

How do resilience attributes contribute to specific resilience at farm level? The case of small ruminants in Spain

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STRENGTHENING THE RESILIENCE OF SMALL RUMINANT LOCAL BREED FARMING SYSTEMS: FROM COVID-19 TO GLOBAL CHANGE (RUMIRES)



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Theoretical framework:

Resilience

The ability of farming systems to cope with challenges while keep providing their functions (Folke, 2010).

Resilience attributes

Properties that characterise a resilient system (Boahen et al., 2023) and capacity the farming systems to be resilient (Meuwissen et al., 2019).

Specific resilience:

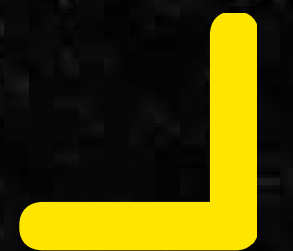
Farming systems deals with a concrete challenge (Meuwissen et al., 2019)*Analyzing the perception for a farmer



Boahen, S. O.-B. (2023). Understanding Resilience of Agricultural Systems: A Systematic Literature Review, in: Proceedings of the Design Society. Cambridge University Press, pp. 3701-3710.
Folke, C. S. (2010). Resilience Thinking: Integrating Resilience, Adaptability and. *Ecology and Society*, 15(4): 20.
Meuwissen, M. F.-D. (2019). A framework to assess the resilience of farming systems. *Agricultural Systems*, 176, 102656.

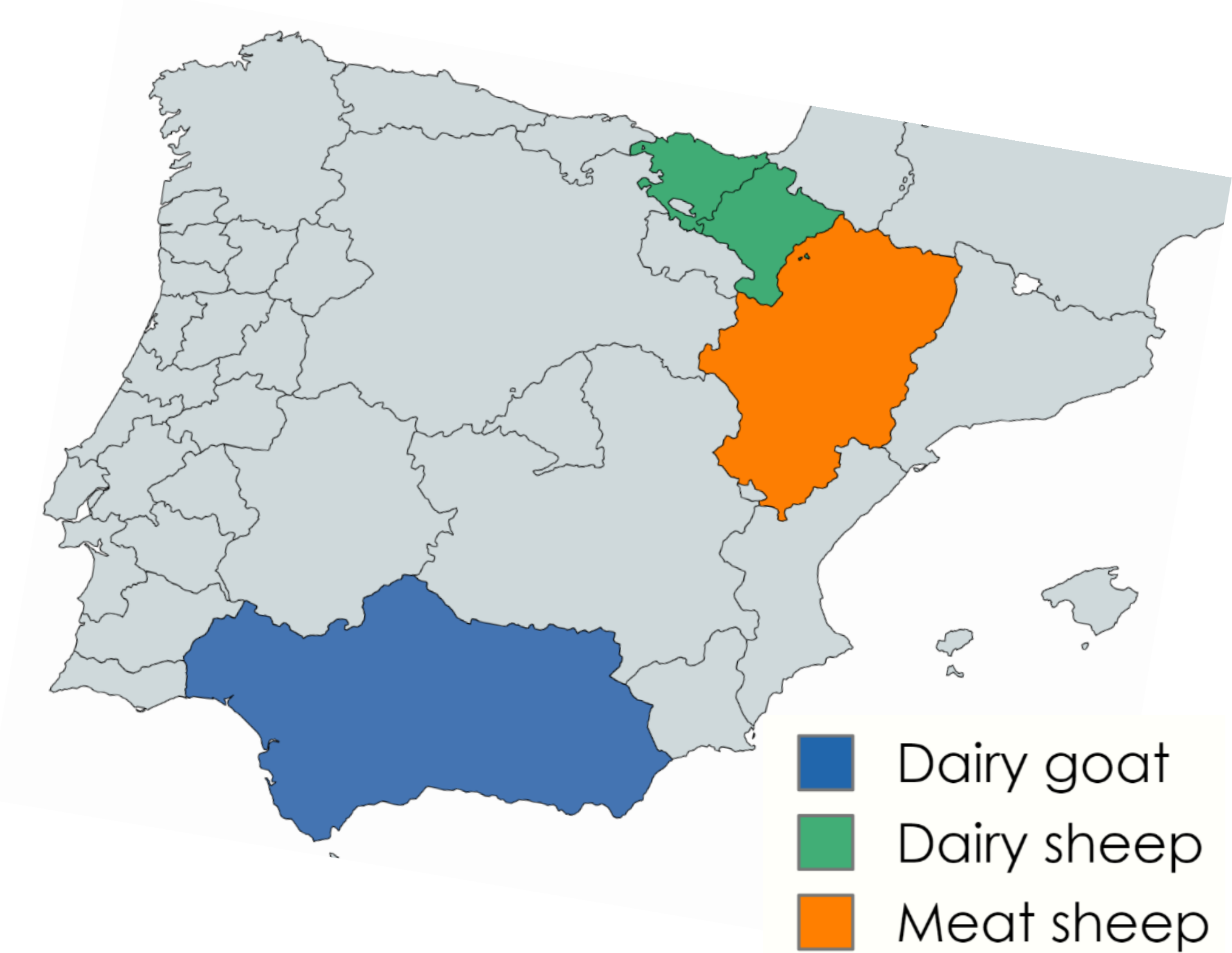
Objective

Understand which attributes are the most relevant to explain the perceived specific resilience.



Material and Methods」

Territory	Animal Specie	Race	Product	System type	Survey
Dairy goat	Caprine	Murciano-Granadina ¹ , Malagueña, Florida, Payoya	Milk sale	Intensive /Semi-extensive	53
Dairy sheep	Ovine	Latxa ²	Cheese elaboration (PDO Idiazabal)	Semi-extensive	41
Meat sheep	Ovine	Rasa Aragonesa ³	Lamb sale (PGI Ternasco)	Extensive	50



During June 2022 and February 2023
 Total: 144 surveys

Survey

Farmers were asked about:

The characteristics of their farms.



Indicators of resilience
85 indicators



21 Resilience attributes
Min-Max normalization

7 concrete challenges:

- Temperature increase
- Wildlife increase
- Common Agricultural Policies (CAP) changes
- Labour shortages
- Changes in consumer perceptions
- Covid-19
- Ukrainian war

Likert scale (1-7):

“How difficult is it for your farm to cope with...?”.



**PERCEIVED
SPECIFIC
RESILIENCE**

Kruskal-Wallis' and
Dunn' test



**PERCEIVED
SPECIFIC
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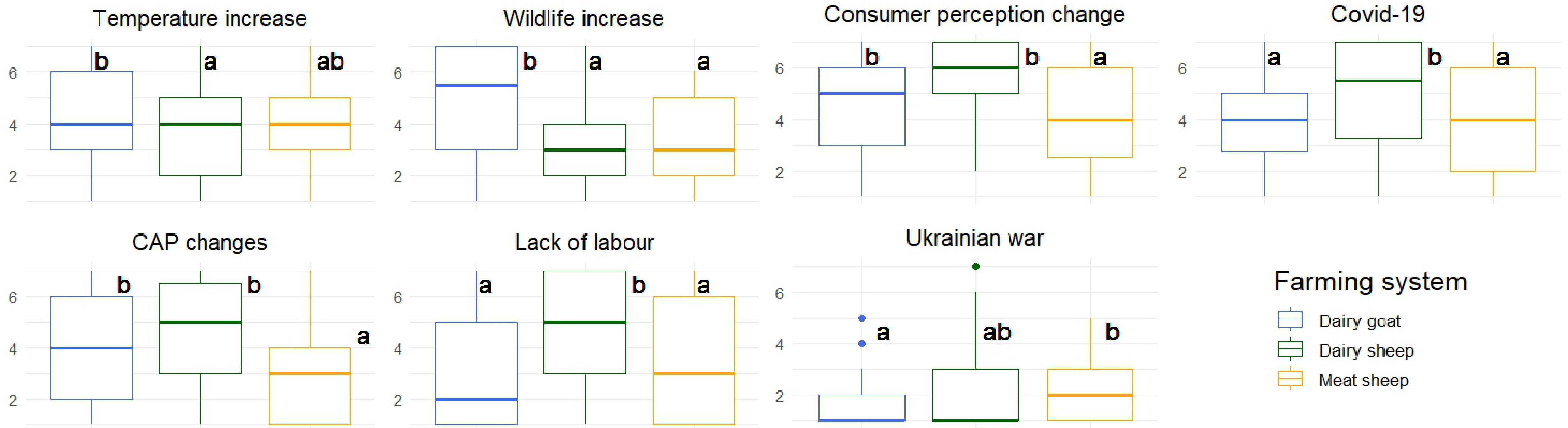
Ordinal logistic regression

21 Attributes of resilience
Financial capital
Access to natural capital
Farm infrastructure capital
Infrastructures in the living area
Human capital
Social capital: people support
Social capital: honors legacy
Social capital: work land life quality
Functional diversity
Response diversity
Spatial and temporal heterogeneity
Optimally redundant
Globally autonomous
Sanitary isolation
Organized and structured farming system
Knowledge and innovation networks
Exposed to disturbance
Organizations feedback
Locally interdependent
Ecologically self-regulated
Coupled with natural capital

Results

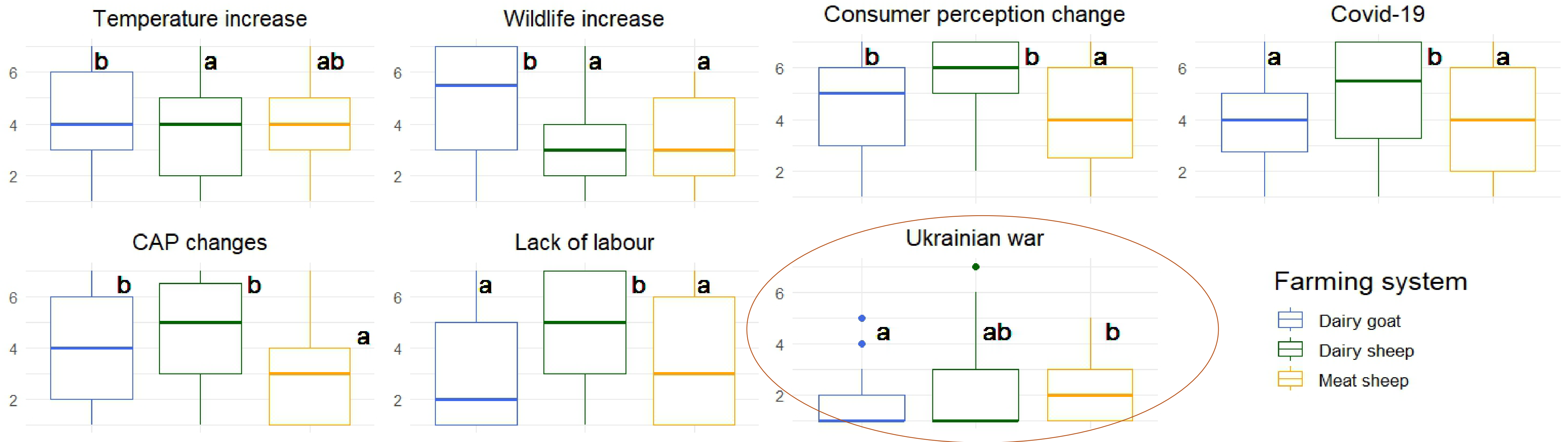


PERCEIVED SPECIFIC RESILIENCE



There are differences between the PSR across case studies

PERCEIVED SPECIFIC RESILIENCE



There are differences between the PSR across case studies

Perceives Specific Resilience VS Resilience Attributes

	Temperature increase	Wildlife increase	CAP changes	Lack of labour	Change in costumer perception	Covid -19	Ukrainian war
	OR (%95 CI) p-value						
Sanitary isolation	0.08(0.02-0.38)*				4.37(1.23-15.80)*	0.25(0.06-0.93)*	0.19(0.04-0.87)*
Ecologically self-regulated			5.73(1.27-23.31)***	6.02(1.23-30.57)*			11.88(2.18-69.41)**)
Farm infrastructure capital			0.11(0.02-0.50)**			0.22(0.05-0.90)*	0.18(0.04-0.84)*
Functional diversity	5.66(1.22-26.84)*			8.58(1.65-46.5)*	5.71(1.27-26.05)*		
Locally interdependent		0.18(0.04-0.80)*			0.18(0.04-0.79)*		
Social capital: people support		0.26(0.08-0.80)*					0.15(0.04-0.54)*
Social capital: Honors legacy			0.22(0.07-0.69)*				0.30(0.09-0.95)*
Spatial and temporal heterogeneity			0.12(0.02-0.91)*			0.11(0.01-0.83)*	
Exposed to disturbance						6.15(1.26-30.27)*	
Globally autonomous						0.21(0.05-0.92)*	
Infrastructures in the living area			0.21(0.05-0.92)*				
Optimally redundant			10.03(1.67-63.43)*				
Organizations feedback							4.86(1.11-22.87)*
Response diversity				0.14(0.03-0.73)*			
Social capital: work land life quality				27.11(5.16-157.59)***			
Dairy goat	3.82(1.12-13.60)*		8.49(2.64-28.50)***			3.96(1.32-11.82)*	
Dairy sheep			4.60(1.86-11.71)**	1.04(0.35-3.07)***		6.49(2.34-18.3)***	

Statistical significance: 0 '***' 0.001 '**' 0.01 '*'

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Locally interdependent		0.	• Ecologically self-regulated: - CAP changes (+) - Lack of labour (+) - Ukrainian war (+)					
Social capital: people support		0.						
Social capital: Honors legacy								
Spatial and temporal heterogeneity								
Exposed to disturbance						(0.01-0.83)*		
Globally autonomous						(1.26-30.27)*		
Infrastructures in the living area						0.21(0.05-0.92)*		
Optimally redundant			• Functional diversity: - Temperature increase (+) - Lack of labour (+) - Customers perception change (+)					
Organizations feedback								
Response diversity								
Social capital: work land life quality								
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Functional diversity	5.66(1.22-26.84)*	- Farm infrastructure capital: - CAP changes (-) - Covid-19 (-) - Ukrainian war (-)					
Locally interdependent							
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Conclusions



- Each case study have different perception to specific challenges which can be associated to their system characteristics.
- There are some attributes that contribute in many specific challenges (sanitary isolation, functional diversity, ecologically conserved environments, farm infrastructures).
- There are other resilience attributes contributing to specific challenges.

Thank you

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