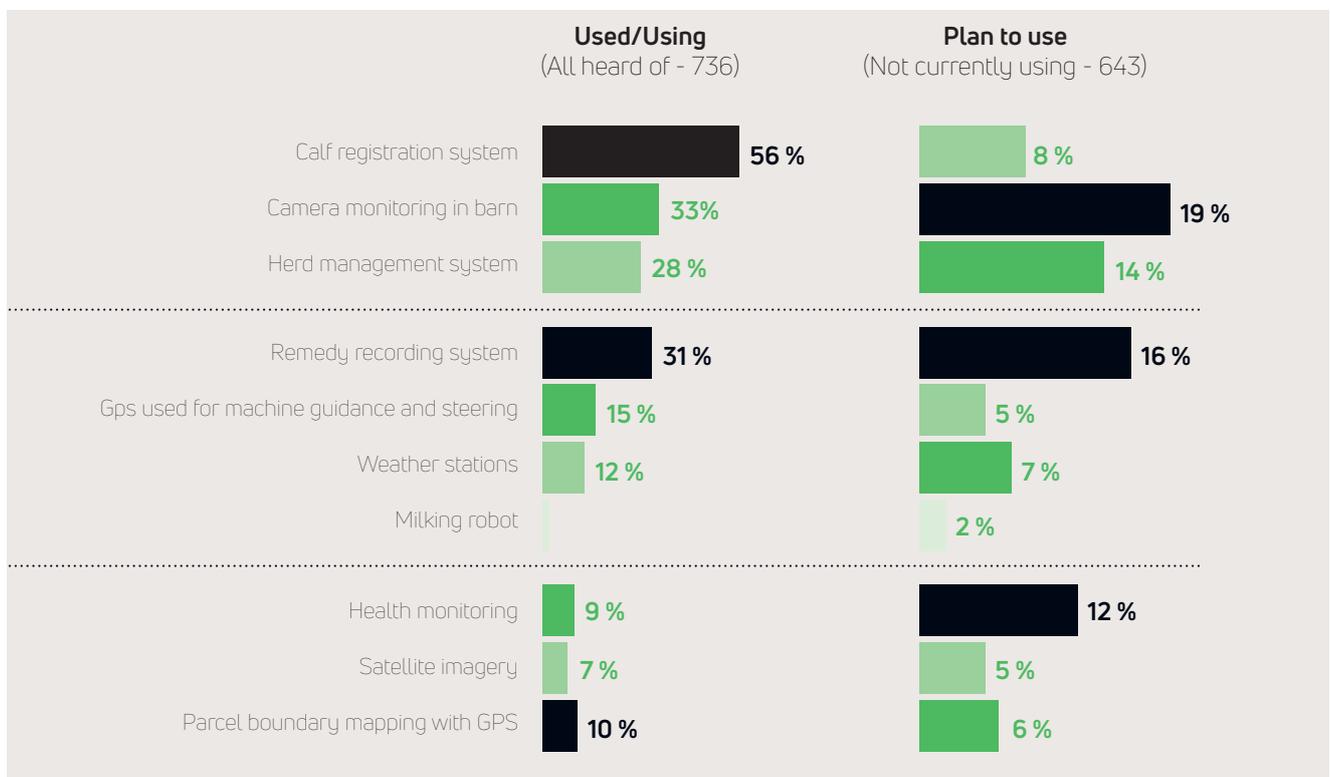


Figure 13

Top systems were predominately relevant to the beef, dairy and tillage sectors:

Calf registration system
Camera monitoring in barn
Herd management system
Remedy recording system
GPS used for machine guidance and steering

Table 5

Whilst take up appears strongest within these sectors, particularly dairy, only two have over 75% adoption in a relevant sector: calf registration systems (86% of dairy farmers are using/have used) and GPS for machine guidance and steering (77% of tillage farmers are using/have used).

Whilst 83% of beef farmers have heard of calf registration systems, and 56% have adopted, only 10% more are planning to use in the future.

Similarly, 66% of beef farmers have heard of camera monitoring in the barn, only 30% have used, with 17% more

planning to use in the future. Sheep farmers register higher levels of future interest in camera monitoring than beef and dairy farmers, at 27%. They also register higher future interest in remedy recording systems than beef farmers, and at 23% are aligned with future interest amongst dairy farmers.

Dairy farmers seem to be most engaged and likely to adopt technology overall at the present time, if it is not already part of their activity, with 86% using a calf registration system, and around half having any of the remaining three in the top four: camera monitoring, herd management system, remedy recording system.

Whilst at least two thirds of tillage farmers are aware of GPS machine guidance and steering, parcel boundary mapping with GPS and satellite imagery, take up of the latter is only at 28%, with just 9% more interested in the future. 55% of tillage farmers are using parcel boundary mapping, but only 7% more indicate future interest.

Two thirds of dairy farmers are aware of milking robots, but only 4% claimed to be using and 6% of those where dairy was their main farm enterprise indicated future interest.

Sector breakdown (Top 10)

Q5 Have you heard of any of the following farm technologies? Q6 Have you used or are you using any of them? Q7 Do you plan to use any of them in the future?

%	Q5 Heard of Main Farm				Q6 Used/Using				Q7 Plan to Use			
	Beef	Dairy	Sheep	Tillage	Beef	Dairy	Sheep	Tillage	Beef	Dairy	Sheep	Tillage
Calf registration system	83	97	69	53	56	86	26	13	10	10	6	5
Camera monitoring in barn	66	83	74	51	30	53	18	15	17	24	27	5
Herd management system	55	76	49	51	24	46	17	17	15	17	14	9
Remedy recording system	50	79	53	47	27	53	16	17	15	23	23	2
GPS used for machine guidance and steering	39	51	43	96	7	15	7	77	3	7	1	7
Weather stations	42	50	47	55	12	11	12	17	7	10	7	2
Milking robot	39	61	42	34	1	4	1	0	1	6	0	5
Health monitoring	32	53	32	34	6	13	7	4	9	23	11	7
Satellite imagery	30	35	44	66	6	2	9	28	3	6	3	9
Parcel boundary mapping with GPS	29	31	42	81	5	5	11	55	4	6	6	7

Table 6

Other technologies

Q5 Have you heard of any of the following farm technologies?

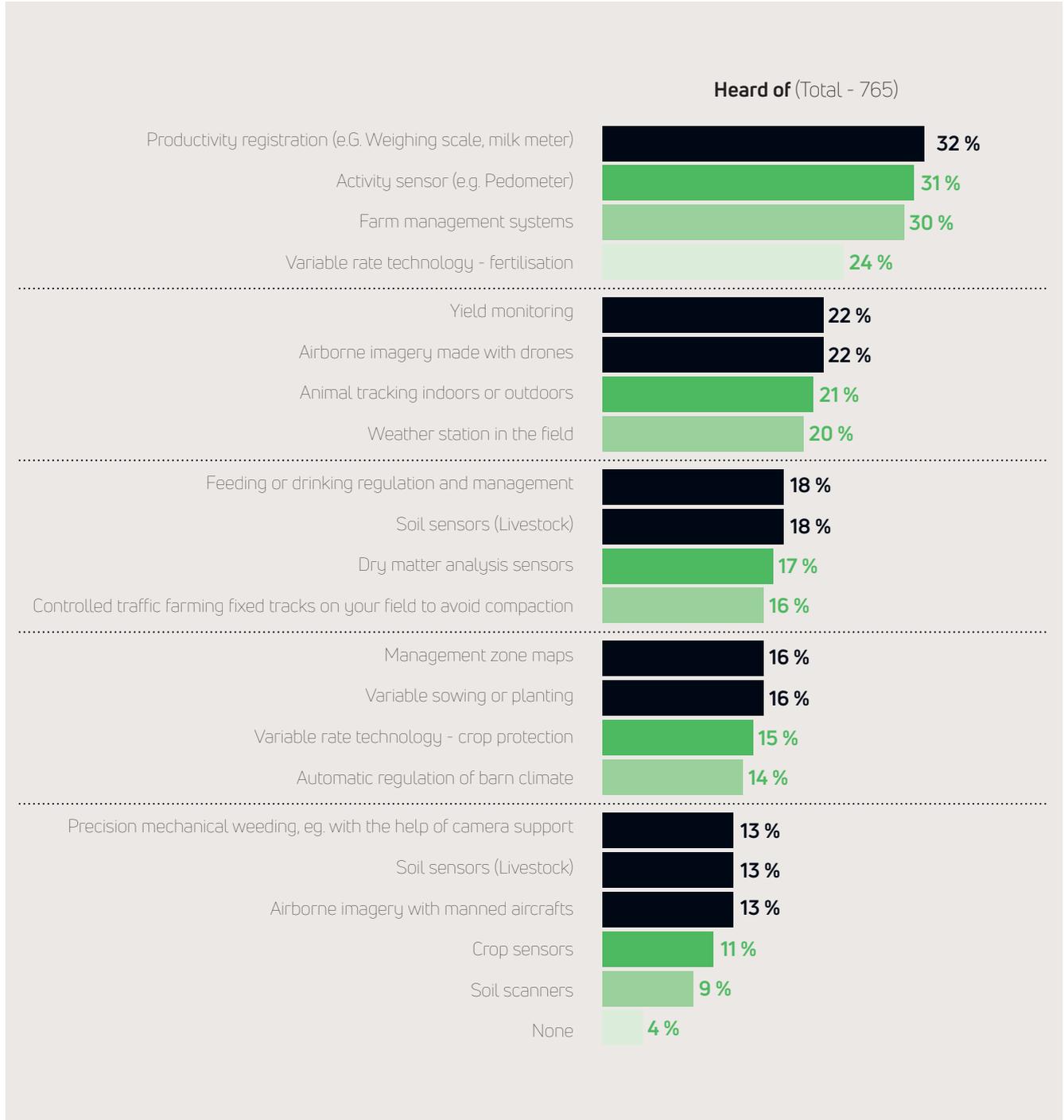


Figure 14

Q6 Have you used or are you using any of them?
Q7 Do you plan to use any of them in the future?

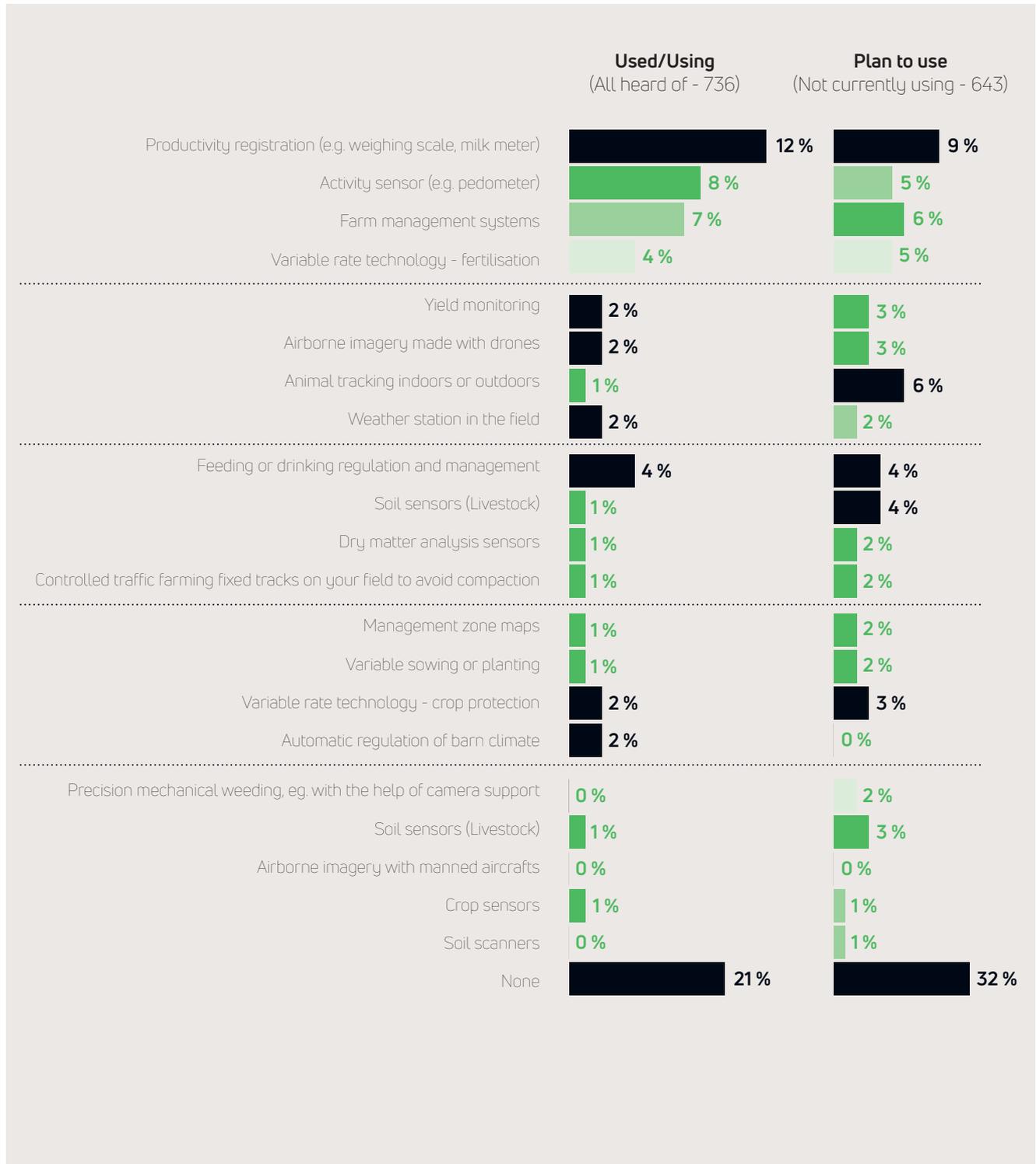


Figure 15

Less than one third keep the online submission of the Basic Payment Scheme 'in-house'.

Q9 Do you submit your Basic Payment Scheme application online yourself or do you get someone else to do it for you?

(BASE: All respondents - prefer not to answer removed - 742)

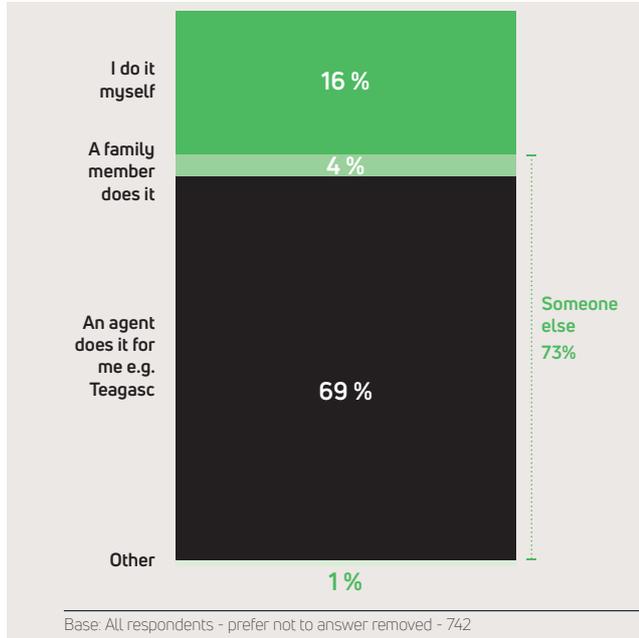


Figure 16

Perhaps indicative of a wider reluctance to adopting technology in administrative elements of farm management, **the majority of farmers use someone else to submit their Basic Payment Scheme online**, most likely an agent such as Teagasc.

This was particularly marked where general confidence in technology was low, with 90% of those lacking technical confidence using someone else to submit their BPS vs 64% of those claiming to feel confident.

There was very little variation by other parameters, such as farmer age, farm size or whether currently using technology or having completed digital training.

Dairy farmers were however more likely than others to use someone else (81%), and tillage farmers were least likely (64%).

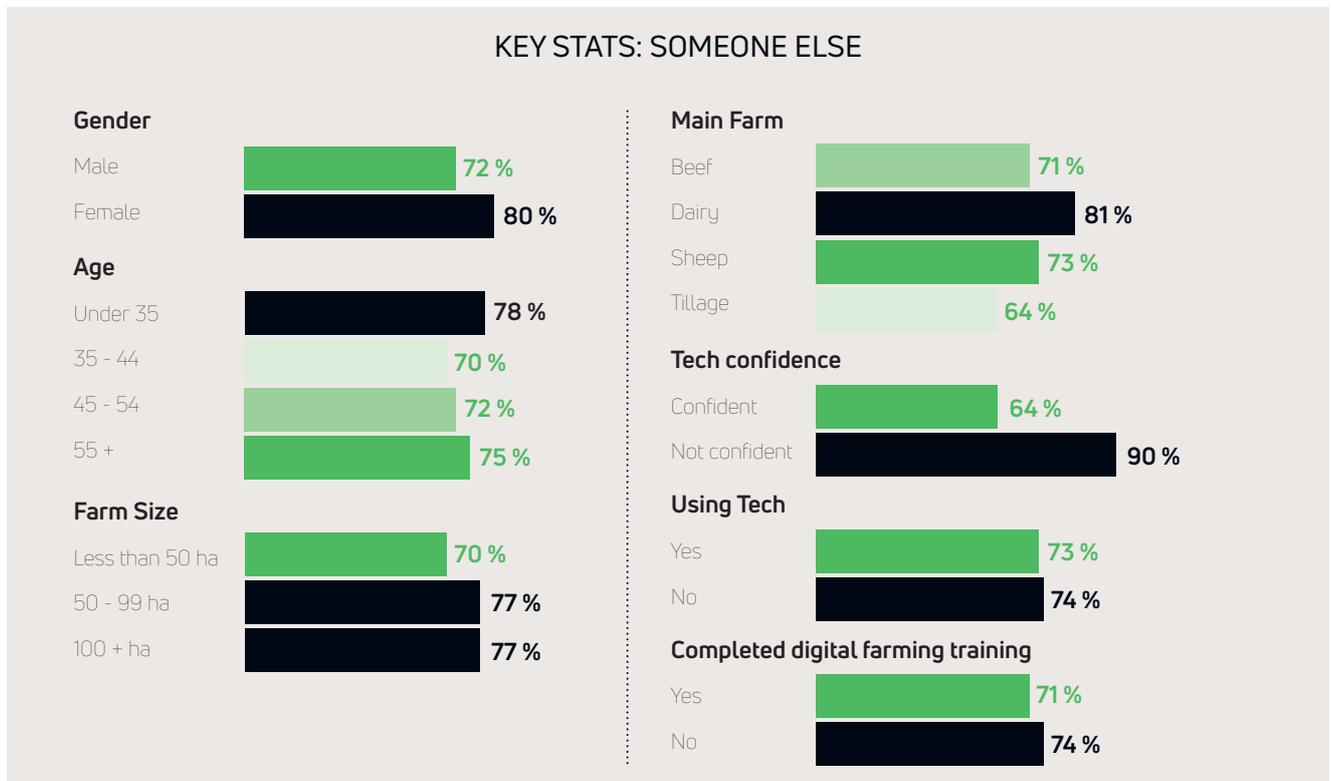


Figure 17



“ There is a positive attitude towards farming technology, with 86% either already using technology on their farm or planning to embrace it in the future. ”

5 COMPARING IRELAND TO INTERNATIONAL ADOPTION OF TECHNOLOGY

The consensus among two thirds of Irish farmers, is that Ireland is in line with the average compared to other countries when it comes to farming technology.

Further endorsing the dairy sector’s apparent inclination to embrace technology, survey participants believed dairy farmers were the group most likely to believe Ireland is ahead of most other countries (14%) or in line (71%) with the average.

Those more likely to express a view that Ireland is behind other countries were sheep and tillage farmers, where over one third responded ‘behind’, and farmers who have not yet received any digital farming training, where one quarter felt Ireland is running behind.

Q10 Where do you think Ireland is in comparison to other countries when it comes to farming technology?

(BASE : All respondents – 763)

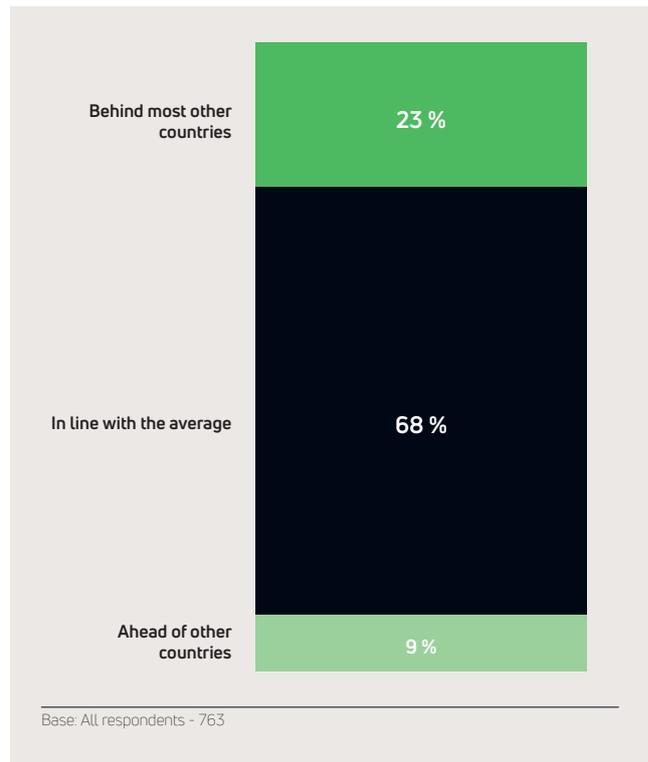


Figure 18

	MAIN FARM				FARM SIZE			RECEIVED TRAINING*	
	Beef	Dairy	Sheep	Tillage	Less than 50 ha	50-99 ha	100 + ha	Yes	No
Behind most other countries	23	15	35	36	25	19	26	18	26
In line with the average	68	71	62	53	68	69	64	66	67
Ahead of most other countries	9	14	4	11	8	12	11	16	7

Table 7

Three quarters of all farmers in the sample confirmed the overall indications through their belief that the dairy sector is leading the way. One third highlighted the tillage sector.

Q11b Who is leading the way in using technology in farming and why? Please type in. Which farm sectors are leading the way?

(BASE: All respondents - 732)

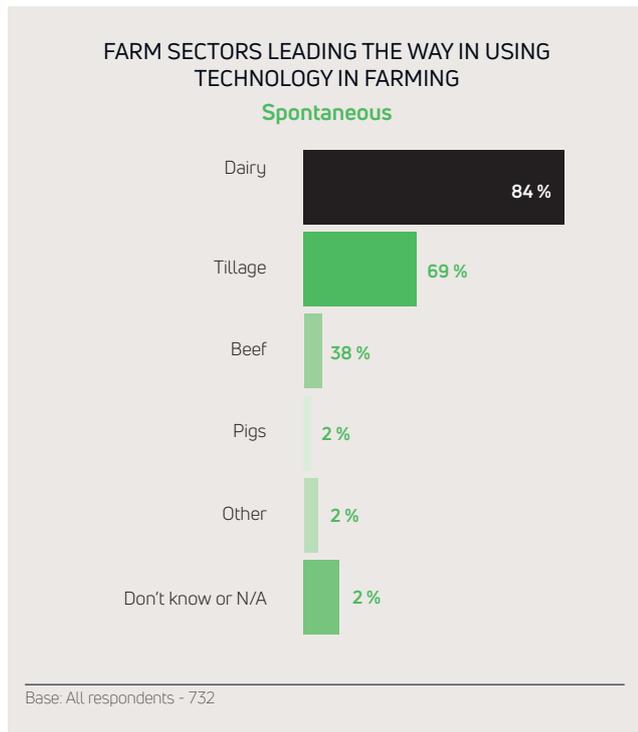


Figure 19

Industry commentary - global ranking

Industry leaders offered further confirmation on Ireland’s positioning within the global picture. The general consensus among those working in industry is that Ireland is middle of rank in terms of a global ranking in adopting digital agriculture.

Ireland is seen as conservative and slow to promote change, amongst industry stakeholders. There is some variance between sectors, with agreement that dairy is the most advanced sector.

Research and development and adoption is believed to be still very much at the early stages in Ireland. Start-ups are thought to be very important in the sector, but the level of funding will greatly define where Ireland excels in the area.





“ There is an acceptance that farmers will need to see first-hand evidence of technology working and of claims made by software providers. ”

6 BARRIERS

Access to good quality broadband is seen as the main barrier to using technology on Irish farms, followed by the cost of both the initial investment and servicing/maintenance requirements.

While it is not the most pressing reason, 60% include access to support and training in their top three barriers, after the very critical matters of internet availability and making the investment. Confidence limitations in use is also key to adoption for many.

The main barriers are similar across all farm types, except for Tillage who are much more likely to see cost as a barrier.

Those in the under 45 age cohort also over indexed on cost. Farmers in Connaught/Ulster were most likely to highlight connectivity barriers (60% vs 55% overall).

Q12 In your own opinion, what are the main barriers to using technologies on Irish farms/your farm?

(BASE: All respondents - 732)

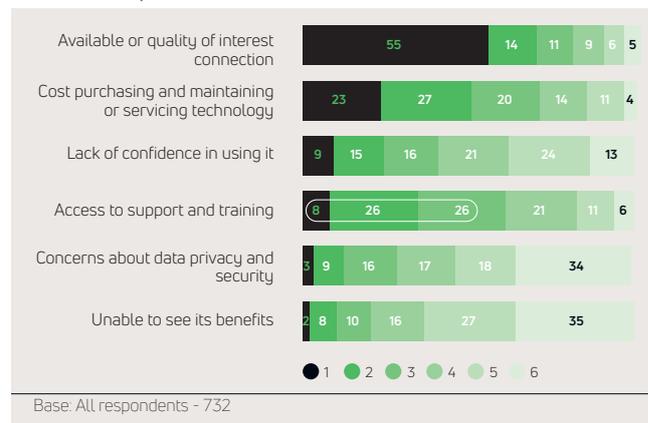


Figure 20

Q12 In your own opinion, what are the main barriers to using technologies on Irish farms/your farm?

(BASE: All respondents - 732)

%	Total	Main Farm				Age				Location			
		Beef	Dairy	Sheep	Tillage	Under 35	35-44	45-54	55+	Dublin	Leinster	Munster	Conn/Ulster
Availability or quality of internet connection	55	54	59	51	33	45	54	54	58	55	49	56	60
Cost of purchasing and maintaining or servicing technology	23	22	22	23	47	34	31	21	19	36	25	25	18
Lack of confidence in using it	9	9	10	8	9	5	6	11	9	0	13	8	6
Access to support and training	8	10	4	10	4	10	4	8	9	0	7	7	11
Concerns about data privacy and security	3	3	3	3	4	2	2	2	4	0	3	2	4
Unable to see its benefits	2	3	2	6	2	3	3	3	2	9	4	2	1

Table 8

Those who are not confident in everyday technology are more likely to see access to support and training as a barrier. Cost is more likely to be a barrier for those who are confident using technology.

%	Using Tech		Likelihood to invest		Received training		Tech Confidence	
	Yes	No	Likely	Unlikely	Yes	No	Confident	Not Confident
Availability or quality of internet connection	54	59	55	53	62	53	54	51
Cost of purchasing and maintaining or servicing technology	25	19	24	21	22	25	30	8
Lack of confidence in using it	9	9	8	12	5	10	5	21
Access to support and training	8	7	8	10	5	7	6	15
Concerns about data privacy and security	2	3	2	3	3	3	2	3
Unable to see its benefits	2	3	2	1	3	2	3	1

Table 9

For those using farm technology, getting the most out of equipment was a key concern. For those not confident with technology, learning how to use it was the main problem, 81% vs 40% of those who were confident. They were also more concerned about not being able to service it themselves, 43% vs 24% amongst those confident.

Q15 What problems or drawbacks did you encounter when using various technologies to manage farms?

(BASE : All that have or are using some –574)

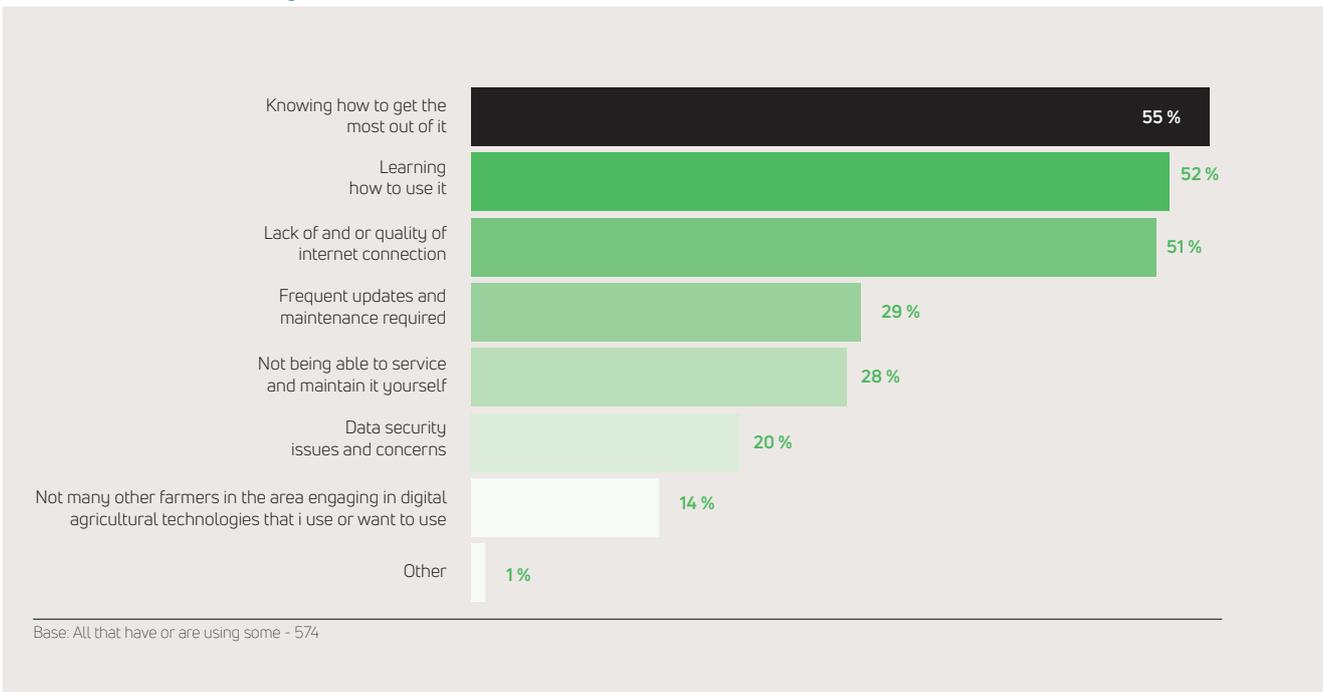


Figure 21

	Total	Main Farm				Farm Size			Received Training		Tech Confidence	
		Beef	Dairy	Sheep	Tillage	Less than 50 ha	50-99 ha	100 + ha	Yes	No	Confident	Not Confident
Knowing how to get the most out of it	55	50	60	57	66	54	52	61	67	53	53	56
Learning how to use it	52	52	51	59	51	49	56	52	56	50	40	81
Lack of and or quality of internet connection	51	49	55	59	34	51	59	40	55	52	48	59
Frequent updates and maintenance required	29	30	28	27	34	29	28	30	35	29	29	33
Not being able to service and maintain it yourself	28	23	32	25	41	25	25	42	27	32	24	43
Data security issues and concerns	20	20	21	34	10	20	22	18	28	20	18	17
Not many other farmers in the area engaging in digital agricultural technologies that I use or want to use	14	12	11	25	17	12	16	14	11	16	18	15

Table 10

Industry commentary - barriers

Industry commentators shared first-hand experience of the impact of limited levels of awareness and the benefits associated with using farming technology.

One of the main barriers observed by industry is a lack of farmer knowledge of the benefits using farming technology can bring about. In many cases they believe farmers are unaware of what they are missing out on; one described it as “ignorance is bliss”.

Industry recognises for those that may be considering, it is still a leap of faith as to whether the technology will pay off or not. This lack of awareness around benefits is heightened, given the large amount of capital often needed for investment.

There is an acceptance that farmers will need to see first-hand evidence of technology working and of claims made by software providers, for example a cost benefit analysis. Long before consideration happens, farmers will have to be convinced.

The availability of technology between sectors is also an issue, for instance it is acknowledged that the technology currently available in the dairy sector is much more advanced and has better infrastructure. There is a belief that this is mainly due to heavier investment in the sector. Other less mainstream technologies are less readily available and again not as much is known about them in the sector, especially in terms of benefits.



“Those working in the industry are of the view that advocacy and communication will be paramount in developing and maintaining technological adoption on farms.”

7 LEVERAGING CURRENT FARMER EXPERIENCES

Agricultural related media has a strong influence on farmers - it had the greatest influence on their decision to use farming technologies, being referred to by 42% when participants were asked about key influencers. This rose to 52% for the under 35s age group, who also over indexed on being influenced by other farmers, farm Discussion Groups and trade shows.

Face-to-face environments had been particularly influential on many: farm advisor or agent, other farmers or farm Discussion Groups.

Other farmers and farm Discussion Groups were most influential on dairy farmers.

A contrast was seen between under 35s and over 55s in respect of farm advisors or agents, only 21% of under 35s referenced advisors/agents vs 38% of over 55s.

Q13 What or who influenced your decision to use farming technologies

(BASE : All that have or are using some- 581)

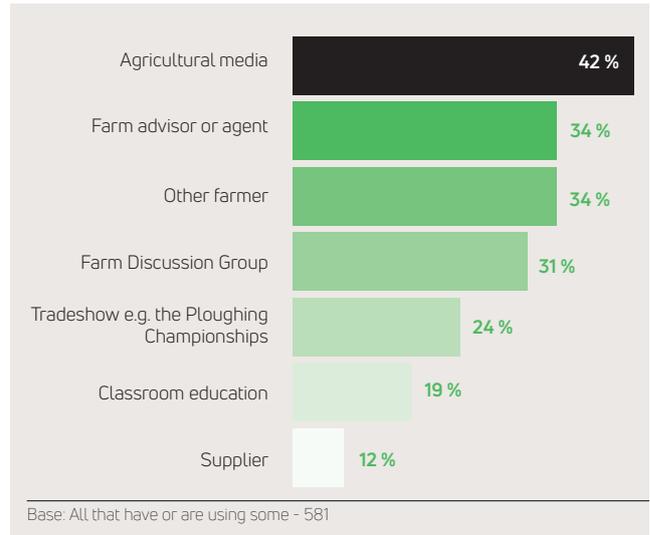


Figure 22

Q13 What or who influenced your decision to use farming technologies

(BASE : All that have or are using some - 581)

%	Total	Main farm				Age				Location				Likelihood to invest		Received Training		Tech Confidence	
		Beef	Dairy	Sheep	Tillage	Under 35	35-44	45-54	55+	Dublin	Leinster	Munster	Conn/Ulster	Likely	Unlikely	Yes	No	Confident	Not confident
Agri media	42	42	46	45	51	52	47	42	38	44	42	44	38	42	46	45	43	35	50
Farm advisor or agent	34	32	36	39	34	21	32	35	38	44	29	35	39	33	35	41	35	36	30
Other farmer	34	29	39	30	44	38	40	36	30	44	33	36	32	35	36	31	33	38	33
Farm Discussion Group	31	24	42	30	27	33	36	28	30	33	30	31	31	31	32	38	31	35	30
Trade show e.g. The Ploughing championships	24	22	26	23	17	19	30	27	22	33	21	26	27	24	27	31	24	20	28
Classroom Education	19	20	19	20	7	44	23	15	15	0	14	21	23	16	21	25	19	13	22
Supplier	12	8	20	5	5	6	15	11	12	22	9	15	11	8	13	16	11	11	14
Decided myself/no one	6	7	3	9	5	0	7	7	6	11	7	5	7	6	5	2	8	4	7
Family/friends	3	2	3	7	0	0	3	1	4	0	5	2	1	2	2	2	3	5	2

Table 11

Technology users were advocates of technology in saving time day to day

Q14 How does using these technologies help you in your daily work on the farm?

(BASE : All that have or are using some – 573)

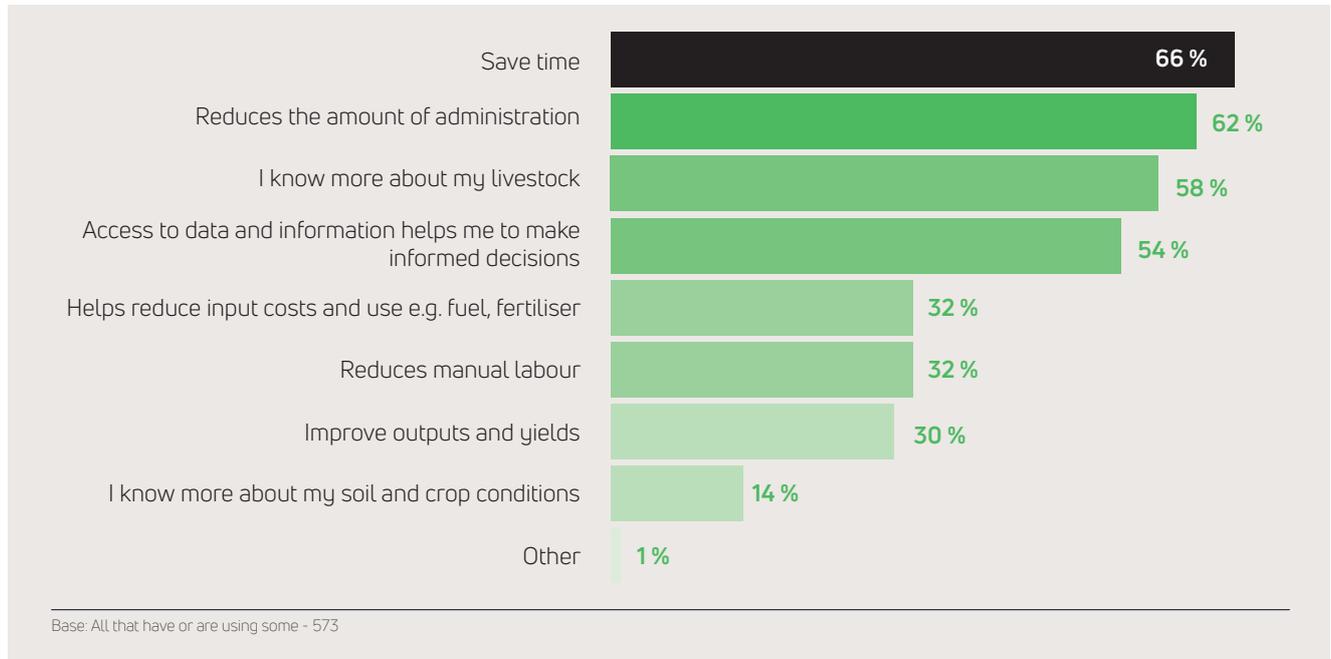


Figure 23

Saving time is the most commonly mentioned way farming technology helps farmers day to day. This was referred to most widely by dairy and sheep farmers.

Dairy farmers and those farming 100+ ha also shared their experience of reductions in administration, increased livestock knowledge and wider access to information and data to support decision making.

Tillage farmers were conscious of the impact on reducing input costs and usage, for example of fuel and fertiliser. They also acknowledged improved yields and confidence in knowing more about soil and crop conditions.

% Benefit	Total	Main farm				Farm Size			Tech Confidence		Received Training	
		Beef	Dairy	Sheep	Tillage	Less than 50 ha	50-99 ha	100 + ha	Confident	Not confident	Yes	No
Saves time	66	66	71	73	53	67	67	65	70	59	69	68
Reduces the amount of administration	62	64	74	48	38	62	61	67	66	57	70	62
I know more about my livestock	58	65	65	48	18	56	56	66	62	49	64	56
Access to data and information helps me to make informed decisions	54	49	64	43	53	46	56	68	61	29	63	56
Helps reduce input costs and use e.g. fuel, fertiliser	32	24	32	34	70	28	28	51	39	20	38	34
Reduces manual labour	32	28	42	25	30	29	31	42	32	20	37	33
Improve outputs and yields	30	18	38	20	65	21	32	52	39	25	44	28
I know more about my soil and crop conditions	14	8	15	14	45	11	11	29	18	10	20	16

Table 12

Industry commentary - encouraging farmers to adopt

Those working in the industry are of the view that advocacy and communication will be paramount in developing and maintaining technological adoption on farms.

'Test Farm Locations' are thought to be particularly useful. There is a sense that implementing these across the country and across each sector will be vital to increase adoption rates. Farmers will get the opportunity to see how the technology works, therefore having a positive effect on their confidence in using similar technology on their own farm.

The importance of interdisciplinary research has also been brought into focus to ensure that technology is user centric. This involves bringing together farmers, manufacturers and software developers.

Ultimately, there is a call for an increase in education to inform farmers of what the technology is capable of.



“ In an ideal situation, farmers feel on-farm Discussion Groups are a better learning environment, with evening classes the most suitable time. ”

8 EDUCATION & TRAINING

60% of farmers have completed a diploma or third level or higher education

Q28. What is the highest level of education you have completed to date?
 (BASE : All respondents – 768)

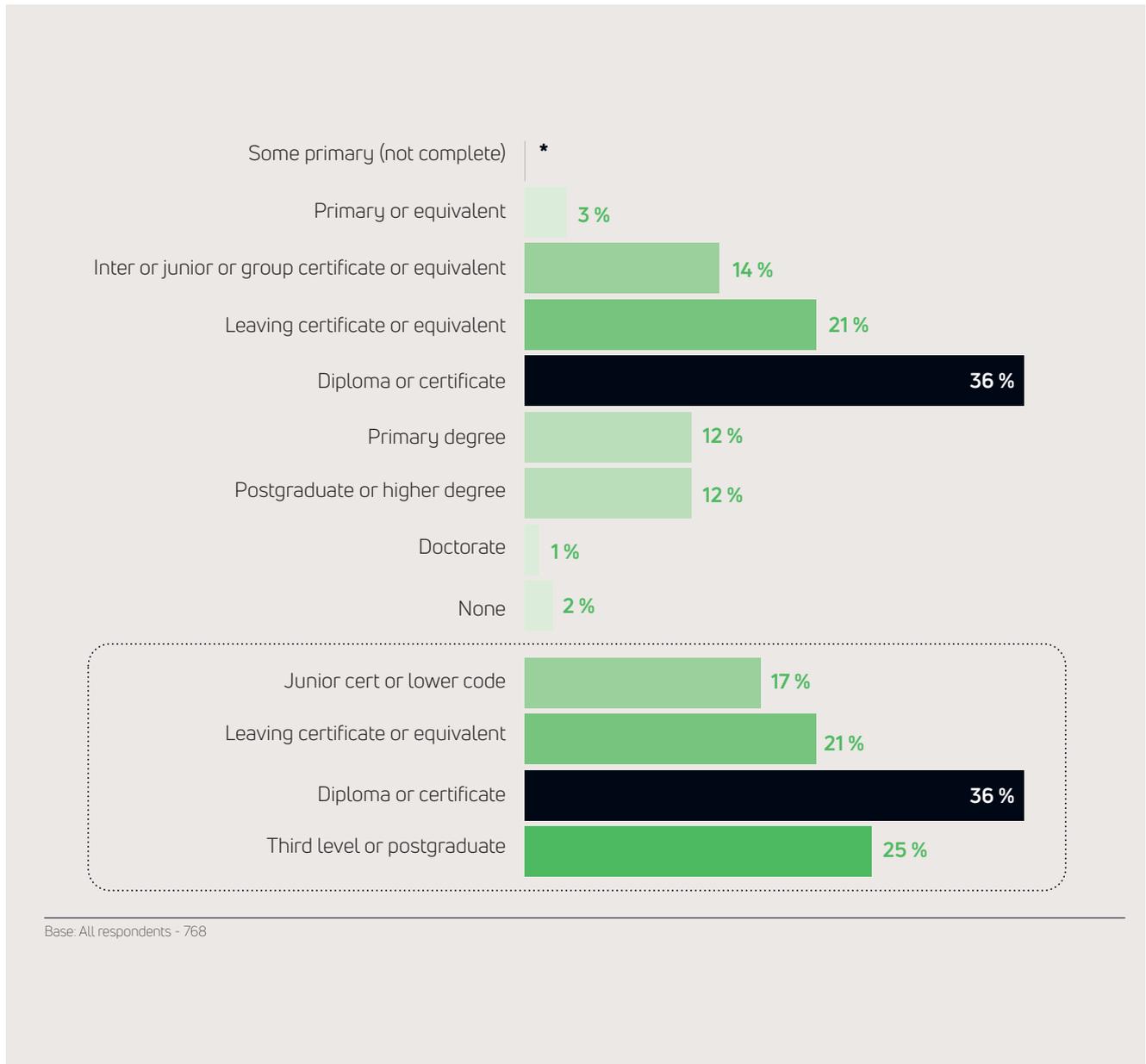


Figure 24

Those with a diploma/certificate are most likely to invest in technology, compared to those having completed up to the leaving certificate, or completed third level.

Q28 What is the highest level of education you have completed to date?

(BASE : All respondents – 768)

%	TOTAL	Main Farm				Age				Location				Likelihood to invest		Received Training		Tech confidence	
		Beef	Dairy	Sheep	Tillage	Under 35	35-44	45-54	55+	Dublin	Leinster	Munster	Conn/ Ulster	Likely	Unlikely	Yes	No	Confident	Not confident
Junior cert or lower code	17	20	9	19	17	3	3	18	24	8	17	12	24	13	17	14%	16	8	31
Leaving certificate or equivalent	21	24	21	19	15	10	16	20	26	31	18	19	25	20	22	24%	16	16	14
Diploma or certificate	36	30	49	30	45	29	46	45	28	23	38	41	28	41	34	38	41	39	34
Third level or post grad	25	25	19	32	21	58	35	17	21	38	24	26	22	26	26	22	26	35	16

Table 13

Three quarters of farmers have completed farming related training courses.

Farmers are familiar with accessing training and support. There is very little difference by demographics or farm type or size in respect of undertaking farming related training.

Q16 Have you completed any farming related training courses?

(BASE : All respondents – 764)

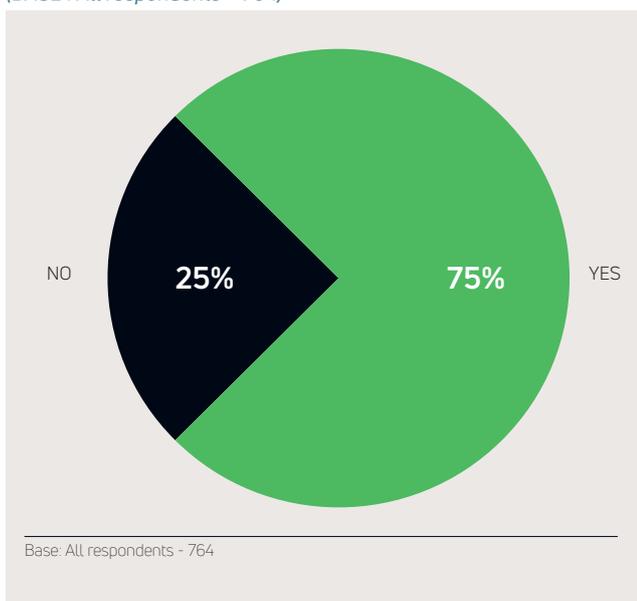


Figure 25

One quarter of those who have completed training, have completed courses in digital farming technology.

Those who have completed digital training courses are more likely to invest in technology in the future than those who have not.

Females were more likely than males to have completed a course in digital technology for farming, 34% vs 23%. Those aged 55+ also over indexed, at 30%, compared to 15% in under 35s, however this could be attributed to more limited general exposure to technology in comparison with younger generations – a differing ‘baseline’.

Q17 Have you completed any training courses in digital technology use in farming?

(BASE : All who have completed training – 570)

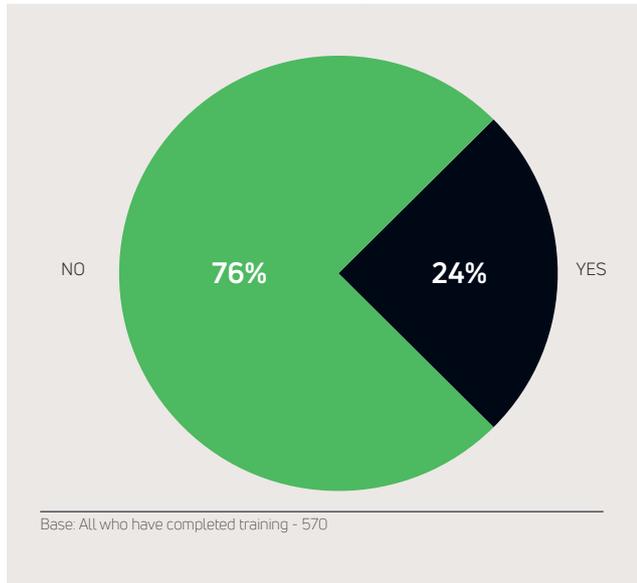


Figure 26

Technical literacy is clearly important within a farming context, as the most cited 'farming related training course' completed is a computer or technology course, such as the European Computer Driving Licence (ECDL).

On-farm Discussion Groups are a potential route to future skills development

While classroom based is the most common training environment, and full day courses and evening courses are most common timeframes for those who have undertaken training and development, 41% had participated in on-farm Discussion Groups.

Those using technology on their farm are more likely to have completed on-farm Discussion Groups and evening classes, than those not using technology, emphasising the importance of learning and of peer-to-peer knowledge sharing.

In an ideal situation, farmers feel on-farm Discussion Groups are a better learning environment, with evening classes the most suitable time.

Under 35s are most likely to have completed peer-led and online training. They feel most comfortable with online learning but still are just as likely to value on farm Discussion Groups

Those who are likely to invest in technology are more likely to feel that on-farm Discussion Groups are an ideal learning environment when compared with those who are unlikely to invest.

Q19 What type of learning environment have you completed courses through in the past?

(BASE : All that have completed any farming related training courses – 570)

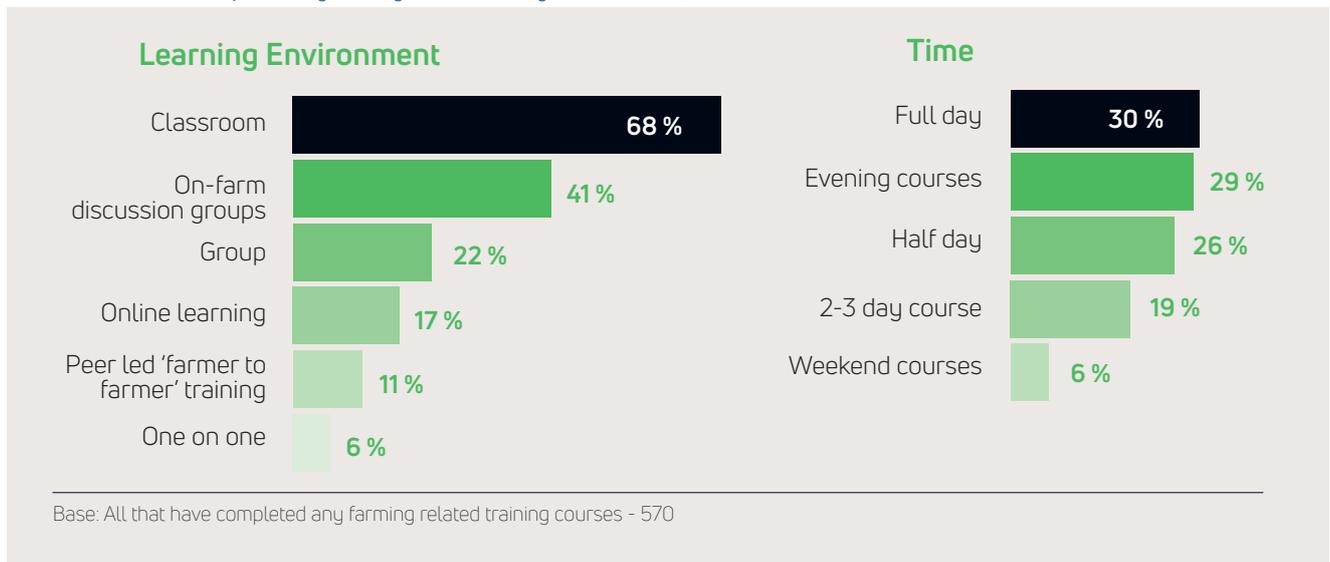


Figure 27

Q19 What type of learning environment have you completed courses through in the past?

(BASE : All that have completed any farming related training courses – 570)

%	AGE			
	Under 35	35-44	45-54	55+
Classroom	89	79	70	58
On-farm Discussion Groups	41	40	36	44
Full day	26	28	32	30
Evening courses	11	21	28	37
Half day	20	19	27	29
Group	17	15	19	29
2-3 day course	20	20	19	18
Online learning	28	24	13	14
Peer-led 'farmer-to-farmer' training	17	14	7	11
Weekend courses	11	5	9	4
One on one	7	5	6	6

Table 14

Q19 What type of learning environment have you completed courses through in the past?

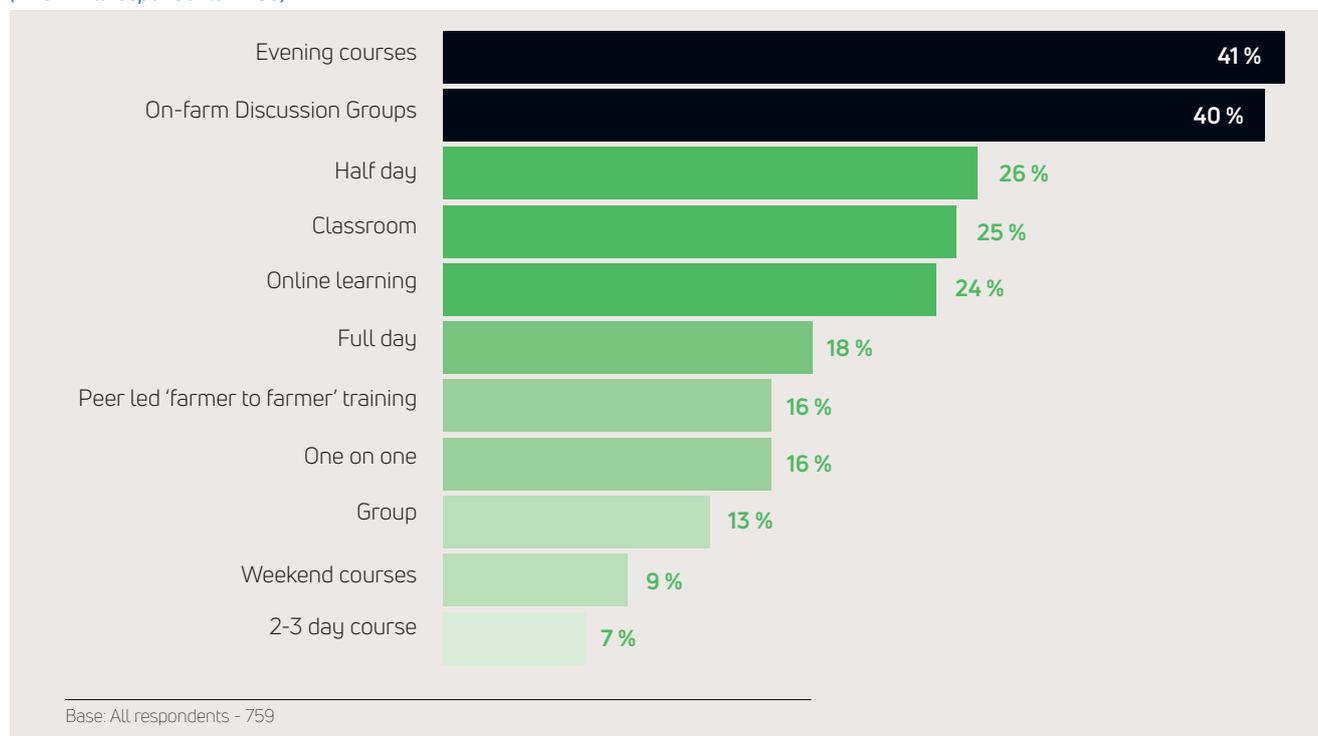
(BASE : All that have completed any farming related training courses – 570)

%	Using Tech		
	TOTAL	Yes	No
Classroom	68	68	68
On-farm Discussion Groups	41	44	32
Full day	30	28	33
Evening courses	29	31	23
Half day	26	26	23
Group	22	20	32
2-3 day course	19	18	25
Online learning	17	19	10
Peer-led 'farmer-to-farmer' training	11	13	4
Weekend courses	6	7	5
One on one	6	7	4

Table 15

Q20 What type of learning environment would work best for you?

(BASE : All respondents – 759)


Figure 28
Q20 What type of learning environment would work best for you?

(BASE : All respondents – 759)

%	AGE			
	Under 35	35-44	45-54	55+
Evening courses	36	45	38	42
On-farm Discussion Groups	42	45	33	42
Half day	20	26	28	27
Classroom	36	24	23	25
Online learning	41	29	25	19
Full day	17	15	17	21
Peer led 'farmer to farmer' training	24	16	15	15
One on one	15	12	16	18
Group	19	13	12	12
Weekend courses	17	13	8	6
2-3 day course	17	9	4	6

Table 16

Q20 What type of learning environment would work best for you?

(BASE : All respondents – 759)

%	Likelihood to invest	
	Likely	Unlikely
Evening courses	45	31
On-farm Discussion Groups	45	35
Half day	29	23
Classroom	27	30
Online learning	25	27
Full day	20	17
Peer led 'farmer to farmer' training	15	20
One on one	16	17
Group	15	10
Weekend courses	9	6
2-3 day course	7	9

Table 17

Farmers are open to encouragement through training

Training in how to utilise technology would be most effective in encouraging the use of farming technology, however there is a broad interest in a variety of training options.

Interest ranges from general usage to 4 in 10 looking to learn about setting up technology and receiving ongoing support. For those who admit they feel farming technology is too difficult, help with set up and offering ongoing support is likely to be welcomed.

Q21 Would training in any of the following areas encourage you to use farming technology?

(BASE : All respondents – 744)

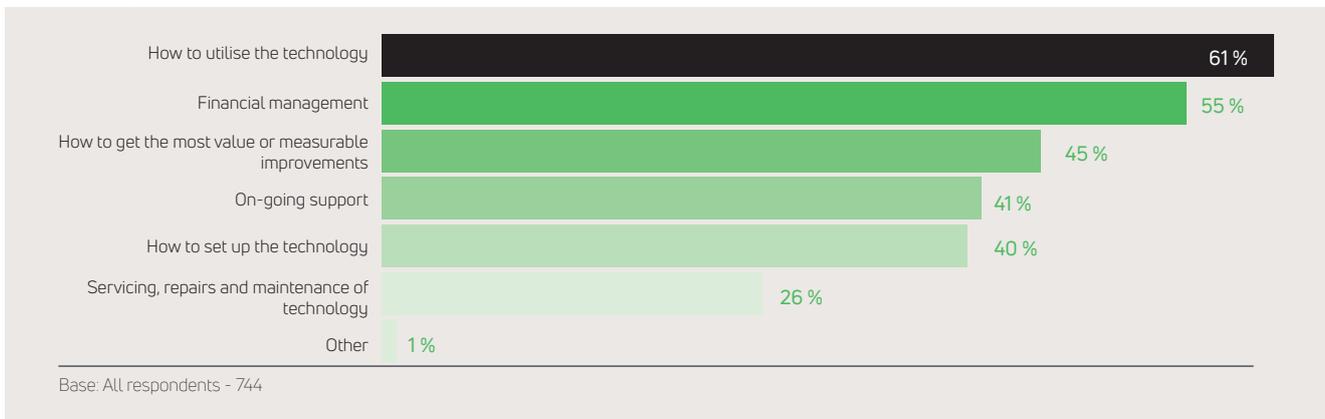


Figure 29

Tillage farmers over index on all areas, except for ongoing support, suggesting a level of confidence is already in place. Dairy farmers indicate a particular appreciation of the importance of financial management and technology. Both are sectors of the industry appearing to lead the way in adopting technology to date.

Under 45s in particular are looking to be more strategic - understand the financial impact, get the most value and see measurable improvements.

Q21 Would training in any of the following areas encourage you to use farming technology?

(BASE : All respondents – 744)

%	Total	Main Farm			
		Beef	Dairy	Sheep	Tillage
How to utilise the technology	61	61	63	56	70
Financial management	55	52	64	49	61
How to get the most value or measurable improvements	45	40	49	49	57
Ongoing support	41	41	42	47	30
How to set up the technology	40	39	36	38	59
Servicing, repairs and maintenance of technology	26	28	18	30	46
Other	1	1	1	1	0

Table 18

Q21 Would training in any of the following areas encourage you to use farming technology?

(BASE : All respondents – 744)

%	Tech Confidence		Attitudes to Farming			
	Confident	Not confident	I will embrace farming technology	I am already using technology on my farm	I doubt I will ever invest in farm technology	It is too difficult to use farming technology*
How to utilise the technology	56	71	64	61	52	58
Financial management	62	33	57	58	45	31
How to get the most value or measurable improvements	49	35	47	44	40	36
On-going support	36	51	40	41	38	56
How to set up the technology	34	52	41	39	34	50
Servicing, repairs and maintenance of technology	31	15	28	27	15	33
Other (please specify)	1	1	*	*	2	6

Table 19



“ Aside from broadband, increased support on training would have one of the most positive effects. ”

9 SUPPORTS & INCENTIVES

Tailored face-to-face training, Discussion or Knowledge Transfer Groups and dedicated ag tech advisors would be the preferred forms of support to help farmers use technology on their farms. This further endorses the relevance of one-to-one support, and peer-to-peer learning.

An openness to video-based training is also evident, particularly amongst tillage farmers, and those under 45, both of whom are also most receptive to online documentation.

This suggests that those who are using and /or are gaining confidence do become more self-sufficient and self-motivated as their experience and confidence grows. This is emphasised by those with tech confidence having a higher likelihood of preferring distance-learning options.

Under 35s showed the most interest in live chat supports.

Q22 What supports would you prefer to help you use technology on the farm?

(BASE: All respondents – 748)

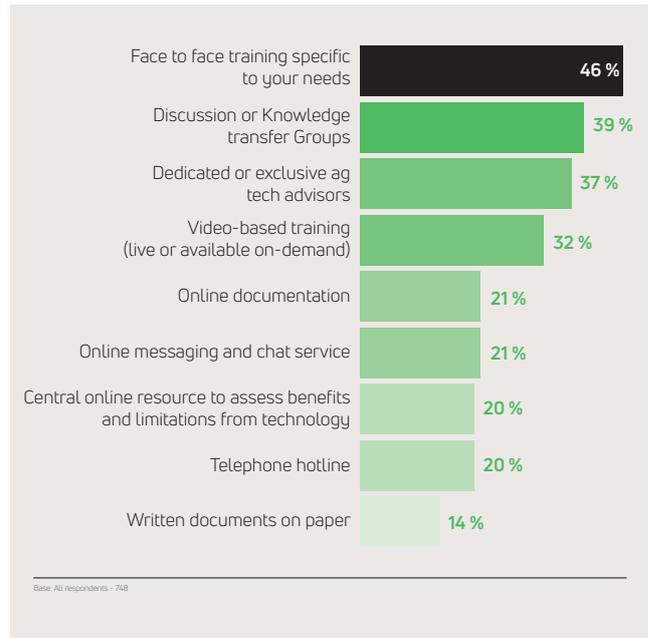


Figure 30

Q22 What supports would you prefer to help you use technology on the farm?

(BASE: All respondents – 748)

% Support Method	Total	Main Farm				Age			
		Beef	Dairy	Sheep	Tillage	Under 35	35-44	45-54	55+
Face-to-Face training specific to your needs	46	45	48	45	45	39	38	48	49
Discussion or Knowledge Transfer Groups	39	40	41	44	23	32	42	35	41
Dedicated or exclusive ag tech advisors	37	33	45	30	43	53	34	39	33
Video-based training (live or available on-demand)	32	30	31	41	51	47	40	31	28
Online documentation	21	21	12	21	36	24	27	17	20
Online messaging and chat service	21	24	18	20	9	27	20	22	19
Central online resource to assess benefits and limitations from technology	20	22	16	19	23	22	26	20	17
Telephone hotline	20	19	25	16	19	12	15	22	23
Written documents on paper	14	15	14	10	21	19	8	12	17

Table 20

Q22 What supports would you prefer to help you use technology on the farm?

(BASE : All respondents – 748)

%	Likelihood to invest	
	Likely	Unlikely
Face-to-Face training specific to your needs	44	47
Discussion or Knowledge Transfer Groups	44	30
Dedicated or exclusive ag tech advisors	40	37
Video-based training (live or available on-demand)	36	27
Online documentation	25	10
Online messaging and chat service	22	16
Central online resource to assess benefits and limitations from technology	23	16
Telephone hotline	22	17
Written documents on paper	13	16

Table 21

“I think public meetings are needed to give the outline of benefits; this then needs to be followed up by one-to-one (with adviser?) on how to get the best from technology in each farmers situation. Then Discussion Groups of like-minded farmers can help each other make improvements.”

“Training on farm after limited use of specific technology.”

“One-to-one or small groups so that you get help where you need it.”

“Farm Advisors should be encouraging farmers to embrace and adopt modern precision technologies to improve the profitability of their farms.”

“Age related one on one.”

Industry commentary - training and education

In terms of training and education, it was felt that a high level of support would be instrumental to the effectiveness of training.

Support structures included:

- Discussion groups (as local as possible)
- Customer helplines through apps
- Video training
- Peer-to-peer groups/ advice
- Intuitive software in the first place

Financial rewards would be most likely to encourage farmers to use or increase their use of technology.

Aside from broadband, increased support on training would have one of the most positive effects.

Q23 What incentives, if any, would encourage you to use or increase your use of digital technologies on your farm?

(BASE : All respondents – 749)

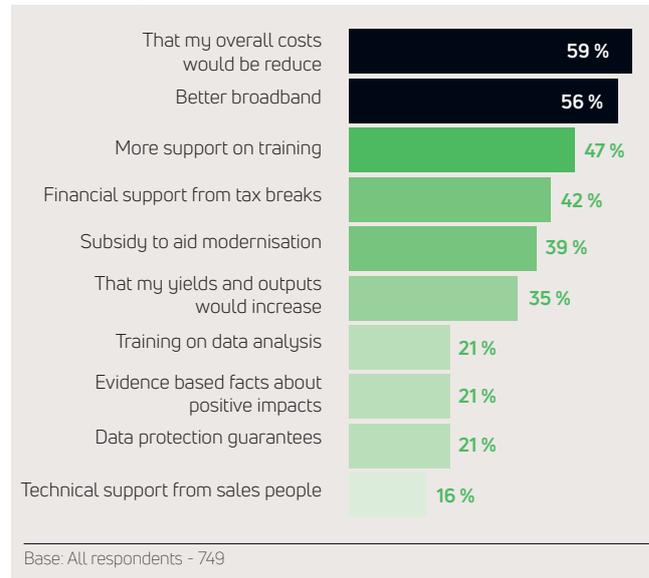


Figure 31

Encouraging use of digital technologies:

- “Every farmer should be given free training on how to submit their basic payment scheme online. At the minute we have to pay an advisor to do it because if I try it myself and do it wrong I could lose all my payments for that year.”
- “Training is a must. The cost of equipment to be subsidised.”
- “Classes are needed to tailor to farmers in on-line recording and applications.”
- “Plenty of on-farm demonstrations of the technology that is being used on different farms and let the farmer explain the time that is saved and reduced labour.”
- “Broadband needs to be improved before large scale technological training would be worth implementing. We can’t have a calving camera linked to our phones as the internet signal is too weak.”
- “It all boils down to broadband speed. There should be no reason why for instance I couldn’t show my vet an animals system online, thus saving him a twenty km journey saving valuable time for the animal and the vet. It would be good for the environment cutting down on unnecessary journeys.”
- “No point in having technology when I have to drive up the road to get the broadband to work.”

Beef farmers are most likely to see increased support on training as a way to encourage them to use digital technology on their farm. Tillage farmers are the cohort most interested in reducing overall costs and increasing yields and outputs.

Q23 What incentives, if any, would encourage you to use or increase your use of digital technologies on your farm?

(BASE : All respondents – 749)

%	Total	Main Farm			
		Beef	Dairy	Sheep	Tillage
That my overall costs would be reduced	59	58	61	60	64
Better broadband	56	56	56	52	45
More support on training	47	54	44	41	30
Financial support from tax breaks	42	44	37	42	49
Subsidy to aid modernisation	39	41	30	46	53
That my yields and outputs would increase	35	28	41	30	62
Training on data analysis	21	20	23	20	13
Evidence based facts about positive impacts	21	17	25	26	23
Data protection guarantees	21	21	19	27	23
Technical support from salespeople	16	15	18	17	15

Table 22

Those lacking in confidence, and those who plan to embrace farming technology indicate that more support on training would encourage them.

Q23 What incentives, if any, would encourage you to use or increase your use of digital technologies on your farm?

(BASE : All respondents – 749)

%	Tech Confidence		Attitudes to Farming			
	Confident	Not confident	I will embrace farming technology	I am already using technology on my farm	I doubt I will ever invest in farm technology	It is too difficult to use farming technology*
That my overall costs would be reduced	62	52	59	61	59	47
Better broadband	52	71	55	56	53	64
More support on training	37	68	52	42	47	64
Financial support from tax breaks	46	34	42	45	36	28
Subsidy to aid modernisation	41	36	41	37	36	50
That my yields and outputs would increase	39	33	35	37	26	39
Training on data analysis	21	24	20	22	14	31
Evidence based facts about positive impacts	22	20	19	24	12	19
Data protection guarantees	20	21	22	19	21	36
Technical support from salespeople	15	18	17	15	8	22

Table 23



“ No point in having technology when I have to drive up the road to get the broadband to work. ”



“ Dairy farmers are most likely to invest. Those who have completed digital training are more likely to consider investing than those who have not. ”

10 SHARING DATA & FUTURE INVESTMENT

Digital agriculture is providing new and more detailed insights and information on farms and even across farms. This ability to collect, transfer, store, and analyse data has become easier, but with this brings questions: who has sovereignty over the data generated on-farm, where is this data stored and what happens with this data – especially as it flows up and down the supply chain?

Initiatives such as the 'EU Code of Conduct for Working With and Sharing Agricultural Data'⁵, developed by a range of agricultural representative bodies across the EU's agri-food chain, aims to answer some of these questions by establishing the rights involving data produced on the farm through a set of principles and guidelines.

Therefore, we feel that it is a pertinent time to find out how farmers view and value their data. Four in ten farmers said they would be happy for their data to be collected in exchange for a reduction in the cost of on-farm technology, but for a further 4+ out of 10 more information or assurances are needed. Those most likely to be seeking further information or assurances were the under 35s. This demographic are also least likely to say no or unsure.

Q25 Would you be happy to share the data collected through certain farm technologies in exchange for a reduction in the cost of on-farm technologies?

(BASE : All respondents – 761)

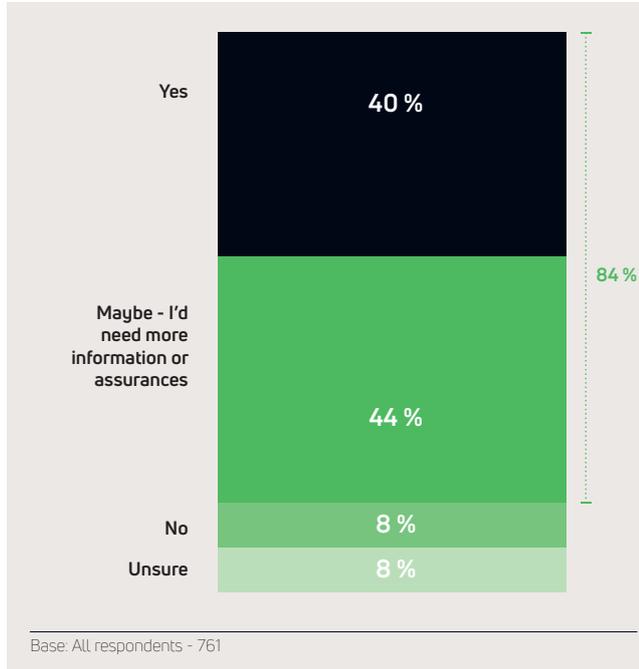


Figure 32

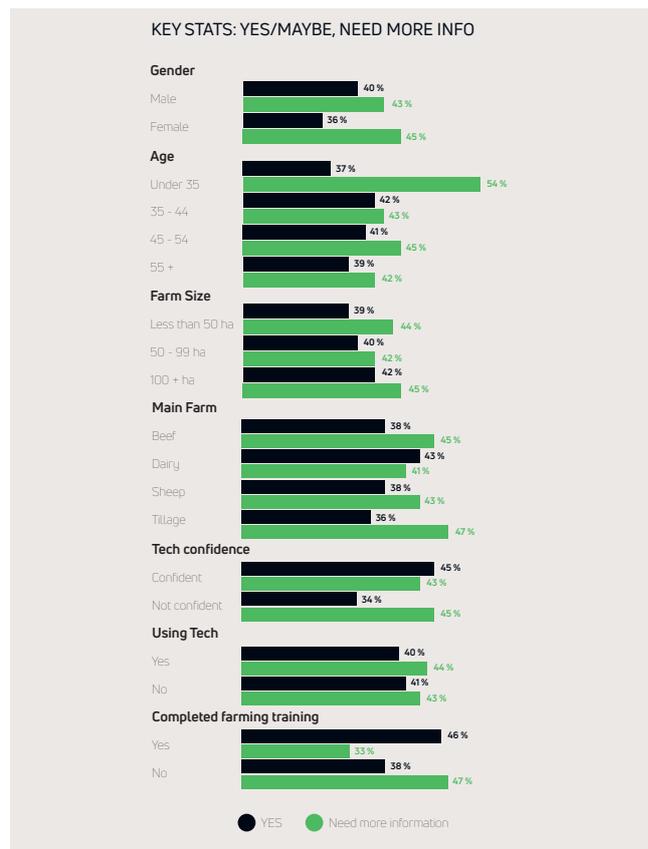


Figure 33

⁵ EU Code of Conduct for Working With and Sharing Agricultural Data www.ifa.ie/DataCoC

Industry commentary – data sharing

Advice from those in industry emphasised that data sharing needs to be an open and transparent system.

Stakeholders emphasised a benefit transfer will be critical, where farmers can clearly see what advantages they are getting from sharing their data. Strong governance will be a key element, those who comply will be looking for high levels of privacy and trust. It must be clear from the outset where this data will end up, what third parties the data will be shared with, and what exactly it will be used for.

Once again, strong communication is the backbone of the success of any data sharing initiative, farmers need to be included in the discussions from an early stage, processes need to be clearly explained and transparency is important.

6 in 10 Irish farmers say they are likely to invest in digital technology on their farm.

Dairy farmers are most likely to invest. Those who have completed digital training are more likely to consider investing than those who have not, as are more of those who feel confident in using or are already using technology.

Q26 How likely do you think it is that you will invest in digital technology on your farm?

(BASE: All respondents – 761)

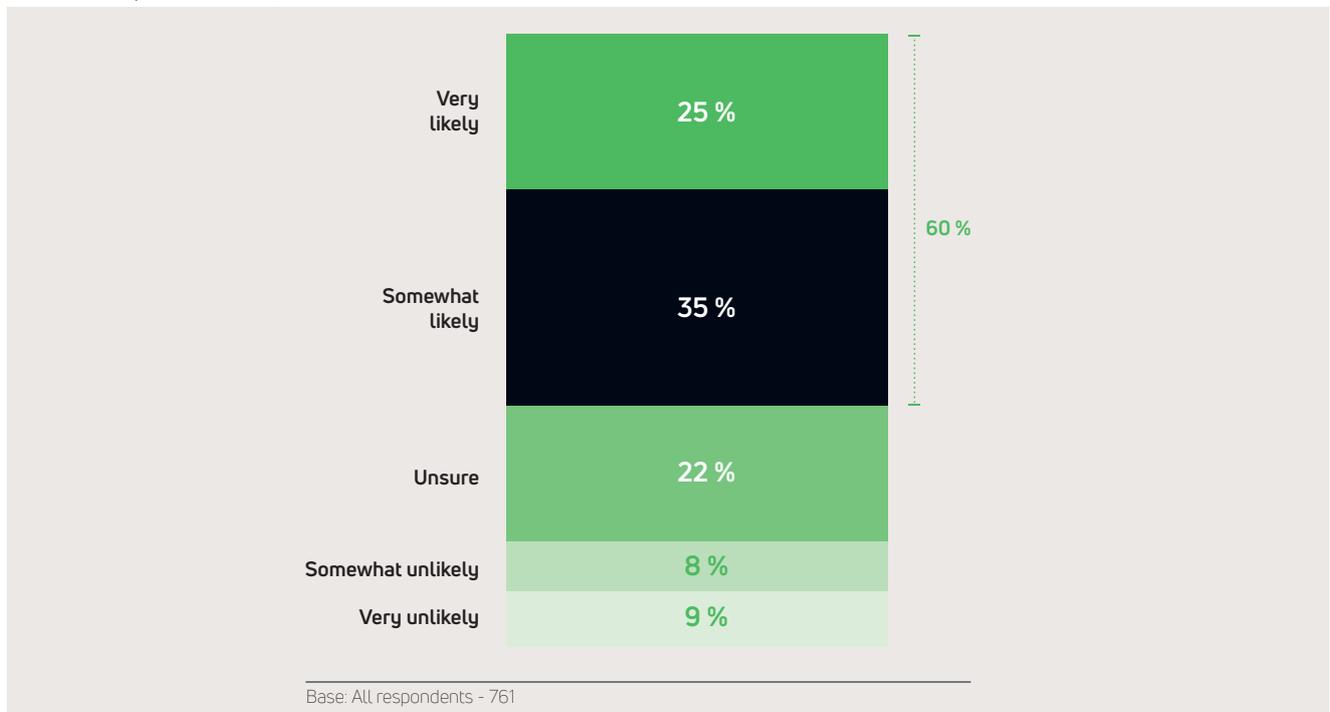


Figure 34

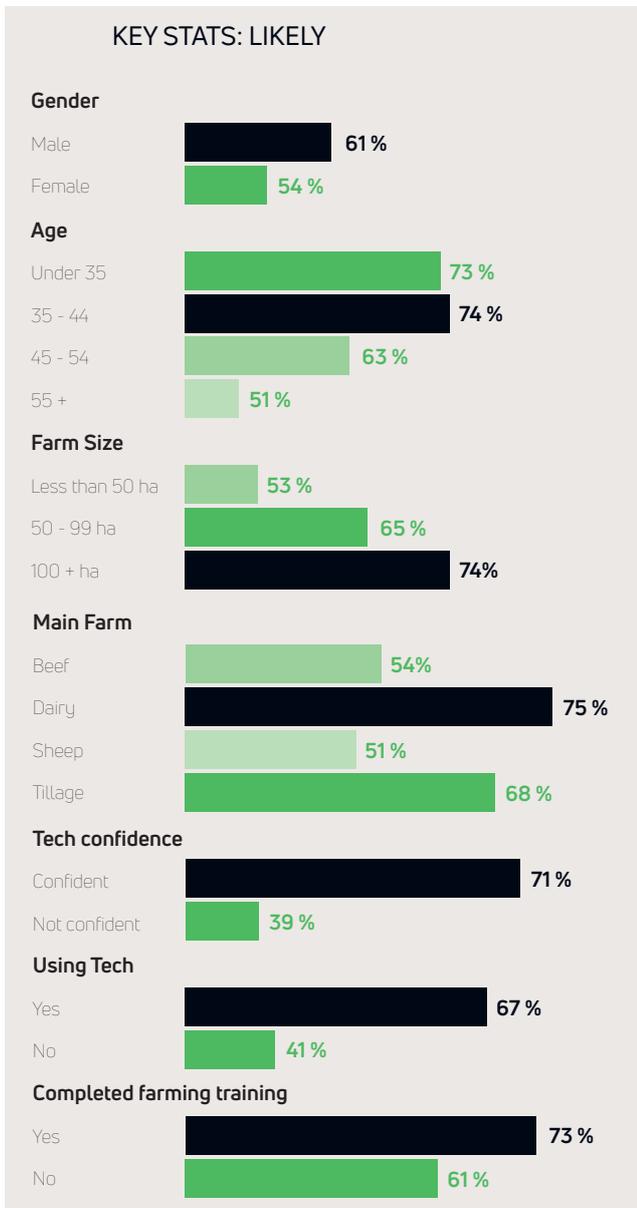


Figure 35

The majority of those considering investing are planning to do so within the next two years, with those in tillage and the under 35s claiming they are most likely to act within the next 12 months.

Q27 If you are going to invest in technology, when do you plan to begin?

(BASE: All that are unsure or likely that they will invest in digital technology on the farm - 624)

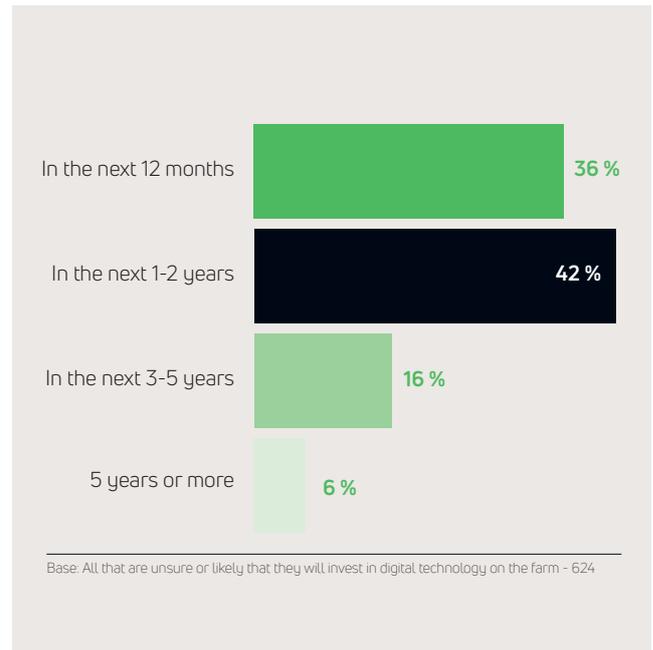


Figure 36

%	AGE			
	Under 35	35-44	45-54	55+
In the next 12 months	43	37	33	36
In the next 1-2 years	31	39	45	44
In the next 3-5 years	17	18	17	15
5 years or more	9	6	5	5

Table 24



“ There should also be a focus on existing users to leverage their positive experiences. ”

11 RECOMMENDATIONS & CLOSING THE GAP

As evidenced from this research, training and education, along with financial incentivisation, will be key components in driving the continuing digitalisation of agriculture in Ireland.

We need to blend stimulating awareness around the positive impacts these new technologies bring (such as saving time and reducing operational costs), with training and education programmes that range from generic IT upskilling to very customised and tailored programmes. We can see from the research that farmers feel that this will need to be supported and delivered through a combination of advisors, technological providers and the Knowledge Transfer Group model. We will require the key players in the agricultural ecosystem working together to establish a roadmap to help farmers ascend the digital experience curve. This will involve us moving from reactive and isolated occurrences of digital upskilling programmes, to a more integrated, systematic approach.

This will result in farmers knowing where they can avail of the education and skills development programmes they require no matter their experience or competency levels. They will then in turn be able to see and acknowledge the benefit of digital technologies with the longer term aspiration for this to create a flywheel effect where farmers will become digital advocates within their peer group.

Recommendations

1	2	3	4	5
Increasing confidence and openness to using the technology is key	Assisting farmers in how to utilise technology for maximum benefit	Starting small to include all levels of technology confidence and farm needs and building on what they are already using	Education and implementation need to happen close together	Education should also focus on changing attitudes towards digital technologies

Figure 37 - Recommendations

The recommendations highlight how training and education programmes can tackle the causes of digital exclusion through increasing confidence and openness in digital technologies, which in turn will change attitudes. From there the focus is on building motivation in incremental steps through aligning training and education with on-farm practices that digital technologies can make better.

Setup and support are the two priority areas in increasing digital agriculture adoption

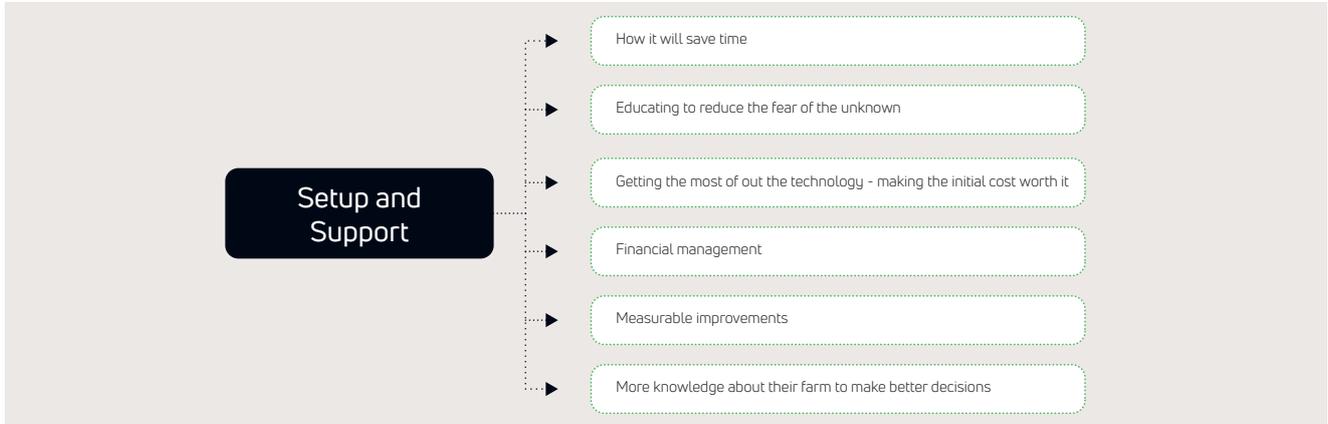


Figure 38 - Setup and Support

Building on these recommendations, and as outlined in the Executive Summary, a core objective of this report is to identify the digital skills gaps and requirements for the sector. Based on the survey results and the structured and unstructured discussions with the various industry stakeholders, a maturity model of digital skills development emerged as a means to help measure and evaluate the different stages of progression required in farming digital skills development. Figure 39 presents our proposed Digital Skills Development Maturity Model.

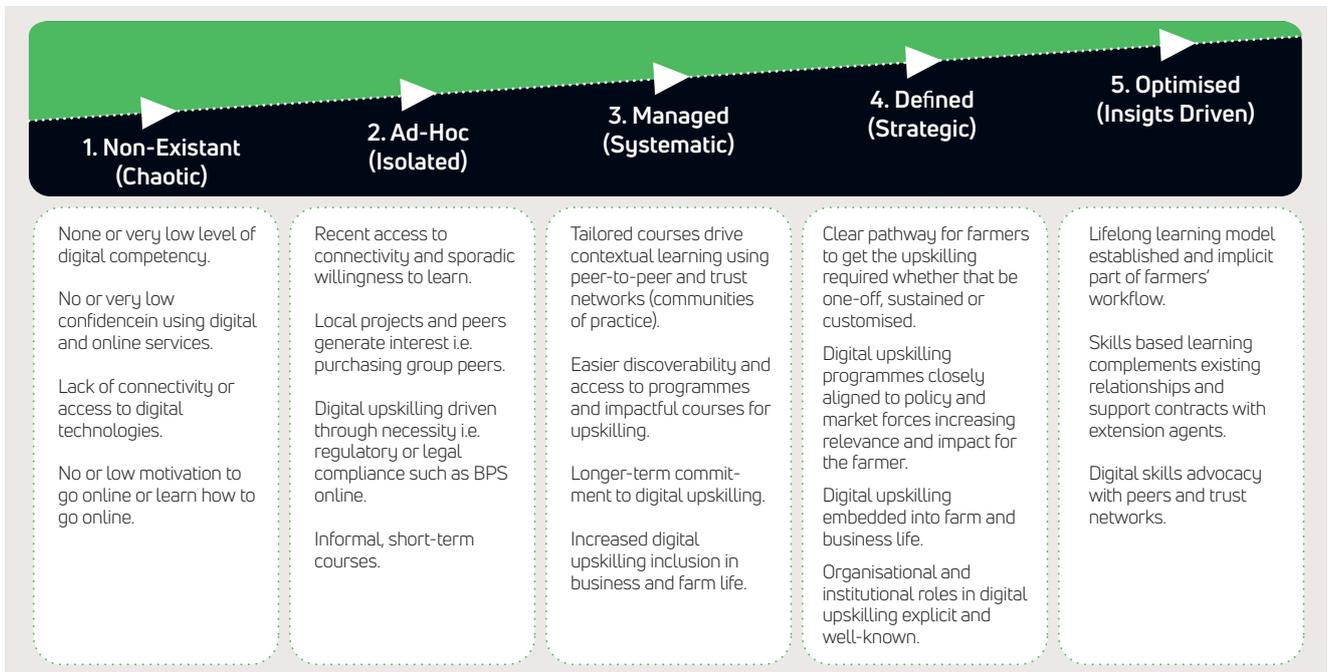


Figure 39 - Proposed Digital Skills Development Maturity Model.

This model requires the key players in the agricultural ecosystem working together to establish a roadmap to help farmers ascend the digital experience curve. This involves us moving from reactive and isolated occurrences of digital upskilling programmes, to a more integrated, systematic approach.

This will result in farmers knowing where they can avail of the education and skills programmes that they require and should cater for all experience and competency levels. Farmers will then in turn be able to see and acknowledge the benefit of digital technologies with the longer-term aspiration for this to create a flywheel effect where farmers will become digital advocates within their peer groups.

This model will also give our network – Farm Business Skillnet – new insights into understanding the best ways to help farmers upskill and reskill in the digital era.

While the objectives for each stage of the Digital Skills Development Maturity Model are indicative presently, Farm Business Skillnet will be refining and adding to the model as the focus is increased on digital skills training and education.

Farm Business Skillnet will concentrate on the different stages in the model presented in figure 39, in a well-defined sequence, where progression leads to our farmer participants advancing through the different levels until digital upskilling is an ongoing, self-motivated activity. On a more foundational level this research will also influence Farm Business Skillnet in how we deliver training:

- A hands-on practical approach appears to work best with farmers, and they learn best through face-to-face interactions.
- There should also be a focus on existing users to leverage their positive experiences but also to raise awareness of common pitfalls: peer-to-peer support is key.

This research is already impacting Farm Business Skillnet's own development roadmap as we are assessing how best to deliver an online training solution for network members, in particular the under 35 years old cohort.



A photograph of three cows standing in a grassy field, overlaid with a semi-transparent green filter. The cows are positioned in the lower half of the frame, looking towards the camera. In the background, there are rolling hills and some hay bales. A large white bracket is on the left side of the image, framing the text.

“ One of our key aims is that the results from this research will help guide a national systematic approach to digital transformation in Irish agriculture. ”

CONCLUDING STATEMENT



There are a wide range of technological innovations promising to significantly improve the way we grow, produce and distribute food. We will need to harness these technologies for our benefit. The challenges facing farmers today are immense: producing more and better using less inputs, in an environmentally sustainable way while keeping up the pace with consumer demands.

As a result of the relatively recent smartphone revolution we now have increasing access to low-power, ever-more-sophisticated hardware components that can be used in environments and situations that previously weren't possible. The proliferation of software in all walks of life brings new and exciting ways to interact with the world around us. The decreasing cost of cloud computing services gives us increased computing power, storage capacity and computer processing at scale.

At the core of these innovations lies the increasing ability to capture, exchange and understand agricultural data. However, the spectrum of digital applications in agriculture is broad. These range from lower-tech solutions that use standard mobile devices and basic software applications, to high-tech fully integrated solutions that make use of satellites, drones, robotics and automation, sensors, big data analytics and machine learning derived intelligence and insight. These advances allow for us to acquire vast amounts of aggregated and site-specific data, which when combined with existing knowledge and wisdom can give more clarity to the decision-making process on farms of all types and sizes.

This is not a new concept to many. Farmers have always sought out or developed methods to reduce production costs and increase outputs. We will need to continue to demonstrate this ingenuity in light of a rapidly changing global food production environment. A new Common Agricultural Policy (CAP) will launch in 2020 and the European Commission has indicated that digital technologies will play a significant role in terms of farm modernisation, innovation and restructuring. As big data applications, automation and the various strains of artificial intelligence become integral in how other entities in the global agri-food supply chain operate, farmers require access to these same technologies and the means to learn how to use and adapt them on our farms.

As a result of this increased focus on digital technologies in agriculture, we felt that Irish farmers could benefit greatly from more direct research on the matter. Through Farm Business Skillnet, supported and funded by Skillnet Ireland, we have been able to conduct this research and produce this report.

From the outset of this project, we viewed this research as a compass to help guide a national systematic approach to digital transformation in Irish agriculture. This will involve all the key players across the industry; agri-business, government, technology companies, research bodies, and most importantly, farmers themselves. We believe that through working together we can help farming transition to a digital future which will benefit the economy as a whole. Policy supports and instruments to aid capital investments such as technology subsidisation, conversion grants, tax incentives and innovation voucher systems coupled with new approaches to education and learning will help make it easier for people to realise the benefits of digital agriculture.

Another objective of this research is to develop a digital training and educational development roadmap for Irish agriculture for the medium-to-long term. It is hoped that the Digital Skills Development Maturity Model proposed in chapter 11, 'Recommendations & Closing the Gap', will be useful in building that roadmap. We need to create the conditions where farmers can readily access and learn the skills to analyse, assess and implement the best actions, solutions and technologies for their farm business so that they can be best positioned to take advantage of the changes that the digital era is bringing.

Ethan Cleary
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NOTES

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