Sustainable integration of laying hens with crops in organic farming. A review

Pedro R. Soares[a,b,*], Marta A. R. Lopes[a,c], Maria Antónia Conceição[a,b,d], Daniela V. S. Santos[a,b,d], Maria Alexandra Oliveira[a,b,d,e]

[a] *Polytechnic of Coimbra, ESAC, Bencanta, 3045-601, Coimbra, Portugal*

[b] *Applied Research Institute (i2A), Rua da Misericórdia, Lagar dos Cortiços – S. Martinho do Bispo, 3045-093, Coimbra, Portugal*

[c] *INESC Coimbra, DEEC, University of Coimbra, Polo II, 3030-290 Coimbra, Portugal*

[d] *Research Centre for Natural Resources, Environment and Society (CERNAS), ESAC, Bencanta, 3045-601 Coimbra, Portugal*

[e] *Centre for Interdisciplinary Research in Animal Health (CIISA), Faculty of Veterinary Medicine, University of Lisbon, Avenida da Universidade Técnica, 1300-477 Lisboa, Portugal*

[*] *Correspondence to: pedro.soares@esac.pt*

Abstract

Crop-livestock integration plays a key role in the sustainability of organic agriculture systems, where the reduction of inputs is central to farms performance. The existing literature has focused on the general dynamics of crop-livestock systems without exploring the specificities of each animal species. Egg production significantly contributes to the world food market and it is expected to continue due to its versatility. At the same time, consumption of organic products has increased in recent years, due to enhanced consumers' awareness. Here, it is made a revision about the complex web of relationships between various elements of organic agriculture systems with integrated laying hens. The major findings about the integration of laying hens with crops in organic systems are as follows: 1) contributes to the reduction of inputs (less feed and fertilizers) and a diversified production; 2) supports ecosystem services shaping the landscape towards biodiversity and contributing to a healthier environment; and 3) improves farmers' livelihood, especially in developing countries. Its benefits will be increased by using mobile systems to ensure a better distribution of manure and in synchronization with canopy cover species, as fruit and forest trees. However, more research is needed to find further contributions to this system sustainability.

Keywords:

Organic farming; Laying hens; Crop-hens integration; Crop-livestock systems; Weed control; Soil fertilization; Sustainable agriculture