



Integrating innovative **TECH**nologies along the value Chain
to improve small ruminant welf**ARE** management

How Stakeholders perceived the TechCare experience?

Evangelia N. SOSSIDOU & Sotiris I. PATSIOS



*17 - 18 June 2025
University Foundation - Brussels*



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862050



Aim: Multi-actor approach (from farmers to consumers and regulators).

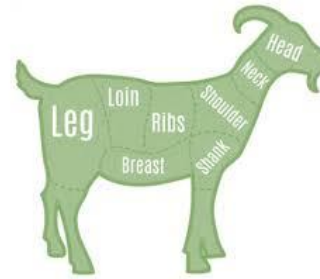
Workshops provided feedback and guidance for the other activities. Outputs from the multi-actor approach provided the basis to define and establish the framework for business models. Strong interactions exist to ensure fast and effective communication and dissemination of project results and new knowledge by the scientists and stakeholders through relevant and adapted strategies and tools.

Interactions with all the activities!

All Partners involved!



Definition of TechCare Stakeholders: WHO



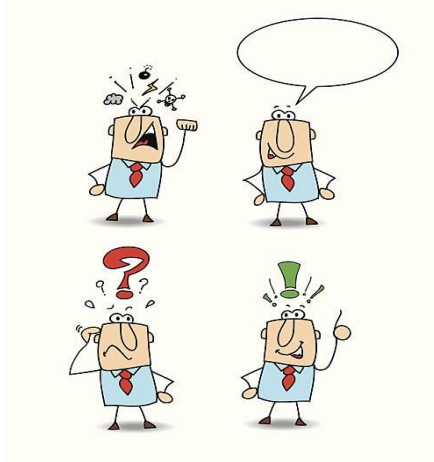
 A large silhouette illustration of a cow, a group of people, and a lamb standing in a green field.

European Commission | Health and Food Safety

#EU4AnimalWelfare



What co-design approach aims to?



(a) Identify all relevant actors in SR value chain and train facilitators to **engage stakeholders in continuous interaction and feedback** to the rest of the project activities. This will increase collaboration, exchange of knowledge and influence mediation among all interested parties;

(b) Explore **attitudes, behavioral dynamics and perceptions** of stakeholders and their implications for prioritizing welfare issues and using innovative technologies to manage animal welfare at different production stages, and analyze the sustainability of the identified technologies by exploring their environmental, social, economic and cultural impacts.



Why a co-design approach?



Why a co-design approach?



shutterstock.com - 1256659849



Why a co-design approach?



One-size-fits-all Solutions



Stakeholders' Engagement : HOW

National Workshops

Surveys

Presentations/Publications

Open Days

Road Shows

One-on-One INTERVIEWS

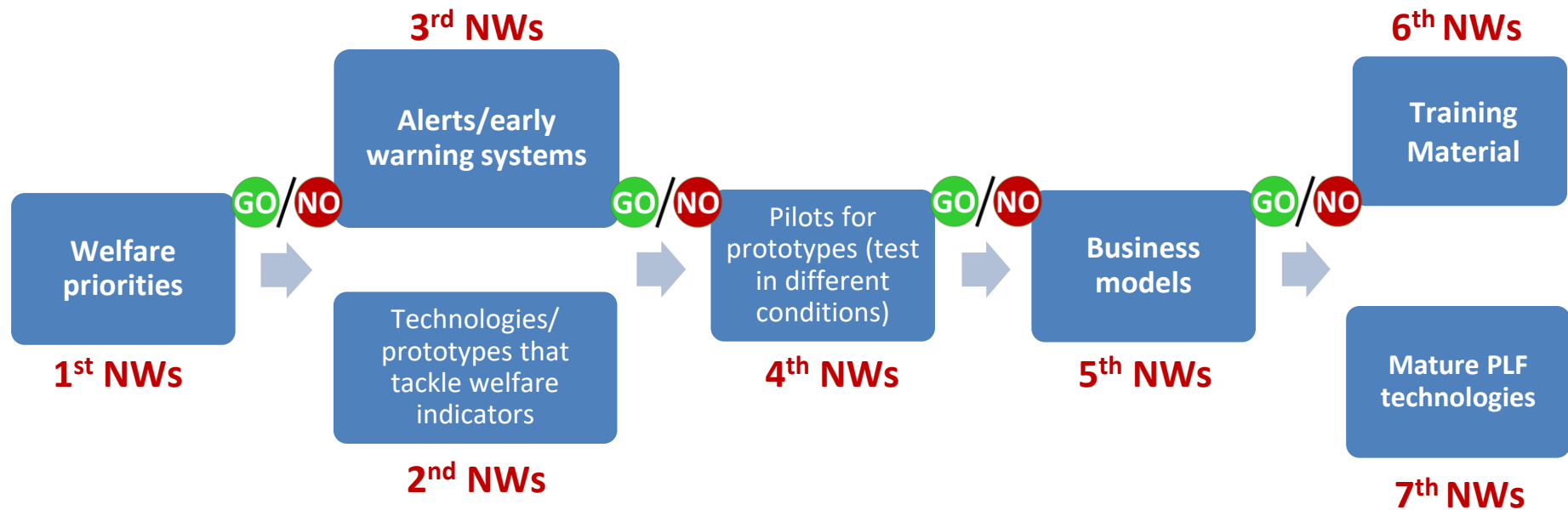
Concept MAPPING

Advisory Board

etc...



Stakeholders – a crucial role



Stakeholders' decision/validation



NW Organization Methodology

- Appointment and training of a National Facilitator in each country (2nd semester 2020)
- Common outline and material prepared for each NWs
- Translated into the local languages
- Either online, hybrid and in-person meetings (COVID pandemic...)



Outline of 3rd NWs

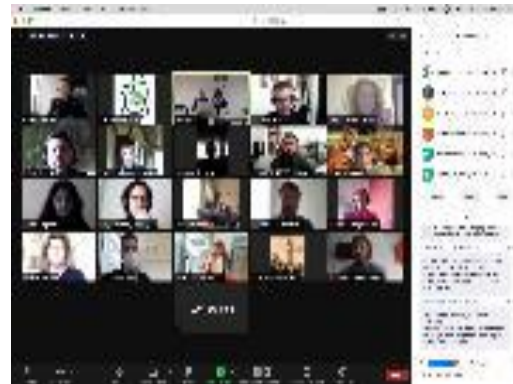
1. BEFOREHAND: Stakeholders fill the questionnaire on Stakeholders opinion
2. Quick update of the project (Where are we know?) (**Project Overview.pptx**)
3. Present the main outcomes of WP1 (1st and 2nd NWs). Present the logical order of Health & Welfare Issues --> Welfare Indicators --> PLF tools --> Algorithms & Apps (**Main Outcomes.pptx**)
4. Focus on the early-warning Algorithms & Apps
5. Present examples of developed (existing) Algorithms and Apps screenshots
6. Use examples to trigger the conversation; focus on countries' specific issues & needs
7. No need to prioritize but rather get qualitative feedback
8. Need to ask the right question to get useful feedback
9. Grab the chance to get feedback for practical issues e.g. connectivity, signal quality issues, data management issues etc.
10. Don't forget to ask them to score the NW (five simple questions)

- At first: common questionnaire to grab participants' opinion
- Presentation of the project and its progress
- Main objectives of each NW (presentation, discussion, Opera method, polls, etc...)
- NW evaluation



1st series of National Workshops (NWs)

- The 1st series of National Workshops on **Welfare Issues** (early spring 2021)
- Approx. 260 stakeholders from 9 countries
- Stakeholders expressed their opinion on **welfare issues in sheep and goats**
- A list of welfare issues to be considered in WP2 for dairy sheep, meat sheep, and dairy goat farming systems



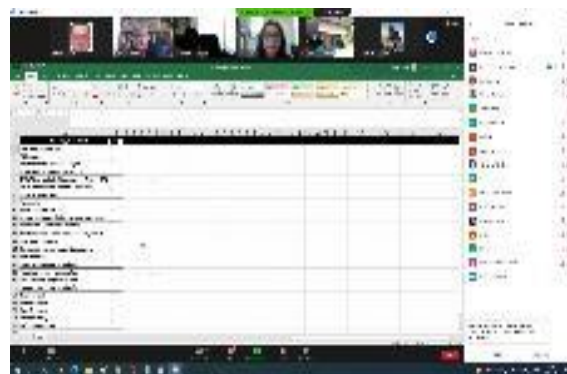
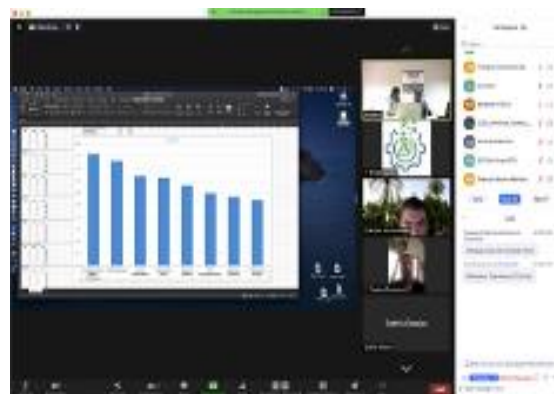
1st NWs Main Outcomes

COUNTRY	PRODUCTION SYSTEM		
	MEAT SHEEP	DAIRY SHEEP	DAIRY GOAT
SPAIN	1. Nutritional issues 2. Housing & environmental conditions 3. Stocking density	1. Mastitis 2. Nutritional issues 3. Housing & environmental conditions	1. Mastitis 2. Nutritional issues 3. Housing & environmental conditions
ROMANIA	<i>not considered</i>	1. Gastrointestinal parasites 2. Lameness 3. Mastitis	<i>not considered</i>
FRANCE	1. Water availability & quality 2. Feed competition 3. Housing & environmental conditions	1. Housing & environmental conditions 2. Lameness 3. Nutritional issues	<i>not considered</i>
IRELAND	1. Nutritional issues 2. Poor maternal relationship 3. Mortality rates	<i>not considered</i>	<i>not considered</i>
GREECE	<i>not considered</i>	1. Housing & environmental conditions 2. Diarrhoea 3. Insufficient bedding	1. Food competition 2. Insufficient bedding 3. Mastitis
UK	1. Nutritional issues 2. Lameness 3. Gastrointestinal parasites	1. Nutritional issues 2. Mastitis 3. Abortion	<i>not considered</i>
ITALY	<i>not considered</i>	1. Nutritional issues 2. Gastrointestinal parasites 3. Lameness	<i>not considered</i>
ISRAEL	1. Stocking density 2. Respiratory diseases 3. Feed competition	<i>not considered</i>	<i>not considered</i>
NORWAY	1. Mortality rates 2. Parasites (internal & external) 3. Lameness	<i>not considered</i>	1. Mastitis 2. Parasites (internal & external) 3. Agonistic social interactions



2nd series of National Workshops (NWs)

- The 2nd series of National Workshops **on PLF tools** evaluation organized (early autumn 2021)
- Approx. 150 stakeholders from 9 countries (including some live events)
- Expressed their opinion on PLF technologies
- Evaluation reports on PLF tools to be considered in WP3 & WP5



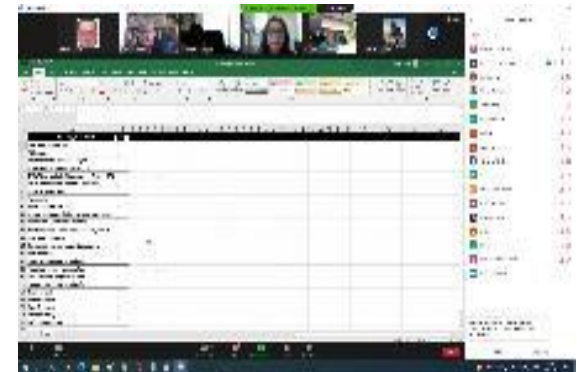
2nd NWs Main Outcomes

COUNTRY	PRODUCTION SYSTEM		
	MEAT SHEEP	DAIRY SHEEP	DAIRY GOAT
SPAIN	1. Weather/Air quality Sensors 2. Weight Crate 3. EID Reader (UHF) - RFID	1. Weather/Air quality Sensors 2. Electronic Milk Meter 3. Automatic Weight Platform	1. Weather/Air quality Sensors 2. Electronic Milk Meter 3. EID Reader (UHF) - RFID
ROMANIA	<i>not considered</i>	1. Weather/Air quality Sensors 2. Automatic Weight Platform 3. EID Reader (UHF) - RFID	<i>not considered</i>
FRANCE	1. EID Reader (UHF) - RFID 2. Automatic Weight Platform 3. Accelerometer + GPS	1. Weather/Air quality Sensors 2. Water Meter 3. EID Reader (UHF) - RFID	<i>not considered</i>
IRELAND	1. Accelerometer + GPS 2. Weather/Air quality Sensors 3. EID Reader (LF) - RFID	<i>not considered</i>	<i>not considered</i>
GREECE	<i>not considered</i>	1. Weather/Air quality Sensors 2. Electronic Milk Meter 3. EID Reader (UHF) - RFID	1. Weather/Air quality Sensors 2. Electronic Milk Meter 3. EID Reader (UHF) - RFID
UK	1. Weight Crate 2. EID Reader (LF) - RFID 3. Weather/Air quality Sensors	<i>not considered</i>	<i>not considered</i>
ITALY	<i>not considered</i>	1. Electronic Milk Meter 2. Automatic Weight Platform 3. EID Reader (LF) - RFID	<i>not considered</i>
ISRAEL	1. EID Reader (UHF) - RFID 2. Automatic Weight Platform 3. Sorting Gate	<i>not considered</i>	<i>not considered</i>
NORWAY	1. Weather/Air quality Sensors 2a. Automatic Weight Platform 2b. Accelerometer + GPS	<i>not considered</i>	1. Accelerometer + GPS 2. Electronic Milk Meter 3. Infrared Udder Camera



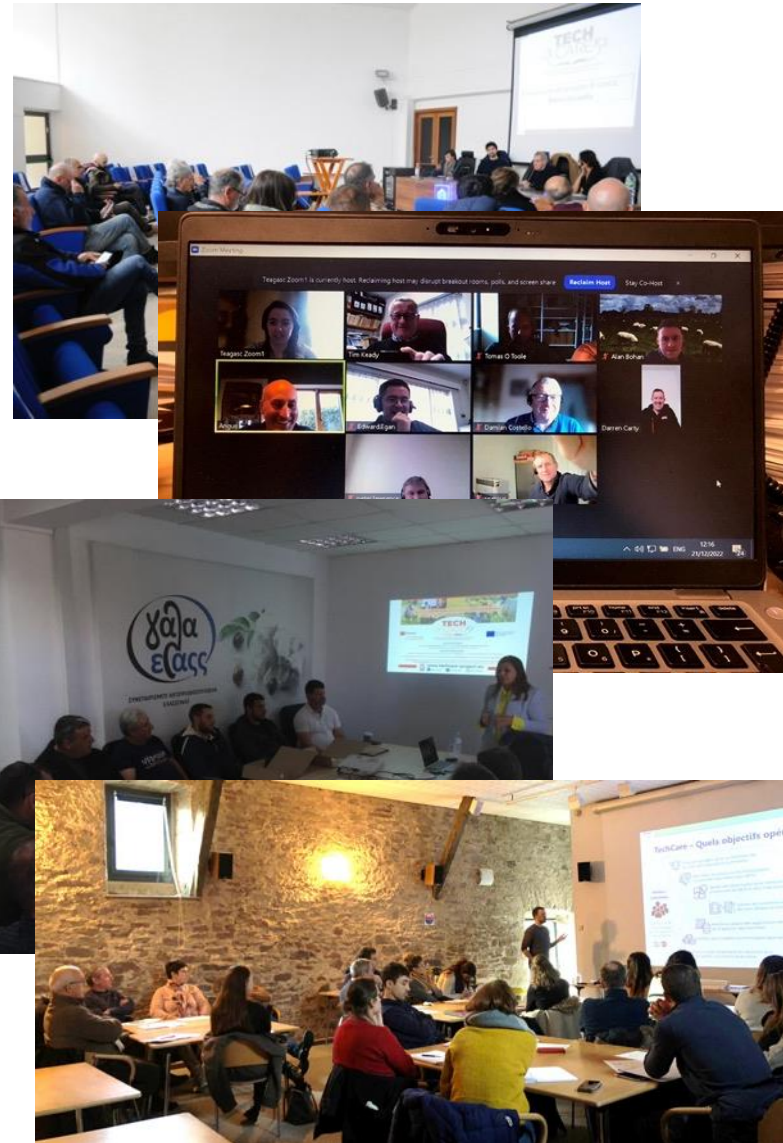
3rd series of National Workshops (NWs)

- The 3rd series of National Workshops on **Early Warning Applications** evaluation was organized (end of 2022).
- Approx. 300 stakeholders from 9 countries in both live and online meetings
- Stakeholders expressed their opinion on Early Warning Applications



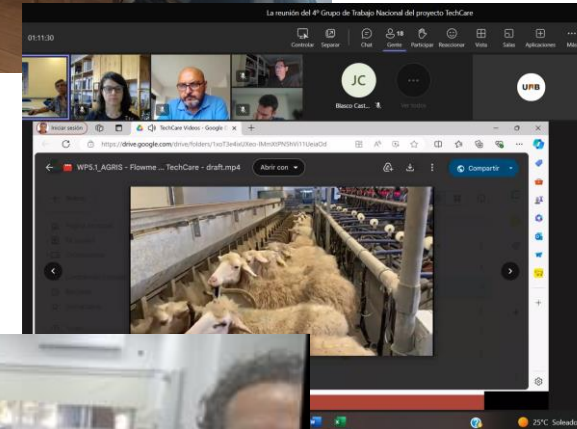
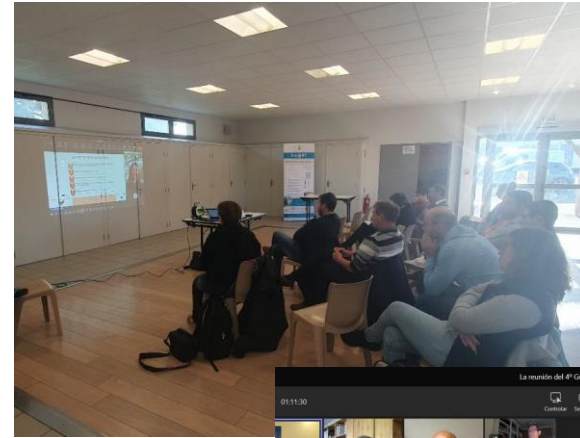
3rd NWs Main Outcomes

- **Rather common findings in all countries**
- History and past trendlines are considered highly important,
- Integration of online tools/data with the EW app.
- Ability to manually add data recordings
- To make use of information already collected or recorded on farms
- To define thresholds and configure alerts
- To keep track of alerts; Simple alerts/not multiple



4th series of National Workshops (NWs)

- The 4th series of National Workshops on the **outcomes of the pilot studies** was organized (first half of 2024).
- Approx. 188 stakeholders from 9 countries in both live and online meetings
- Expressed their opinion on the PLF tools that have been tested during the TechCare pilot studies



4th NWs Main Outcomes

- **There is strong enthusiasm among stakeholders for using Precision Livestock Farming (PLF) tools**
- Practical concerns were raised such as: accessibility, cost, and the need for user-friendly systems that hinder the adoption of PLF tools.
- There is need for integration with existing PLF systems and compatibility; training is considered necessary
- Stakeholders expressed the need for technical support in data management and clearer metrics to validate the utility of PLF data.




5th series of National Workshops (NWs)

- The **5th series of National Workshops** on potential **business models** performed during the second half of 2024.
- Approximately **135 stakeholders** from **9 countries** participated in live and online meetings.
- They shared their views on business models and the use of Precision Livestock Farming (PLF) tool data



Mile Meter



Current approach to buy/get Milk Meter

☐ Direct sales

☐ Online

☐ Professional exhibition

☐ Expert/Friends recommendation

☐ Other: _____

Payment Method

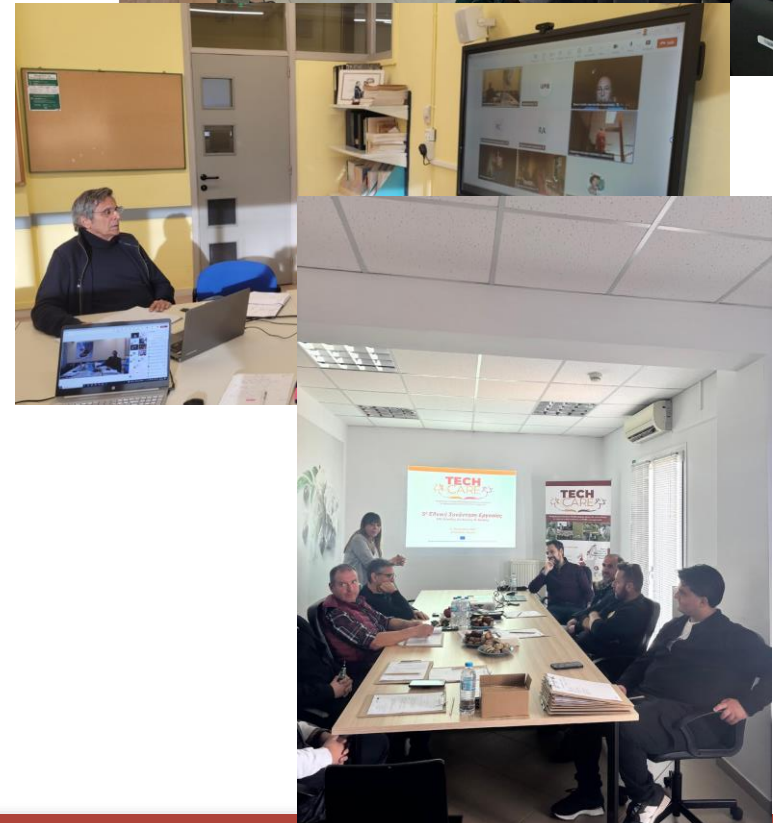
☐ Purchase date

☐ Periodic payments (monthly/yearly/etc.)



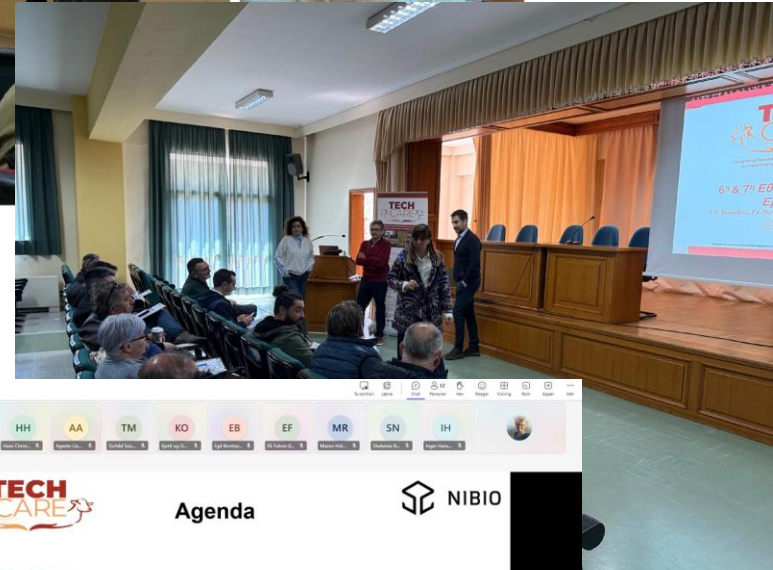
5th NWs Main Outcomes

- **Practical concerns were raised regarding the use of data by third parties.**
- The appropriate business model, as well as who pays and how for the use of PLF tools, **depends on the specific tool in question.**
- Stakeholders highlighted the need for business models to allow for **gradual implementation and upgrade of the relevant systems.**



6th & 7th series of National Workshops (NWs)

- The **6th & 7th series of National Workshops** were organized together (in two sessions-spring 2025).
- Approximately **120 stakeholders** from **9 countries** participated in live and online meetings.
- They shared their views on the training material of TechCare (6NW) and they evaluated the PLF tools used in the LS trials concerning their usefulness and possibility to be adopted (7NW).



TECH CARE **Agenda** **NIBIO**

1900 - 2030

- Dine perspektiv på presisjonshusdyrhold (PLF) / digitale teknologier ([google forms spørreskjema](#))
- Kort om TechCare project og 'workshoper' så langt (NW1-5)
- **Hvordan vurdere dyrevelferd?**
- Discussion
- **10 min benstrekk ..**
 - **Presentation av TechCare PLF teknologier**
 - Vurdering av PLF teknologier ([google forms spørreskjema](#))
 - Takk !



6th & 7th NWs Main Outcomes

- All countries recognize the importance of practical, user-friendly training materials i.e. **technical sheets** and **visual aids**
- Need to **adapt material to the user**, (especially younger farmers) and **blended approaches** tailored to different levels of digital familiarity

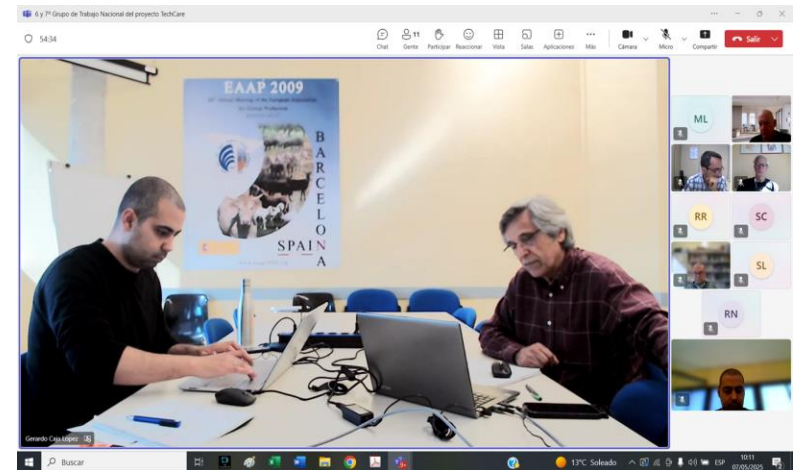


Figure 6. Assessment of hair coat condition of goats (after AWIN 2015).

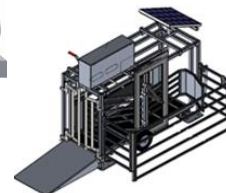
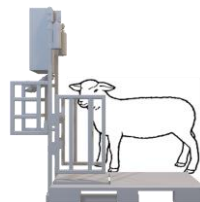
- France favoured short, technical documents due to time constraints while farmers in Ireland and Italy emphasised on video training.
- Spanish farmers prioritized simplicity and in-person guidance, highlighting the farmer's need for training from experiences technicians



6th & 7th NWs Main Outcomes

Four PLF tools from LS trials were evaluated

1. Water Trough with Weighting Scale
2. Walk-over-Weighing
3. Meteorological Station and THicare app
4. Analog Milkmeter



Extremely Useful

Very Useful

Average

Little Useful

Not at all

How useful do you consider this PLF tool?



Extremely Useful

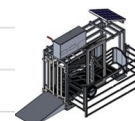
Very Useful

Average

Little Useful

Not at all

How useful do you consider this PLF tool?



Extremely Useful

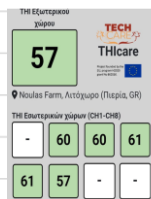
Very Useful

Average

Little Useful

Not at all

How useful do you consider this PLF tool?



Extremely Useful

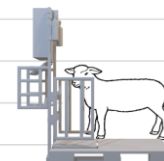
Very Useful

Average

Little Useful

Not at all


How useful do you consider this PLF tool?



Consumers' Survey

TECHCARE: Integrating innovative **TECH**nologies along the value **Chain** to improve small ruminant **welfARE** management (2019-2025)

techcare-project.eu



In your opinion, should welfare of sheep and goats be improved across the value chain? *

☐ Yes, I agree

☐ No, not necessary

After section 1 Continue to next section

Section 2 of 4

PRIORITIZATION OF WELFARE ISSUES

Description (optional)

Please score the species and production systems which, **according to you**, are more affected by welfare issues (1 little impact, 3 big impact; Unknown) *

12 questions in total on:

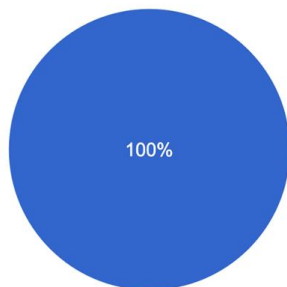
- Overall welfare status
- Prioritization of welfare issues (at the farm, during transportation and in the abattoir)
- Consumers' perspectives



Consumers' Survey (indicative results)



1. In your opinion, should welfare of sheep and goats be improved across the value chain?

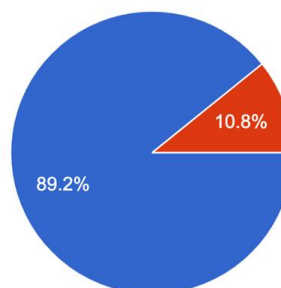


Higher

- Yes, I agree
- No, not necessary



1. In your opinion, should welfare of sheep and goats be improved across the value chain?



Lower

- Yes, I agree
- No, not necessary



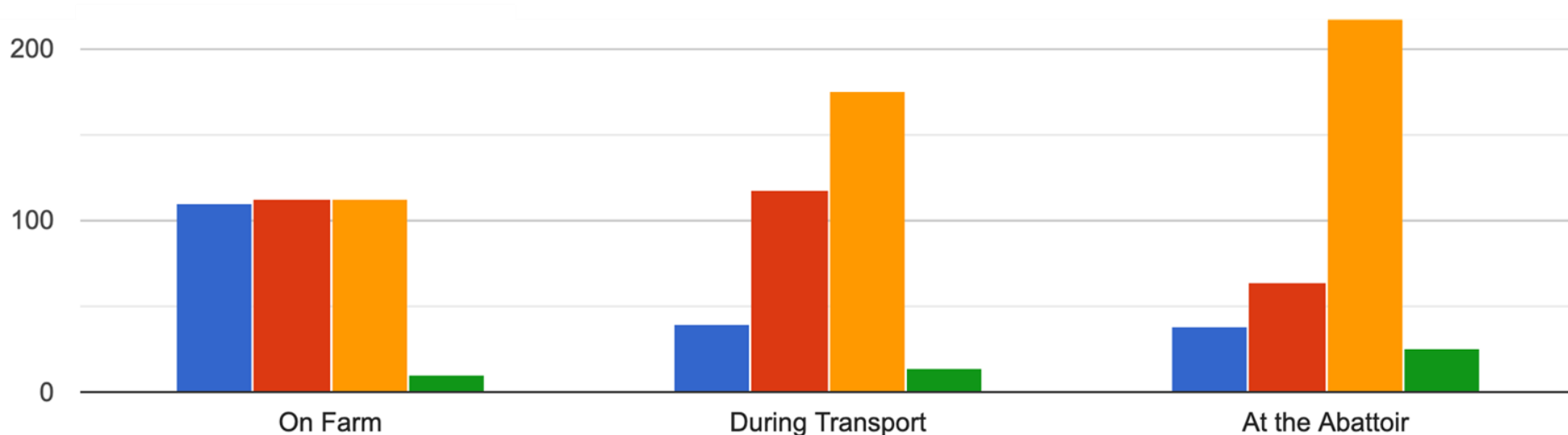
Consumers' Survey (indicative results)

- Major concerns are for the abattoir, followed by transport and the farming practices, common in all countries



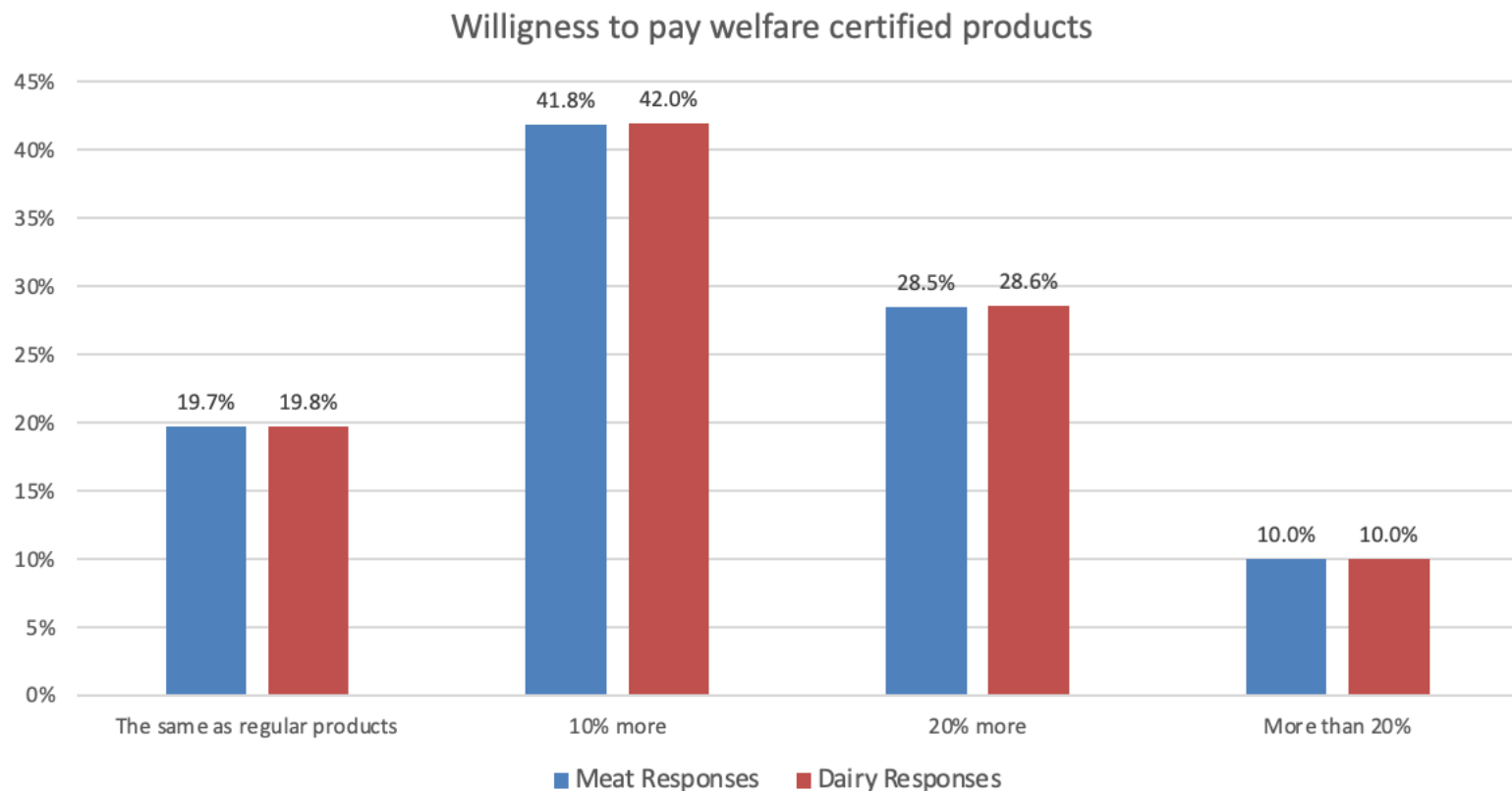
3. Please indicate where, in your opinion, are welfare issues related to sheep and goats mainly likely to occur (*1 less, 3 more; Unknown*)

1 2 3 Unknown



Consumers' Survey (indicative results)

- The most popular answer in all TechCare countries was 10% more, followed by 20%
- There is practically no difference between meat and dairy products



Summarizing some (common) key points of Stakeholders' opinions

- Rather common welfare issues in the same production systems; differences in the prioritization based on local conditions.
- Great interest on PLF tools and novel technologies together with skepticism for their adoption.
- Concerns on their practicality and usefulness; need to gain confidence with one technology before further steps.
- Need for simple applications (fit-for-their needs) and alerts.
- Concerns about the data use (regulatory issues), but unaware of their value.
- Importance of human factor for adoption of PLF technologies (trust on technicians, animal scientists, veterinarians...)
- Consumers do care about welfare issues in small ruminants value chains.



Summarizing the Stakeholders' experiences

- Stakeholders started from 'zero point' and throughout the NWs and other project activities they experienced a lot of information and knowledge exchange;
- They were able to share their practical knowledge to design and develop solutions relevant to the whole EU, as well as specific solutions for different systems, environments and production purposes existing at their country
- They were also able to express barriers and motivations towards PLF technologies implementation and animal welfare management.

**Stakeholders want us to keep
TechCare Network 'alive'!**



Dear Dr Sossidou,

Thank you for submitting your abstract, we have received your contribution for **EAAP Annual Meeting 2021, Davos, Switzerland** in good order.

Abstract no.: 36343

Abstract title: **A stakeholder co-design approach for improving small ruminant welfare: The TechCare Project**

Author: Sossidou, E.N., Dwyer, C., González-García, E., Halachmi, I., Gautier, J.M., Caja, G., Rosati, A., Menet, A., Patsios, S.I., Barns, A., Morgan-Davies, C.

Preferred presentation: Theatre

Preferred session: 77: The Sm@RT and TechCare projects

Υπαιθρος ΠΕΜΠΤΗ 24 ΜΑΡΤΙΟΥ 2022

ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ Βακτηρία Αποστολολογία

ΝΕΟΦΥΤΕΣ ΕΠΙΧΕΙΡΗΜΑΤΙΚΟΤΗΤΑ Μέχρι τις 3 Μαΐου η υποβολή αιτήσεων για το πρόγραμμα επιδότησης

παγωγικός αγρότης

Υπαιθρος ΧΩΡΑ

Εξατομικευμένη διάγνωση προβλημάτων υγείας σε αίγες στην Ελλάδα για την αύξηση της παραγωγικότητας

του Αντώνη Ανδρονίκου



Το TechCare είναι ένα ευρωπαϊκό έργο, με στόχο τη βελτιστοποίηση της ευλίας και της παραγωγικότητας των μικρών μηρυκαίων, μέσω τεχνολογικών καινοτομιών. Στο πλαίσιο του έργου συμμετέχουν 19 εταίροι (ανεπτυγμένα, εντακτικά φορέα, ανεπτυγμένοι κ.λ.λ.) από εννέα χώρες (Γαλλία, Δανία, Γερμανία, Βελγίον, Ισπανία, Ιταλία, Λατβία, Ρουμανία).

Στο έργο, που βρίσκεται σε εξέλιξη από τις αρχές του 2021, συμμετέχουν από τη χώρα μας το Ινστιτούτο Κτηνιατρικών Ερευνών του Δυτικού Παιονικού Οργανισμού ΕΛΓΟ-ΔΗΜΗΤΡΑ, υπό την επιστημονική επίβλεψη της Δρ. Σωσίδου, κτηνιάτρου, διευθύντριας Ερευνών και επιστημονικής υπεύθυνης του προγράμματος. Μετά τις αρχικές εντακτικές ομάδες ερευνητών του Οργανισμού, ο συνολικός προϋπολογισμός του έργου, που πραγματοποιείται από το έτος 2020, είναι 5,7 εκατ. ευρώ.



Γαλακτοπαραγωγή πρόβατα στη Σαρδηνία. Φωτογραφία: Mariia Gallus, ©AGRI



H2020 TechCare

Νέο διεθνές έργο με ελληνική

Αλλο ένα σημαντικό ευρωπαϊκό πρόγραμμα ξεκίνησε τον Σεπτέμβριο του 2020 και μέσα στις δράσεις του περιλαμβάνονται και ορισμένες που αφορούν στην αειφοροδοτικότητα. Στις χώρες που συμμετέχουν στην υλοποίηση του περιλαμβάνεται και η Ελλάδα με φορέα υλοποίησης τον ΕΛΓΟ-ΔΗΜΗΤΡΑ.

Ένα ερευνητικό πρόγραμμα ύψους 5,7 εκατ. ευρώ στο οποίο συμμετέχουν εννέα χώρες – από τη Σκανδιναβία έως τη Μέση Ανατολή – κι έχει ως στόχο να φέρει 'επαύλαση' στη χρήση της τεχνολογίας στην εκτροφή αιγοπροβάτων και στην ανάπτυξη της κοινωνικής πρόνοιας ξεκίνησε να υλοποιείται από τον Σεπτέμβριο του 2020. Με επικεφαλής το Αγροτικό Κολέγιο της Σκωτίας (Scotland's Rural College - SRUC), το πρόγραμμα αναμένεται πως θα αποτελέσει τη μεγαλύτερη μελέτη για τα μικρά μηρυκαία που έχει εκπονηθεί το τελευταίο διά-

Το τετραετές έργο H2020 την 1η Σεπτεμβρίου 2020, το γνωστό πρόγραμμα έρευνας 2020 της Ευρωπαϊκής Ένωσης χρησιμότητα των διαφορετικών Ακρίβειας (Precision Livestock Farming) για τη διαχείριση της ευρωπαϊκής φάση αυτό θα πραγματοποιηθεί εργαστηρίων και κλάδου, συμπεριλαμβανομένων, σφαγίων, καθώς και κοινωνικών φορέων, κλάδων που αποκαλείται ο

Καινοτόμες τεχνολογίες Στο πλαίσιο της υλοποίησης για γκάμ καινοτόμων τεχνολογιών, οι οποίες θα μπο-

STAKEHOLDERS' PERCEPTIONS OF PRECISION LIVESTOCK FARMING TO IMPROVE SMALL RUMINANT WELFARE

Sossidou, E.N., Garcia, E.G., Karatzia, M.A., Csiszter, L.T., Elhadi, A., Riaguas, L., Caja, G., Barnes, A., Gautier, J.M., Keady, T., Halachmi, I., Molle, G., Grova, L., Patsios, S.I., Morgan-Davies, C.

Introduction

Within the TechCare Project, a list of Precision Livestock Farming (PLF) tools, with potential for monitoring animal welfare in small ruminant production, was formulated in TechCare Countries.

Materials and Methods

The opinions of stakeholders were taken into account after consultations, following a multi-actor approach. The OPERA method was used to reach consensus between stakeholders.

Results

Overall, stakeholders' opinions appear rather uniform.

Meet sheep

1. Automated weighing and low frequency identification (LF) system
2. Localisation (GPS)
3. 3-axial accelerometers (new ultra-high-frequency (UHF) eartags and readers for several uses (e.g. water intake)



ΚΤΗΝΟΤΡΟΦΙΑ | TECHCARE

ΤΕΧΝΟΛΟΓΙΕΣ ΚΤΗΝΟΤΡΟΦΙΑΣ ΑΚΡΙΒΕΙΑΣ ΣΕ ΕΙ ΜΙΚΡΩΝ ΜΗΡΥΚΩΝ

Ποιες είναι οι απόψεις των Ελλήνων

Οι Τεχνολογίες Κτηνοτροφίας Ακρίβειας έχουν τη δυναμική να μεταμορφωθούν σε μηχανισμούς, προσφέροντας πρακτικές και αποτελεσματικές λύσεις για τη βελτιστοποίηση της εκτροφής. Το ερευνητικό Ευρωπαϊκό έργο τεχνολογικών λύσεων για τη βελτίωση της ευλίας, προβλέπει και αυτήν.

Δρ. Ε.Ν. ΣΩΣΙΔΟΥ
Κτηνίατρος
Διευθύντρια Ερευνών
ΕΛΓΟ-ΔΗΜΗΤΡΑ

Δρ. Σ. ΠΑΤΣΙΟΣ
Χημικός Μηχανικός
Εξωτερικός Συνεργάτης
ΕΛΓΟ-ΔΗΜΗΤΡΑ

Πρόλογος

Το ερευνητικό έργο TechCare, το οποίο χρηματοδοτείται από το Ευρωπαϊκό πρόγραμμα Horizon 2020, έχει ως κύριο στόχο τη βελτίωση της διαχείρισης εκτροφών αιγών και προβάτων με τη χρήση τεχνολογιών Κτηνοτροφίας Ακρίβειας. Συγκεκριμένα, το TechCare στοχεύει στην εκπόνηση βιώσιμων τεχνολογικών λύσεων Κτηνοτροφίας Ακρίβειας στις επιβατικές μικρών μηρυκαίων με προσαρμοστικότητα προς τη βελτίωση του επιπέδου ευλίας των ζώων και ως εκ τούτου, την αύξηση της παραγωγικότητας αυτών και της οικονομικότητας των εκτροφών. Στο έργο συμμετέχουν φορείς από εννέα



NEWS DAIRY
ΓΑΛΑΚΤΟΚΟΜΙΑ • ΤΥΡΟΚΟΜΙΑ • ΚΤΗΝΟΤΡΟΦΙΑ
Ο.Μ.Ι.Ν.Δ. • ΑΔΕΦ. ΣΥΓΓΡΑΦ. 187, 171 21, ΝΕΑ ΕΜΠΡΟΣ, ΘΡΑ. 210 9510040



ΤΕΥΧΟΣ #23 • ΜΑΡΤΙΟΣ - ΑΠΡΙΛΙΟΣ 2021

IDK
INDO DESIGN MATERIS S.A.

«Η υποστήριξη των συνεργατών, είναι ο 'πλούτος' μιας εταιρείας»



Integrating innovative technologies using the value chain to improve small ruminant welfare management



- ✓ TechCare Coordinator and Partners
- ✓ National Facilitators
- ✓ Stakeholders
- ✓ Advisory Board Members
- ✓ All of YOU

