



Question to EURCAW-Poultry-SFA

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Key words: Behaviour, Enrichment, Handling, Housing system, Management

Level: Husbandry

Type of production: Broiler, Laying Hen, Other poultry

Background context provided by the solicitor

The presence of photovoltaic panels/solar panels is increasing everywhere in the countryside. There is a huge promotion of alternative systems for energy production, and farmers want to use land they have for it.

Question

We would like to know if there is any study/practical information regarding the use of photovoltaic panels/solar panels as shelters for poultry kept in open spaces, including the possible impact of these kind of structures on the health/welfare of the animals.

Answer

Background information

The term “Agrivoltaics” refers to the combination of electricity production using photovoltaics and agriculture simultaneously on the same area of land. This concept, originally conceived in 1981, has evolved and can currently include livestock production in combination with solar panels. Grazing sheep has been used in agrivoltaics as pilot experiences worldwide (usually called “solar grazing”), mostly for vegetation management purposes, since the presence of sheep results in fewer labour hours on maintenance of the land under the solar panels.

Agrivoltaics experiences using solar panels in free-range poultry are extremely limited. However, the Commission proposed on 21 April 2023 to revise the marketing standards applicable to free-range eggs, including the possibility to install solar panels in free-range laying hen farms:

Draft Commission Delegated Regulation (EU) supplementing Regulation (EU) No 1308/2013 of the European Parliament and of the Council as regards marketing standards for eggs, and repealing Commission Regulation (EC) No 589/2008, Annex II, paragraph 1.b)

Open-air runs to which hens have access must be mainly covered with vegetation and not be used for other purposes except for orchards, woodland and livestock grazing. The competent authorities may authorise the use of open-air runs for other purposes, in particular the installation of solar



panels, that are not conflicting with the animal welfare conditions as laid down in Directive 1999/74/EC and do not limit the mobility of the hens.

Therefore, an increase of laying hen farms using solar panels in the range is foreseeable in the near future.

The draft of the delegated regulation was open for public feedback for one month, and the final document for Commission adoption is planned for the third quarter of 2023. From 54 answers, 13 showed interest in the authorisation to use solar panels, considering it a positive change in the regulation, and only 1 answer was against it. However, the need for more detailed instructions or guidelines for the implementation of solar panels on the range was also stressed in most of the answers. Petitions asked to:

- Keep natural cover of the free-range with trees or bushes in combination with solar panels.
- Establish a maximum space of the range covered by solar panels. This should also help avoiding greenwashing, so the poultry activity should remain predominant over the energy production.
- Establish a minimum height beneath the panels.
- Provide guidelines for the distribution of the panels in the free-range and determining a maximum surface area per each group of solar panels.

Practical information

Laying hen's outdoor area shall have at least 50% of vegetation cover to maximize their use by the hens (EFSA, 2023). Good cover usually is achieved with vegetation (e.g. bushes, trees, deep grass, maize, etc.) because it also provides added benefits to the farm environment and the welfare of the animals. However, artificial shelters (e.g. tents, roofs, elevated camouflage nets, etc) can also be used as cover on the range, in addition to vegetation cover.

There are scarce examples of farms using solar panels as artificial shelters. From a welfare point of view, they can be as valid as any other artificial shelter, as long as they offer shade and protection. They can be useful to reduce predator risk perception (protection from aerial threats and terrestrial predators), and to provide protection towards adverse climatologic conditions (such as sun, wind or rain).

There are no official recommendations or research studies on the combination of agrivoltaics and poultry free-range use. Results from future pilot studies or practical experiences are needed to fully understand the benefits and consequences of the use of solar panels as shelter in laying hen farms and the possible impact on health and welfare of birds. However, some basic considerations should be taken into account:

- **Use of solar panels does not replace the need for natural cover on the range.** Artificial shelters may produce similar effects to the birds as natural shelters, but a vegetative cover has a wider range of benefits for the birds, for the biodiversity of the ecosystem and as an active mitigation measure to counteract climate change (EFSA, 2023). Providing vegetation diversity will promote range use, as it will offer environmental variation to the birds and increase the number of insects and material for hens to forage upon. As hens are domesticated from the "jungle fowl", their behaviour is adapted to use tree and bush like structures for safety from predators (Newberry, 2017) and for perching. It is important to provide material to increase behavioural opportunities such as foraging material, perching material, grass or dust bathing substrates. Forage sources, including hay bales, were

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observed to be most effective in attracting hens to use the range followed by artificial shade (Newberry, 2017). Besides of keeping the outdoor area attractive to the birds, the range should be free of disease risks (dirty water, garbage, soil pollution, vectors of diseases). The farmer should check that the installation of solar panels does not increase the presence of puddles or muddy areas around the panels. Maintaining ground vegetation could help prevent muddy ranges.

- **Height beneath the photovoltaic panels.** A minimum height should be respected for the installation of the solar panels. EFSA report (2023) recommends a minimum height of 55 cm for laying hens in any part of the system, therefore this minimum height can be recommended on the range also so that birds can perform all activities under solar panels. However, this does not allow humans to inspect the area beneath the solar panels. A minimum height allowing for human inspection of the entire free-range would allow farmer to recover dead animals, inspect the panels and check the soil and the condition of the animals that are outside. The recommended height to allow a comfortable inspection is 2 m (EFSA, 2023). The elevation of the structures should prevent hens from climbing on top of the solar panels and perch there (preventing faeces and scratches on the surface of the panels). Height should be sufficient to discourage hens to try to climb on the top of the panel and fall from there. On the other hand, the surface of the panels could be extremely warm at noon or in hot conditions (i.e. summer).
- **Temperature beneath the panels and vegetation.** For laying hens to use the area beneath the panels as shelter, temperature in this area should be appropriate for them. Installing the panels in bare soil or using vegetation can have a huge impact on the temperature beneath and around the installation. On one hand, the study from Barron-Gafford *et al.* (2016) concluded that larger photovoltaic arrays cause a “heat island” effect that warms the area within the installation if no vegetation is used beneath and within the panels in semiarid conditions. Usually, vegetation reduces heat gain and storage in soils by creating surface shading. Energy absorbed by vegetation and surface soils can be released as latent heat through evapotranspiration, but this heat-dissipating latent energy exchange is dramatically reduced in photovoltaic installations. On the other hand, if vegetation or crops are available beneath the panels, then the area under the panels maintain higher soil moisture (Hassanpour Adeh *et al.*, 2018), register cooler daytime temperatures and more moisture in the air (Barron-Gafford *et al.*, 2019), and the surface temperature drops compared to arrays mounted over bare ground (Williams *et al.*, 2023), a cooling effect that is a result of the evapotranspiration from vegetation. Although these changes depend on the vegetation or crop that is being cultivated, and the height and tilt of the installation, they stress out the importance of covering the bare soil. The best vegetation to maintain a good temperature and encourage foraging behaviour in laying hens is still not clearly defined. PV panel placement should create a spatially uniform shadow pattern to foster uniform biomass growth (Hassanpour Adeh *et al.*, 2018) and also encourage range use by the hens. Experiences using grazing sheep in combination with solar panels show that the lambs spend more time in shade under the solar panels (Andrew *et al.*, 2021) and spend more time grazing (Kampherbeek *et al.*, 2023), thus, lowering levels of heat stress in comparison to open pasture grazing.



In conclusion, to our knowledge there is no specific study or practical information regarding the use of photovoltaic panels/solar panel as shelters for the poultry in the open spaces, including the possible impact of these kind of structures on the health/welfare of the animals. But this document is listing all what we know about the topic. An experimental study or commercial survey on health and welfare of birds related to different conditions of use of photovoltaic panels on laying hens outdoor ranges, may help to identify the best situation for birds.

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