Increased farmer engagement with ICT?

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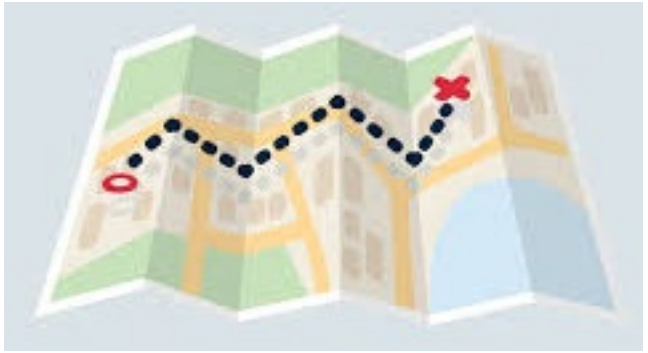
Presentation Structure

- Context
  - Literature
- Data
  - Survey
- Methodology
  - Preliminary results
- Discussion and future direction



Context

- Technology adoption is crucial for effective farm management
  - Potential to improve farmers' access to, and use of data with clear benefits (DeLay et al., 2021, Chavas & Nauges, 2020, Aker 2011, Rolfe et al. 2003)
- Role for digitalisation and ICT to facilitate farm data collection
  - Potential combination of smartphone and precision agriculture technologies (PAT) through integration with on-farm sensors
  - Farmer uptake of smartphone and computer technology crucial to further facilitate acceptance and uptake of such technologies
  - Evolving CAP monitoring and evaluation needs
- Changing communication channels
  - Drivers and barriers to technology adoption?

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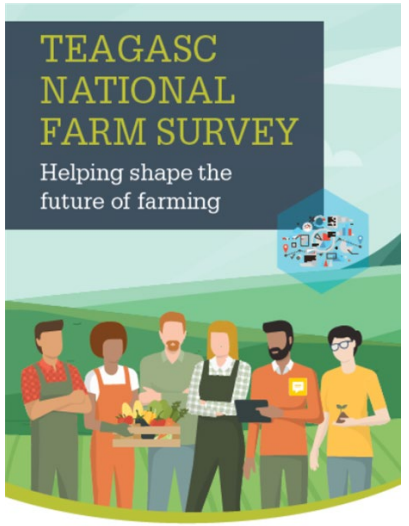
Some literature

- Socio-demographic & farm household characteristics influence technology adoption
- Socio-economic, agro-ecological, institutional, informational, perception, behavioural and technological factors (Tey and Brindal, 2012)
- Hennessy et al. (2016) - younger dairy farmers more likely to engage with ICT
- Emerging literature on smartphone use (Li et al., 2022, Michels 2020)
  - Farmers' age, education, and farm size key determinants

Background

- Building on research by Hennessy et al. (2016) on farm household computer use
- Changing agricultural landscape
  - Irish dairy production has increased dramatically post-quota
  - Milk production increased 79% from 2008 to 2022 (CSO)
  - Technology - potential to assist family farms to manage workload
    - » Insufficient herd management -> reduced animal welfare and health, lower economic performance
  - Evolving technology for ease of data collection and processing
- **Research aim: Explore the drivers and barriers to the adoption of computer and smartphone technology**
  - Important to understand the timing of adoption and to facilitate change

Data



- Teagasc National Farm Survey
  - EU Farm Accountancy Data Network (FADN)
  - Annual survey of approximately 900 farms
  - Statistically representative of approx. 85,000 farms
  - Farm system classifications - dairy, cattle rearing, cattle other, sheep and tillage
- Additional survey mechanism
  - Farm household computer and smartphone usage
  - Purposes – personal and farm business
  - Identify those most equipped to adapt to the changing communication and operational environment

Descriptive Statistics

	All Farms (N = 709)	Dairy Farms (N = 277)
UAA size (hectares)	62.2 *(47.8)*	72.5 *(38.9)*
Farm Income per ha (€)	651.4 *(566)*	1,122.4 *(596)*
Investment per ha (€)	309.6 *(674)*	498.3 *(1,004.5)*
Farmer Age (years)	57.0 *(12.4)*	52.6 *(13.5)*
Advisory Contact (%)	.69 *(.46)*	.79 *(.40)*
Off-Farm Job (Holder)	.24 *(.43)*	.09 *(.28)*
No. of Household Members	2.9 *(1.5)*	3.3 *(1.5)*
Farmer Lives Alone	.16 *(.37)*	.08 *(.27)*
Farmer Training (%)	.65 *(.48)*	.82 *(.39)*
Off-Farm Job (Spouse)	.49 *(.54)*	.43 *(.55)*

*Means with Standard Deviations in parentheses

Sample: 39% dairy, 39% cattle, 14% sheep & 8% tillage.

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Survey Results

- Data from the 2019 NFS survey indicated that 80% of respondents had access to the internet
  - Those without cited a lack of interest or knowledge
- Quality broadband access
  - 13% Very Good
  - 36% Good
  - 33% Average
  - 13% Poor
  - 5% Very Poor

ICT use across Irish farm systems 2019

%	Dairy	Cattle	Sheep	Tillage	All farms
Household Computer	95	74	76	90	79
Farmer Mobile phone	92	93	87	99	92
Farmer Smartphone	74	58	50	67	60
Computer – Farm Business	78	57	53	72	62
Smartphone – Farm Business	68	49	56	57	54

- Higher ICT usage amongst Dairy farmers
- Lower proportion using smartphones

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Farmer computer use - personal

%	All Farms (N = 709)	Dairy Farms (N = 277)
Email	41	44
Social Media	17	25
Video calls	9	24
Newspaper access	15	38
Streaming	13	14
Motor Tax	30	41

- Level of personal usage indicative of farmer engagement and readiness to adopt in the context of their farm

Farmer computer use – farm business

%	All Farms (N = 709)	Dairy Farms (N = 277)
Farm accounts	60	64
Herd register	73	80
Technical advice	56	62
Animal management	53	62
Buying inputs	63	71
Selling produce	65	74
Administration	69	71
Price comparison	49	54
Farm news	51	49
Chat group	53	54
Compliance information	58	65
Banking	77	81
Production planning	51	58

- Some categories broadly similar e.g. farm accounts, accessing farm news, admin. and chat groups e.g. WhatsApp
- For other purposes, dairy farmers reported higher levels

Methodology

- Adoption decisions modelled as binary choices (*1=Yes; 0=No*) using a binomial logit model
- Relationship between farmers, farm/household characteristics and computer/smartphone adoption for farm business
- Following the approach of Michels (2020), in their analysis of German farmers' smartphone adoption
- Numerous previous agricultural studies have taken this approach with regard to adoption of precision agriculture (e.g. Tey and Brindal 2012)
- Preliminary econometric investigation – further work required

Binary Logistic Model of Farmer Use of Computer and Smartphone Technology in the Operation of their Farm Business – Irish Dairy Farmers (2019)

	Coef.	P>z	Marginal Effect
Farmer age >50	-0.212	0.000	-0.05
Household members <20	0.351	0.000	0.08
Forma Agric. Qualification	0.992	0.000	0.21
Farmer lives alone	-1.252	0.000	-0.27
Mid West region	1.668	0.000	0.36
Hired labour on farm	0.166	0.000	0.04
Land rented in	0.321	0.000	0.07
Farm Family Income	0.000	0.000	0.00
Contracting expenditure	0.000	0.000	0.00
Farm accountant	0.000	0.000	0.00
Farm investment	0.000	0.000	0.00
Second level education	-0.290	0.000	-0.06
Spouse off-farm job	-0.160	0.000	-0.03
Milk Recording	0.166	0.000	0.04
_cons	-0.561	0.000	

N = 277

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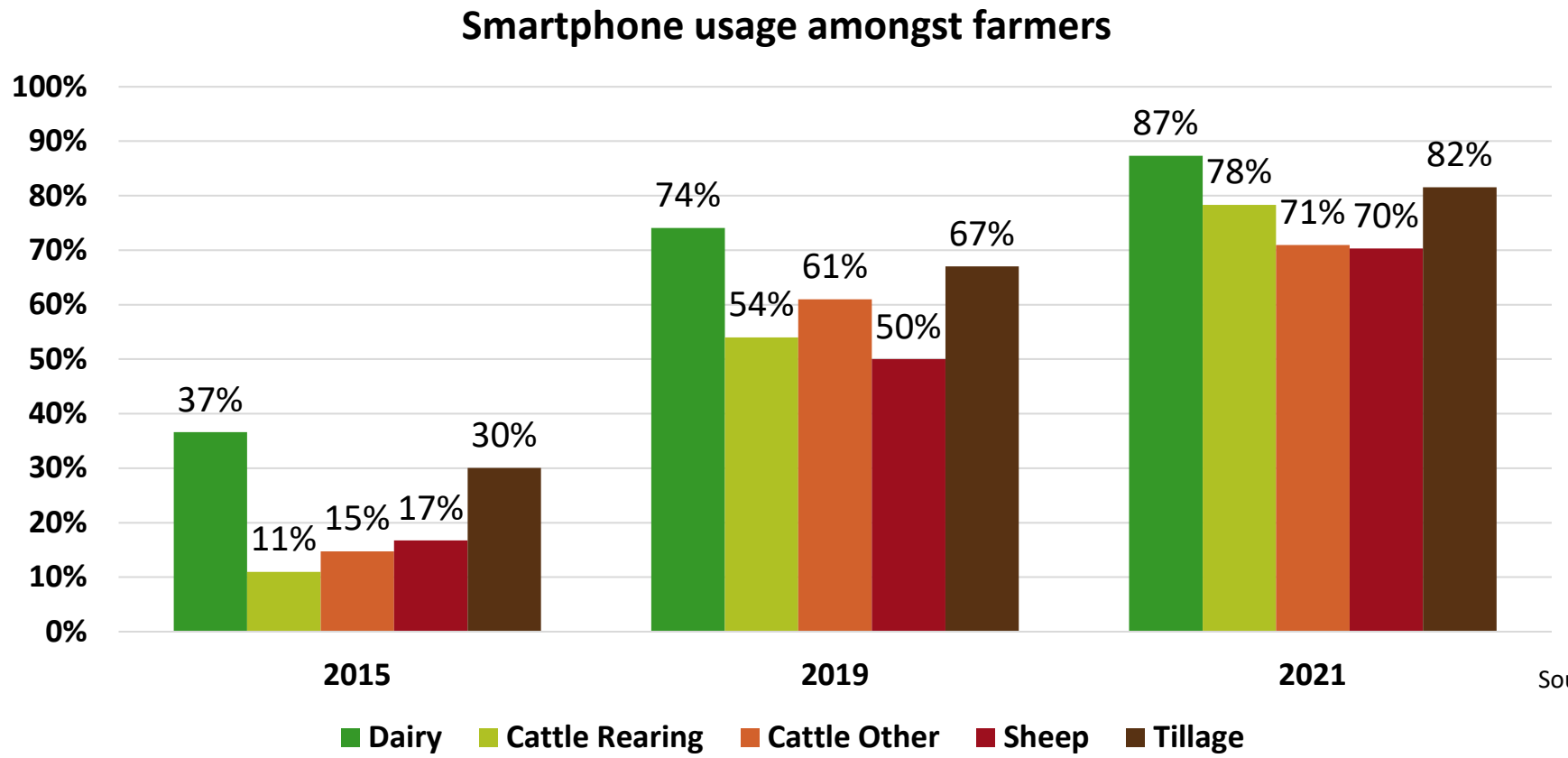
Special Focus - Social Sustainability 2021

- **Connectivity**



Source: Teagasc National Farm Survey

- **Dramatic increase in smartphone usage amongst farmers**
  - Going from 20% across systems in 2015 to 76% in 2021
  - Above 70% across all systems, highest amongst Dairy and Tillage farmers

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Special Focus - Social Sustainability 2021

- **Connectivity**

Internet access across farm households			
%	**2011**	**2019**	**2021**
Dairy	84	95	97
Cattle Rearing	66	68	88
Cattle Other	67	80	83
Sheep	66	78	85
Tillage	94	90	92
All	**76**	**80**	**88**

Source: Teagasc National Farm Survey

- **Steady increase in internet access/utilisation amongst farm households since 2011**
  - Almost universal amongst Dairy farms in 2021
  - Increase evident since Covid-19 pandemic
  - Dairy farmers more likely to use ICT for farm business
- **Quality - 57% report good/very good, broadly similar across systems**
  - 28% report average quality, with 15% poor/very poor

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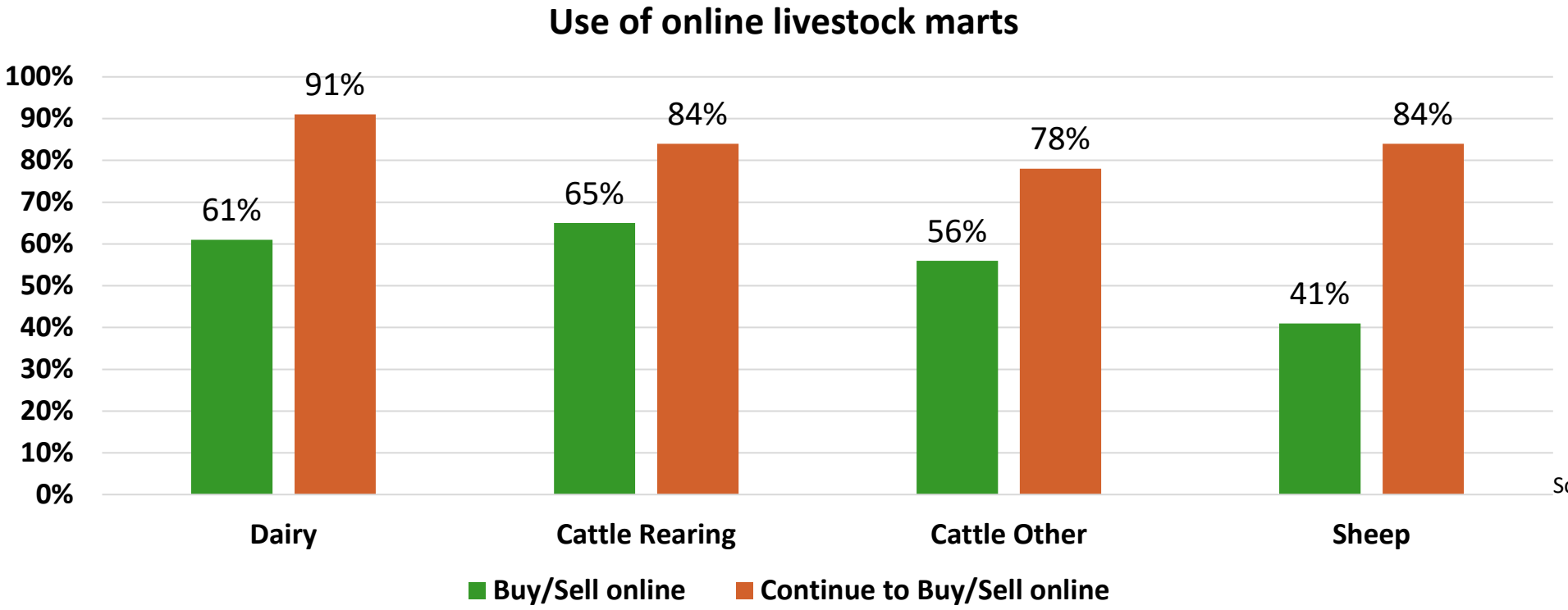

Source: Teagasc National Farm Survey

- **Behavioural change evident around livestock mart participation**
  - 2/3 of farmers watched marts online during the pandemic
  - Over half bought/sold in this way (across all systems)
  - 83% of those plan to continue doing so
  - Sheep farmers least engaged in buying/selling online

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Discussion

- Recent literature is reflective of the cultural and social context in farmer use & non-use of technology (Pavez et al., 2017)
- Influencing factors in line with previous research (Gloy, 2000, Hennessy et al. 2016, Michels, 2020)
  - Farmers' age and education, household age profile and uptake of other technologies
  - Further data exploration needed
- Schulz et al. (2022) highlight the influence of farm advisors and farmer networks in the adoption of farm related smartphone apps by farmers
  - Such data is available through the NFS – next step
- COVID-19 – new opportunities in communication

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By Mary Brennan, Emma Dillon and David Meredith, Teagasc and Thia Hennessy, UCC

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By Emma Dillon, Mary Brennan and Brian Moran, Teagasc

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Author: Francis Farragher
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