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TechCare: technologies to manage the welfare of sheep and goats: from pilots to large scale studies

C. Morgan-Davies, G. Tesniere, C. M. Dwyer, G. Jorgensen, E. Gonzalez-Garcia, JM. Gautier, L. Grova, M. Decandia, F. Kenyon, G. Caja Lopez, I. Halachmi, A. Godo, E. Sossidou, S. Patsios, L. T. Czyszter, T. W. Keady, B. McClearn, G. Lagriffoul, N. Litalien, L. Riaguas

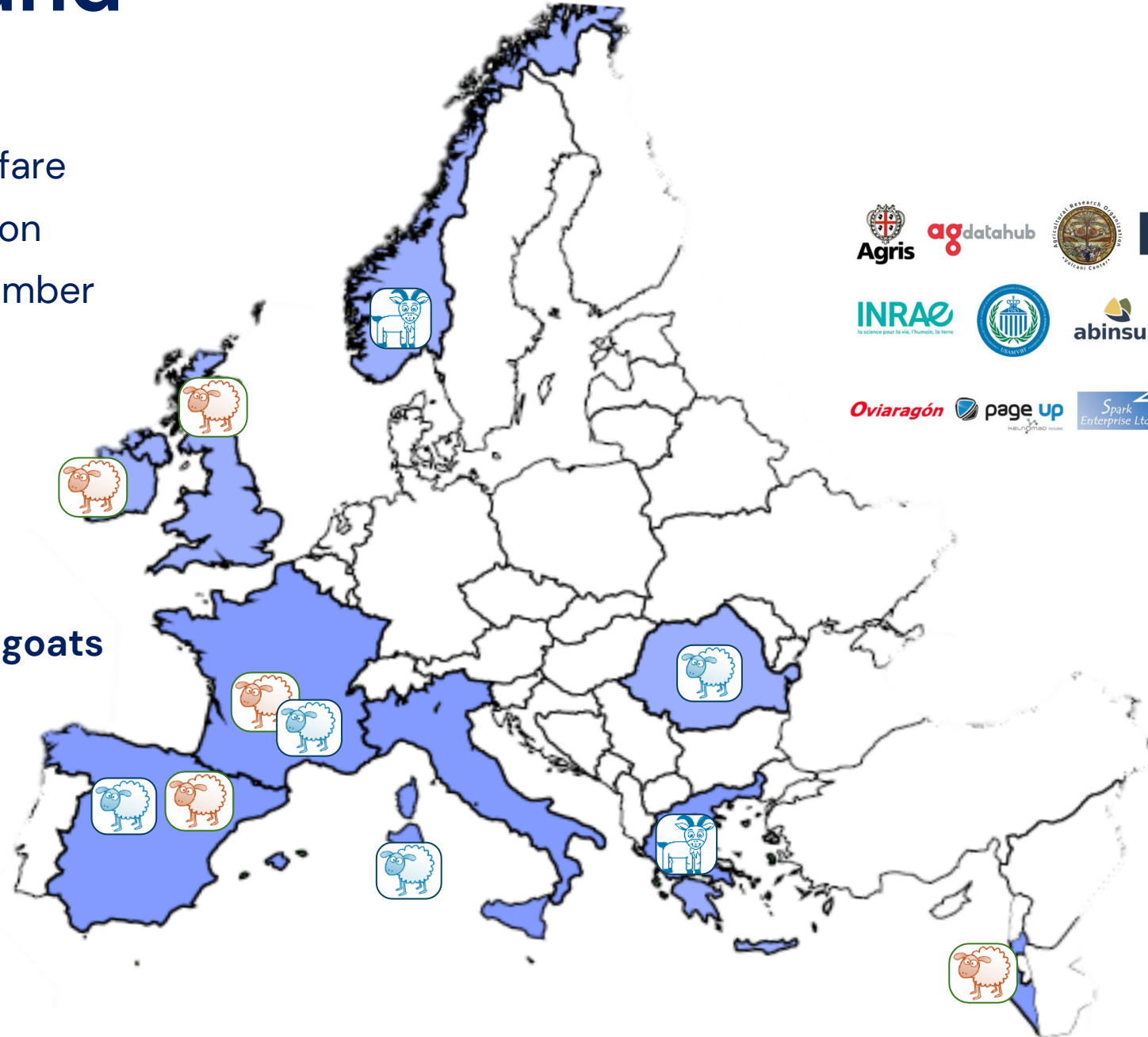
Claire.morgan-davies@sruc.ac.uk



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1. Background

- H2020-SFS-2019-1, Improving animal welfare
- Type: Innovative Action
- Starting date: 1 September 2020
- Duration: 60 months
- Focus on **sheep and goats farming systems**
- **9 countries**
- **19 partners**



5 key steps:

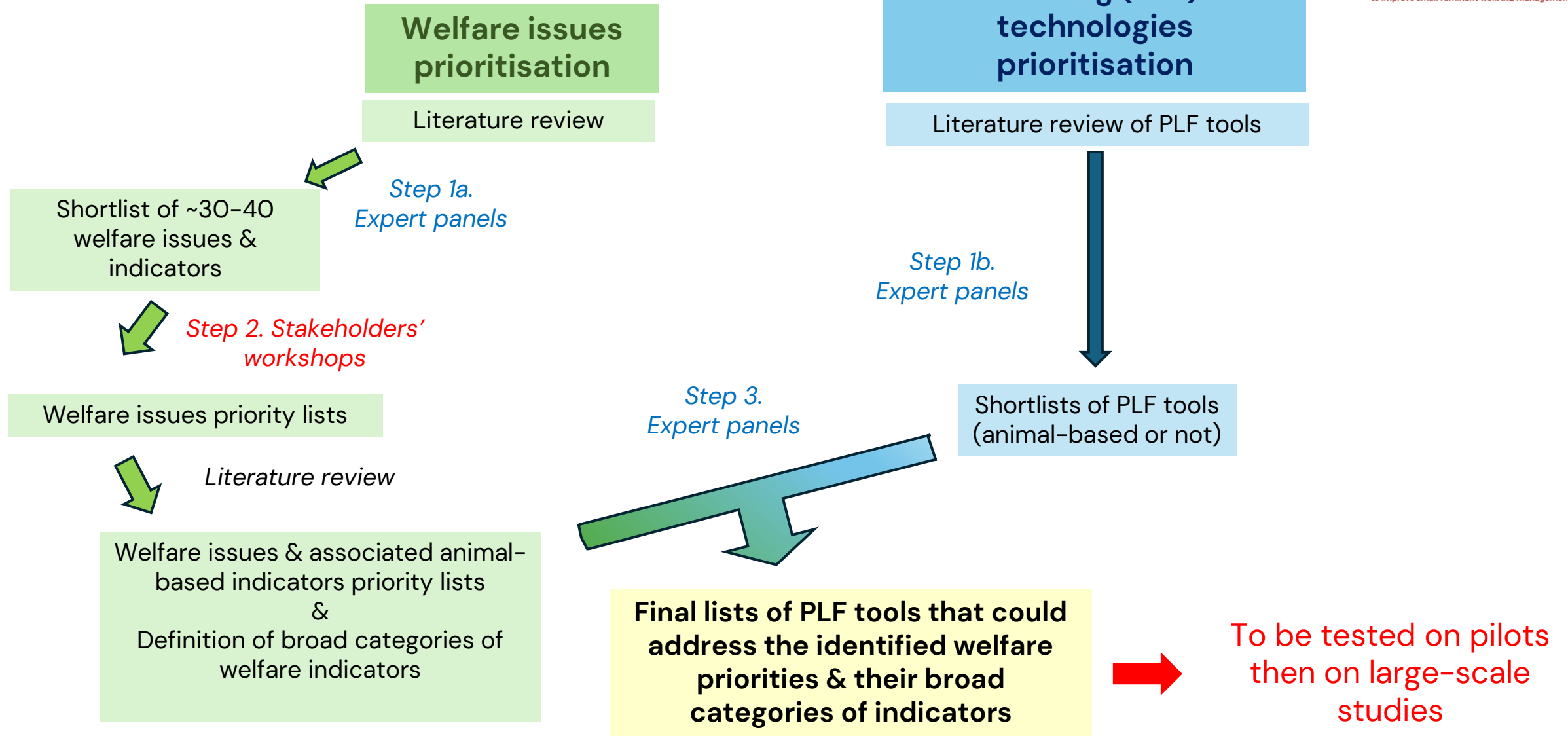
1. Prioritise welfare challenges and issues
2. Identify potential innovative technologies solutions
3. Validate the solutions in different and real conditions
4. Define appropriate business models
5. Communicate widely the results

2 main outputs:

1. Ready to use **PLF solutions** for small ruminant welfare management (**tested & validated**)
2. Guidelines/blueprints for adapted solutions not ready yet to be deployed



2. Methods



3. Results

welfare priorities & indicators



Overall welfare priorities (all sheep)

1	Nutritional issues
2	Mastitis
3	Gastrointestinal parasites
3	Lameness
5	Ectoparasites
6	Inadequate water supply
6	Reproductive disorders

Overall welfare priorities (all goats)

1	Mastitis
2	Insufficient food & water
3	Agonistic behaviour/feed competition
4	Poor environmental management
5	Gastrointestinal parasites
5	Ectoparasites
7	Lameness/claw health

Weight loss or change in body state (animal based)

Behavioural change (animal based)

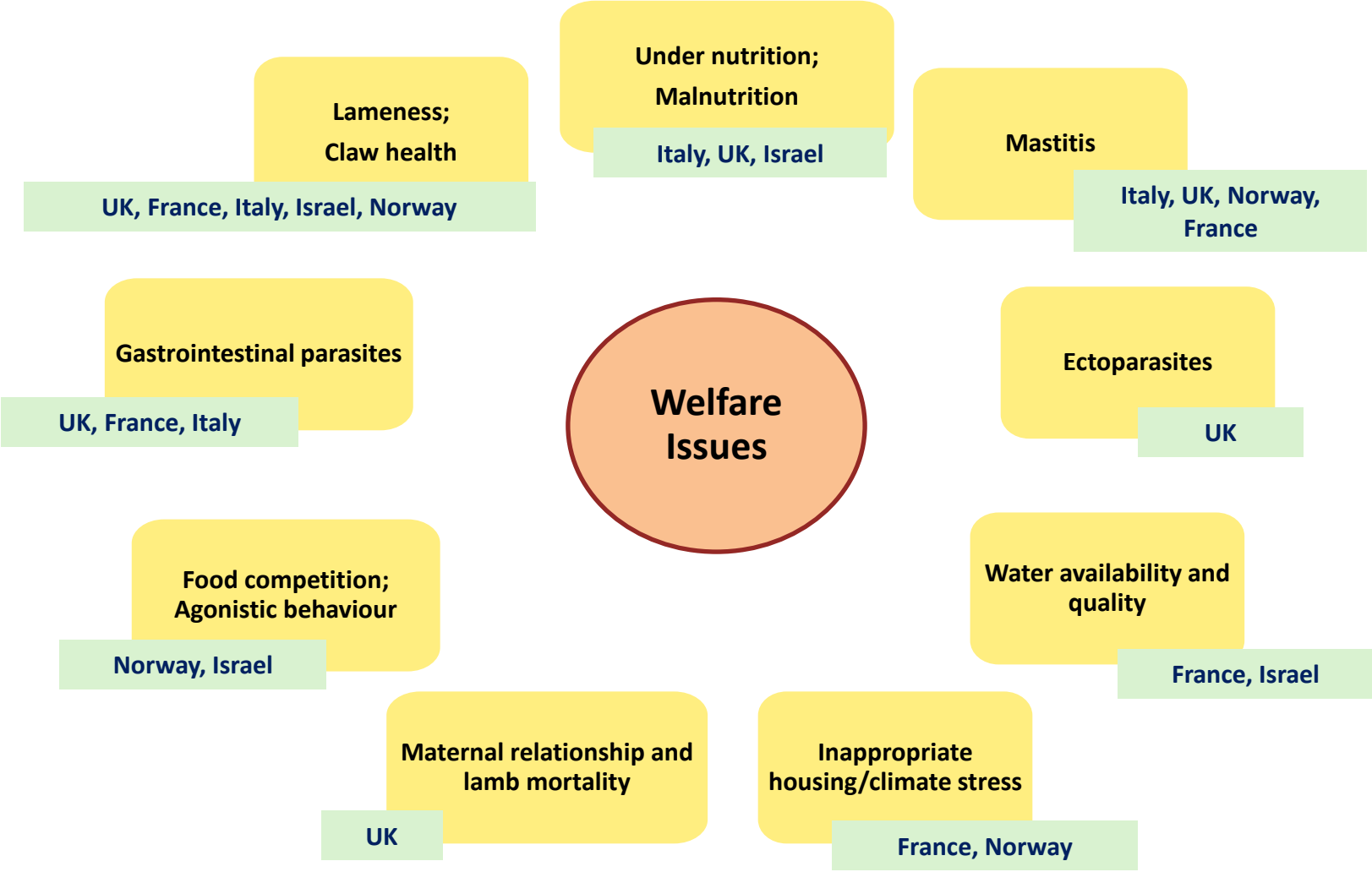
Milk yield and quality (animal based)

Environmental indicators (resource based)



3. Results

Pilots studies



3. Results

Pilots studies



Technological devices tested	Nutritional issues	Mastitis	Gastro-intestinal parasites	Lameness/ claw health	Inappropriate water supply	Agonistic behaviour	Poor envt management
Water meters	BC		BC	BC	BC		
Walk-over-Weigh	BWC		BWC	BWC	BWC		
Proximity loggers	BWC		BWC	BWC	BWC		
Portable SCC readers	MY	MY					
Thermal camera	MY	MY			MY		
EID UHF ear-tags + readers	BC	BC	BC	BC	BC	BC	
EID LF ear-tags + readers	BC	BC	BC	BC	BC	BC	
Electronic milk meter	MY	MY					
Milk tank weighing scales	MY	MY			MY		
Temp. & Hum. sensors					Evt		Evt
Weather stations					Evt		Evt
Weigh crate	BWC		BWC	BWC	BWC		

BC = behaviour change

BWC = change in body state

MY= milk yield & quality

Evt – Environmental indicators

3. Results


























Pilots studies



Technological devices tested	Nutritional issues	Mastitis	Gastro-intestinal parasites	Lameness/ claw health	Inappropriate water supply	Agonistic behaviour	Poor envtl management
Water meters	BC		BC	BC	BC		
Walk-over-Weigh	BWC		BWC	BWC	BWC		
Proximity loggers	BWC		BWC	BWC	BWC		
Portable SCC readers	MY	MY					
Thermal camera	MY	MY			MY		
EID UHF ear-tags + readers	BC	BC	BC	BC	BC	BC	
EID LF ear-tags + readers	BC	BC	BC	BC	BC	BC	
Electronic milk meter	MY	MY					
Milk tank weighing scales	MY	MY			MY		
Temp. & Hum. sensors					Evt		Evt
Weather stations					Evt		Evt
Weigh crate	BWC		BWC	BWC	BWC		

3. Results


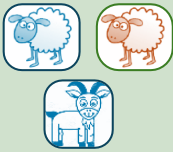







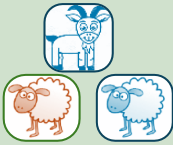


Large scale studies

Technological devices	France	Greece	Ireland	Spain	Romania
EID LF ear-tags + readers				 	
Electronic milk meter					
Milk tank weighing scales					
Temp. & Hum. sensors				 	
Weather stations				 	
Weigh crate				 	

- Potential to measure broad welfare indicators
- Available commercially
- Meet other criteria for likely uptake by farmers (e.g., cost, robustness, ease of use).

- 6-10 commercial farms in each large scale
- Welfare assessments



	Technologies selected	Production	Level of data information	Relevant measure	Welfare Issues	Welfare indicators
	EID tags (LF or UHF)		Individual	Movement patterns, use of key resources Behavioural change, ewe-lamb relationships	<ul style="list-style-type: none"> Lameness Mastitis Other illnesses 	Behavioural change (BC)
	Milk meter		Individual	Individual changes in milk production	<ul style="list-style-type: none"> Mastitis Heat stress 	Milk yield (MY)
	Milk tank scale system		Flock/batch	Flock-level changes in milk production		
	Inside sensors (housing conditions)		Flock	Environmental risks	<ul style="list-style-type: none"> Heat stress Environmental air quality, bedding quality Respiratory diseases 	Environment: (Evt)
	Weather station (outside)		Flock	Environmental risks	Outdoor environmental stress (temperature, rainfall, wind, etc.)	Environment (Evt)
	Weigh crate With an EID reader/antenna or stick		Individual	Changes in weight or condition	<ul style="list-style-type: none"> Nutrition (Bad/under) Lameness Mastitis Internal and external parasites Other issues: conflicts with wildlife 	Body state change (BWC)

4. What's next?

Alerts for farmers

Algorithms (sensors + welfare assessments data)

- Change in milking order (LF ear tags & readers)
- Change in milk yield (milk meters/milk tank weigh)
- Change in liveweight (LF ear tags & readers with weigh crate)
- Change in environmental conditions (THI -> with indoor/outdoor weather station)

Completed with pilots, to be refined with large scale

Ongoing with pilots, to be refined with large scale



5. Conclusions

- Useful approach for uptake
- Potential for sensors to monitor sheep/goat welfare
- Limited level of optimal technology
- Alerts? ongoing
- Promising other technologies -> still prototypes or too expensive



Acknowledgments



All the farmers and stakeholders in the 9 countries for their feedback and to the commercial farmers in the 5 countries for their participation



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