

# Barriers and levers of enhancing animal welfare in organic and low-input outdoor production: Insights from a supply chain survey

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Animal welfare is an essential part of the sustainability of animal production. While low-input farming, such as organic animal production, is often considered animal-friendly, several ways to enhance animal welfare in low-input animal production exist. However, currently there is little information on how farmers and other supply chain actors view different innovations and tools which may influence animal welfare in low-input outdoor and organic production systems. The aim of this study was to examine farmers' and experts' reactions to new approaches to pig and poultry production, with special attention to their animal welfare-related measures. The reactions were tested formally in by using a quantitative survey instrument in nine European countries (Finland, UK, France, Denmark, the Netherlands, Belgium, Germany, Italy, Romania). In the survey, respondents' views on production practices and novel measures were asked. These included aspects such as applicability and advantages and disadvantages of various measures such as avoiding mutilations, using dual-purpose or local breeds, or in-ovo sexing. The data included altogether 218 responses from nine countries. Differences between countries were tested and groups of respondents were identified. The results suggest that supply side stakeholders foresee the welfare benefits and some disadvantages of welfare improving measures proposed to them. However, they also indicate that several measures were considered inapplicable despite their benefits. Inadequate financial provisions to adopt a measure was considered as one of the most important reasons for inapplicability of a measure. This may imply either high costs of implementing measures of low market incentives or perceived low demand for animal-friendly products. Other barriers for adopting welfare-friendly measures included farm-specific factors such as limitations imposed by housing. The respondents indicated a high relative preference for feeding, breeding, shelter from predators and the use of vaccines and anti-parasitic treatments to the provision of enrichments and nesting material to pigs, and to mutilations. Farmers agreed that environmental enrichments are important welfare-improving levers and preferred their use in low-input pig and poultry production. Animal breeding-related measures in pig production were perceived quite favorably by supply side stakeholders. Despite their welfare benefits, farmers in some countries had quite high preference towards maintaining castration and tail docking in pig and beak trimming in broiler production as part of their production method.

*Keywords:* free-range, pig, poultry, measure, market incentive

## Introduction

Animal welfare is an essential part of the social sustainability of animal production. Animal welfare can be defined as individual's own experience of its physical and psychological condition (Broom 2007). It may be enhanced by decreasing negatively affecting factors and by increasing positively affecting factors, experiences, and possibilities (Niemi et al. 2021). For example, increasing living space, allowing animals outdoors and providing enrichments all enable species-specific behaviour and decrease stress (Studnitz et al. 2007, Scollo et al. 2016). Similarly, using pain relief with painful treatment or giving up mutilations increases animal welfare (Fitzpatrick 2006). Animal welfare and health can also be enhanced by better disease control, living conditions and care (Niemi et al. 2018).

Current animal production methods differ in many ways when considering production practices, housing, management, treatment and resources used, as well as welfare that can be measured by observing the animals. While low-input farming, such as organic or free-range animal production, is often considered animal-friendly, several ways to enhance animal welfare in low-input animal production exist. There are also new regulations and production innovations on way that will affect also low-input production. However, currently there is little information on how

farmers and other supply chain actors view different innovations and tools which may influence animal welfare in low- input outdoor and organic production systems.

The aim of this study was to examine farmers' and experts' reactions to new approaches to pig and poultry production, with special attention to their animal welfare-related measures, their implications and applicability on farms.

## Material and methods

A survey to the farmers and allied industry was developed and distributed to test the implement ability of practices under different contexts among stakeholders. The survey was targeted as widely as possible to organic and outdoor pig, broiler chicken and laying hen farms and industry experts working with these farms. Hence, the target groups included organic and outdoor pig and poultry farmers, pig and poultry industry experts, advisors, relevant researchers, organic association representatives and other relevant experts, input suppliers and industry stakeholders who do business with the farmers mentioned above (i.e. slaughterhouses, egg packers, feed suppliers, veterinarians, industry associations, authorities, researchers etc.). Some non-organic and non-outdoor pig and poultry farmers could also have responded to the survey, if they received the survey link.

The survey instruments were submitted for ethical review to the Ethics Committee for Human Sciences (University of Turku, Finland). The data collection was carried out in compliance with the General Data Protection Regulation of the EU. An informed consent for each respondent to participate in the survey and for PPILOW to use the responses was obtained.

The survey was distributed by the partners of the PPILOW Horizon 2020 project (Poultry and Pig Low- input and Organic production systems' Welfare) in each country in June and July 2021. The data collection was organised by LUKE by using Webropol online survey software. Hence, the survey was distributed to the target group electronically by email, newsletters and other electronic channels. The preferred form of data collection was an on-line survey. However, the survey was available also as a paper copy and this option was used in parallel with the online form in Romania. The cover letter and the link to the survey was distributed to the target group both directly and indirectly by using 1) registries and databases to which the partners had access, 2) national practitioner groups' members of the PPILOW project, 3) industry associations and farmer associations and mailing lists managed by them, and 4) other ways of communicating the survey to the target group. Reminders were sent to increase the response rates.

Altogether 24% of respondents who had entered the survey and 38% of respondents who had entered the first question, had completed responding the survey. The final dataset included altogether 218 responses (Belgium 29, Denmark 3, Finland 31, France 25, Germany 13, Italy 38, The Netherlands 17, Romania 36, UK 26). The data included both pig and poultry farmers and other experts (Table 1) working either mainly or partially with pigs, laying hens, broilers or other animals.

In the survey, respondents' views on production practices and novel measures were asked. These included aspects such as applicability and advantages and disadvantages of various measures such as avoiding mutilations, using dual-purpose or local breeds, or in-ovo sexing. The measures studied were chosen based on literature and earlier studies. The main results are presented for all countries on average.

Table 1. Proportion of survey respondents (N=218) representing different types of business

Type of business	Frequency, %
Livestock farmer	39
Working on a livestock farm	3
Advisor or consultant	12
Veterinarian	16
Supplier of animal genetics to farms	1
Slaughterhouse	1
Egg packaging	1
Food processing	3
Retailer	2
Farmer or industry association	7
Other	16

## Results

Supply side actors (farmers, veterinarians, industry representatives and other experts) had clearer views on factors enhancing or restricting animal welfare improvement when production practices were considered than when more common factors, such as price premium, product certification or availability of inputs, were considered (Figs. 1, 2 and 3). Majority of supply side actors agreed with that low labour input requirement of welfare-improving measures, additional price premium paid for animal-friendly product, high consumer demand for animal-friendly products, appropriate availability of inputs, housing and facilities available at farms, ethical benefits related to welfare-improving measures, ease of implementing welfare-improving measure in practice and benefits to respondent's own wellbeing were opportunities to improve animal welfare in low-input use pig and poultry production.

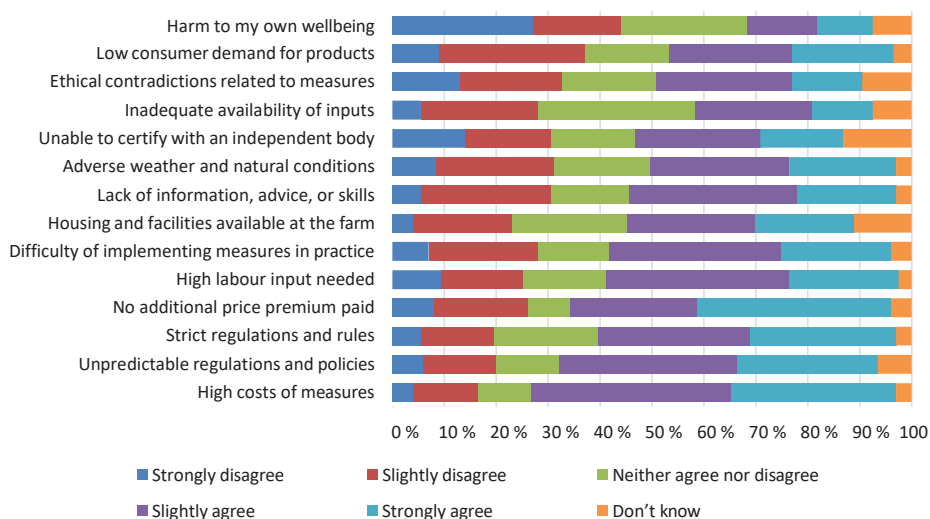


Fig. 1. Proportion of respondents (N=218) indicating that they agree or disagree that following factors are a barrier for improving animal welfare, or adopting welfare-improving measures, in low-input usage pig and poultry production. The items are in the order of disagree:agree ratio.

When similar features were asked in reverse, by considering their role as a barrier to improve animal welfare in organic and low-input pig and poultry production, the respondents considered especially factors relating to regulations and economics of production as potential barriers. (Figs. 1, 2 and 3). High costs or labour input requirement of implementing the measures, unpredictability of regulations and policies, strictness of regulations and rules, and unavailability of additional price premium for high animal welfare production were considered most frequently as a barrier. These were followed by practical challenges faced to implement the welfare-improving measures. Hence, many of the afore-mentioned factors were considered from different perspectives, both as an opportunity and as a barrier to enhance animal welfare.

The results concerning supply side actors' views about whether measures suggested in the survey are applicable or provide animal welfare benefits which favor their application are presented in Figures 2 and 3. Supply side actors considered that most of the studied practices included animal welfare benefits that favor their implementation. The measures were also considered to involve some disadvantages which restrict their implementation. While measures could have both benefits and disadvantages at the same time, there was a tendency that the higher the percentage of respondents who considered a measure to provide animal welfare benefits, the lower the percentage of respondents who considered it to have disadvantages limiting its adoption (Figs. 2 and 3).

Most of the proposed practices were considered applicable in low-input outdoor and organic pig and poultry farms. For example, adjusting nutrition to ensure animal health and welfare was considered both beneficial and applicable in pig, egg and broiler chicken production. However, there were also practices which were considered inapplicable by a higher proportion of respondents than applicable. For example, allowing the birds to live their whole life outdoors (only outdoors with shelters) was considered by less than one third of respondents as applicable. Practices to facilitate the expression of natural behaviors, such as appropriate housing, feeding and providing environmental enrichments, were considered both beneficial and applicable in chicken by the majority of respondents.

	Benefits		Applicable	
	Layers	Broilers	Layers	Broilers
<b>Housing and environment</b>				
Providing perches (layers, broilers), platforms (broilers) to increase bird mobility	██████████	██████████	██████████	██████████
Trees, bushes and other elements on a pasture	██████████	██████████		
Pasture management and rotation to ensure pasture condition and efficient use	██████████	██████████		
Letting the birds to a pasture with trees, bushes, other natural elements, hides			██████████	██████████
Enhancing the opportunities of birds to express natural behaviours	██████████	██████████	██████████	██████████
Dustbathing areas	██████████	██████████		
Nests or nest boxes with a suitable floor substrate to support nesting behaviour	██████████			
Efficient control of temperature, humidity and air quality in the house	██████████	██████████	██████████	██████████
Control of light intensity and duration	██████████	██████████		
Protecting the birds from contacts with wild animals by using fences, shelters	██████████	██████████	██████████	██████████
Enhancing the quality and care of bedding	██████████	██████████	██████████	██████████
Restricting maximum number of birds per flock	██████████	██████████	██████████	██████████
Increasing space allowance per animal	██████████	██████████	██████████	██████████
Use of mobile housing to enhance pasture use, bird health and well-being	██████████	██████████		
Allowing the birds to live their whole life outdoors in movable shelters			██████████	██████████
<b>Management practices and animals</b>				
Adjusting nutrition to ensure animal health and productivity	██████████	██████████	██████████	██████████
Treating animals with vaccines to prevent diseases	██████████	██████████	██████████	██████████
Treating animals with antiparasitic substances to prevent parasitic infections	██████████	██████████	██████████	██████████
Feeding that supports natural behaviours (grains, insects, vegetables for pecking)	██████████	██████████		
Not shortening (trimming) the beak of the birds	██████████	██████████	██████████	██████████
Avoid the killing day old male chicks: a breed that allows rearing them for meat	██████████			
Avoid the killing day old male chicks: in-ovo sexing technique	██████████			
Using methods so that the killing day old male chicks can be avoided			██████████	██████████
Not using veterinary medicines, including antibiotics	██████████	██████████	██████████	██████████
Breeding genetically resistant animals			██████████	██████████
Rearing a slow-growing chicken to enhance their welfare and leg health		██████████	██████████	██████████

Fig. 2. Proportion of respondents indicating that they do agree that the suggested practices provide animal welfare benefit, which favour their adoption in the low-input usage production of chicken and eggs, and proportion of respondents who consider that these practices would be applicable on their own farm or on the other farms. Size of the balk indicates the proportion of respondents; the longer the balk, the bigger the proportion is. Data for missing cells is unavailable.

Increasing space allowance per animal was considered to provide animal welfare benefits in all three production lines, but in poultry only about half of respondents considered it applicable. In poultry production, restricting flock size was considered applicable by less than half of respondents. Some measures were considered to provide both welfare benefits and various disadvantages and were perceived both inapplicable and applicable. For example, not using veterinary medicines divided the views of supply chain actors, and there was no strong overall preference for this measure to be either inapplicable or applicable in any of the three production lines. However, treating animals with antiparasitic substances and vaccines to prevent parasites and diseases was considered beneficial by the majority of both pig and poultry actors. Hence, animals needing care should be treated.

In broiler production, rearing a slow-growing chicken was considered to provide animal welfare benefits by 70% of respondents, and it was also considered to be applicable by approximately half of respondents. Keeping birds with intact beaks was considered to provide animal welfare benefits and be applicable in laying hens by about two thirds of respondents, but only by less than half of broiler chicken expert respondents. Somewhat similar qualitative difference between production lines was observed in relation to the provision of perches. The importance of enhancing the quality of bedding was found both beneficial and applicable by a clear majority of all poultry respondents. In egg production, avoiding the killing one day old male chicks (by application of in-ovo sexing or rearing male chicks for meat (i.e. by using dual-purpose breeds)) was considered to have both disadvantages and benefits. This was considered applicable by less than half of respondents.

In pig production, raising entire males and immunocastration were considered to provide both animal welfare benefits and a range of disadvantages and these practices were considered inapplicable by larger number of respondents than applicable. The respondents had mixed views on loose housing of sows. Even though most respondents considered it to provide animal welfare benefits, also disadvantages were identified. About half of respondents considered the confinement of sows applicable, but many considered it also inapplicable (Fig. 3). Giving pigs access to an outdoor yard was found to involve both disadvantages and benefits by a substantial proportion of respondents, but it was considered very applicable practice.

Rearing intact-tailed pigs was considered both beneficial and applicable by the majority of respondents. Either rearing entire male pigs or immunocastrated pigs as an alternative to castrating male piglets were considered to provide animal welfare benefits by close to 30% of respondents, but only about one fifth of respondents considered these practices applicable. Moreover, immunocastration is not allowed in organic pig production.

	Pigs	Applicable
	Benefits	Applicable
<b>Housing and environment</b>		
Trees, bushes and other elements on a pasture	██████████	
Use of movable shelters to enhance pasture use, pig health and well-being	██████████	
Allowing the pigs to live their whole life outdoors in movable shelters		██████████
Protecting the animals from contacts with wild animals by using fences, shelters	██████████	
Pasture management and rotation to ensure pasture condition and efficient use	██████████	
Letting the pigs to an outdoor yard where they can root and mud bathe	██████████	██████████
Enhancing the opportunities of pigs to express their natural behaviours		██████████
Using special pens to maximize piglet viability and health in loose-housed sows	██████████	
Loose housing of sows instead of confinement in crates (farrowing, lactation)	██████████	
Confining the sows in crates to mitigate piglet crushing		██████████
Increasing space allowance per animal	██████████	██████████
<b>Management practices</b>		
Efficient control of temperature, humidity and air quality in the house	██████████	██████████
Provision of enrichments to explore and play with	██████████	██████████
Providing the sows with materials and pen which allows them to build a nest	██████████	██████████
Adjusting nutrition to ensure animal health and growth	██████████	██████████
Rearing genetically resistant animals	██████████	██████████
Treating animals with vaccines to prevent diseases	██████████	██████████
Treating animals with antiparasitic substances to prevent parasites	██████████	
Keeping pig groups stable or unchanged	██████████	
Not using veterinary medicines (including antibiotics)	██████████	██████████
<b>Mutilations</b>		
Not cutting the tails of piglets	██████████	██████████
Performing painful mutilations, only when using pain relief and anaesthesia	██████████	
Castrating male pigs under pain relief and anaesthesia		██████████
Rearing entire male pigs instead of castrated males	██████████	██████████
Using immunocastration to reduce the risk of unwanted odour in the meat	██████████	██████████
Using nose rings to maintain better pasture condition	██████████	

Fig. 3. Proportion of respondents indicating that they do agree that suggested practices provide animal welfare benefits, which favour their adoption in the low-input usage production of pig meat and proportion of respondents who consider that these practices would be applicable on their own farm or on the other farms. Size of the balk indicates the proportion of respondents; the longer the balk, the bigger the proportion is. Data for missing cells is unavailable.

## Discussion

This study provides qualitative information on possible levers and barriers for enhancing animal welfare in low-input outdoor and organic pig and poultry production. Because of the number of respondents and the size of low-input and organic farming sectors, it is unclear whether the results are representative of the overall views of the sector. Nevertheless, the results suggest that supply side stakeholders perceive that there are both animal welfare benefits and various disadvantages associated with the measures proposed to them in the current study. The results also suggest that several measures were considered inapplicable despite their benefits. Inadequate financial provisions to adopt a measure was considered as one of the most important reasons for inapplicability of a measure. Because meeting an increased animal welfare standards have been found to increase production costs of animal products (e.g. Bornett et al. 2003, Grethe 2017), this may imply either high costs of implementing measures of low market incentives or perceived low demand for animal-friendly products. Hence, financial and market provisions play an important role when farmers decide about the adoption of welfare-enhancing practices, as discussed in more detail by Niemi (2020) and Niemi et al. (2020). The results suggest that other barriers for adopting welfare-friendly measures included farm-specific factors such as limitations imposed by housing. These results can be considered to both support and conflict with the conclusion of van Staaveren et al. (2020) that farmers would rate items as more of an animal welfare issue when the question pertains to the sector as a whole rather than to their farm. Already based on previous studies, farmers' interest to reduce a specific animal welfare issue is known to be influenced by his/her perception of the problem (Palczynski et al. 2016, Peden et al. 2018).

The respondents indicated a high relative preference for feeding, breeding, shelter from predators and the use of vaccines and anti-parasitic treatments to the provision of enrichments and nesting material to pigs, and to mutilations. If the studied measures were ranked by the percentage of respondents who indicated the measures to have benefits or disadvantages and to be applicable, ensuring the living environment and nutrition to enhance animal welfare and natural behaviour were ranked the most relevant measures in broiler production. These

practices included taking care of the quality of bedding and adjusting animal nutrition. In addition, providing access to pasture and good condition of pasture as well as protecting birds from wild animals and adverse weather were ranked high in this type of ordering. Efficient control of housing conditions, including lighting, was found both beneficial and applicable. Similar results were applicable to egg production.

In pig production, providing enrichments to pigs and a nest-building possibility to the sows was ranked higher than access to a well-maintained pasture or outdoor yard with shelters and adjusting nutrition to ensure animal welfare. Rearing genetically resistant animals was considered more beneficial and applicable in pig than in poultry production. The rearing of pigs with intact (undocked) tails and free farrowing were also considered both beneficial and applicable by supply side actors. Hence, also in low-input and organic production supply-side actors assign a high importance to good agricultural practices and a higher importance to such practices than for example to factors such as increased space allowance when compared to the consumers (Clark et al. 2019, Lähtinen et al. 2022).

The respondents agreed that environmental enrichments are important welfare-improving levers and preferred their use in low-input pig and poultry production. Animal breeding-related measures in pig production were perceived quite favorably by supply side actors. Despite their animal welfare benefits, respondents in some countries had quite high interest towards maintaining castration and tail docking in pig and beak trimming in broiler production as part of their production concept. This is partly associated with possible low market demand for such production, welfare regulations applied in different countries and perceptions about practical applicability of the measures.

Allowing the animals to live their whole life outdoors (only outdoors with shelters) was considered among the least applicable measure. One reason for this may be natural conditions which are limiting outdoor rearing and emphasize the need for providing adequate housing and shelter for the animals.

## Conclusions

Enhancing animal welfare on organic and outdoor pig and poultry production requires actions of all stakeholders. Current survey results suggest that supplier side actors recognize the animal welfare benefits of different practices. However, in many cases financial viability of practices and farm-specific factors limit the adoption of new practices. Hence, changes are needed also in market demand for high animal welfare production, including the price premiums available for such production and regulations. As most of animal welfare improving practices require more resources (farm work, living space per animal etc.), the costs have to be covered by higher market price of product. Hence, consumers should be prepared to pay more for products with higher level of animal welfare.

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