

# Changes and adaptations in mountain livestock farming systems

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Workshop "Environmental sustainability of extensive livestock systems in Italy"

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# 1.1. Introduction

Europe's ecological backbone:  
recognising the true value of our mountains

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European Environment Agency



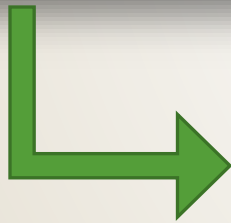
- ▶ Mountain areas cover **1/3 of Europe land area** and hosts **17%** of its **population**.
- ▶ Mountain agroecosystems deliver crucial services:
  - ▶ **Provisioning** (food, timber, ...),
  - ▶ **Regulating** (wildfires prevention, climate regulation, ...), and
  - ▶ **Cultural** (landscapes, traditional practices, ...).

→ **Ecosystem Services**

Faccioni G., Sturaro E., Ramanzin M., Bernués A., 2019. **Socio-economic valuation of abandonment and intensification of Alpine agroecosystems and associated ecosystem services**. Land Use policy 81, 453-462.

Bernués A., Alfnes F., Clemetsen M., Eik L.O., Faccioni G., Ramanzin M., Ripoll-bosch R., Rodríguez-Ortega T., Sturaro E., 2019. **Exploring social preferences for ecosystem services of multifunctional agriculture across policy scenarios**. Ecosystem Services 39, 101002.

# 1.1. Introduction



Mountain livestock is suffering a general process of **abandonment**

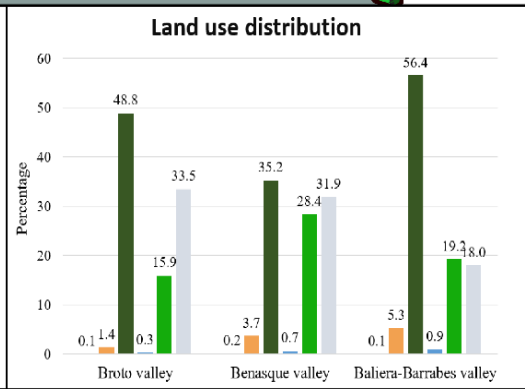
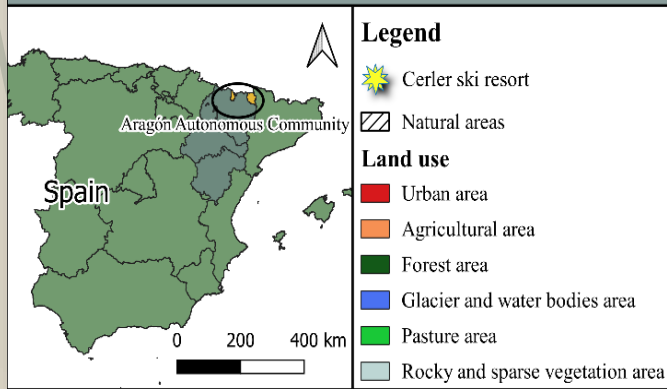
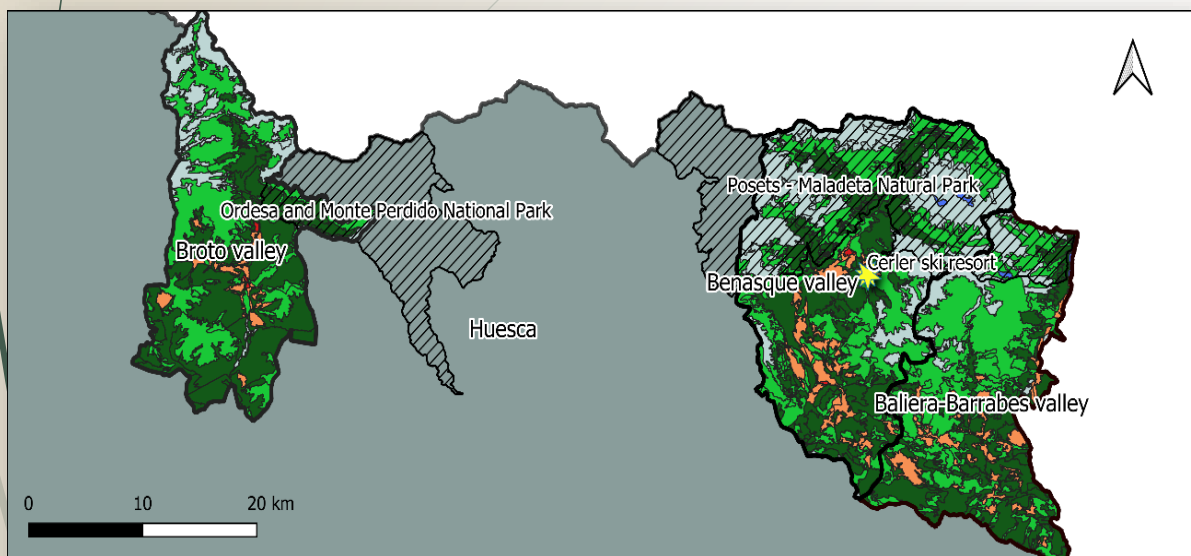
- Labour opportunity cost (economic and lifestyle)
- Succession
- Natural resources vs. external inputs
- Sensitivity to climate change
- Sensitivity to markets



## 1.2. Objectives

- Analyse the **main changes** in cattle farming systems in the Pyrenees from 1990 to 2020
- Identify the different **trajectories of evolution** of farms
- Determine the **key drivers** of those trajectories at global, regional and household levels
- Analyse **farmers' strategies** to face climate and market changes
- Influence of **farms and farmers' characteristics** on those strategies.

# 1.3. Study area and data collection



Monitoring of constant sample through face-to-face surveys

101, 71 and 54 Face-to-face surveys in 1990, 2004 and 2018  
Broto, Benasque and Baliera-Barrabés

Farm functioning

- Farm structure
- Management
- Economics...

Farmer's perception (only in 2018)

- 2-year-long drought
- Rise of input prices

## 2. Changes in mountain livestock farming systems

Changes were analysed at different levels:

Socio-economic  
context of the  
valleys

Population, farms and  
economic sectors  
dynamics

General farm  
evolution

Statistical tests on  
variables defining  
structure, management  
and economic  
performance

Trajectories of  
evolution

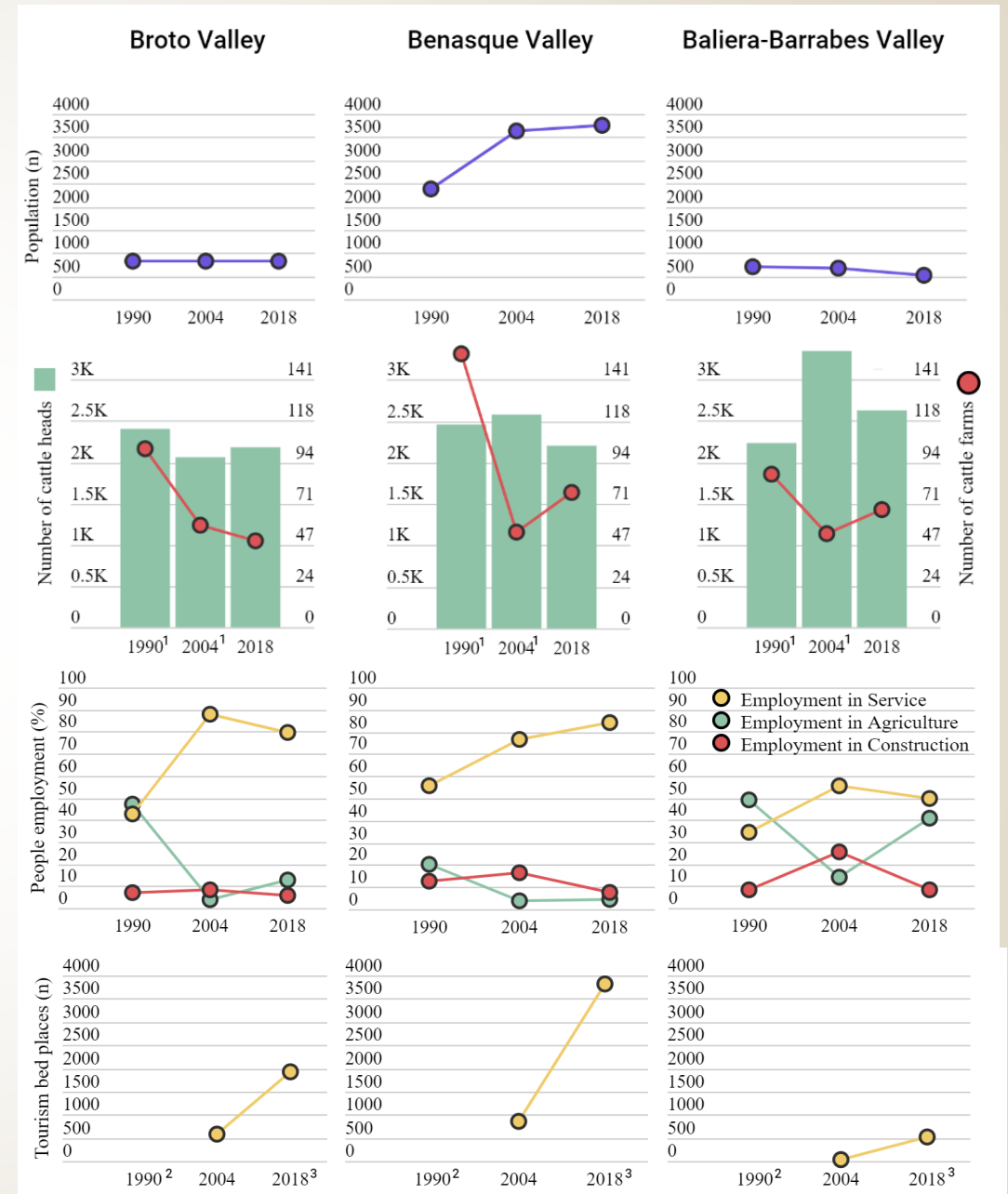
PCA and Cluster  
analysis on 9 key  
variables

Drivers of  
change

Discriminant analysis

## 2.1. Socio-economic context

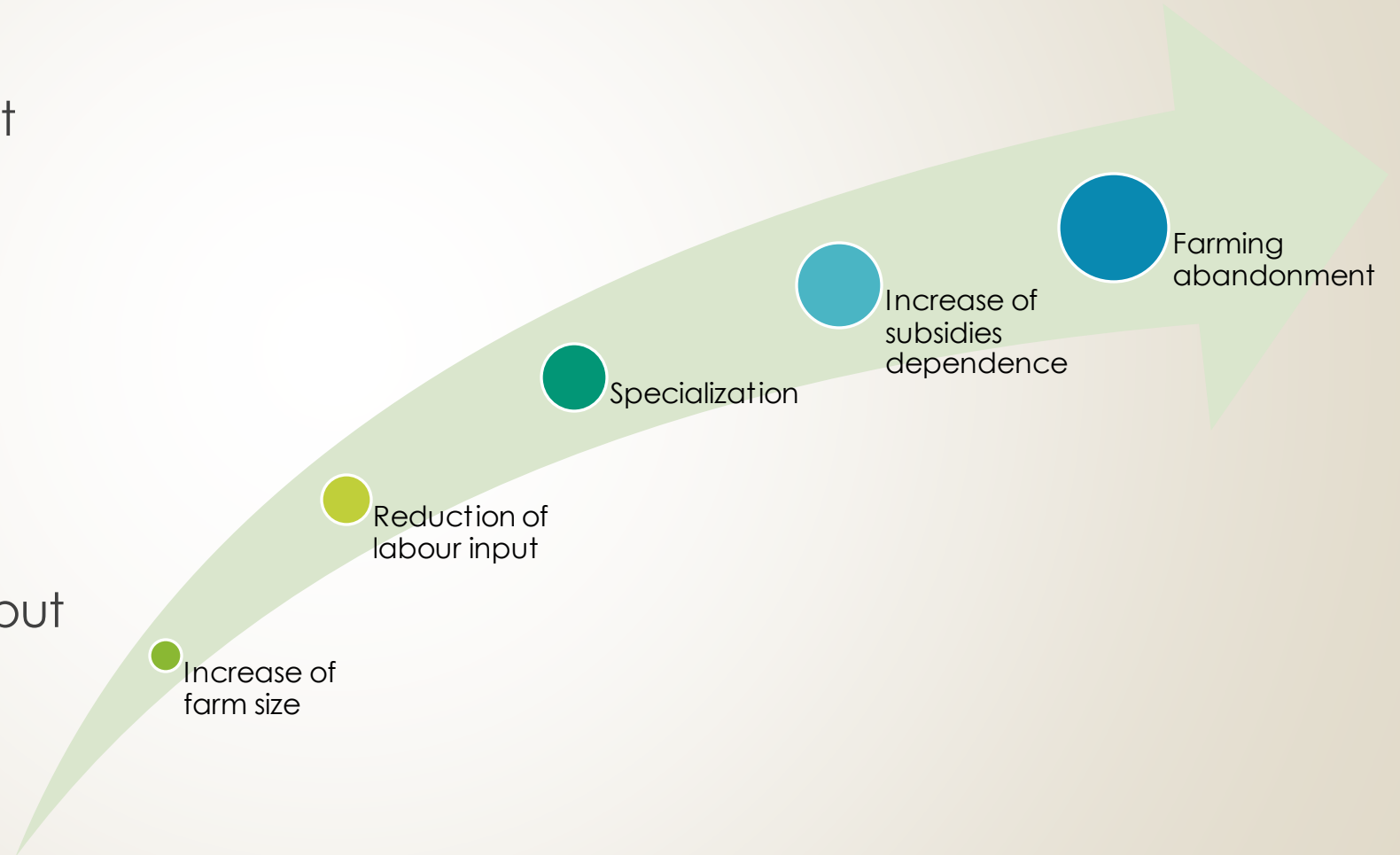
- Increase of population in valleys with tourism
- Reduction in the number of farms in all valleys, while stable cattle heads
- Uneven reduction of population working in agriculture and increase of population working in services (tourism)
- Increase of the touristic sector





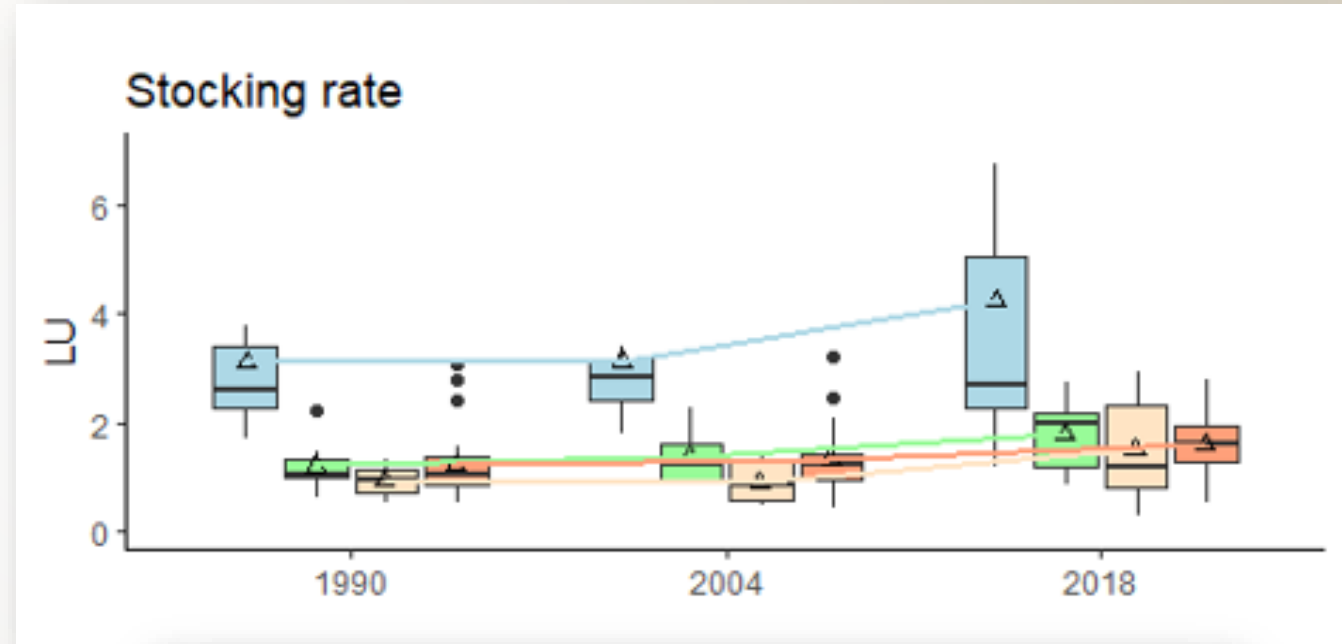
## 2.2. General evolution

- Farming abandonment
- Change in productive orientation (Specialization)
- Increase of subsidies dependence
- Increase of farm size
- Reduction of labour input
- Reduction of feeding costs



## 2.3. Trajectories of evolution

- Broto trajectory – **Small land area and large herd growth** (22%)
- Benasque trajectory – **Labour extensification** (18%)
- Baliera-Barrabés trajectory – **Large land area and fattening focus** (16%)
- Common across-valleys trajectory – **Small farms with little changes** (44%)

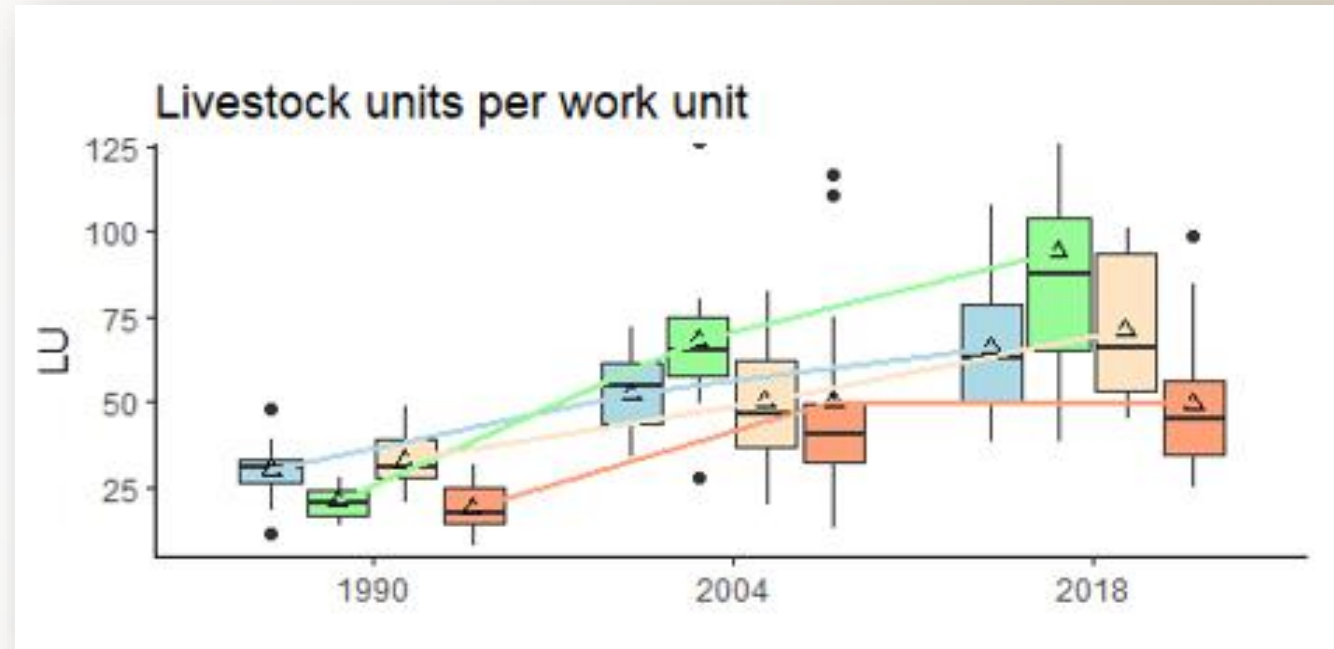


### Trajectory

- △ Broto trajectory-Small land area and large herd growth
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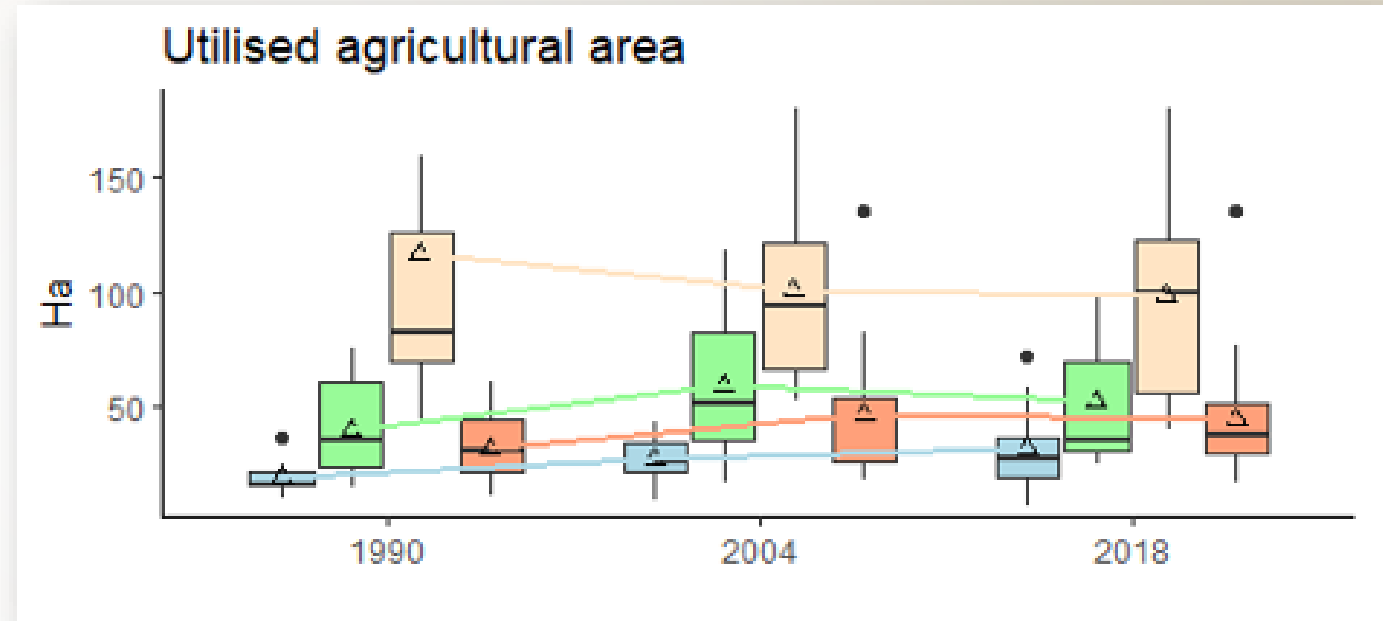
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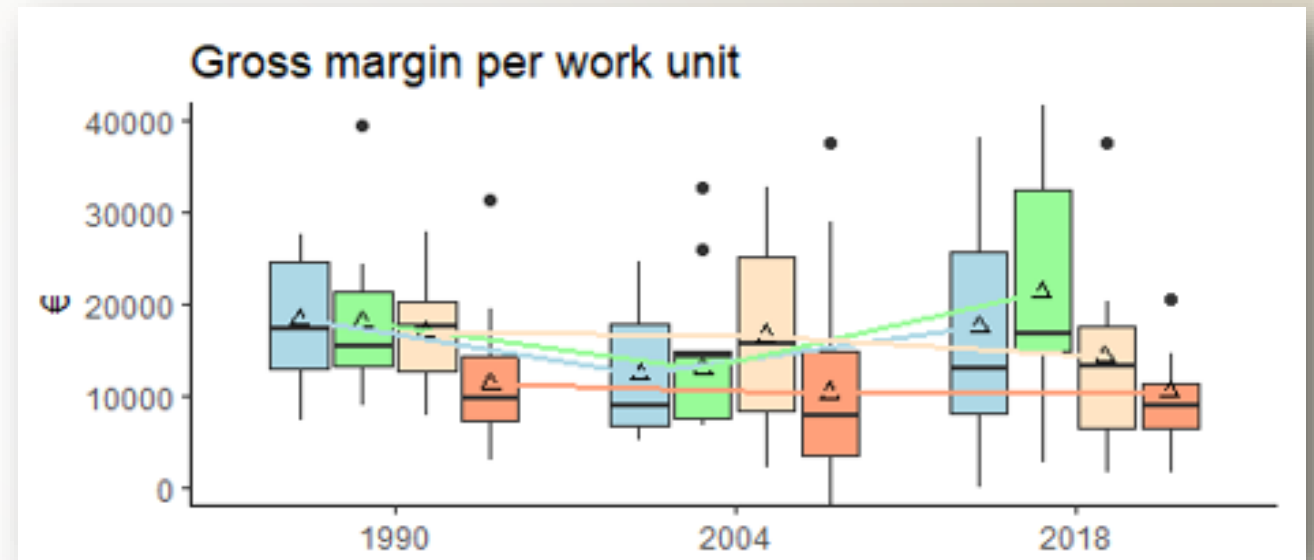


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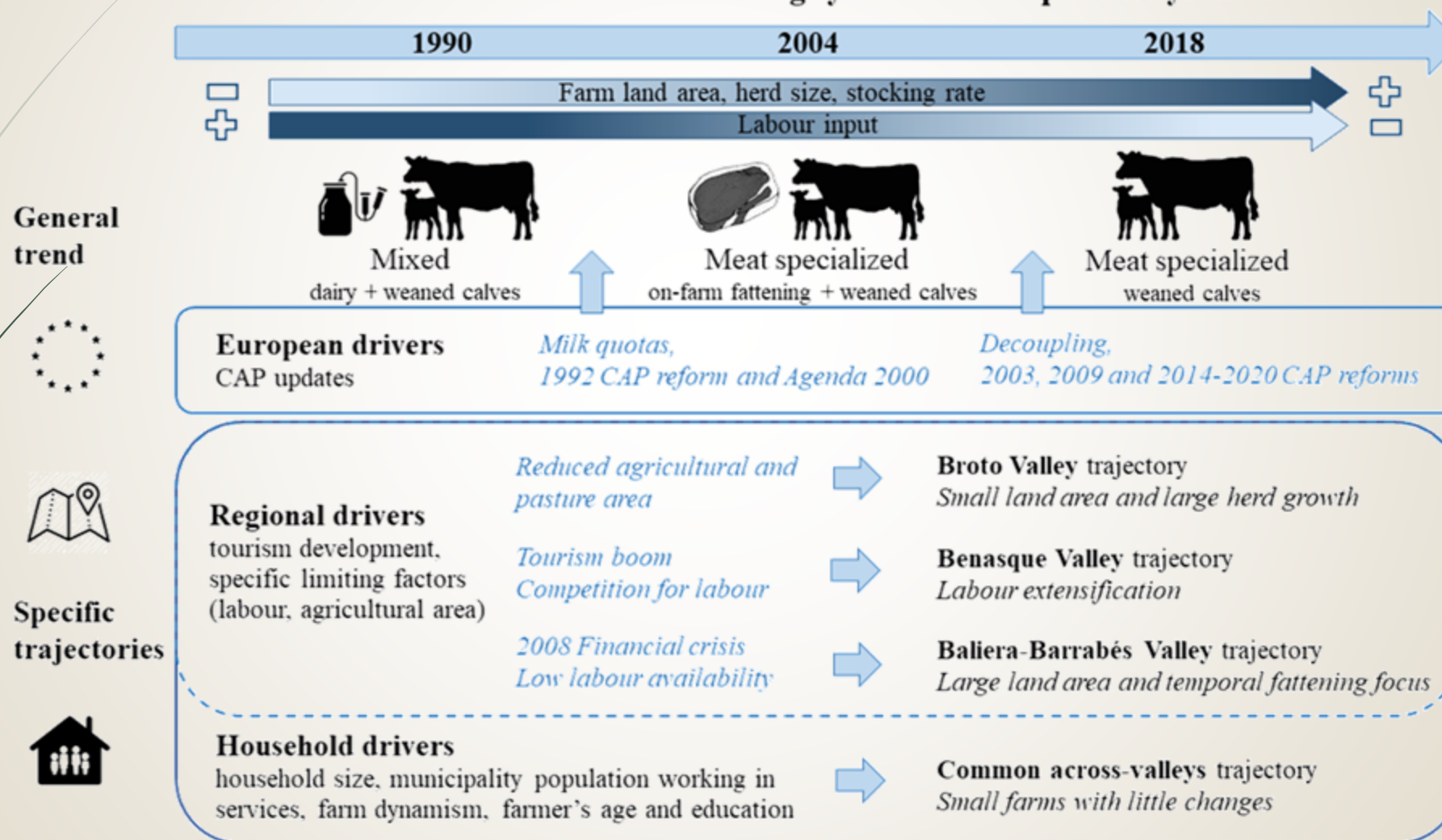
## 2.4. Drivers of change

Differences between the farms that follow the common across-valley trajectory and those that follow the specific trajectory of their valley	Farms from Broto		Farms from Benasque		Farms from Baliera-Barrabés	
	Broto Trajectory	Common Trajectory	Benasque Trajectory	Common Trajectory	Baliera-Barrabés Trajectory	Common Trajectory
<b>Household size in 1990</b>	3.56	3.17	6.33	4.33	3.71	3.00
<b>Farmer level of education in 2004</b>	1.44	0.83	1.56	1.17	1.71	1.70
<b>Change in municipality pop. working in services from 1990 to 2004</b>	111%	106%	49.4%	48.7%	67.3%	57.4%
<b>Farm dynamism in 2018</b>	3.33	1.33	2.78	2.33	3.00	1.60
<b>Farmer age in 2018</b>	51.33	52.33	47.89	58.83	45.14	56.30



# To sum up...

## Evolution of mountain cattle farming systems in the Spanish Pyrenees



# 3. Farmer's adaptations

In this situations, **would any of these changes improve the continuation of your exploitation** and how would they be?

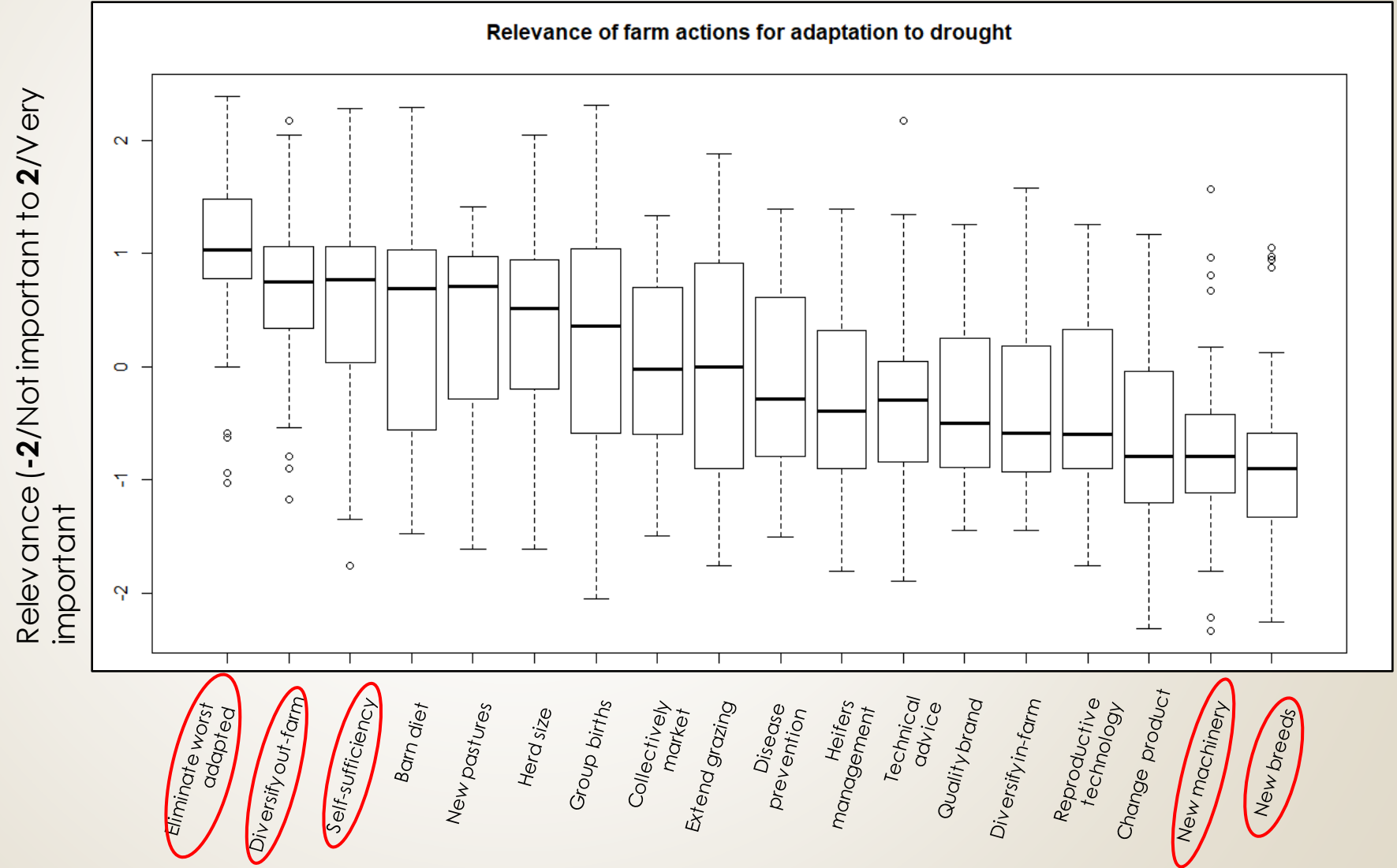
- **Reproduction**
- **Sanitary management**
- **Feeding**
- **General management**
- **Commercialization**

In these situations, would any of these changes improve the continuation of your exploitation and how important would they be?

	Prolonged drought					Increase in input prices				
	1. Not imp.	2. Little imp.	3. Important	4. Considerably imp.	5. Very imp.	1. Not imp.	2. Little imp.	3. Important	4. Considerably imp.	5. Very imp.
<b>Reproduction</b>										
Group births in specific periods										
Incorporate reproductive technology (synchronize jealousy, artificial insemination, pregnancy diagnosis ...)										
Follow a specific management program for heifers										
<b>Sanitary management</b>										
Intensify disease prevention and control programs (vaccines, diagnoses, ...)										
Eliminate the worst adapted animals (fertility, ease of delivery, poise)										
<b>Feeding</b>										
Extend the grazing season										
New grassland areas										
Modify barn diets										
Seek self-sufficiency (self-produced food)										
<b>General management</b>										
Modify herd size										
Introduction of new breeds										
Modernize machinery and facilities										
Seek technical advice to modify management										
<b>Commercialization</b>										
Change the type of product (+ fattening?)										
Produce under some quality brand										
Collectively market										
Diversify the activity within agriculture										
Diversify off-farm activity										

# 3.1. Most valued measures

➤ Drought

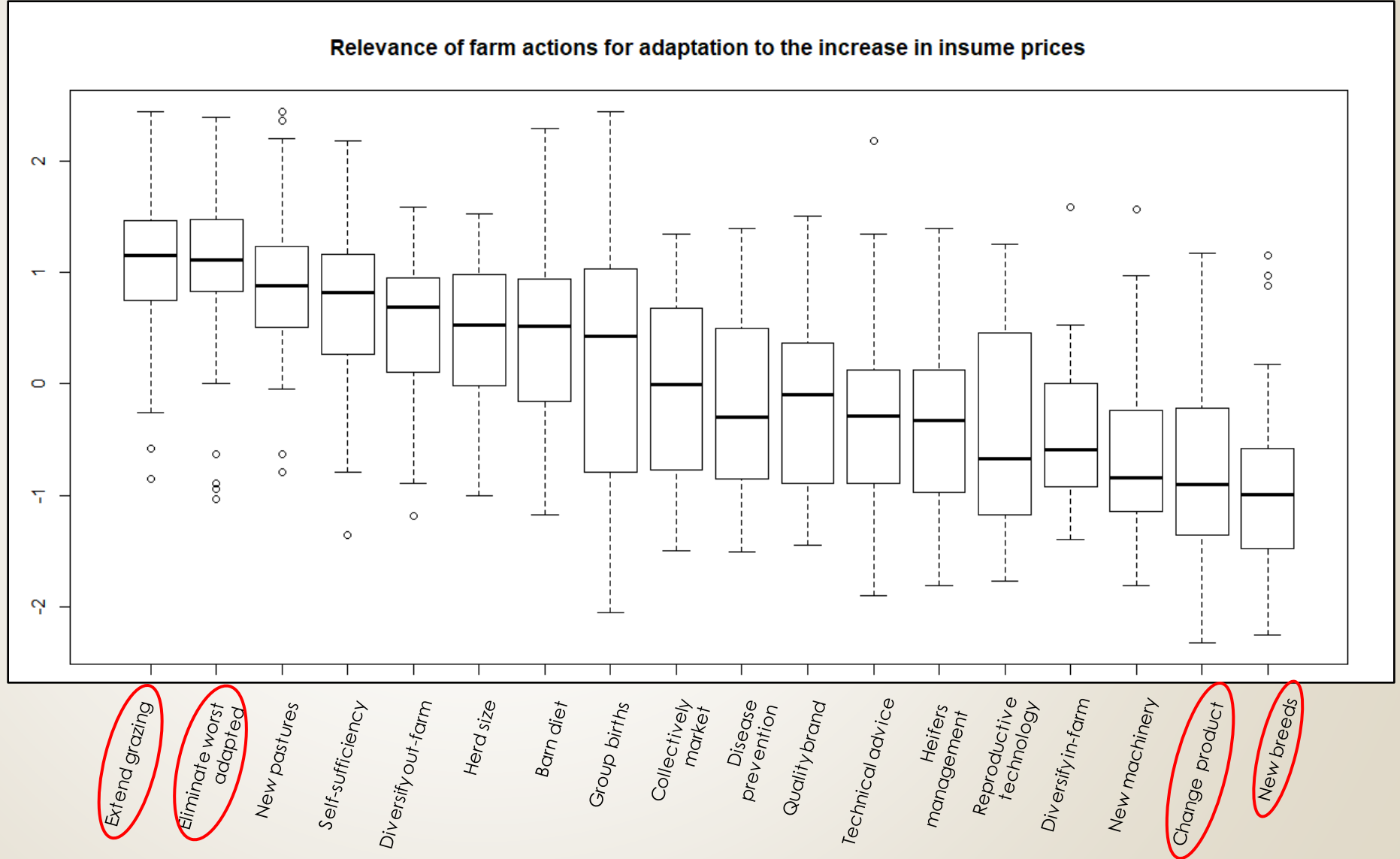




# 3.1. Most valued measures

Inputs' prices

Relevance (-2/Not important to 2/Very important)



## 3.2. Importance of farm and farmer characteristics

Scenario	Discriminant variable			ANOVA	
	Age	Young (<51)	Old (>51)	F	p
Prices' increase	New pastures	0.493	1.126 ↑	5.621	0.0251 *
	<b>Fattening</b>	<b>No</b>	<b>Yes</b>		
Prices' increase	New pastures	1.08 ↑	0.389	6.482	0.0167 *
	New machinery	-0.844 ↓	-0.248	4.607	0.04 *
Drought period	New machinery	-0.87 ↓	-0.173	6.685	0.0135 *
	<b>Land area</b>	<b>Big (&gt;77 ha)</b>	<b>Small (&lt;77)</b>		
Drought period	Barn diets	1.104 ↑	0.166	8.211	0.00654 **

## 4. Final remarks

**At the European scale**, the Common Agricultural Policy had a strong influence, resulting in a **high dependence of subsidies, increase of the herd size and reduction of the labour force**

**At the regional level, tourism** created a scenario of **competence for the labour and land**, but also the possibility of extra income for the household

**At the farm level**, household factors such as **farmer age, farmer level of education or household size** were crucial in determining the specific trajectory followed by the farm

However, **a 44% of farms showed limited modifications to adapt to changes**, which questions their capacity to face the challenges ahead

## 4. Final remarks

Farmers considered **eliminating worst adapted animals, off-farm activity and seeking new pastures for self-sufficiency** as some key strategies for both, increase in inputs prices and a period of droughts scenarios

In a **2-year-drought scenario** farmers considered **modifying diet** as one relevant action, while this wasn't too relevant in an increase in inputs prices scenario

Farm and farmers characteristics such as **farmer age, size of agricultural area and on-farm fattening** were relevant to identify how farmers face these scenarios



## 4. Political implications



Necessity to improve the monitoring and evaluation of farms

Necessity to improve the succession and replacement policies

Necessity to integrate the CAP with other sectorial policies (SDG, Natura2000, ...)

# Thank you

## For your attention!



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Drivers of change in mountain agriculture: A thirty-year analysis of trajectories of evolution of cattle farming systems in the Spanish Pyrenees

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