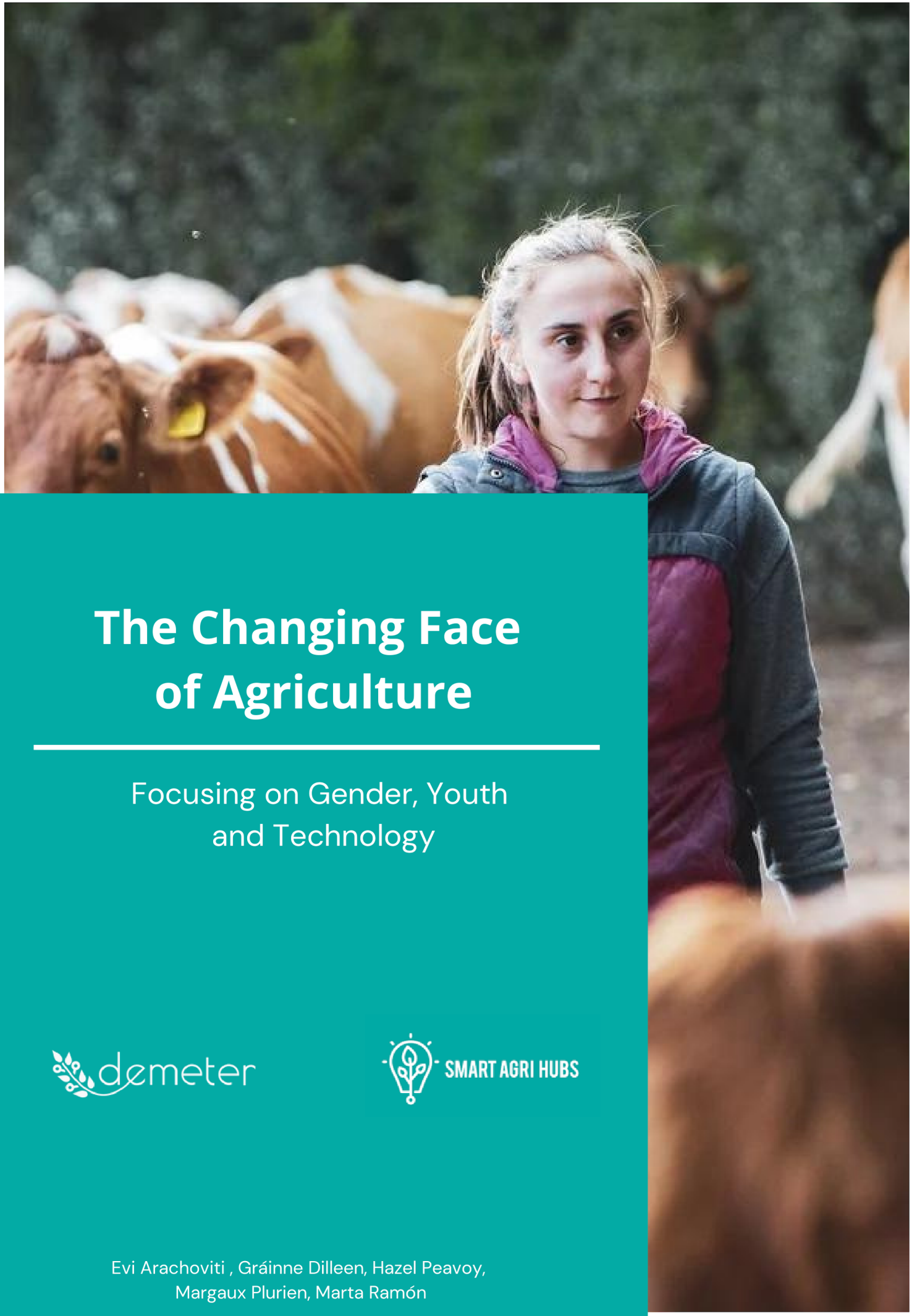


The Changing Face of Agriculture

Focusing on Gender, Youth and Technology

demeter

SMART AGRI HUBS

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Introduction

The agricultural sector is facing a myriad of challenges such as climate change, biodiversity loss, rising prices of inputs, and the threat of war, to name but a few.

An ageing population and gender inequality are undeniably pressing issues too, which if not tackled, the achievement of equal participation of women across agriculture and rural development and the competitiveness of the sector, are under threat.

According to data from the European Commission in 2021, women represent some 30% of the total workforce in agriculture, forestry and fisheries, with considerable differences between countries.

For example in Austria, 40% of the agriculture workforce are women, while only 15% in Ireland. Data also shows that about a third of farms across the EU are managed by women, however just 4.2% of farm managers are under the age of 35, and 42% are over 65, so the gender gap could widen in future years.

Though the employment rates have been increasing in recent years, the employment rate of rural women is consistently lower than for rural men, and income for rural women is lower than that of rural men in all Member States. Rural women are also more likely than men to work in the informal economy and on a part time basis.

To analyse the origin of the gender gap in farming, we refer to The Plough Hypothesis from Danish Economist, Ester Boserup. The Plough Hypothesis observes that before the plough was introduced, farming communities used many tools such as the hoe, which are handheld, in order to prepare the soil.

However, once the plough was introduced more physical ability and body strength was required, thus favouring men.

As a result, in farming communities that used the plough, women were removed from agricultural work, staying at home. In 2012, a group of researchers tested this plough hypothesis with a sample of second generation immigrants living in Europe and the US.

They found that even generations later, those who derive from a culture of using the plough hold unequal beliefs regarding gender roles. In those societies that relied on ploughs, women are today less likely to participate in work outside the home, be elected to parliament or run businesses.

Furthermore, Caroline Criado Perez explains in her book 'Invisible Women: Exposing Data Bias in a World Designed for Men' that males are the default person for which solutions are developed, further widening this gender gap. How do we address this gender gap to encourage more females to consider agriculture and farming as a suitable career?

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In regards to attracting more young people to agriculture, research from the European Commission cites access to land and capital as major barriers.

Farm succession plays a key role here too, and an in-depth understanding of generational renewal is needed to address the issue of farm succession and keeping the farming business moving forward, while being respectful to the senior generation.

So too does the need to provide opportunities for young entrants that do not come from an agricultural background, and encourage them to enter the industry with all the new ideas and new business models they can bring.

In response to these situations, the EU is committed to supporting female farmers, providing, for example, rural development funds to help young women get started in farming.

The Common Agricultural Policy (CAP) 2023-2027 has a stronger focus on promoting the participation of women in the socio-economic development of rural areas, with special attention to farming, supporting women's key role.

For the first time in the history of the CAP, a specific objective refers explicitly to women by promoting gender equality, including the participation of women in farming. Member States will be required to assess the situation of women in farming and in rural areas and address challenges to this end in their strategic plans.

Quoting Maria Noichl Member of European Parliament (AGRI & FEMM Committee):

'When it comes to the implementation of the strategic plans, we will have to keep a close eye on the Member States, ensuring they do their utmost to achieve this goal. Women and men on farms, as in society, need to be on equal footing, taking decisions together as a team and being remunerated for their work fairly and equally. Only like this, we can be successful as a society and only like this, a farm can be successful, too'.

To help spotlight the challenge of attracting more young people and more females to the agriculture sector, two Horizon 2020 projects, DEMETER and SmartAgriHubs, both promoting the digital transformation of the European agri-food sector, joined forces to address the current status and the growing opportunities within farming.

On 17 February 2022 the webinar "The Changing Face of Farming - discussing gender, youth, and digitalisation in agriculture", was organised to discuss the importance of attracting young people and women into agriculture. On 15 October 2021, for the 2021 edition of the International Rural Women Day, SmartAgriHubs and DEMETER co-organized an online event:"Gender in agri-tech", to discuss the importance of gender equality in agriculture and the essential role that rural women play in the food systems of the world. Both events were supported by DEMETER and the SmartAgriHubs projects alongside the SmartAgriHubs Regional Cluster Ireland & UK.

This report summarises the work done by the two projects and the regional cluster following these series of webinars and discussions with farmers, experts, policymakers, researchers and technology providers.

The work that the EU Commission is undertaking to reduce the gender and youth gap in Europe together with new CAP plans, measures and initiatives, is outlined as part of the analysis of the themes raised in the webinars. The report also sheds light on education and training being central to increasing women and young people's representation in agriculture, with two interviews from academia. The challenges that the war in Ukraine brings to the food safety and food scarcity issues around the globe are discussed.



Gender in Agriculture

Women make a significant contribution to agriculture both at farm and farm family level. They also play a key role in delivering a more sustainable agricultural sector. However, the challenges women in agriculture face differ considerably to those faced by men.

These challenges are not due to gender per se, but rather gender-differentiated factors such as women owning smaller farms than men, the difficulty in female farmers accessing capital, labour and resources, and the historic land transfer practices of the farm passing to male family members. In addition, much of the work contributed by women on farms is often described as "invisible" as their inclusion in the decision-making on farm is lacking.

DEMETER and SmartAgriHubs held a webinar titled 'Gender in Agritech' on October 15th, 2021 to highlight these challenges and collaboratively examine what can be done to encourage more women into the agriculture sector, and importantly raise the profile of those already actively contributing. The event was fittingly held on International Day of Rural Women which recognises the critical role and contribution of rural women in enhancing agricultural and rural development.

Speakers representing farmers, farmer organisations, policy makers, technology and innovation projects, analysed and discussed the current status of the gender gap in the agritech sector. Hazel Peavoy of SmartAgriHubs and also of Walton Institute was the moderator for the webinar. The event included participants not only from Europe but also international speakers such as Ntuthu Mbiko Motshegoa, a South African agripreneur and the first SmartAgriHubs Gender Ambassador.

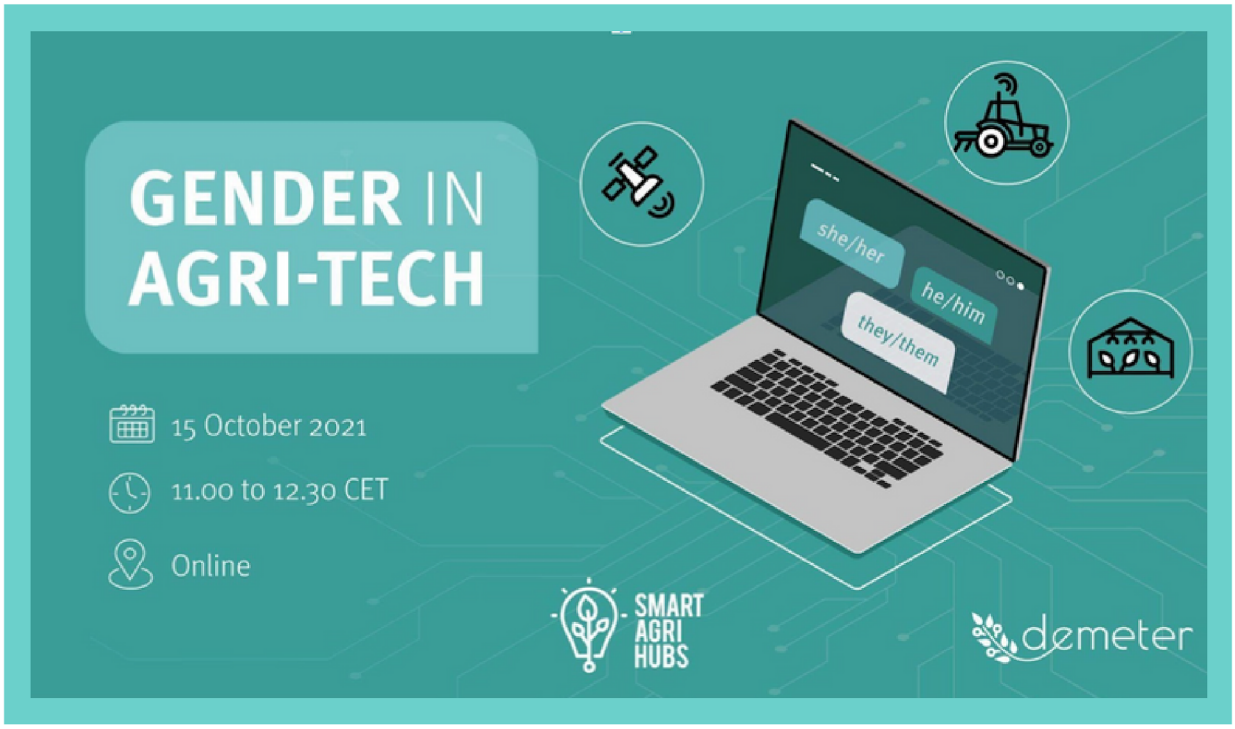


Image 1: DEMETER and SmartAgriHubs 'Gender in Agri-Tech' event

The event was opened by **George Beers,** the **project coordinator of SmartAgriHub**s, who welcomed attendees and highlighted the importance of gender equality in agriculture. He also shared information about the SmartAgriHubs Gender Task Force which is dedicated to supporting gender equality in the agriculture and agri-tech sectors. The first section of the webinar focused on the policy perspective with representatives from the European Commission, Institute for European Environmental Policy and the Food and Agriculture Organisation (FAO).

Dr. Doris Marquardt of the European Commission, in the Directorate-General for Agriculture and Rural Development outlined the EU 2030 objective of a tech savvy continent where all citizens are digitally empowered. Dr. Marquardt posed an interesting question "What would a digital decade look like with women in the driving seat?". This referenced the fact that women are still under-represented in research and innovation. She also discussed the personal, societal and economic implications of the digital gender gap, and noted the importance of women in ICT tailoring solutions for female end-users.

Faustine Bas Defossez, Head of Agriculture and Land Management Programme, at Institute for European Environmental Policy discussed what a sustainable CAP, relying on a more gender-balanced decision-making approach, could achieve. Fasutine outlined that in relation to CAP, the percentage of women involved in reform decisions, agriculture presidency seats and leadership positions is relatively low. Women need to be represented at these discussions to advocate for the female farmers that they represent.

The next speaker, Hajnalka Petrics, Programme Officer (Gender Equality and Women's Empowerment) at FAO spoke about ICT-enabled, gender-responsive, rural advisory services and the role of gender transformative approaches. Hajnalka outlined that the level of technical information provided to women in agriculture lags behind that of men and this is causing a widened digital gender divide. The digitalisation of agriculture needs to focus on access to technology but more importantly delivering tailored education and training around usage and breaking social norms.

The second section of the webinar was centred around female farmers and farm advisors and their experiences in working in agriculture. In addition, the perspective from other EU Horizon 2020 projects was presented. From the farmers' perspective we heard from female farmers in Montenegro, South Africa and Italy.



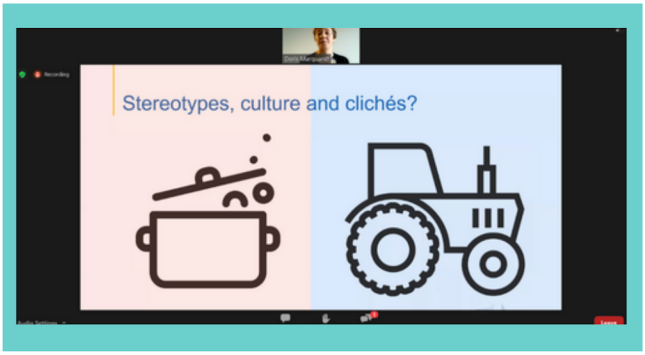


Image 2: Dr Doris Marquardt of the European Commission speaking at the DEMETER and SmartAgriHubs 'Gender in Agri-Tech' webinar.

The next speaker Ntuthu Mbiko Motshegoa, an agri-entrepreneur and SmartAgriHubs Gender Ambassador brought the discussion outside Europe and into Africa. She made a compelling story about the plight of and fight for women's rights in the continent, and the steps that are being made to reinforce that. Access to land was highlighted as a key barrier that needs to be addressed by policies and strategies. Her appeal to the EU-Africa partnership is that we need to have an action-oriented approach driven by real data.

Katarina Pavicevic of Montenegrin wine and grape brandy producer, Plantaze, and also involved in DEMETER discussed the gender balance within DEMETER and within her own organisation, highlighting the importance that these figures are tracked and monitored. Katarina also outlined how the ministry of agriculture in Montenegro has prioritised the prevention of discrimination and caring for the rights of rural women.

Federica Basile, a farmer who moved from the high-tech industry in the UK to farming in Italy, spoke next. Federica is also involved in SmartAgriHubs and presented her depiction of the circular agri-economy in her region in Italy, and her efforts towards social sustainability. Technology was highlighted as a key enabler for delivering a stronger gender balance in agriculture, as were successful internship programmes for female farmers.



From other H2020 project perspectives, we heard from FAIRshare and INNOSETA.

- **Dr Teresa Hooks**, from **FAIRshare**, presented on Women in Advisory Services and their use and perception of digital technologies. FAIRshare aims to promote increased uptake of digitalisation among farm advisors first, ensuring that they will then be equipped to advocate for their use at farm level.

- **Elena Sanchez Sanchez** of **INNOSETA,** which aims to set up a self-sustainable thematic network on spraying equipment, training and advising, spoke about the knowledge transfer within INNOSETA. She noted a good uptake in terms of gender balance on their platform.

In the Questions and Answers session which followed, participants and attendees discussed the need for initiatives to promote female leadership in the agricultural sector and the need to share female success stories locally and internationally.

Government support was highlighted as being critical with policies to drive inclusion at project level, research level, ICT level and farm level. However, these policies need to translate into actual plans with an impact, rather than merely being a plan on paper.

Furthermore, translation is important, making sure that communication materials are available in local languages to women and supported by local, female-run, communication networks on the ground in each country.

The webinar was closed by Kevin Doolin of Walton Institute and project coordinator of DEMETER. Kevin outlined how Walton Institute is building on existing measures to meet the Commission's Gender Strategy in Research and Innovation. Kevin summarised the key points from the speakers discussing the need for tailored education and training, more females involved in decision making at farm and policy level, and a continued combined effort from all, including DEMETER and SmartAgriHubs, to highlight positive stories of female farmers and females involved in ICT.



The Changing Face of Agriculture

Following the Gender in Agritech webinar, DEMETER and SmartAgriHubs came together to discuss the work needed to continue to promote a gender-balanced agriculture sector.

As part of the discussion, it was recognised that the future of agriculture also depends on attracting more young people to the sector.

In 2020, the EU agricultural industry EU created an estimated gross value added of EUR 177 billion, representing 1.3% of the EU's GDP. Behind these numbers there are 9.7 million people employed, but only one in ten EU farm managers are under the age of 40.

In addition, the majority of farm holdings (57.8%) in the European Union are run by farmers aged 55 years or more. This represents an ageing workforce that will have to be replaced by the next generation of farmers and other related professions.

It is clear that the agriculture sector needs to face the challenge of filling the generational and gender gap in order to keep its competitiveness on a global level. Therefore, DEMETER and SmartAgriHub held a second webinar,

"The Changing Face of Agriculture- discussing gender, youth, and digitalisation in agriculture" on February 17th, 2022 to discuss "how do we attract more young people and women to Agriculture?". The seriousness of the situation was clearly explained by one of the speakers, Diana Lenzi, President of CEJA (European Council of Young Farmers:

"We are on the threshold of a very big revolution, a huge change, grand ambitions for the farming sector yet we really don't have enough arms to carry on this transition to succeed on the big and very noble objectives that are being laid on the table to make agriculture more sustainable".

Session 1 - The Farmer's Perspective

- The first speaker was Philippa Gray, a farmer and former Fundraising Manager at Innovation for Agriculture, UK. Philippa grew up on a small family livestock farm in Yorkshire, England, and with the support of her family began breeding her own pedigree sheep when she was 14 years old. In her presentation, Philippa outlined some of the digital tools used to help with the management and sale of sheep as well as the marketing of produce directly to consumers. Philippa outlined the need for specific agricultural education in schools, particularly targeting females from non-agricultural backgrounds. In addition, better career guidance and access to work experience on-farm is needed to encourage more young people and females into agriculture.



Image 3 - Philippa Gray, Farmer and former Fundraising manager at Innovation for Agriculture

- The second farmer to speak was Mateusz Sikora, a beekeeper from Poland. Mateusz spoke about farm succession as he took over the running of the professional apiary farm from his father. He delivered his story of how he modernised the apiary, changing all machinery and investing in digital tools and equipment. Technology improves his daily work in terms of transporting the hives, weather -monitoring, increasing security against the threat of thieves and animal predators, and marketing the produce. Mateusz highlighted that to encourage more young people into farming, more talks are needed at primary level to pique children's curiosity.

- The final speaker in the farmer session was Diana Lenzi, president of CEJA. Diana is a young farmer from Tuscany where she cultivates and processes grapes to make Chianti Classico wines, olives for EVO and ancient grains for flour and pasta. Diana explained the urgent need for a strategy for generational renewal at national and EU level. Challenges such as access to land, access to finance, access to knowledge and skills have yet to be tackled broadly. To overcome these issues, there is a need to make agriculture more attractive and to demonstrate how agriculture is using technology and science to its benefit. Positive success stories need to be shared. Importantly, Diana outlined how there is a need to make agriculture more profitable to ensure farmers can make a decent living from their work.



Figure 1: Mentimeter results on the biggest challenges faced in agriculture.

After the farmer session, attendees were invited to share questions with the panel of speakers and participate in the Mentimeter session. Mentimeter is an interactive presentation software where attendees can share their opinions and thoughts. Participants were firstly asked

"What has been the biggest challenge faced in your career in food and agriculture?".

A number of challenges were outlined and respondents were asked to rank them accordingly.

The results demonstrated that rising costs and lower prices for produce was the biggest challenge. This brought the discussion back to the point made by Diana Lenzi that in order to safeguard the future of agriculture, it firstly must be seen as a viable career for young and female farmers. Secondly, investing in technology was seen as a significant hurdle, highlighting the need to make it easier for farmers to access capital to allow them to purchase digital technologies.

The next question in the Mentimeter session asked attendees if they had ever experienced harassment working in agriculture. 61% of respondents said No, but 39% had experienced some form of harassment.

14% received verbal harrassment, 11% online harassment, 7% sexual harrassment and 7% physical harrassment. Respondents were then asked to elaborate on some of the reasons for this harassment. Some respondents outlined that it came from “Anti-farming activists" while others indicated it was just “for being a woman”. Giving young and female farmers the tools to deal with offline and online harassment is now undoubtedly an important aspect of education and training and must be implemented into future initiatives.

Respondents were then asked “Are women and young people well represented in the agri-food sector?”. In total 83% of respondents answered No, while 17% answered Yes. As a follow on questions, respondents were queried “How can we ensure that women and young people are better represented in the agrifood sector?”. The following word cloud was produced:



Figure 2: Mentimeter word cloud on what is needed to ensure increased representation of young farmers and female farmers in the agrifood sector.

This demonstrated that education and training are central to increasing women and young people's representation in agriculture.

In addition, equal salaries, more funding and more positive role models were important steps to further increase representation.

The next question focused on young farmers and asked "*What do you think is most needed to attract more young people to farming?*". Ten different answers were given and respondents were asked to choose the one they felt was most important. Unsurprisingly, financial support was the most popular, followed by better knowledge transfer and better work-life balance.

This highlights the need for support and advisory services and also more communication around how digital technologies can support social sustainability alongside economic and environmental sustainability.

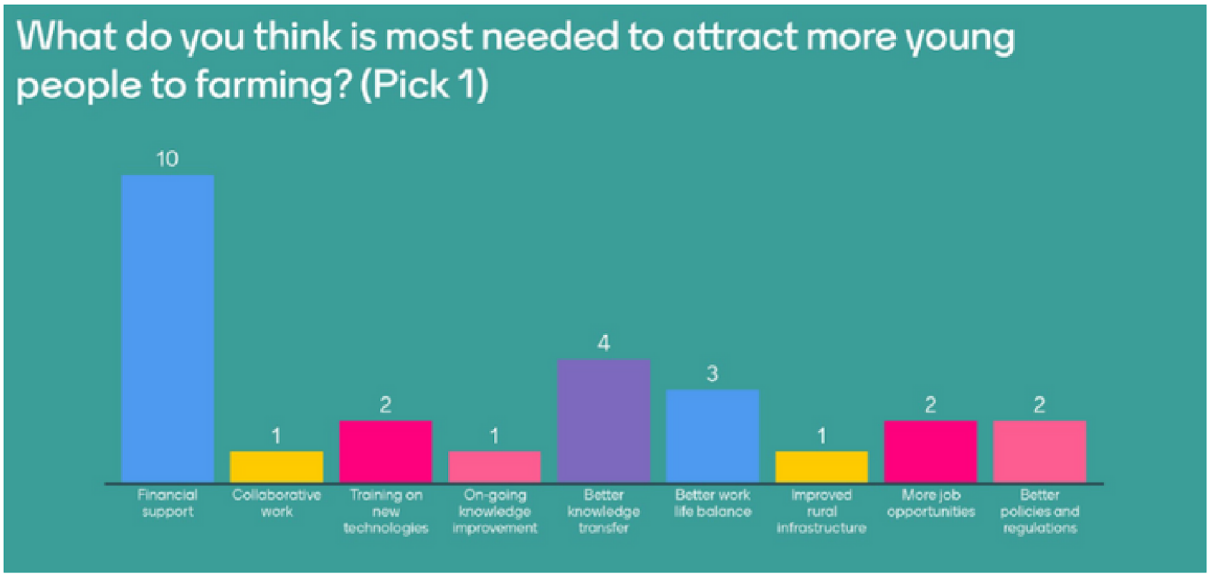


Figure 3: Mentimeter result outlining what is needed to attract more young people to farming.

This linked into the next part of the webinar which focused on the "Support and Training" perspective and heard experiences for a farm advisor, a farming organisation representative and a Digital Innovation Hub leader.

Session 2 - The Support and Training Perspective

- Annick Spaans is a project expert in food security & health for ZLTO in the Netherlands. Annick shared her experiences of being a young, female farm advisor. The interest in technology from young farmers is high due to the work relief, better control of the farm and improved work-life balance. However, the major pitfall is sometimes believing that the technology will solve all the work problems; technology is not a complete solution. Annick finished by summarising what developments are needed to encourage more young people and females into farming. These include summer schools, more testimonials and mentorships programmes.

- The next speaker was Kristina Sermuksnyte-Alesiuniene, Director and coordinator of the Digital Innovation Hub AgriFood Lithuania. Kristina explained the role of Digital Innovation Hubs (DIH) in bringing together information for the common pursuit of digital transformation in the agriculture, food and associated sectors. DIHs link stakeholders with initiatives to provide all-round support in the research, development and deployment of AgriFood Tech innovations. Kristina highlighted the need to bring young people back into regions and the important role of women in orchestrating ecosystems around them.

- The final speaker was Ethan Cleary, Technology and Innovation Executive from the Irish Farmers Association and 5th generation arable farmer. From a policy perspective, his current focus is driving the innovation and digital agenda for Irish farmers at an EU and national level with the aim of ensuring farmers benefit from this era of rapid digital transformation. Ethan discussed how farmer associations/organisations play a critical role in encouraging young farmers and females into the sector.

He gave local examples of what is being implemented in Ireland to encourage the adoption of technologies mapping it to the National Economic Social Council research on Digital Exclusion and showing where progress has been made and where it is lacking in Irish agriculture. Ethan finished by summarising some of the emergent challenges in digital agriculture such as farm data, interoperability, education, connectivity and the digital divide, analytics and UX improvement.



Following the support and training perspective, respondents were asked to participate in the Mentimeter and answer:

"Do farmers need new skills to adopt digital technologies or just better technology solutions?". Almost 70% of respondents answered that both were needed, while 19% said new skills and 13% said better solutions."

This again highlights the need for adequate training but also the importance of listening to farmers' needs, interests and concerns when developing digital solutions and designing technology that is optimal to farmers' working environment. Next, attendees created a word cloud of what support was most needed to encourage more young and female farmers to adopt digital technologies. Again, funding, training and education were seen as key.



Figure 4: Mentimeter word cloud outlining what is needed to encourage the increased use of digital technologies.

With education and training highlighted as a key support mechanism to encourage technology adoption, the next question asked was, "What is the most successful way to really achieve the knowledge and technological transfer in agri-tech?" The results were as follows:

- Communities of Practice (a group of people who share a common concern, or an interest in a topic) - 27%
- On farm demonstrations - 24%
- Peer to peer exchange - 22%
- Support/discussion groups - 14%
- Online forums - 5%
- Independent agricultural advisors - 5%
- Formal education - 3%
-

Finally, the last question posed was "When do you think that the gender and generational gap will be filled?". Respondents were split on their thinking: 25% said in the next 10 years, 20% said in the next 15 years while 30% said in the next 20 years. A quarter of respondents did however indicate that they do not think that an equal gender and generational agriculture sector will ever be achieved.

This demonstrates the need for initiatives such as the SmartAgriHubs Gender Task Force and the work ongoing in H2020 projects such as DEMETER and SmartAgriHubs to continue to spotlight the issues and encourage discussion and action. The event was closed by George Beers of SmartAgriHubs who highlighted the urgency in attracting more young farmers and that women can act as a catalyst in this process.

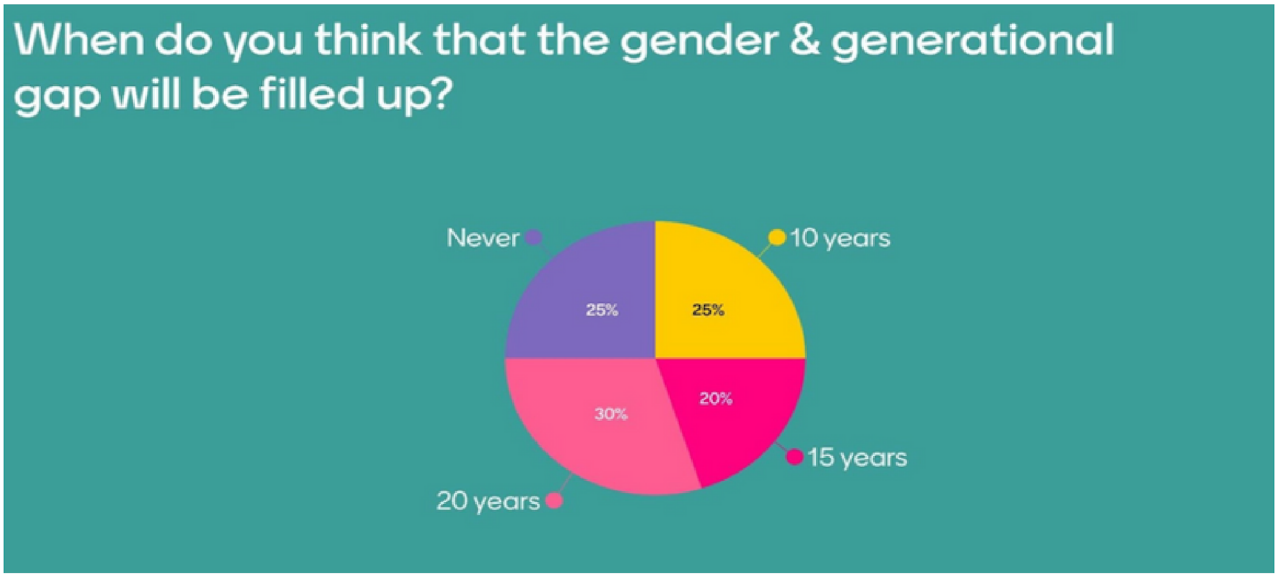


Figure 5: Mentimeter result outlining when respondents believe the gender and generational gap in the agrifood sector will be filled.

Key findings arising from the events

The two webinars raised some interesting findings that warrant further discussion. Financial support for women and young people is important to attract them to the agriculture sector and provide the necessary training and education regarding the use of digital technologies. Furthermore, more women and young people are needed at the policy table to advocate for their peers and to ensure their voice is heard. Uncertainty in the market, heightened by the war in the Ukraine, brings these issues to the fore and highlights the importance of recognising the central role that farmers play in our society. Each of these findings is explored in more detail in this section.

4.1 Financial Support

Innovation can only be implemented if supported by the necessary capital and training.
One of the main points highlighted by these events was the need to facilitate women's access to capital. Women can also drive innovation, but they are unfortunately under-funded: In 2019, 2.8% of funding went to women-led startups; in 2020, that fell to 2.3%, according to Crunchbase figures. When women-led startups do get funded, they're more likely to be successful.

Awards and programs dedicated to women such as the EIT Food EWA support women innovators in agrifood. Through this program, more than 260 female entrepreneurs have received support, mentoring and training from EWA between 2020-2022 and over 40 start-ups in the agrifood sector have been created.

Taking the need for funding into account, following the events SmartAgriHubs community gathered an overview of funding opportunities for each of its Regional Clusters.
2022 was the European Year of Youth, and we are now entering the Year of Skills. Young farmers are more likely to adopt new techniques and technologies, but would need to receive proper training. More generally, life-long learning in agriculture and further educational opportunities in rural areas are needed. Both access to funding and training can be supported by the right policy framework

4.2 Policy for youth and women in Agriculture.

Representation for women and young people at policy level is key to ensuring their voice is heard within the agriculture and ag-tech sector. Their needs, interests and concerns need to be gathered and acted upon. Work is being done at local and international level to ensure the gender gap is reduced.

As outlined, Dr. Doris Marquardt of the European Commission, in the Directorate-General for Agriculture and Rural Development posed an interesting question at the first webinar; "What would a digital decade look like with women in the driving seat?". Without doubt, women advocating for women is critical in shortening the gender gap. As part of the 'Gender in AgriTech event, Dr Marquardt outlined some next steps that were currently underway as part of the work the EU Commission is undertaking to reduce the gender and youth gap in Europe.

- Target on basic digital skills established as part of the EU pillar of Social Rights Action Plan; 80% of citizens aged between 16-79 have at least basic digital skills by 2030 (2020 baseline is 58.3%). This is an ambitious target, but thought to be achievable.
- European Skill Agenda for sustainable competitiveness and social fairness and resilience (Action 6, skills to support the twin transition).

- Declaration of digital principles (the European way for the digital society); The commission will propose to include a set digital principles and rights in an inter-institutional solemn declaration.
- Gender balance in Horizon Europe projects - Commission Gender strategy in R&I.
- Private sector engagement e.g. in achieving 2030 targets in ICT experts (including share of women).

From the policy side, the World Farmers' Organisation (WFO) is a member of the DEMETER consortium and has been extremely active in empowering women in agriculture. We have worked closely with them on events and publications to ensure that the voice of women is heard, not only from Europe but from around the globe. Maria Giulia De Castro, Advocacy Policy and Partnership Officer at the WFO explains about the work they are doing.

"In 2013, the WFO established a Women Committee composed of members from all the six WFO Constituencies (North America, Oceania, Asia, Europe, Africa, Latin America). This committee meets to discuss women farmers' issues in their respective constituencies as well as finding and sharing a common global vision when WFO is called to represent the global farmers' community in agriculture-related international policy processes (i.e. United Nations Decade of Family Farming 2019-2028, Committee on the Status of Women (CSW), High-Level Political Forum(HLPF)).

Also, to strengthen women farmers' advocacy at all levels, the WFO General Assembly in 2013 adopted a policy document on Women which contained the vision, needs, challenges and calls for action collected by WFO members back then. After a few years, as the world changes, a few months ago, at the last WFO GA in Budapest, all WFO members came together to discuss and adopt a revised and updated policy document to promote women empowerment, enhancing women farmers' role in the farming sector and eliminating social, cultural and economic barriers that prevent women from fully pursuing their objectives both in their personal and working life."



As already mentioned, the new CAP 2023-2027 has a stronger focus on promoting and supporting women's key role in the socio-economic development of rural areas, with special attention to farming. CAP funds and other funding sources will support;

- Investments into infrastructure and services – enablers of social inclusion of women
- Provision of incentives for local employment opportunities for women
- Enhanced support and incentives for female farmers
- Improving the access to loans for women for entrepreneurial activities;
- Empowering women in decision making

Furthermore, the new measures and initiatives will also enhance the monitoring of gender equality implementation using a methodology to measure the related expenditure at programme level. The new 'Social Conditionality' concept introduces serious financial consequences for farmers who do not respect employment and social legislation in relation to their employees. This will lead to better working conditions in the agriculture sector for all workers, including women.

As part of the Commission's Long Term Vision for EU Rural Areas, there will be a flagship initiative called 'Social resilience and Women in rural areas'. Support for women will be provided for entrepreneurship, participation in decision making and investments in work-life balance services, such as early childhood education and care, as well as services for older people. There can also be opportunities to increase women's integration in the labour market. This work by key organisations is crucial to ensuring women are better represented and heard.

4.3 Education in Agriculture.

Today, women and girls are 25 per cent less likely than men to know how to leverage digital technology for basic purposes, four times less likely to know how to program computers and thirteen times less likely to file for technology patents. At a moment when every sector is becoming a technology sector, these gaps should make policy-makers, educators and everyday citizens 'blush' in alarm.

UNESCO's new publication, I'd blush if I could, shares strategies to close gender divides in digital skills through education. The main message from this publication is that education is simply not enough, but instead it must be education that is tailored to women's interests and needs in order to increase the uptake on digital skills.

I'd blush if I could seek to expose some of these biases and put forward ideas to begin closing a digital skills gender gap that is, in most parts of the world, wide and growing.

Education, knowledge, and technological transfer are ongoing solutions to overcome the generational renewal and gender bias barriers in farming. The trend towards the digitalisation of agriculture has already enabled the diversification and enrichment of professional roles in agriculture: young farmers now coexist with IT and Telecom engineers, data scientists, researchers and other technological profiles.

The specialised and formal training of young farmers will help them to manage their agribusiness but also to easily adopt smart agri-tech solutions based on IoT and artificial intelligence (AI). Both points are compelling to help accomplish the exigent goals of the EU Green Deal's "Farm to Fork" strategy, which aims to transition to a sustainable food system that ensures food security while reducing the environmental impact of farming and generating fair profitability for farmers.

Therefore, the key to safeguarding the future of European agriculture is providing support to new generations, ensuring gender equality as a given. This will successfully enhance the European farming sector from a broad perspective that comprehends rural development, climate change response, economic competitiveness and food supply guarantee.
Federica Bastille, as part of the Gender in Agri event spoke about the programmes that they are currently running for high school kids, starting at the age of 16, where they are targeting females and have gone on to hire 7 full time staff, 5 of which were female. A group of these 5 women have gone on to take up key roles. This demonstrates the importance of investing in education earlier, encouraging women to participate and engage.
With this in mind, we conducted two interviews with education institutes to better understand what is being done to encourage more young people and more women into agriculture.



Interview 1:
Dr. Russell Readman
Principal Lecturer in the Department of Agriculture and Environment
Harper Adams University, UK.

What training is in place to support women or youth to enter and remain in Agri education?
Harper Adams offer a range of undergraduate Agriculture courses. These are equally open to both male and female applicants. Students may enter via the A-level route/Subsidiary diploma (or combination of these) or having studied a BTEC Extended Diploma in a relevant subject – a range of other colleges offer an Extended Diploma in Agriculture.
Proportion of entrants from a BTEC background has increased significantly over the last 5 years; 77% of FdSc Agriculture entrants & 47% of BSc entrants come from a BTEC background. Pastoral and academic support is in place to support all students to complete their studies, this support is equally available to male & female students.

What effects are we seeing in Agri Courses within your university, regarding the uptake of female participation?
Percentage female enrolments on average across BSc & FdSc Agriculture courses has increased by around 10% over the last 10 years (female entrants 2021: 27%; 2011: 18%).

Are there specific supports within your university to encourage youth and females to take up Agri courses?
No specific support/initiatives that I am aware of within Harper Adams specifically devoted to female youth regarding the take up of Agriculture Courses. All students are supported equally.

What is your Institution's Diversity, Equality and Inclusion Policy?
Harper Adams has a Diversity, Equality & Inclusion Policy both at an institutional level & an admissions level & an Access & Participation Plan that aims to ensure equality & inclusion across all student groups.



Interview 2:
Eleanor Kent,
Head of Department of Land Sciences
South East Technological University (SETU), Ireland

What training is in place to support women or youth to enter and remain in Agri education?

We have no specific training in place which targets women to enter and remain in Agri Education, we do have a number of supports in place - see Q3 below. Also, all staff are made aware of the EDI (Equality, Diversity and Inclusion) policy and SETU has a strong focus and track record of supporting EDI. Many Schools and Departments across SETU have Athena Swan Accreditation with others starting the process.

What effects are we seeing in Agri Courses within your university, regarding the uptake of female participation?

We have support in place (see Q3) that we believe has increased the uptake of female students, as outlined below in our Gender Stats for Land Sciences in the last 5 years. The table shows an increase from 26% in 2017 to 38% in 2021 (based on approx. numbers from registered students, may be repeat students there also).

Year	Female	Male
2017	(26%)	(74%)
2018	(27%)	(73%)
2019	(31%)	(69%)
2020	(33%)	(67%)
2021	(38%)	(62%)

Table 1: Gender Stats for Land Sciences Department for last 5 Years (July 2022)

Are there specific supports within your university to encourage youth and females to take up Agri courses?

The Department of Land Sciences has approximately a 50/50 split between male and female lecturing staff all of whom are actively involved in marketing our Agri/Food programmes during the year at Open Day Events, Agricultural Shows, School Visits etc.. The presence of females promoting these programmes definitely encourages women and youth to consider Agricultural Courses.We have conducted interviews with women studying and working in the Land Sciences area which has been supported by our EDI office. This video will be used to promote female participation in Agri/Land related programmes.

We have an excellent track record in placing female students in various "Work Placement" settings and we experience no barriers to females in any of these settings.

Female student testimonials are promoted via the website and through other promotional material. Annual Industry Sponsored Awards see an equal split between male and female awardees each year. These are promoted in the local and national media each year.

What is your Institution's Diversity, Equality and Inclusion Policy?

SETU is a newly formed university in the South East of Ireland, bringing together two high performing Institutes of Technology (Carlow and Waterford). In line with the new strategy that has been developed for SETU, there is also a new EDI policy that encourages the uptake of training across both campuses to better understand the needs of all our staff and students. More information on the new SETU EDI Policy is available at the following link: SETU-Equality-Diversity-and-Inclusion-Policy.pdf

War and Agriculture

Agriculture will have personal, social and economic implications, in both the developed and underdeveloped world. While we are only beginning to understand, and will not for some time, the impact of COVID-19, had on youth, women and agriculture, we are now facing the next global crisis with the war in Ukraine.

Margot Batthyany-Schmidt, President of the Union of Hungarian women and COPA COGECA's Women committee, highlighted on International Women's Day 2022 the role women play as the family leader. This is even more true in the context of war where men of fighting age are not authorised to leave Ukraine, but are also expected to fight and not to farm. As a result, the breadbasket of Ukraine is now being farmed by its women

While we have noted supports, financial and other, offered to women in food and agriculture across the Ukraine, again we will not know the real impact of both the pandemic and the war for some time to come. More importantly the impact of both, in reducing or increasing, the digital divide to allow females or the youth to find their full hold in our economy, while holding ground for us all personally and socially.



Figure 4: Ukrainian military defence on the fields. Photo credit: Taras Gren.

Furthermore, the war in the Ukraine brings uncertainty to the market, rising costs and food security and scarcity issues. According to a note published by the FAO in July 2022, production shortfalls in Ukraine may only be partially compensated by alternative sources during the 2022/23 marketing season.

The war started in the context of a weakened global economic prospect following the COVID-19 pandemic, increasing prices of food and other key commodities, such as energy, and high inflation. The capacity of many exporting countries to boost outputs and shipments may be limited by high production and input costs. The resulting global supply gap could raise international food and feed prices.



Figure 5: Samantha Power on Twitter, meeting Ukrainian Farmers

Further Actions

The SmartAgriHubs Gender Task Force was established with the aim of raising awareness among the SmartAgriHubs community, and the wider agri-food network, about gender inclusiveness and equality. Similarly DEMETER undertook a gender survey to better understand the gender divide across agri businesses and research organisations involved in the consortium.

Results from the Task Force are shared below. We have also continued to ensure that the topic of youth and women in agriculture is raised at other events and conferences, while also highlighting key success stories. Listed below are some of the next steps undertaken by both SmartAgriHubs and DEMETER:

6.1 Gender Task Force

To better understand the situation of men and women in agriculture and smart farming, the Gender Task Force of SmartAgriHubs created a "Gender Survey".

46 respondents, from all genders and working in the agri, agrifood and agri-tech industry, shared their perspective. 21.7% disagree with the statement "Gender equality measures in the agri-tech sector are adequate". Most respondents agree that gender equality positively impacts both personal and organisational performance

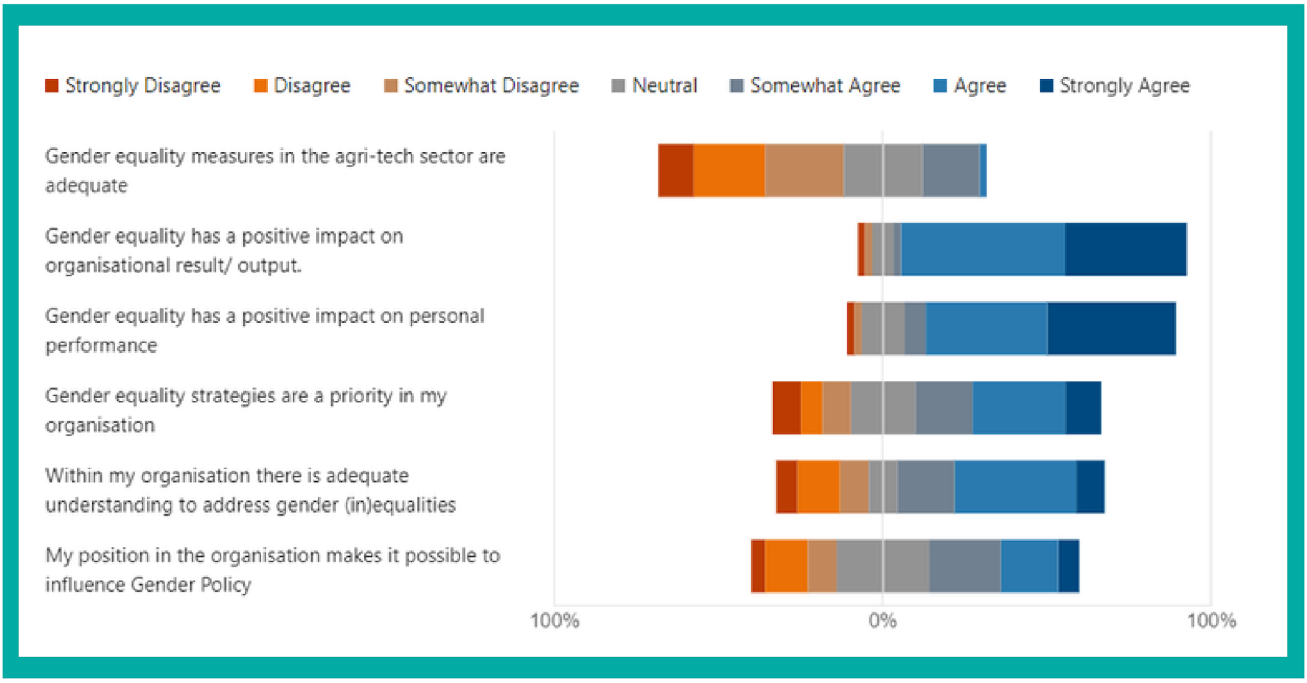


Figure 6: Results from the SmartAgriHubs Gender Task Force survey on organisational performance towards gender equality

Despite this perception of gender equality, the majority of respondents declared not knowing if their organisation has assigned a budget to improve it, or that no budget existed at all.

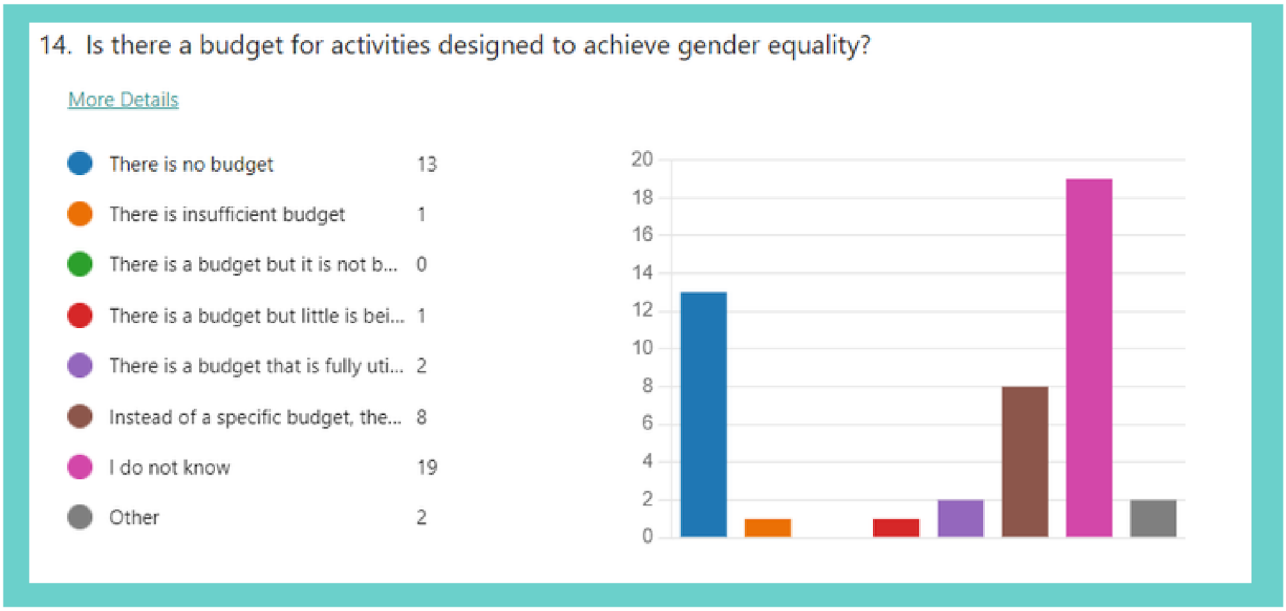


Figure 7: Results from the SmartAgriHubs Gender Task Force survey on budget allocation towards gender equality

Reflecting on these results, the Gender Task Force prepared a special edition of the SmartAgriHubs newsletter, along with a workshop, both titled "Investing in Gender Equality".

Now that SmartAgriHubs is ending, the Gender Task Force is exploring new ways to continue its work.

Leveraging the Task Force and its network, a new organisation is in preparation, which will focus on what the respondents to this survey and the participants to the SmartAgriHubs Final Event workshop deem most important: creating toolkits and sharing best practices for a concrete impact on their organisation.

6.2 IoT Week, Dublin 2022; Gender Workshops

As part of IoT week, Dublin 2022 Smart Agri Hubs hosted a series of workshops that joined the dots from the early stages of the project and portal to the services that were now available online for the Digital Innovation Hubs and Competence Centres. As part of this series, we also hosted a workshop on 'New ways of farming and the next generation of farmers; gender & youth in agri-tech'.

As part of this session we hosted speakers from Doris Marguardt (DG Agri), George Beers (Coordinator of SAH), Kevin Doolin (Coordinator of DEMETER), Felicity Kelliher (SETU), Cynthia Giagnocavo (SAH WP4) and Ethan Cleary (IFA, Ireland).

Ethan spoke about Technology Trends and making technology more accessible and open to all, while Felicity Kelliher and Grainne Dilleen (PhD on DEMETER looking at digital adoption) spoke about their research into exploring the 'Fem in Farming' and the effects of gender and age on the adoption of smart technologies.

Their work looked at the very slow uptake of female farming in Ireland, and the average size of holdings most females had. Accelerating the creation of rural nascent start-ups (ACORNS), had developed a report on a peer-led support network that was put in place for female entrepreneurs in rural Ireland, with a Rural Innovation and Development Fund put in place to support this work.



Image 6: Kevin Doolin, Coordinator of DEMETER and moderator of the gender workshop, speaking at IoT Week.

They pointed out that Ireland, with the exception of the US, was one of the countries less represented by females on farms. There have been calls for research to be undertaken on how push and pull factors (including tech), characteristics of local agriculture, and the type of agriculture practised related to female farm operators.

As part of this workshop and Grainne Dilleen's research it was noted that there is gender inequality at policy level, that there was a gender bias in agritech design with a fraction of venture capital funding going to female entrepreneurs.

The gap between technology uptake differed greatly between men and women, however there is very little research into why this is, other than the obvious gap in number of female farmers to their male counterparts. It was also noted that women are more influenced by social concepts while men are influenced by their attitude towards using technology.

In contrast, Cynthia looked at how to empower women in the digital age, which could impact the uptake of technologies by women.

The commission undertook a study of 'Women in the digital age' , which found that few women had participated in the digital sector, following this report and some work already done by Smart Agri hubs, it was decided to set up a Gender Task Force (see point b), this task force set out a path for the wider AgriTech community to get involved and provide analysis, share information and consolidate various sources and initiatives, good practices and truly identify metrics that could/would be measured.

A Gender Ambassador was identified and engaged with on numerous events. For European Gender Equality week 2021, Ntuthu Mbiko-Motshegoa, a South African agri-entrepreneur said 'My message for young women [....] is to be aggressive in your approach, be ruthless with your time, spend time with people with vision and be creative and innovative'.

Smart Agri Hubs Final Event, Lisbon, 2022; Gender Workshops

Workshop 1:
Investing in gender equality: the future of SmartAgriHubs Gender Taskforce

The raison d'être of SmartAgriHubs is inclusive and exponential Agri-digital community and network building, showcasing Agri-digital innovation which leads to more sustainable and competitive European agriculture. In the past 4 years, the SmartAgriHubs Gender Task Force set out the path for the wider agri-tech community, expanding beyond the project.

Through communication campaigns, events, and synergies with other H2020 projects and policy-makers, the SmartAgriHubs Gender Task Force highlighted the importance of

- Investing capital in women-led innovative tech projects
- Investing resources in training and educating
- Investing time & labour to change our processes and structures.
- In this session, the SmartAgriHubs Gender Task Force presented:
- Our milestones and achievements, by Marlijn Henskens
- SmartAgriHubs Gender Survey by Cynthia Giagnocavo
- Changing the Face of Agritech, a brainstorm session facilitated by Margaux Plurien
- The future of the Gender Task Force by Lorena van de Kolk.

The workshop was attended by 18 participants, members of the Task Force and attendees to the event. Participating organisations included COPA COGECA, ILVO, Digital Innovation Hubs and SMEs.
The workshop started by a short introduction of each participant, followed by the presentation of the Gender Task Force milestones. Each Mentimeter question was followed first by a comment by the facilitators.

The floor was then open to the contributions from the attendees. The attendees showed great interest in the discussion, sharing testimonials of their personal experience facing gender discrimination at work, the progress they have seen and what the efforts they believe is still needed.

Attendees showed clear preference for the toolboxes created by the Taskforce. They showed appreciation for the communication products, and pointed out the importance of role models and inspiration. However, toolboxes are perceived as providing clear steps for change.

- Including women in decision-making is identified as the most urgent topic, as it would allow to raise awareness and potentially resolve any other issue related to gender.
- Gender quotas for certain positions are controversial. Attendees reflected on the danger of undermining the legitimacy of women promoted through these shemes, but agreed they could help them in breaking bias. The link with race and background was made.
- Attendees regretted the lack of participation from men in gender discussion. For the workshop itself, 2 men only participated.
- Attendees highlighted the importance of sharing success stories and a number of EU projects/organisations successfully investing in gender

The main output of the workshop was the feedback given on the services provided by the Gender Taskforce, which helps to better define and support the creation of GAIA (Gender Alliance for Innovation in Agriculture).

Workshop 2:
Addressing gender inequality in the agri sector: an inclusive value chain

At the SmartAgriHubs final event, DEMETER held a workshop 'Addressing gender inequality in the agri sector: an inclusive value chain'. This workshop addressed gender inequality in the agri sector from several different perspectives: farmer, policy, technology, researcher and project level.

Representatives from the World Farmers' Organisation, F6S (a leading growth company community), Origin Trail (technology developer) and the SmartAgriHubs Gender Task Force shared their views.



Image 7: Hazel Peavoy of SmartAgriHubs, speaking at the DEMETER gender workshop.

Fostering inclusive governance at all levels, strengthening women's engagement and participation is key to allow them the opportunity to represent and advocate for their specific needs and interests. To achieve this, and to support long-lasting change in the way we approach gender equality in agri-tech a collaborative effort is needed.

However, the large majority of participants at the workshop were female.
Therefore, one of the key learnings was that until we achieve gender-balanced discussions, we will not achieve gender balance in the agriculture sector. Work is needed to encourage more men to join the conversation and act as advocates for their female colleagues.



Communication on Gender

Highlighting positive news stories on women and young people working in agriculture is important. Both DEMETER and SmartAgriHubs have actively promoted and shared such success stories. For example on International Women's Day, DEMETER published short quotes from women working in the sector.



Image 9: Floriana Fanizza of Coldiretti shares experiences from female farmers

Also as part of the SmartAgriHubs newsletter (No.13) Investing in Gender Equality, there was a collection of interviews and stories from across the globe. The SAH project showed the magnitude of the project and the gender-balance inclusiveness with quotes from across the globe.

Cynthia Giagnocavo in the editorial described some of the work undertaken within the overall project 'One of the more satisfying activities in SAH, carried out together with synergy projects IoF2020 and NEFERTITI, was the opportunity to do some "action research" on why women were underrepresented in digitalisation and agriculture. Where were they?

If SAH is about "connecting the dots", what parts of the network were not yet visible? We contacted women farmers in precision agriculture and agritech, sought out women entrepreneurs, and found women and men in producer organisations and agricultural research and advisory services to support our common search. We also found good practices embedded in organisations that were already inclusive. We sparked something and made more visible the role of women in digitalisation and agriculture'.



Image 10: Image from the Smart Agri Hubs Newsletter, No.13 Investing in Gender Equality

Regional Cluster Ireland & UK, as part of the Smart Agri Hubs project, did a series of special interviews to highlight the work undertaken by the cluster during the Smart Agri Hubs project.

One such special interview was undertaken with Margaux Plurien & Marlijn Henskens from Schuttelaar Partners, who worked tirelessly with the Regional Cluster to promote and highlight Gender in Agriculture and worked alongside their colleagues to develop the Gender Alliance for Innovation in Agriculture (GAIA) (see section 5).

Interview: Farming is a career which does provide work-life balance and real opportunities for progression. It affords women equal opportunities to really thrive in a fast-moving, rewarding working environment where many previously manual tasks are largely automated. Yet these positive attributes need to be marketed far better and role models given a voice, according to Margaux Plurien, SmartAgriHubs.

While SmartAgriHubs (SAH) has come to an end, the legacy of the Gender Task Force and the work of like-minded participants interested in agricultural and digital innovation continues, she explained. The momentum gathered and the members who have made it work are now building on progress made through Gender Alliance for Innovation in Agriculture (GIIA), a new initiative aimed at promoting gender equality in the agriculture and AgriTech sectors

It is possible to have a great life and be a farmer

"Farming isn't marketed very well," Margaux Plurien said. "It's generally perceived as a way of life that is isolating, lonely and more than a full-time commitment. The reality today is very different and advances in technology have significantly reduced the workload and the time commitment involved. It is possible to have a great life and be a farmer.

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"

The traditional perception was that you needed to be from a farm family to farm and that if you went into farming, you'd have to farm full time into your old age and you would never have a life outside of that work.

"Agricultural technology has changed the way we farm and educational initiatives and increasing numbers of discussion groups and other farmer facing initiatives mean that farmers now feel part of a network. Today, farming is a career that is attracting highly educated men and women who are passionate about what they do, who care for the environment and want to farm for the future.

"Consumers are more in tune with the environment than they ever were. They want to buy local produce. They appreciate that farmers are working with nature, not against it, and they appreciate the work local farmers are doing.

"The coming together of the Gender in AgriTech and Changing Face of Agriculture cross functional teams on the subject was very beneficial and we were delighted to have some expert speakers, superb support from the Commission and really strong contributions from young, enthusiastic and future-focused participants for our online gatherings in February 2022 and October 2021.

"It all builds towards a very positive future for farming in Europe where women are no longer invisible and where agricultural technology is allowing us to farm smarter, farm better and protect our environment for generations to come," Margaux added.

Next Steps; Gender Alliance for Innovation in Agriculture (GAIA), EU

Marlijn Henskens said the Gender Task Force has left an enduring legacy which participants are keen will not be forgotten.

"We're not finished and are on a mission to create even greater awareness in the agri tech sector.

The work we have completed is just too valuable to stop

"We're keen to keep assisting companies, government organisations and other Horizon 2020 projects to make sure gender equality is something they naturally include in their programmes. The work we have completed is just too valuable to stop.

"People who work in gender equality who have come to us have all benefited from having a community to learn from and from sharing experiences and practices. We have come a long way from the generation that has gone before us. But from the surveys we concluded with our various participants show we also have a way to go.

Women need to be more involved in decision-making processes and they need access to capital.

The toolbox and the best practice advisories we developed were very well received and our participants also highlighted the need for greater mentorship and lobbying. We've seen the power of our various social media campaigns, of Gender Week and of Gender Fridays.

The momentum built over the past two years can't and won't be abandoned and the Gender Task Force lives on," Marlijn Henskens vowed.

Building on the great work started with the SAH Gender Taskforce, they believe that GAIA has the potential to make a real impact on the lives of women in agriculture. They're hoping as many of the original partners as possible, and more, will join and that working together, they can bring about change.

SmartAgriHubs has been a ground-breaking collaboration and brought together a like-minded, enthusiastic and progressive Agri-digital community which bonded, built a life-long network which will endure into the future showcasing Agri-digital innovation which leads to more sustainable and competitive European agriculture.

Image 11: Logo for the new Gender Alliance for Innovation in Agriculture (GAIA)

Conclusion

The EU's agriculture sector is facing pressing challenges among which the gender and age gap are critical.

The maintenance of the farming sector and its sustainable and profitable development is immanent to generational replacement as well as to gender equity. These principles are a must in order to guarantee the future of the EU's farming sector and its leading role in the worldwide market.

In order to protect this crucial economic sector besides the life in the rural areas, it's essential to implement efficient regulations and business strategies that promote farming as an auspicious sector to develop a professional career with a transversal and inclusive approach.

In this regard, it is a priority to activate initiatives that efficiently promote work opportunities for the new generations and leading responsibility roles for women in the farming sector.

This report gathers significant insights about how the agricultural and farming sector is about to experience a noteworthy transition which can be only deployed by attracting the new generations' workforce to the rural areas to perform a wide range of diverse challenging job opportunities from farm to fork that can solve both the gender and generational gap.

In this sense, the continuation of the EU qualitative, productive and profitable farming economical motor relies on the digital transformation of the sector, by implementing already available innovative machinery and digital management tools. To this purpose, education, training and public investment (infrastructures, connectivity, funds, policies) are key to accelerate and ensure the successful future of the EU's agriculture sector.

Definitely, filling the gender and generational gap will contribute not just to strengthening and boosting the EU farming sector but also in reflecting a modern profitable sustainable business paradigm which can become a model for the worldwide farming market and firmly inspire the development countries from all the agronomic, technological, business and human rights perspectives.

About DEMETER & SmartAgriHubs

DEMETER aims to lead the digital transformation of Europe's agri-food sector through the rapid adoption of advanced IoT technologies, data science and smart farming, ensuring its long-term viability and sustainability.

Funded by H2020, project seeks to create a secure and sustainable European IoT Technology and business ecosystem. DEMETER will demonstrate the real-life potential of advanced, standards-based, interoperability between IoT technology by adapting and extending existing standards into an overarching Agricultural Information Model.

h2020-demeter.eu | @H2020DEMETER | @H2020Demeter | H2020 DEMETER
Project Coordinator: Kevin Doolin, Walton Institute, SETU
Project number : 857202

SmartAgriHubs is a €20m EU project under the Horizon 2020 programme, and brings together a consortium of well over 164 partners in the European agri-food sector. The project aims to realise the digitisation of European agriculture by fostering an agricultural innovation ecosystem dedicated to excellence, sustainability and success.

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Project Coordinator: George Beers, Wageningen University & Research
Project number : 818182

project number : 857202

project number : 818182