ESAAF

European Science Alliance
for Agriculture and Food

Strengthening Climate Resilience in European Livestock Systems

ESAAF Roundtable, 26 June 2026

CSIC Office Brussels

The Science of Livestock and Climate Change

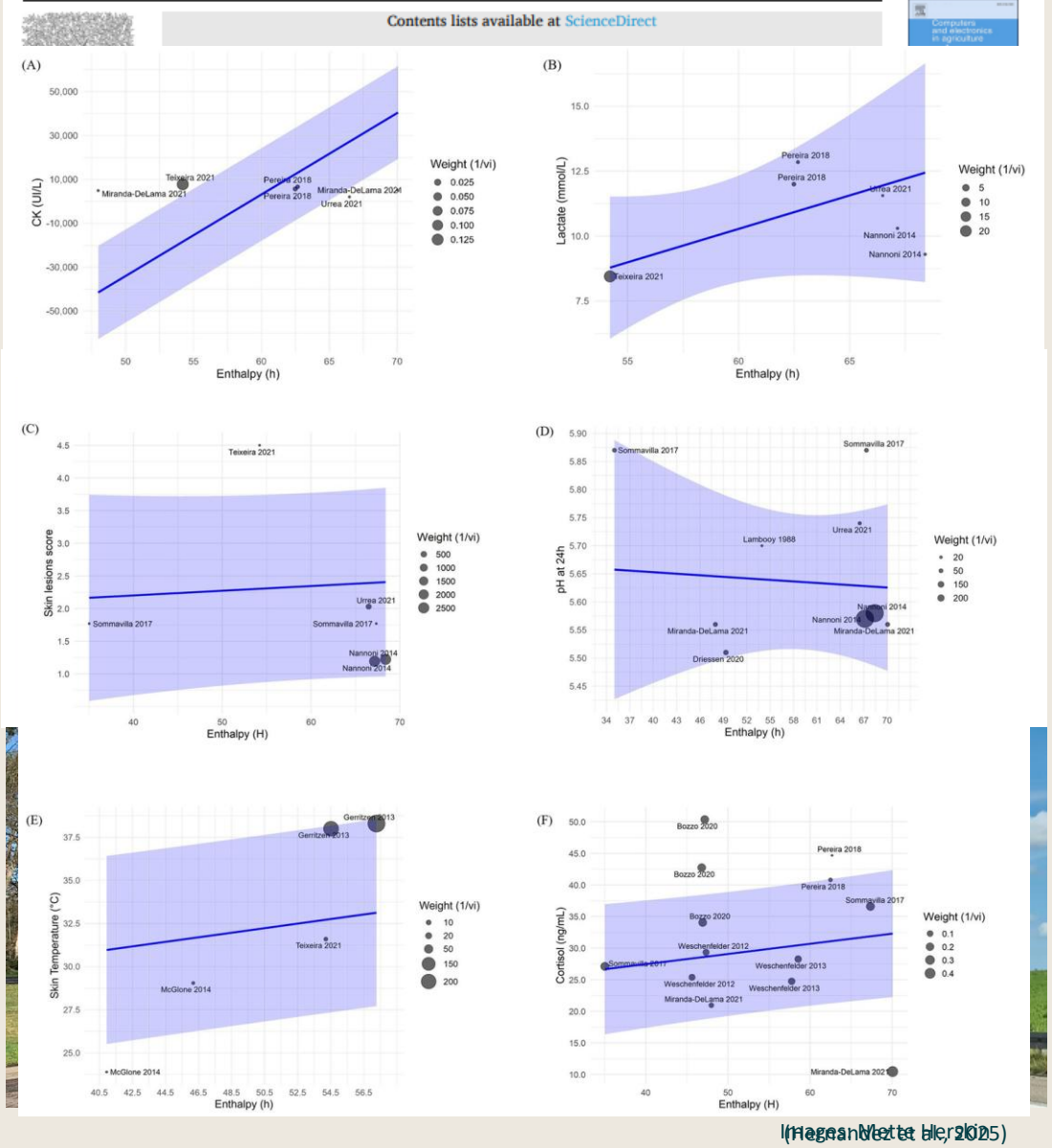
TOPIC

- Functioning and performance of livestock systems: mitigation and adaptation

  - *How can livestock systems mitigate the climate change by increasing resilience of animals during life critical events such as transportation*

Livestock transport

- Transport is a critical life event in livestock animals' life:
  - Slaughter, export, and movement of high value breeding animals
  - Microclimatic conditions during transport differ from those of the environment (Thodberg et al., 2022; Hernandez et al., 2025)
  - Microclimate changes alter animals' physiology and welfare



Images (Hernandez et al., 2025)

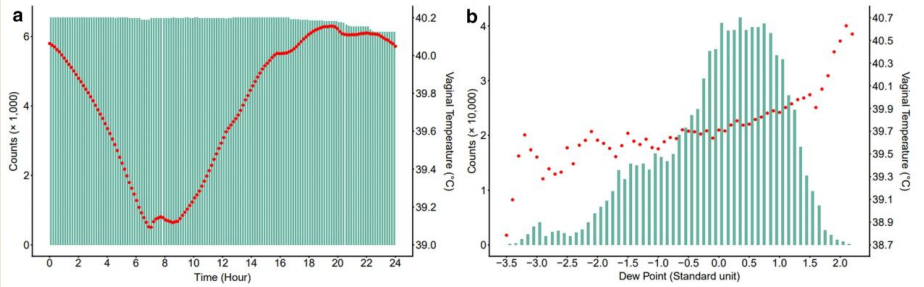
Current genetic strategies

within livestock systems

- Genetic stragtegies to increase heat stress resilience:
  - Identification of novel phenotypes of heat stress resilience (Brito et al.,2020; Freitas et al., 2023; Wen et al., 2024)
  - Novel selection indexes
- Use of new technologies: Genomics and phenomics as stragtegy to increase resilience from the farm
- Increasing resilience during transport also can bring advantages to acute stress scenarios of abrupt climate changes during housing and vice versa (Hernandez et al., 2026; Wen et al., 2024)

Fig. 1

From: Longitudinal genomic analyses of automatically-recorded vaginal temperature in lactating sows under heat stress conditions based on random regression models



Number of records and average vaginal temperature throughout the day and along environmental gradients. **a** Number of records (green bars) and average vaginal temperature (T_V) (red dots) for time points (every 10 min) throughout the day and **b** number of records (green bars) and average T_V (red dots) along environmental gradients based on dew point values

(Wen et al., 2023)

Journal of Animal Science, 2026, **104**, skag142
https://doi.org/10.1093/jas/skag142
Published: 6 May 2026
Animal Health and Well Being

OXFORD

A preliminary assessment of the effects of summer transport on behavioral and physiological stress biomarkers in cull sows selected for heat stress tolerance or sensitivity in the F1 generation

Rick O. Hernandez[1], Luiz F. Brito[2,*], MaryKate Harrod Byrd[2], Hui Wen[2], and Jay S. Johnson[2,*,]

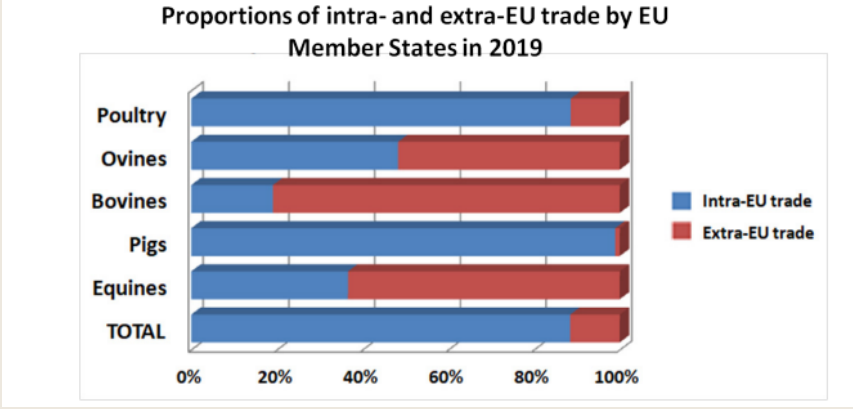
(Hernandez et al., 2026)

Importance for climate resilience in European livestock systems

- European livestock systems work within a network
  - Climate change affects differently EU areas, genetics of animals raised or living in one conditions needs to thrive in another.
  - Example:
    - Denmark export more than 15 milion ~30kg pigs annually. (Svejstrup & Herskin, 2025)
    - In 2019, ~1,9 billion animals were traded across EU members, while ~230 million exported to non-EU countries (ANIT, 2021)

- Relation between productivity and welfare that apply to all EU

Figure 1: Proportion of intra and extra-EU trade of livestock during 2019



(ANIT, 2021)

Transport becomes a crucial link in supply chains

Why is the topic important for Europe

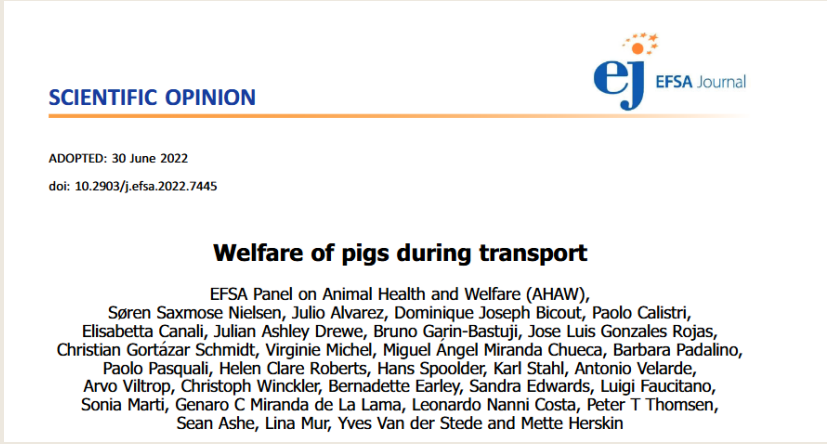
Challenges are here already

- European transportation regulation currently under revision:
  - Maximum in-vehicle temperatures (30/35°C) – above the upper critical temperature for many animal categories
  - Requirement for stationary periods as breaks for drivers and animals
- Large fleet of vehicles – Difficulties to regulate
- Temperature control in complex vehicles is challenging during EU transport
- Across animal species and categories: Limited research under European conditions

Opportunities

The role of future policy

- International problem and trade ⇒ need for coordinated policy action
- In a warmer and less predictable future climate, transport of animals will have higher impact on animal welfare – it may be difficult to live up to EU regulation - Breeding for resilience
- Future research (EFSA, 2022) recommended to:
  - Develop systems to maintain conditions inside thermal comfort zone and to monitor thermal conditions properly in all stages of the supply chain – Engineering solutions
  - Determine space allowance allowing animals to thermoregulate properly



SCIENTIFIC OPINION

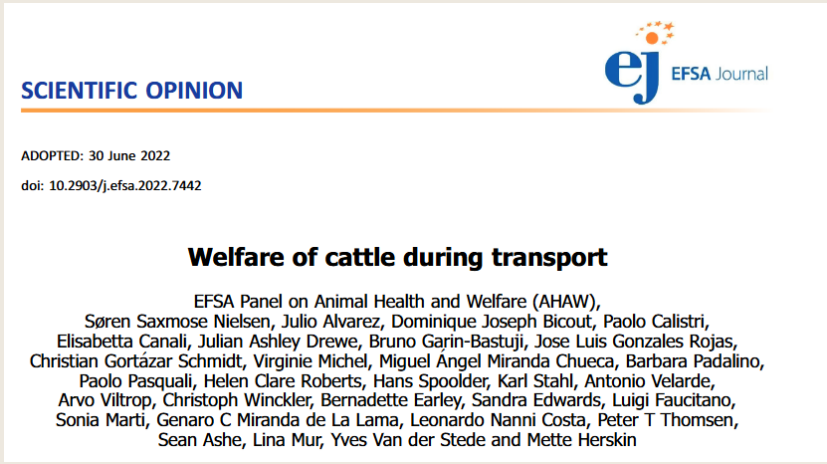
EFSA Journal

ADOPTED: 30 June 2022

doi: 10.2903/j.efsa.2022.7445

Welfare of pigs during transport

EFSA Panel on Animal Health and Welfare (AHAW),
Søren Saxmose Nielsen, Julio Alvarez, Dominique Joseph Bicout, Paolo Calistri, Elisabetta Canali, Julian Ashley Drewe, Bruno Garin-Bastuji, Jose Luis Gonzales Rojas, Christian Gortázar Schmidt, Virginie Michel, Miguel Angel Miranda Chueca, Barbara Padalino, Paolo Pasquali, Helen Clare Roberts, Hans Spoolder, Karl Stahl, Antonio Velarde, Arvo Viltrop, Christoph Winckler, Bernadette Earley, Sandra Edwards, Luigi Faucitano, Sonia Marti, Genaro C Miranda de La Lama, Leonardo Nanni Costa, Peter T Thomsen, Sean Ashe, Lina Mur, Yves Van der Stede and Mette Herskin



SCIENTIFIC OPINION

EFSA Journal

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Welfare of cattle during transport

EFSA Panel on Animal Health and Welfare (AHAW),
Søren Saxmose Nielsen, Julio Alvarez, Dominique Joseph Bicout, Paolo Calistri, Elisabetta Canali, Julian Ashley Drewe, Bruno Garin-Bastuji, Jose Luis Gonzales Rojas, Christian Gortázar Schmidt, Virginie Michel, Miguel Angel Miranda Chueca, Barbara Padalino, Paolo Pasquali, Helen Clare Roberts, Hans Spoolder, Karl Stahl, Antonio Velarde, Arvo Viltrop, Christoph Winckler, Bernadette Earley, Sandra Edwards, Luigi Faucitano, Sonia Marti, Genaro C Miranda de La Lama, Leonardo Nanni Costa, Peter T Thomsen, Sean Ashe, Lina Mur, Yves Van der Stede and Mette Herskin

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