

of poultry, are sheep (42%) – mainly in United Kingdom – and cattle (34%) – mainly in Germany and Austria, followed by pigs (9%) – mainly in Denmark – and goats (7%) – mainly in Greece. Authors' top 10 keywords were: organic farming (74 times), organic, animal welfare, animal health, cattle, livestock, farming, organic agriculture, organic livestock production and health (10 times each). Even if poultry is the most important species reared organically in Europe only the term 'cattle' appeared as an indicator of the species studied within those keywords. This could indicate that more research has been done in cattle because of the importance of this species in Germany. Moreover, the presence of the terms 'animal welfare' and 'animal health' within those keywords seems to indicate that the research on organic livestock production has been focussing on these two areas, which are the major concern for consumers on organic farming. This bibliometric analysis revealed that: (i) countries focalised their research on their main production, (ii) more research on organic livestock production in other species than cattle is needed, and (iii) more and more high-quality research on this topic is needed.

Acknowledgements

The research was found from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774340 for the OrganicPlus project.

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Role of zinc and copper in the intensive swine production systems

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Animal manure represents a possible route of heavy metals and metalloids (HMMs) diffusion into the environment. HMMs can be released into groundwater, absorbed by crops and enter into food chain and could cause problems for animal and human health. Some HMMs are essential nutrients and they are widely used as additives. Nevertheless, after the digestive process, not absorbed elements are released in manure. The aim of this study was to estimate the input and the output of HMMs in swine production in order to establish strategy to implement the sustainability of livestock.

Samples of feed ($n = 16$), faeces ($n = 80$) and water ($n = 4$) were collected from four typical swine farms located in northern Italy.

The collection of samples (in airtight nylon bags) was carried out considering the representativeness of matrix according to AOAC procedure. Samples were analysed for the principal components (AOAC, 2005; 152/2009). Mineralised samples (Microwave Digestion System) and water samples were evaluated by Inductively Coupled Plasma Mass Spectrometry (Bruker Aurora M90 ICP-MS), in triplicate, for the detection of Na, Mg, K, Ca, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Mo, Cd and Pb.

The principal nutrients' analysis presented proper composition linked with the swine nutritional requirements (NRC 2012). The undesirable elements (As, Cd, Pb, Co, Ni, Mo) did not exceed the thresholds levels (2002/32/EC) in the feed samples. Zinc (Zn) and copper (Cu) resulted widely applied in swine diets for their positive impact to help young animals to cope with pathogens. The evaluated Zn content of feed samples, probably related to its pharmacological use, was 821.74 ± 301.27 mg/kg (as fed) and 1737.88 ± 301.27 mg/kg (as fed) in the weaning and finishing phases, respectively. Pig diets also presented a high Cu concentration in the finishing (133.75 ± 11.55 mg/kg as fed) and in the weaning (160.09 ± 11.55 mg/kg as fed). The content of HMMs in faeces reflected their presence in the diet and swine manure represents a possible source of Zn and Cu pollution. In conclusion, Zn and Cu should be used as nutritional additives in a concentration lower than the maximum admitted level. Thus, alternative strategies are required to guarantee the health status of growing piglets, in line with the recent European Regulations (Reg. 1039/2018; EMA/394961/2017) aimed to reduce the total Cu level in complete feed and to ban the pharmacological use of ZnO.

Acknowledgements

This study was supported by MIPAAF2015.

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Environmental impact assessment of goat milk production

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Goat farms are spreading as an alternative to other milk production pathways. Given the wide interest in goat milk quality and composition and the different characteristics of goats breeding, their presence in intensive farming systems is increasing. Similarly, to food, environmental assessments play an important