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THE BENEFITS OF SHEEP GRAZING ON PHOTOVOLTAIC FARMS

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In recent years, sheep have found their significant place not only in breeding farms but also in agritourism and ecological farms due to their versatile use, the raw materials obtained from them, and the role they play in landscape care. They are increasingly used in the maintenance of areas of high natural value, such as national and landscape parks, nature reserves, and xerothermic grasslands. They also play a role in the upkeep of flood embankments and earth dams [1]. Small ruminants are also involved in the care of young forests, forest plantations [2], vineyards [4] agricultural wastelands, and areas surrounding photovoltaic panels [3, 7, 8]. A new form of activity that combines solar farming with agriculture is agrivoltaics. In recent years, especially in countries like Germany, France, the USA, Australia, and Poland, sheep have been introduced to solar farms, where they graze beneath PV installations (solar grazing) [3, 7, 9]. Sheep grazing with the use of shepherd dogs, which protect the sheep from wolves, bears, or theft, and help farmers control [5, 6] the herd while grazing on solar farms, effectively and ecologically combines the production of renewable energy with agriculture. This is a natural model of energy production, and at the same time, it offers farmers the opportunity to obtain economic benefits by organizing service grazing for which they receive compensation. Thanks to this form of cooperation, the farmer or breeder gains access to land without needing to own or lease it, and in doing so, receives natural green fodder for sheep, whose presence also promotes the natural fertilization of the area [5, 6, 7, 8]. Maintaining green areas on solar farms often requires mowing several times a year to prevent shading of the panels and to allow for safe maintenance work. Sheep grazing helps achieve this, as they control the spread of invasive plants without the use of chemical herbicides, making the area safer for pollinators such as bees and butterflies, while also preventing the potential fire hazard posed by dry grass [3, 7, 8]. Since vegetation does not shade the photovoltaic installations, they can operate at maximum efficiency, which means lower CO₂ emissions and no noise from machinery. Sheep not only act as natural lawn mowers but also help disperse seeds, thus supporting the biodiversity of the farm area. It has been observed that sheep with access to solar panels spend

more time grazing than those without (the panels provide shade for the sheep). The solar panel cover also increases soil moisture and provides better quality, high-protein feed. The presence of sheep improves soil quality, which in the long term helps increase carbon and nutrient storage. It has also been found that sheep grazing between solar panels has a positive effect on some parameters of wool structure and growth. In addition to improving wool quality, sheep help shorten grass in hard-to-reach areas, reducing the need for solar panel maintenance. Additionally, the land on which sheep graze remains suitable for farming, which also contributes to clean energy production [3, 8]. By combining sheep grazing with renewable energy production, it is possible to create a production model that brings many benefits, such as generating clean energy while protecting and improving the biodiversity of the grazing area and promoting sustainable development.

References

1. Niznikowski R., Jóskowiak L., Wójcik R. Extensive sheep grazing in environmental protection and landscape conservation. *Wiad. Zoot.*, 2017. № 2. P. 92–100.
2. Den Herder M., Amaral Paulo J. Schapen als bosbeheerders - Beheer van jonge bosopstanden door schapenbegrazing. *Afinet news letter* 4 - Technische artikels. This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement, 2020. N°. 727872. P. 1-3.
3. Gill B.C., Rogers M.E., Beverly C.R., McCaskill M.R., Wallace D.D. Microclimate Observations and Pasture Trials within Commercial Solar Farms and Their Implications for Sheep Grazing Agrivoltaic Developments, 2024. Available at SSRN: <https://ssrn.com/abstract=4807687> or <http://dx.doi.org/10.2139/ssrn.4807687>
4. Conrad L., Hörl J., Henke M., Luick R., Schoof N. Sheep in the: Suitability of Different Breeds and Potential Breeding Objectives. *Animals*, 2022. Vol. 12(19). P. 2575. <https://doi.org/10.3390/ani12192575>
5. Potet B., Moulin C.H., Meuret M. Guard Dogs to Protect Sheep Grazing in Fenced Pastures Against Wolf: a New and Still Challenging Practice. *Journal of Alpine Research Revue de géographie alpine*, 2021. 109-4. <https://doi.org/10.4000/rga.8855>
6. Szewczuk M. Pasterstwo w górach. Szkolenie i użytkowanie psów. Trzecie Warsztaty Kynologiczne Szczecin, 2020. S. 66-70.
7. Stewart W.C., Scasta J.D., Maierle C., Ates S., Burke J.M., Campbell B.J. Vegetation management utilizing sheep grazing within utility-scale solar: Agro-ecological insights and existing knowledge gaps in the United States. *Small Ruminant Research*, 2025. Vol. 243. 107439. <https://doi.org/10.1016/j.smallrumres.2025.107439>
8. Andrew A.C., Higgins Ch.W., Smallman M.A., Graham M., Ates S. Herbage Yield, Lamb Growth and Foraging Behavior in Agrivoltaic Production System. *Front. Sustain. Food Syst.*, 2021. 5. <https://doi.org/10.3389/fsufs.2021.659175>

9. DeMartis C. Solar Farming in Maine: An Objective Overview. Student Policy Briefs 1. PPM 672 3/8/2018. <https://digitalcommons.usm.maine.edu/fsp-policy-briefs/1>
 10. Kampherbeek E.W., Webb L.E., Reynolds B.J., Sistla S.A., Horney M.R., Bosch R., Dubowsky J.P., McFarlane Z.D. A preliminary investigation of the effect of solar panels and rotation frequency on the grazing behavior of sheep (*Ovis aries*) grazing dormant pasture. Appl. Anim. Behav. Sci., 2023. 258. <https://doi.org/10.1016/j.applanim.2022.105799>
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