



Assessment of Integrated Renewable Energy Systems in an Experimental Egg-Laying Hens Farm

Integrating renewable energy systems (RES) could play a crucial role in enhancing the sustainability of livestock farming practices. A study conducted on a small experimental egg-laying hen farm in Greece assessed the animal welfare and productivity performance of such a system in comparison to the one before implementing RES, highlighting the potential benefits for poultry farmers from available funding to support its adoption.

The system implemented includes:

- A 9 kWp photovoltaic (PV) system to supply part of the farm's energy needs
- A 10 kW water-to-air heat pump for heating, cooling, and dehumidifying the indoor air
- An LED lighting system tailored to the hens' specific requirements
- A smart control system, incorporating both environmental sensors and energy meters

Prior to the RES4LIVE project, the farm's relatively simple and outdated system consumed low amounts of energy. While the new system is more energy-intensive, it significantly improves the thermal comfort of the hens by regulating indoor air quality, temperature, and humidity compared to the previous setup. This leads to enhanced animal welfare, increased productivity, and lower mortality rates.

SYSTEM	PERFORMANCE PARAMETERS	
Heat pump	SCOPCooling	SCOPHeating
	3.12	3.77
Photovoltaics	Conversion efficiency	
	10.4%	
	Self-Sufficiency (%)	Self-Consumption (%)
	22.81	84.12
Animal welfare and productivity	Decrease in mortality rate	
	28%	
	Increase in total egg production	Increase in average production per animal
	10%	19%

Although there is still much work to be done, adopting similar systems on poultry farms across Greece could improve animal welfare and productivity, with good potential of also improving their environmental and economic sustainability.



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