Politecnico di Torino

Honors Thesis

Master's Degree Architecture for Sustainability.

Abstract

Sustainable transition of livestock farming: design strategies and future scenarios

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Intensive livestock farming is among the most impactful sectors within the global agri-food system, contributing significantly to land, water and energy consumption, as well as to greenhouse gas emissions and ecosystem degradation. Beyond environmental concerns, these systems also raise important ethical issues related to animal welfare, often sidelined in favor of economic priorities. This work critically examines the environmental, social and ethical effects of contemporary livestock systems, with particular attention to intensive models, in order to identify strategies and solutions capable of mitigating their impacts. The first part of the research investigates the main mechanisms that exert pressure on ecosystems and contribute to the climate crisis, highlighting the connections between animal production, resource use and emissions. Building on this analysis, the study proposes targeted design and management interventions, including the optimization of production processes, the adoption of renewable energy sources, advanced livestock waste management practices, and the systematic integration of animal welfare as a foundational component of a more responsible and resilient model. The approach is multidisciplinary and oriented toward the gradual transformation of existing systems through focused yet cumulatively significant measures. In its final section, the work explores future scenarios beyond traditional livestock farming, envisioning a functional reconversion of existing facilities toward alternative activities such as sustainable food production, regenerative agriculture or social and community services. This vision aligns with the principles of the circular economy and a long-term perspective requiring coordinated efforts between public policies, technological innovation and ethical responsibility. This thesis aims to demonstrate how architectural and environmental design can play a strategic role in guiding the transition toward more equitable, efficient and environmentally respectful production systems, contributing to the construction of a sustainable future for present and future generations.