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for Agriculture and Food

Strengthening Climate Resilience in European Livestock Systems

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Policy and Economic Levers to Enable the Transition: How Can We Make Climate-Resilient Livestock Farming Economically Viable for Farmers?

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Scientific status quo

European livestock systems face increasing pressures

- Heat stress and animal health challenges
- Drought
- Feed insecurity
- Volatility of energy and input prices
- Biodiversity decline
- Ecosystem degradation
- Changing consumer expectations

Livestock farming contributes to

- Food security
- Rural livelihoods
- Landscape management
- Ecosystem services

The transition challenge: ambition vs. farm reality

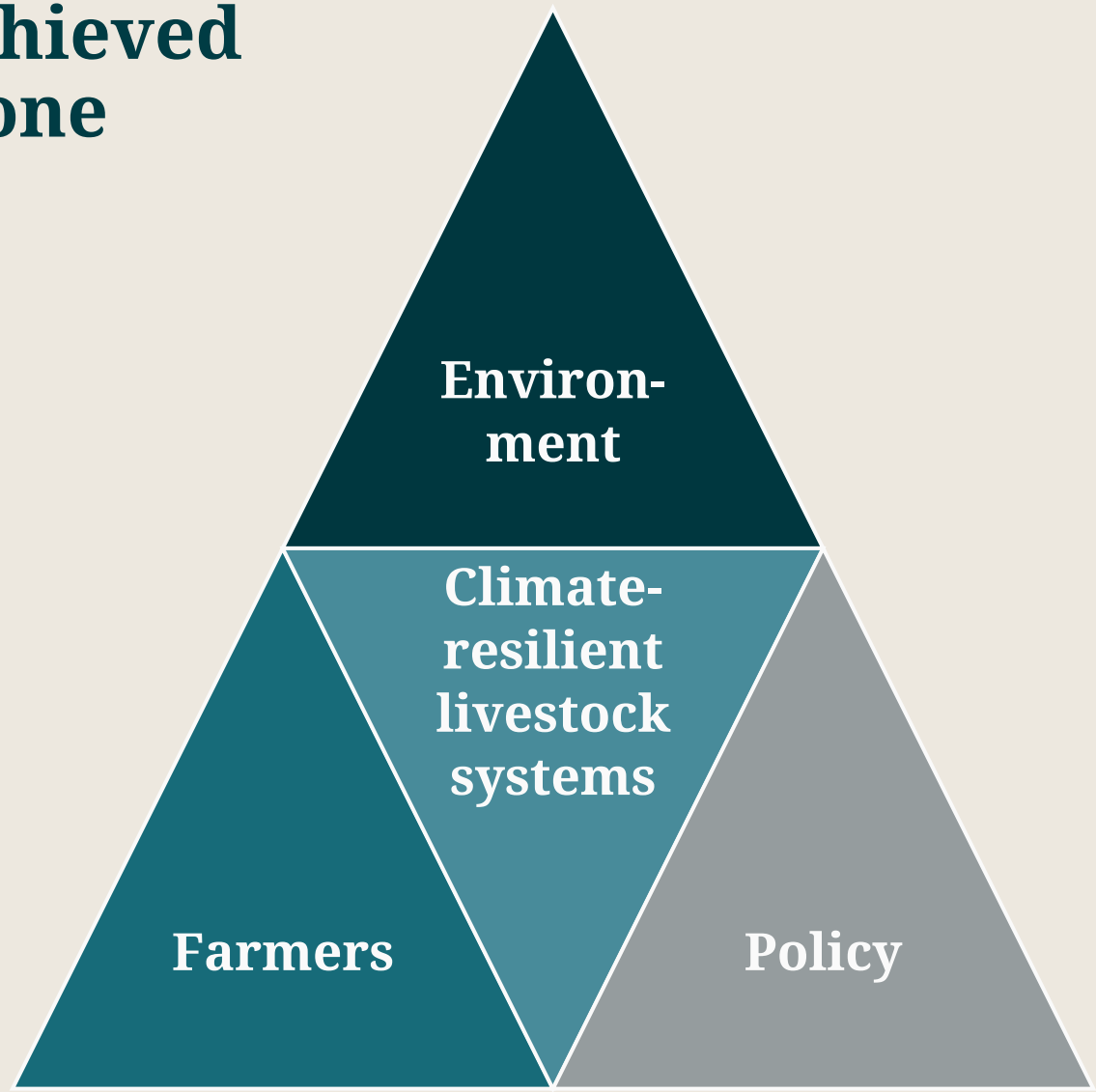
- Farmers: key actors in adaptation and mitigation
- How to make transition feasible and economically attractive?

- Limited investment capacity
- Uncertain returns
- Labour constraints
- Market risks

Climate resilience cannot be achieved by asking farmers to change alone

The transition must become:

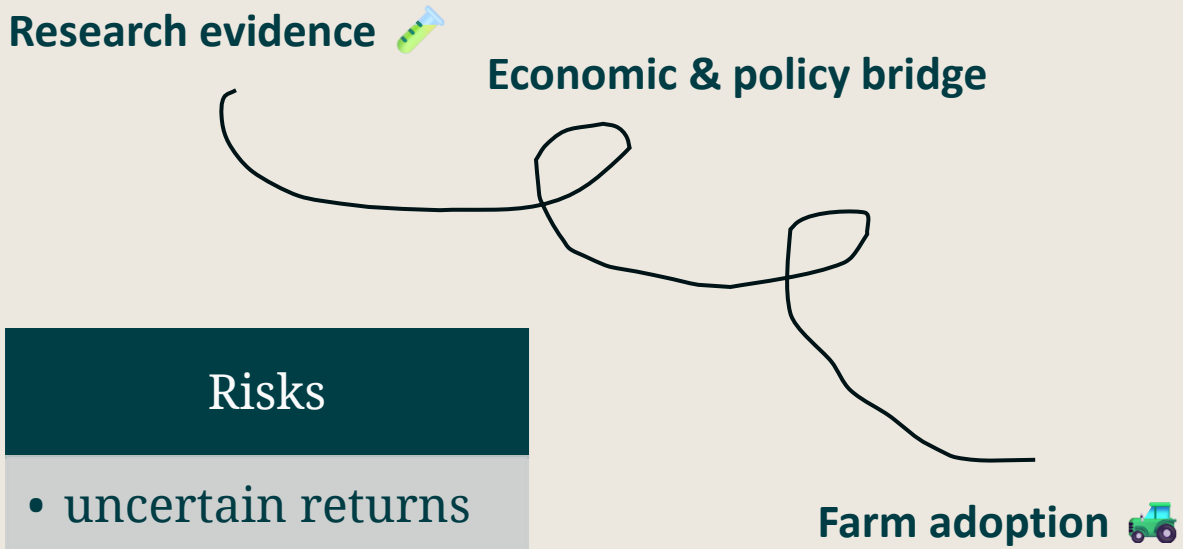
- economically rational
- supported by well-designed incentives
- by risk-sharing mechanisms
- by value-chain transformation.



The farmer’s decision framework

Why do farmers hesitate to adopt climate-smart practices?

Decision model: **Adoption** = **Benefits** – **Costs** – **Risks**



Costs	Benefits	Risks
• investment requirements • labour • knowledge • infrastructure	• productivity stability • reduced input dependence • animal health improvement • market opportunities	• uncertain returns • market instability • policy uncertainty

What does climate-resilient livestock farming look like?

🐄 **Animal level**

- improved welfare
- genetics adapted to climate conditions
- precision feeding

🌱 **Farm level**

- diversified forage systems
- rotational grazing
- soil carbon management
- agroforestry

🔄 **System level**

- circular use of resources
- reduced dependency on external inputs
- integrated crop–livestock systems

Lever:
Education
Awareness
Showcasing
Demonstration farms

Climate resilience and economic resilience often go together.
The most successful transition strategies are those that create value for both ecosystems and farms.

Practice	Environmental benefit	Economic benefit
Precision feeding	↓ emissions	↓ feed costs
Improved animal health	↓ resource use	↓ veterinary costs
Diversified forage	↑ soil resilience	↓ drought losses
Agroforestry	↑ biodiversity	additional income

improved efficiency → higher profitability
better soil → more stable yields → lower feed costs

Policy lever 1: Rewarding public goods

From income support to outcome-based incentives

- **Current challenge:**

Farmers often create benefits that society values, but markets do not pay for.

Biodiversity, carbon sequestration, water protection, animal welfare

- **Policy solutions:**

Moving from: “compensating activities” towards: “rewarding measurable outcomes”

Potential indicators: soil health, biodiversity metrics, emissions intensity, animal welfare indicators

- **Research contribution:**

Develop reliable monitoring systems.

Policy shift

From:

❌ payment for actions

Towards:

✅ payment for outcomes

Policy lever 2: Reducing transition risk

Farmers need security during change

Transition requires:

- new equipment
- new knowledge
- experimentation

Economic instruments

Investment support	Risk-sharing mechanisms	Knowledge systems
• Infrastructure modernization • Renewable energy • Precision technologies	• Insurance schemes • Transition payments • Climate adaptation funds	• Advisory services • Farmer networks • Demonstration farms • Because knowledge is an economic resource

Risk ↓
Confidence ↑
Adoption ↑

Market levers: Creating value (turning sustainability into value)

Sustainability must become economically viable

Consumers increasingly expect:

- Climate-friendly food
- Animal welfare
- Transparency

Challenges:

- Consumers may value sustainability, but do not always pay for it.
- Farmers often receive a small share of the added value.

A key: making the right choice the easiest choice

Solutions: value chain innovations

🌿 Sustainability certification / labels (climate-resilient livestock products, animal welfare, biodiversity, local production)

🔍 Transparent supply chains

🏫 Sustainable public procurement

🤝 Producer–retailer partnerships

Summary: What does science already know with sufficient confidence to justify policy action?

Established consensus: (high confidence)

Climate change is already affecting livestock systems.

Policy implication: **Adaptation policies should be treated as investments rather than emergency responses.**

Resilience is not only about reducing emissions; it is about increasing the ability of systems to absorb shocks.

Policy implication: **Policies should support multifunctional practices rather than focusing solely on emissions.**

Economic barriers are a major determinant of adoption. Many climate-smart practices remain under-adopted because transition costs occur immediately while benefits often materialize later.

Policy implication: **Economic incentives matter.**

Knowledge and advisory systems are critical. Information and trust are major determinants of adoption.

Policy implication: **Extension services are as important as financial support.**

Summary: What does science already know with sufficient confidence to justify policy action?

Emerging consensus

Outcome-based payments may outperform practice-based payments, improve efficiency and farmer engagement.

Remaining challenge: Measurement and verification costs.

Climate resilience should be assessed at system level (including ecological diversity, economic diversity, social networks, market structures)

Diversification is a key resilience strategy. More diverse systems (i.e., mixed farming, crop-livestock integration, landscape diversification, multiple income streams) are often more resilient than highly specialized systems. However, trade-offs between efficiency and resilience remain under debate.

How can research further support EU climate policies?

Reducing uncertainty & implementing science-based policies

Evidence-based, robust indicators of resilience:	Economic modeling – identify:	Participatory approaches	Regional solutions
• Emissions • Ecosystem services • Biodiversity • Welfare • Adaptive capacity indicators • Vulnerability assessments	• Distribution of costs and benefits • Effectiveness of incentives • How much of the transition costs can realistically be transferred to markets (consumers' willingness to pay)	• Farmers as co-designers, not only recipients • Approaches reflecting real farm conditions	• No single transition pathway fits all European highly diverse livestock systems • Solutions adapted to regional contexts

Sources

- Navid Ghavi Hossein-Zadeh. Advancing climate-resilient livestock systems: Next-generation emission mitigation strategies and integrated technological innovations, Veterinary and Animal Science, Volume 31, 2026, 100588, https://doi.org/10.1016/j.vas.2026.100588.
- Assa Nsabiyeze, Mengjie Zhang, Jun Li, Qinan Zhao, Xiaoshuan Zhang. Precision livestock farming for climate-resilient livestock management: a review of real-time monitoring and decision support systems, Journal of Cleaner Production, Volume 524, 2025, 146454, https://doi.org/10.1016/j.jclepro.2025.146454.
- Bashiru HA and Oseni SO. Simplified climate change adaptation strategies for livestock development in low-and middle-income countries. Front. Sustain. Food Syst. 9:1566194, 2025. doi: 10.3389/fsufs.2025.1566194.
- Cornale, P.; Senatore, R.; Battaglini, L.M.; Baratta, M. Climate Change and Livestock Welfare in the Alps: A Comprehensive Review. *Animals* **2025**, *15*, 3578. https://doi.org/10.3390/ani15243578.
- EU CAP Network. Livestock, 2040 climate targets and the CAP: it's a numbers game. Publication - Policy Insights, 2025. https://eu-cap-network.ec.europa.eu/publications/livestock-2040-climate-targets-and-cap-its-numbers-game_en
- European Commission. Keeping livestock systems healthy, sustainable and resilient. https://agriculture.ec.europa.eu/overview-vision-agriculture-food/research-innovation/livestock-systems_en
- European Environment Agency. Building climate-resilient agriculture in Europe: an economic perspective. https://www.eea.europa.eu/en/analysis/publications/building-climate-resilient-agriculture-in-europe-an-economic-perspective.
- FAO, Policy Support and Governance Gateway. https://www.fao.org/policy-support/policy-themes/sustainable-livestock/en.
- Malek, Ž., See, L. Future heatwave exposure of the European cattle sector. npj Sustain. Agric. 4, 6, 2026. https://doi.org/10.1038/s44264-025-00113-w.

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