

BURLEIGH DODDS SERIES IN AGRICULTURAL SCIENCE

Improving organic animal farming

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Setting the scene: the continued drive to improve organic animal farming

Mette Vaarst, Aarhus University, Denmark; and Stephen Roderick, Duchy College, UK

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1 Introduction

The world has changed dramatically and in so many ways over the past half century, and this has profoundly influenced our farming and food systems. As the human population grows and changes, the way we exploit land, water and natural resources, and the way we produce and transport feed and food across continents, impacts on our behaviour as citizens, and in particular our consumption patterns. In large parts of the world our diets are rapidly changing with regard to, for example, our consumption of meat, wheat and sugar. Impacts such as loss of biodiversity, animal species and breeds, increasing pollution, food- and diet-related diseases, hunger and inequity are inextricably linked to production and consumption (Cook, 2018). Consequently, it is becoming increasingly urgent that we include these broad issues in our discussions of the future of food and farming, including the way in which we perceive, engage with and organize the animals that have such a key role in our food and ecosystems. All the elements of current global development – urbanization, industrialization, population rise, food insecurity, environmental degradation, climate change and other universal issues – call for more equitable and balanced agricultural systems, including new and innovative ways of keeping and integrating animals into our food production systems. These are all big issues, and they will not, of

course, be addressed and resolved fully in a book about organic animal farming, but they do, nonetheless, warrant proper consideration in any analysis of the future development of organic animal farming.

During the twentieth century, organic farming was established throughout the world as one of the leading alternatives to an industrialized farming and food sector based on and dependent on external inputs such as fossil fuels and antibiotics. Organic farming and food systems have continued to develop, driven and carried forward by different factors and motivations across multiple contexts. Certified organic animal produce is booming in many countries, evidenced by an increasing general interest in organic production (Willer and Lernoud, 2018), which is in part likely to be a reaction to 'unhealthy food'. The negative effects on human and environmental health from food which is processed with sugar, salt and additives (Tilman and Clark, 2014), contaminated with pesticides (Carvalho, 2017) or produced in ways which create risk of antimicrobial residues (Van Boeckel et al., 2015) are now well established and create societal concern. Large parts of our food systems provide us with such foods, and as a response to this globalized farming industry and food trade, organic farming in different forms – certified or not – presents an alternative to a broken food system. In some cases it may include opportunities for closer connections between farmers and consumers in shorter supply chains, with more transparency, and with respectful relationships between humans, animals and the environment.

2 Challenges of organic animal farming

As well as the opportunities, organic farming clearly does not come without its challenges. Some of these are highly farm specific, where the animals and farmers are the key actors, whereas others are universal challenges that face all citizens and animals. Organic food has itself become, to a large extent, commercialized and part of transnational food and trading systems involving the movement of feed and food around the world. Fortunately, the organic principles as formulated by IFOAM (2005) express the basic ideas of an otherwise diverse organic movement and are of paramount importance for the future guidance and development of agro-ecological farming practices. In this book, through a selected collection of chapters, a number of expert authors draw on the wealth of recent research and personal experiences to address some of the many challenges, thereby enhancing our understanding and providing a stronger framework for the future of organic farming with animals. A wide range of topics are covered, including chapters that address issues such as providing appropriate animal nutrition, establishing better methods of health promotion and disease management, reducing reliance on antibiotics as well as ways of enhancing animal welfare and more effective integration of animals within farming systems. Many of these are seen within the light of global environmental and food security challenges. We have also incorporated a series of chapters that focus specifically on key species, with a brief to authors to identify the major challenges and opportunities to organic animal farming with respect to the key principles and values that have come to define organic farming globally.

Each author was faced with the dilemma of both focusing on the important factors, decisions and choices influencing their particular specialist area, whilst also providing a more holistic perspective that encompasses the multiple objectives of organic farming and the needs and desires of our wider society. Whereas most of the research and published

experiences of organic animal farming has been of European origin, we are proud of the wider range of issues and perspectives covered in this book. In addition, we have endeavoured to reach out to systems and regions which, although perhaps in their infancy in formal organic development, have a significant future contribution to make towards, and benefit to gain from, more innovative, equitable and responsible methods of animal farming.

Many organic farms operate under economic pressure, being parts of the same food system as industrial farming aimed at producing large quantities of cheap food. Furthermore, organic farming operates under huge cultural, geographical, climatic and structural diversity which shapes the way in which farmers and citizens perceive 'what is organic?' This particular aspect serves to highlight why it is imperative to have clear organic principles that emphasize holistic ways of thinking which, in turn, provides opportunities for and encourages thoughtful integration of animals into whole farming systems, and communities. This point is one of the major reasons for including a chapter on the guiding organic principles, rather than specifically addressing standards and certification. Organic farming has core guiding values and should not be viewed just as a legal entity that gives consumer confidence and opportunity for adding economic value. Organic standards and certification have a common reference point in the principles, but it is these principles that guide the overall ethos and future development. There is no doubt that in interpreting legal requirements for organic farming, the guiding principles can be severely tested and hence the need to place principles above label, although it is fully accepted that labels, under some market conditions, are a necessary tool. Organic standards are constantly adjusted in accordance with development of new knowledge and changes in external conditions, for example climatic changes, socio-economic demands and political imperatives.

The aim of this book is to explore how organic animal production can be further progressed to contribute to protecting our natural resources for the future whilst maintaining the highest ethical standards, as well as providing global food security and sovereignty – goals that are embedded in the organic principles. By exploring the importance of these principles of ecology, health, fairness and care within Chapter 2, Susanne Padel provides us with the initial platform and discusses how the principles contribute to the development of agro-ecological systems that include animals, as well as highlighting the challenges and conflicts that emerge when we endeavour to embed these principles within our farming systems.

Moving beyond the principles to the practice of applying organic farming in a range of environments, there is a clear requirement for adaptability. Organic agriculture is very much about robustness and resilience, and the choice of animal species and breeds is challenging and important. Choosing the right species of animals adapted to the environment in which they are kept is a key requirement in organic farming to ensure they are sufficiently robust to cope, for example, with an outdoor life and not to be dependent on the inputs that are commonly found in intensive or industrial farming. More specifically, choosing the right breed of animal for the conditions in which it will live, produce and behave naturally is a crucial determining factor. A good example to illustrate how the principles and the standards are out of step is the issue of 'designed' breeds for organic poultry farming, whereby a single breed has been developed to produce a single product that is either eggs or meat, but not both. In this example, breeding may be viewed as having taken us in a direction where animals are no longer viewed as partners within the organic farm, but components designed to meet a single outcome, and the production imperative is not one based on optimizing the efficiency of the farm's natural resources

but on an economic system driven by external inputs. There are other interesting debates around breeds and breeding, including whether or not artificial breeding techniques should be permitted, whether sexed semen provides a positive or negative contribution to animal welfare and whether, and to what extent, gene technologies should be used as breeding tools.

3 Animals in organic farming

Many of the chapters highlight the key importance of issues such as adaptation, resilience and disease resistance, which are concepts that can also be applied to our understanding of health. The task of Chapter 4, written by Mette Vaarst, was to question our concept of health; the way we define it and hence the way we deal with it. The way animals are viewed is a key issue that perhaps marks out organic farming as being fundamentally different to other methods of animal farming. 'Health' is one of the cornerstones of the organic principles, and is so much more than 'absence of disease'. Putting this different perception into practice provides organic farmers and veterinarians, researchers and students with inevitable practical and conceptual challenges, but also offers inspiration and opportunity. Applying these concepts to, for example, the One Health approach (Zinsstag et al., 2005) enables us to apply a more holistic approach which goes beyond the more common focus on 'one disease'. In this book, we have chosen to focus on the concept of health which can be applied across species, and then to address species-specific health issues and disease challenges in separate chapters on beef and dairy cattle, pigs, poultry, sheep, goats, fish and bees.

Organic animals are outdoor animals, and their health should be supported as much as possible by providing natural environments and conditions, and good management and care. Keeping stable groups and herds, minimizing transport and managing, for example, common grazing areas through quarantine arrangements are ways of enhancing biosecurity, and supporting animals' balance and ability to cope with infections. To some extent, this goes hand in hand with the emphasis of keeping local breeds suited to local conditions.

Many of these approaches to dealing with animal disease control are also of relevance to non-organic farms, albeit with potentially differing risks and challenges. New disease patterns have occurred during the past decades, as a result of increased regional and global transport of live animals and animal products. Current challenges such as antibiotic resistance and increasing levels of zoonotic diseases may call for new biosecurity strategies. In Chapter 6, Kathryn Ellis provides a balanced analysis of the animal disease and public health risks that may be a consequence of applying organic farming principles and practices, as well as providing practical case studies highlighting real-life solutions.

Generally, across the world, the initial focus of organic farming development has been on plant production and soil fertility. Animals have to various degrees been referred to as necessary and relevant system components and, in short, 'manure producers and roughage eaters'. More recently, in some countries but not all, the focus has shifted to the animals themselves, where it has been increasingly recognized that they are living sentient beings, and they have the right to be viewed as such. Even after being domesticated to an extent that they appear to have lost many of their 'wild' traits, it is also recognized that they still maintain their integrity and their species-specific natural needs and that they add to the

fascinating diversity and treasured richness of the world. In Chapter 5, Lindsay Whistance eloquently explores perspectives on 'the natural needs and the naturalness' of our farm animals, as part of an ethical alliance between humans and animals, given that we have chosen to have domesticated animals in our lives. The challenge of giving animals as much of the freedom to meet their 'natural physiological needs' as is possible (e.g. ruminants need feed that enables them to ruminate!) is one of the most significant challenges that organic agriculture constantly faces, and the balance needs to be struck with providing human care, attention and intervention. In organic farming, we consider feeding animals in terms of meeting nutritional requirements at various stages of development, optimizing rather than maximizing production and ensuring that behavioural and physiological needs are met. The element of 'naturalness' in animals that we strive for is not only about naturally produced feed constituents and natural metabolic processes, but also about feeding behaviours. Whether animals are finding their feed through foraging and rooting, whether they are omnivores naturally eating small animals, worms and insects in addition to plants or whether they are primarily browsers of trees are all behavioural considerations that should be taken into account when we are developing and evaluating how we keep food-producing animals. For ruminants, holistic approaches to feeding means providing diets based on natural, forage-based feeds grown on the farm that animals can graze naturally, preferably within a closed nutrient cycle to ensure self-sufficiency and sustainability. In a number of the ensuing chapters, various authors tackle key questions concerning the environmental, economic and animal welfare challenges of this approach, and whether this can be applied across species, systems and agro-ecological zones.

4 Organic animal farming and climate change

As much as it is important for our target audience of researchers, students and other actors in the organic sector to address the issues about animal keeping and animal lives, we also have to face the fact that animal farming occurs in a world dominated by environmental degradation, and increasingly the animals themselves are viewed as key contributors to this. The overwhelming issue of climate change brought about by greenhouse gas (GHG) emissions emphasizes the imperative of developing farming systems, including those involving animals, that are able to meet the challenges of climate change and contribute positively to the future of the planet. This involves us developing a better understanding of the complex relationship between the animals, the way they live and are managed and the likely contribution to, and mitigation of, the factors influencing climate change. In Chapter 3, the scene is set and the evidence evaluated by Laurence Smith and Adrian Williams, who also explore the options for organic animal production. Whereas some experts point to control over emissions through technological solutions, such as keeping animals indoors and breeding for faster growth and higher output efficiency, organic agriculture takes a systems approach that presents us with completely different models as solutions. In Chapter 11, Florian Leiber and colleagues Adrian Müller, Veronika Maurer, Christian Schader and Anna Bieber deal with the issues of sustainability from a dairy farming perspective. They propose innovative solutions and strategies for the resilience of organic milk producing systems typically found in the temperate regions of Europe and the United States, where sustainability is threatened by an overreliance on non-renewable resources, and especially fossil fuels. These strategies are aimed at

enabling organic farmers to satisfy the aspiration to feed a natural diet to dairy animals, whilst also dealing with the potential conflicts that inevitably occur when complex farming systems have multiple objectives. Other examples of potential solutions for organic animal farming are explored in Chapter 7, where authors Alfredo J. Escribano, Julie Ryschauwy and Lindsay Whistance discuss how integrated farming in the form of trees and animals could provide significant solutions for more sustainable animal farming as well as other ecosystem services and animal welfare benefits. The focus of the chapter, illustrated with interesting case studies, is on pasture-based systems and the multiple benefits that can be gained through the integration with trees.

The natural pastures and rangelands of the earth make a critical contribution to the carbon dynamics of the planet's ecosystems and the utilization of these vast areas of the planet has the potential for sustainable and animal-friendly farming with significant environmental and societal benefits. The global importance of the rangelands and the pastoral farming that occurs in these areas also play an important role in conserving animal and plant genetic diversity. The apparent naturalness of herds and flocks kept in these regions often results in them being referred to as close to organic, even though there is little integration with crop production and there are also examples of certified commercial rangeland 'ranches' that are just focused on producing a single product from a single species. A workshop held by the organic International Animal Husbandry Alliance in Delhi, India, in November 2017 had a specific focus on pastoralist systems, and these were discussed in relation to the organic principles, regulations and methods of farming. Stephen Roderick provides a chapter exploring these issues and discusses the complementarity between typical traditional pastoral approaches to animal keeping with the principles and practices promoted in organic farming, and discusses whether they provide us with a future model for the sustainable exploitation of rangelands.

5 Organic smallholder farming in the tropics

Organic farming is diverse and widespread, and increasingly so. It is diverse with regard to the nature of the farming systems, the economies in which they operate, the cultural and political histories that dictate their evolution and current status and, overwhelmingly, the climatic influences that dictate the types of animals and the conditions in which they are kept. Over recent years, much of the research on organic animal farming has tended to focus on European systems that are frequently modelled on the non-organic farming practices from which many of them have evolved, for example dairy farming, or from the market demands of the consumers that purchase the products, as is the case with free-range egg production. In this book, we have also chosen to highlight an example of an organic animal system prevalent in many parts of the world that was perhaps originally modelled on the European but has been adapted to meet the very specific local and regional needs and conditions found in other regions. Raphael Wahome and Caroline Chepkoech describe a system, smallholder dairy farming, that is ubiquitous across much of the tropics and they examine the specific constraints and opportunities for the development of organic smallholder dairying in East Africa. Although certified organic farming has undergone a continuous growth over recent decades in many tropical countries, including in sub-Saharan Africa, the animals on these farms tend to be poorly integrated and are often not viewed as part of valuable elements of the whole organic

system. Organic farming in these tropical areas has also tended to focus primarily on the production of plant products for export and certified organic animal products has not gained ground. There is a need to emphasize the systems thinking of organic agriculture, and – certified or not – to make sure that animals are integrated elements of a well-balanced organic farming environment.

6 Specific issues addressed for each animal species

Having initially explored the topical, cross-cutting issues that we associate with achieving improved organic animal farming, a series of species-specific chapters have also been included in the book which helps us understand some of the detailed challenges and opportunities that exist for certain species and some systems. Five of these chapters concern the 'classical' farm animals: beef cattle, dairy cattle, sheep and goats, poultry and pigs. The expert authors of these chapters were tasked with characterizing and presenting the important features of typical organic systems, in terms of the contribution they make to sustainable farming and the particular challenges they face, but also to illustrate the diversity that we see between farms, regions and countries. Whilst prescriptions for organic animal farming exist in the form of the formal regulations, there are inevitable obstacles and conflicts in the application and achievement of these standards and meeting the demands of the ever-increasing public scrutiny of the use of animals in agriculture. For example, whilst red meat is increasingly highlighted as having significant negative climatic impact, beef cattle also fit into many landscapes and farming systems and, in particular, in marginal lands that provide natural environments that meet animal needs and satisfy a range of ecosystem services. When is beef farming an asset and when is it a burden? Some of the issues are explored by Isabel Blanco Penedo and José Perea-Muñoz in their chapter on the constraints and opportunities for organic beef farming. In many European countries, organic milk production has also provided one of the big drivers for organic development and milk-based products frequently play a significant role in the organic market. Milk from many of these organic herds is often provided by production methods and systems that are highly specialized and 'conventionalized'. Consequently, this presents us with a range of dilemmas and questions, some of which are highlighted by authors Silvia Ivemeyer, Anna Bieber and Anet Spengler Neff in a detailed chapter on organic dairy farming. The forced early weaning of calves, a very limited selection of breeds and a reliance on purchased feeds, are all examples of issues that provide significant challenges to the aspirations embedded in organic principles.

In many regions of the world, dairy production involves goats and sheep and, whilst these systems offer a different set of opportunities than organic cattle herds, in that they often fit more closely with local conditions and environments, they have received less research and some of the obstacles to achieving high standards of organic production are less well understood. Sheep and goats are found in a diverse range of environments and conditions, from Scandinavia to the Mediterranean and beyond to the African Savannahs and the Australian bush. Both species are farmed both intensively and for subsistence purposes, and hence the challenges are diverse and varied. Georgios Arsenos and co-authors Angeliki Argyriadou, Sotiria Vouraki and Athanasios Gelasakis give a description and analyses of the key characteristics and potential barriers to the development of organic sheep and goat farming in Chapter 13.

Diversity also characterizes organic poultry farming across the world, in terms of flock size and intensity as well as the type of systems that are found in practice. Here, in Chapter 15, which examines organic poultry farming, Mette Vaarst, Klaus Horsted and Veronika Maurer focus primarily on chickens, the dominant organically farmed species. Chickens have the smallest environmental footprint of the common farm animal species in terms of energy and water use per kg of product (meat or eggs). The public image is of small-scale, farmyard-type flocks that roam freely and scavenge for much of their food. Whilst these systems exist in many countries, the organic egg and poultry meat sectors are increasingly dominated by larger specialist flocks, which appear as being very similar to many non-organic free-range farms. Poultry potentially compete with humans for feed, they can be easily industrialized and in so many ways they could be viewed as contravening the organic principles if not the regulations. Earlier, we also highlighted a particular issue in that meat and egg production have evolved as two very different systems, with distinct breeds that have been selected either for their egg laying or meat producing capabilities, and rarely both. Hence, there are numerous opportunities for sustainable development of organic poultry keeping in that they can be well integrated into many types of urban and rural farms, and they can have very positive impacts on rural poverty, particularly on the livelihood of women. Local production provides opportunity for production with minimum transport, and there is increasing interest in dual-purpose breeds, which potentially brings the distinct 'designed broiler and egg layer breeds' back to 'one animal' again. In many respects organic pig farming is similar to organic poultry with regard to the opportunity for integration within the farming system and yet there is also the threat of specialization and intensification, albeit limited by the need for outdoor access. Traditionally, pigs are animals which fit into all types of farming environments, using household and plant waste and foraging on marginal and woodlands. In organic production they are mostly reared outdoor and there are a number of issues to be considered, including the issue of nose-ringing, the age of weaning, whether to feed with roughage or imported soya bean as well as the matter of confined fattening. In Chapter 14, Barbara Früh and Mirjam Holinger explore some of the feeding, housing, breeding and husbandry issues in relation to the opportunities for improved organic pig production, as well as tackling the ethical issues associated with practices such as castration.

7 Organic aquaculture

In this book we refer to farm animals as animals rather than the more common 'stock' or 'livestock', which helps move us away from the notion of treating animals merely as commodities and has also liberated our choice of what animals we include as being part of an organic farm. As well as chapters on the 'classical' farm species, we are therefore very pleased to include knowledge and discussions on some of those animal species that are rarely covered in the standard farm animal literature, organic or otherwise. Fish and bees offer organic farmers an opportunity to add biodiversity and new levels and dimensions of integration within our farming systems, which in turn can enhance our farm environments and the farm economy whilst also adding to the diversity of our own organic diets. In many tropical regions, a fish pond is a quite normal part of a farm or, for example, fish, along with ducks and vegetables, can be closely integrated in wet rice production. Despite organic agriculture being thought of as a mainly land-based activity,

with soil being a critical component, the introduction of water-borne animals provides both a valid and important opportunity. Equally, their inclusion also raises a number of discussions and dilemmas that need airing and solving. How do we provide for the welfare needs of fish? What are the ecological consequences of aquaculture innovations within urban farming environments? Although we increasingly see alternative production systems of salt and freshwater shellfish receiving organic certification, the regulations are still unclear and there are still issues around medication, transport and slaughtering and the development of closed recycling systems. In Chapter 16, Timo Stadlander introduces us to the concept of organic aquaculture and unravels some of the issues, economic, ecological and ethical, that have arisen during the development of this sector, which in turn help us to understand the challenges faced by organic fish farmers, policy makers and consumers.

8 Organic bee keeping

Organic beekeeping and natural bee farming are ancient forms of food production, and bees have always been considered central in biodynamic farming. In Chapter 17, Nicola Bradbear provides a comprehensive and engaging introduction to organic and natural beekeeping, illustrating many of the issues and techniques with examples from across the world. Honeybees form only a subgroup among the many species of pollinators, but historically and (agri-)culturally they play a major role in the development of farming, by providing humans with honey and other products and of course by pollinating our crops: more than two-thirds of our human food is dependent on pollinators. While many organic and biodynamic farms keep honeybees naturally as a part of the farm, there are examples of new forms of collaboration arising with 'bee farmers' forming contracts with organic farmers and moving their bees to follow crops in the same arrangement as they would do with non-organic farming, which provides significant scope for ethical and legislative debate. There are also interesting and emerging organic farming opportunities for diversification into bee production within urban smallholder situations.

9 Future trends and conclusion

Currently, organic animal farming occurs in many places throughout the globe, and has the potential to develop in so many different directions, and to provide inspiration for others. Into the future, the editors and authors involved in this book have a desire to see animals responsibly and fully integrated within organic farming where it is relevant and appropriate to do so. This requires a proper appreciation of all of the ethical, social, environmental, economic and institutional aspects that arise. Yet, looking around the world, we see that many of these aspects are not yet fully understood or implemented, and so there is still a tremendous amount of work to be done. This applies not only to those systems that we are familiar with, and that have been described in this book, but also with regard to other less commonly farmed animal species or species that are not yet effectively integrated within farms, or species that are not traditionally farmed. For example, there is a growing interest in insect production for human consumption, but still much debate to be had regarding

the role of insects within organic farming. Many wild animals and insects currently feature amongst the diet of some communities, but often with little regard to the values that are embedded with the organic principles, that is those of fairness, care, ecology and health, in the same way that many of the common industrialized systems frequently fail to consider these principles for the omnipresent farmed species.

Over recent decades, in the light of global ethical challenges such as climate change and environmental degradation, it has become more urgent that we rethink animal production towards a less damaging form of farming that also provides us with a more balanced diet with a lower proportion of animal products. Organic animal production should not only be seen as a way of producing food without the use of chemical fertilizers and pesticides, or with reduced antibiotic usage, or the way it recognizes animals as sentient living beings. It should also be viewed as a means by which we can develop holistic approaches to farming that enable the transition to more sustainable food systems. As editors and on behalf of the authors, we have endeavoured to provide new and relevant material for the never-ending exploration and development of organic animal farming systems, and especially ensuring their role within our wider natural ecosystems and food systems. Animals in organic and non-organic agriculture should be given the opportunity to live lives that are worth living, and to play a valuable part not only as providers of food for humans, but also as contributors to the solutions to some of the immediate major environmental and social challenges that we are faced with.

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