



Policy Recommendations for Livestock Buildings

Challenge overview:

Livestock housing requires adequate indoor thermal conditions to maximise production and animal welfare, especially to avoid heat stress. However, the importance of building design and standards in creating good conditions has been underappreciated. Few building codes are available and even fewer are specifically developed to guide the livestock production buildings. Maintaining adequate indoor thermal conditions is essential for maximising livestock production and ensuring animal welfare, particularly preventing heat stress. However, the role of livestock buildings in influencing the indoor thermal environment has often been overlooked. In regions with highly variable weather conditions and significant heating and cooling demands, developing building code to guide farmers make informed decisions is crucial when farmers are upgrading or renovating livestock buildings for improving building efficiency. As reported by Paris et al. (2022), 17% of energy consumption per kg of slaughter weight of pig meat was for heating.¹ Heating accounts for 90% of livestock buildings' energy consumption in Europe, followed by ventilation, lighting, and cooling.² Due to climate conditions and additional heating needs, energy use in livestock housing is also considerably higher in northern Europe compared to southern. These energy needs may be addressed with insulation on the walls and/or roof, using windows with a thermal break, more durable and sustainable materials, optimised building shape, and other techniques which do not compromise on animal welfare.³

Policy Recommendations:

There are a couple of overarching themes when it comes to improving policies surrounding building standards for livestock facilities. Firstly, funding to deploy good solutions widely is key. To make buildings energy- and cost-efficient through renovation, investment is needed. Public money will likely be needed if livestock sheds [or buildings] are to be upgraded on a large scale. Secondly, additional research is needed into designing livestock buildings for energy efficiency. This includes studying integrated design, ventilation systems, heating systems and lighting systems as well as considering the

¹ Paris, B.; Vadorou, F.; Tyris, D.; Balafoutis, A.T.; Vaiopoulos, K.; Kyriakarakos, G.; Manolakos, D.; Papadakis, G. (2022) Energy Use in the EU Livestock Sector: A Review Recommending Energy Efficiency Measures and Renewable Energy Sources Adoption. *Applied Sciences*, 12, 2142.

² Costantino, A.; Fabrizio, E.; Biglia, A.; Cornale, P.; Battaglini, L. (2016) Energy Use for Climate Control of Animal Houses: The State of the Art in Europe. *Energy Procedia* 2016, 101, 184–191.

³ Masi, Rosa Francesca De; Ruggiero, Silvia; Tariello, Francesco; Vanoli, Giuseppe Peter (2021) Passive envelope solutions to aid design of sustainable livestock buildings in Mediterranean climate. *Journal of Cleaner Production*, 311, 127444.





labour and financial costs of renovation. One of practical challenges for livestock production houses, even in Southern Europe, is that there is no insulation on the roof. The added insulation on the roof can significantly reduce the impact of solar radiation on indoor thermal environment of livestock production houses and thus mitigate the heat stress in animals. However, how thick the insulation should be for the roof or the entire barns for the diverse and dynamic climatic conditions across Europe should be studied individually. In addition, many building materials are available in the market. How to guide farmers to choose the most suitable ones is another consideration that the building code is needed. Finally, standards must be developed to optimise buildings through renovation.

EU level

- Create a publicly accessible database to categorise the options for building designs, building construction materials, ventilation system, energy supply system, and insulation materials. A clear database with building codes would aid farms in selecting the most suitable solutions for their location and budget.
- Develop clear standards for livestock buildings on certain aspects of design, e.g. on ventilation, sanitary conditions, fire protection – particularly for newly built buildings or renovations.
- Establish a short- and long-term funded, multi-year renovation programme for upgrading the energy performance of livestock buildings (such as the renovation of public buildings in the EPBD), according to farms' needs.
- Create and implement an energy audit system to be used by Member States to reward the farmers investments in energy efficient livestock buildings either through direct funding or indirectly through tax exemptions.

National level

- Reward farms whose buildings have high energy performance to incentivise sustainable renovations.
- Training programmes for livestock building construction companies in the latest and best practices.
 - Promote training activities for farmers and advisors at national and regional levels, demonstrating the benefits of following the building code per improving energy efficiency, mitigation of heat stress in animals, and improvement of productivity.





- Alongside any EU-level support (see **PB01 Policy Recommendations for the Common Agricultural Policy**), there should be national-level

public funding for upgrading/renovating livestock farms, such as grants or low-interest loans.

- Demonstrations of pioneer technologies that advance building insulation technologies to more mainstream accessible technologies for farmers.

There is a need for pilot projects to test and

demonstrate the economically sound and safe use of building envelope insulation to the agricultural sector and society. This would additionally create awareness among farms and farming organisations on the benefits of improving energy performance.

- Support research in sustainable construction materials, building structure, building design optimisation, and demonstration.

Some regional governments in Italy have extensively funded the installation of heat pumps in livestock sheds, while others have not. A national-level programme would reduce regional disparities.

Expected impact:

- Overall primary energy consumption could be reduced by at least 40% across the EU by replacing old envelope designs with modern ones.⁴
- Improving the energy performance for climate control through the decrease of the overall consumption of thermal and electrical energy.
- Increased farm profitability as energy costs are significantly reduced while maintaining the same income per production and favouring the sustaining of the rural population.
- The probability of heat stress occurring will be greatly reduced and therefore production can increase while also improving animal welfare.
- Contribute to improving the environmental as well as the overall sustainability of the livestock sector.

⁴ Costantino, A.; Fabrizio, E.; Biglia, A.; Cornale, P.; Battaglini, L. (2016) Energy Use for Climate Control of Animal Houses: The State of the Art in Europe. Energy Procedia 2016, 101, 184–191.

