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PPILOW
Poultry and PIg Low-input and Organic production systems' Welfare

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# Catalogue of implemented innovations

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# 1 Summary

The following deliverable collects the implemented experiments of the PPILOW project concerning pigs and poultry in low input and organic farming systems, taking into account the overall objective of the project to enhance animal welfare, implementing on-farm the experiments carried out within the project framework. The WP2, with a multi-actor approach and through the National Practitioners Groups (NPGs), has facilitated the process from the experimental WPs to the farmers for implementing the selected practices.

The selection process was initiated by the PPILOW facilitators and actively involved the National Practitioner Groups (NPGs). The selected practices were implemented and tested on-farm based on a data collection framework established by the PPILOW researchers to assess the viability of the innovations.

This catalogue of implemented practices provides a summary description of the practices selected during the PPILOW project that can be used by the practitioners (farmers, advisers, technicians and breeders) in their daily work and can be at the basis of dissemination material.

In this deliverable we propose the catalogue of the innovations tested on-farm and ready to be adopted and implemented by farmers, advisors, technicians, and breeders across the EU providing the contacts of the innovation experts for in-depth information and further exchange.

**Objectives:**

1. facilitate communication with partners and encourage effective sharing of knowledge to bridge the gap between research results and adoptable innovations on-farm
2. share the project's outcomes in a clear and easily comprehensible manner for practitioners to facilitate adoption of innovation
3. provide feedback of on-farm experiment implementation

**Rationale:**

In figure 1 the workflow and methodology that has led to on-farm implementation of innovations developed by PPILOW researchers is represented. During the five years of the project, the NPGs have discussed about the innovations proposed by the researchers, NPGs gave their feedbacks on the PPILOW experiments run in experimental facilities creating the basis for co-construction of the innovations to implement on-farm.

The most promising and adoptable innovations were chosen by farmers and implemented on-farm supported by researchers to share a scientific approach. Each innovation/on-farm trial had its own protocol to monitor and report the implementation process. During this process, farmers have given their feedbacks to the NPGs facilitators, who have reported them to the project partners.

At the end of the project, NPGs facilitators have been asked to report the innovations implementation experience, answering the following questions:

1. Which issues have you addressed by adopting the mentioned innovations?
2. What is the long-term expectation of these innovations expressed by NPGs? Will they stay in place? Will they alter (need further implementation to be upscaled)?
3. **Catalogue of innovations**: Problem addressed; solutions; benefits and practical recommendations.

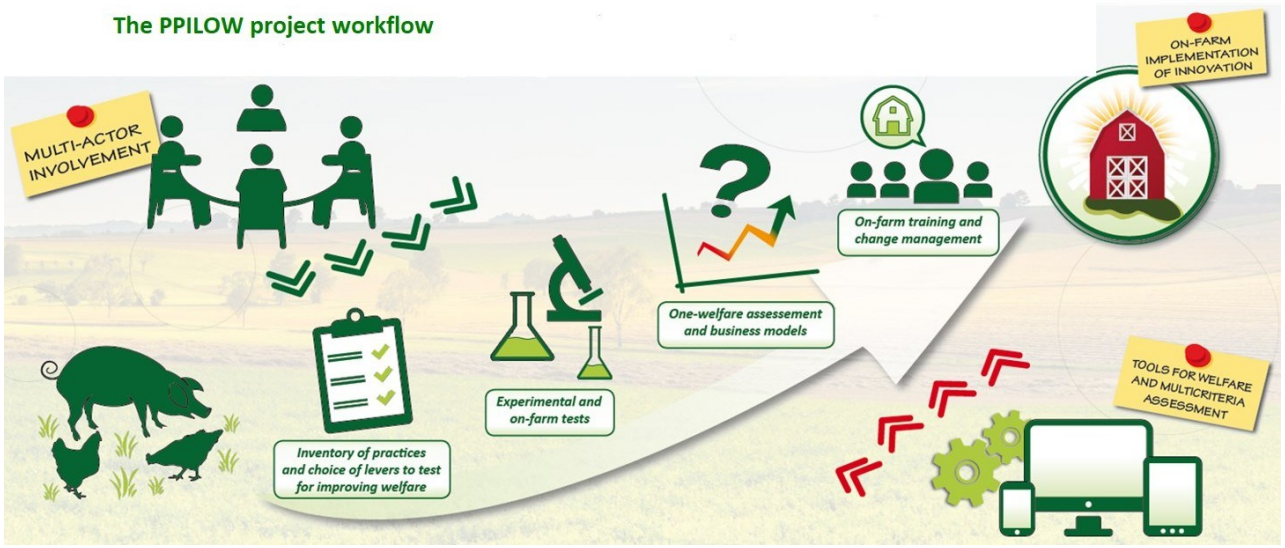


*Figure 1 - The PPILOW work flow*

The list of innovations implemented is shown in table 1, indicating the partners and the countries involved. In the results paragraph, the innovations are described following the questions mentioned above.

*Table 1 NPGs on farm implemented innovations*

| Country | NPG | Overview of the on-farm implemented innovation |
|---|---|---|
| NL | Poultry | Working on **dual propose genotypes** with a group of farmers and a coop with a focus on layers also investigating the effects of **covered veranda and environmental enrichments** to prevent feather pecking |
| DE | | **Broilers from dual purpose genotype** |
| FR | | **Broilers from dual purpose genotype** were reared in France (December 2021 – March 2022). **Laying hens of one PPILOW dual-purpose genotype** have been reared on the same farm since April 2022 |
| DK | | Pullets from **two dual purpose genotypes** reared in France were then tested on-farm in Denmark. One farmer expressed interest in the dual-purpose genotypes during NPG-meetings and received **young hens** from two genotypes for the trial. |
| IT | | **Use of environmental enrichments with dual purpose genotypes** |
| FR | | On-farm **hatching of slow growing chicks tested** |
| DE | | **On-farm hatching**: comparison of hatchers a) Farmers own hatchholders ; b) one2born hatchholder |
| FR | Pigs | **PIGLOW app training and test** in pig farms with IFIP |
| RO | | **Implementing the experiment on medicinal plants** to improve immune system, limit parasitism and pathogenic bacteria on-farm |
| FR | | **Sow huts designed by Vanggaard and AU and tested in DK were installed in 2 farms** |
| BE | | **Sow huts designed by Vanggaard and AU and tested in DK were installed in 1 farm** |
| IT | | **Sow huts designed by Vanggaard and AU and tested in DK were installed in 2 farms** |

**Teams involved:**

All the Consortium partner were involved in the process. Specifically, the facilitating team led by AIAB, NPG facilitators (Bioforum with CRA-W in Belgium, AU in Denmark, ITAB and INRAE in France, TI-BW in Germany, AIAB and UNIPG in Italy, USAMV in Romania, UU in Netherland) the National Practitioner Groups and the research and innovation units (INRAE with ITAB, ITAVI, I F IP & CNRS, UU, WU, AU, EV ILVO, TI-BW, UNIPG, SYSAAF, CRA-W, BIOFORUM, USAMV, VANGGAARD)

# 2 Introduction

The PPILOW project aiming at proposing innovations for improving the welfare of poultry and pigs relies on its multi-actor approach led by the WP2. The catalogue of implemented innovations on farm in PPILOW provides a tangible tool for the exchange of valuable knowledge, fostering practical application within the farming community. It serves as a bridge, facilitating seamless communication between stakeholders, including farmers, technicians, and researchers. Through concise and accessible summaries, the catalogue includes key learnings, methodologies, and outcomes, thereby empowering practitioners with actionable insights. Moreover, by incorporating practical examples tailored to the experiences of real farms, they help other interested farmers, enhancing their understanding and encouraging adoption of new practices. The integration of on-farm experiments within this catalogue further enhances their relevance, offering firsthand validation of techniques and innovations in real-world settings.

The significance of participatory research with farmers, technicians, researchers and private companies is crucial for the WP2 activities and objectives. Collaborating closely with these stakeholders ensures that research efforts are grounded in practical realities and aligned with the needs and constraints faced by those on the ground. By actively involving farmers and private entities in the research process, leading to increased adoption of project outcomes. Furthermore, the inclusion of private companies helps to bridge the gap between research and market, facilitating the development of innovations that are not only effective but also economically viable.

In addition, having a concrete output, such as a catalogue, serves as a lasting resource that can be consulted long after the project's conclusion. This tangible outcome embeds the project's findings, methodologies, and lessons learned, serving as a repository of knowledge for future reference. It provides a roadmap for practitioners, policymakers, and researchers alike, enabling continued learning and improvement in agricultural practices.

Moreover, it is crucial to acknowledge both the positive results and the failures within agricultural projects. While successes demonstrate the potential of innovative approaches, failures offer valuable insights into what does not work and why. It is also important to mention and acknowledge those innovation that were not adopted by farmers or that require more development. Embracing failure as a learning opportunity fosters a culture of experimentation and adaptation, ultimately leading to more robust and effective implementation of sustainable practices.

By openly acknowledging and sharing both successes and failures on this catalogue and other outputs of the PPILOW project, using the appropriate dissemination channels, the agricultural community can collectively advance towards more sustainable and resilient farming practices.

The successful practices proposed in this deliverable can be transformed in standalone practice abstracts that can serve to be disseminated as tools and resources that can support organic and low input farming systems.

# 3 Results

In this paragraph, all innovations implemented are described by the NPG facilitators summarising the implementation process carried out with farmers.

## 3.1 Poultry: on-farm implemented innovations

The adoption poultry National practitioner groups have addressed several issues. These include the elimination of day-old layer male chicks, with one alternative being the use of dual-purpose breeds. Considerations such as how to rear pullets, suitable feeding regimes, peculiarities of rearing males, and the quality of their meat have been examined. To enhance the outdoor exploration of pasture by poultry, enrichment of pasture was tested. In other contexts, in order to prevent the avian influenza issue, a covered veranda to guarantee a safe pasture exploration has been developed.

Additionally, the stressful transport and absence of feed and water between the hatching of chicks in the hatchery and the starting phase in the poultry house has been considered as crucial in several National Practitioner groups, especially in France

On-farm hatching has emerged as a potential alternative, requiring careful setup, particularly in low-input or organic farms, necessitating technical adjustments.

### 3.1.1 On-farm hatching in low-input outdoor and organic farms: Introduction of the experiment/innovation

As an alternative to traditional hatching in the hatchery, fertilized eggs at day-18 of incubation can hatch on-farm, avoiding transport of day-old chicks and several hatchery procedures. In addition, this practice further allows newly hatched chicks access to feed and water immediately post-hatch.

Description of the experiment/innovation

The eggs arrive at 18 days of incubation and are allocated in an incubation setting where ambient temperature around the eggs >33°C and eggshell temperature at 36-37°C (overheating to be avoided). In this experiment the radiant was set at 34.5°C and the temperature probe on eggs 40 cm far from the radiant plumb line. Moreover, Wageningen University advised around 6 cm litter. To monitor the experiment, there were continuous measurements of eggshell temperature, ambient temperature, relative humidity, $CO_2$.

#### Benefits

Better chick quality and performance in outdoor farms, with necessary adjustments required in small-scale organic farms

#### Limitations

On-farm hatching presents opportunities, especially for farmers far from hatcheries with small flocks of slow-growing broilers and during the warm season when heating costs are reduced. However, challenges such as monitoring environmental temperatures and technical difficulties may hinder widespread adoption, particularly in organic farms. Alternatives like on-farm incubation are being considered to mitigate stress associated with chick transport, but issues such as on-farm vaccination and chick density remain significant considerations in low-input and organic farms.

#### 3.1.1.1 On-farm hatching trials in France

On-farm hatching was semi-experimentally tested on a small-scale organic farm in the East of France and a label-type farm in the South West of France on slow-growing broiler chickens

##### Problem addressed

Long transport of small batches of chicks of specific slow-growing strains and delay in feeding and drinking between hatching in the hatcher and on-farm chick delivery

##### Solution

On-farm hatching after the transport of the eggs at 18 days of incubation limits chick manipulation and perturbation, weight loss, and dehydration (especially during hot seasons) with the possibility for the chick to eat and drink whenever ready to do so.

##### Practical recommendations

Fine-tuning of temperature around the eggs (33° to 36°C) to keep the eggshell temperature around 37°C, using either gas radiant or a heating blanket with a moderate electric heater, to be specifically adjusted to the chick house conditions, avoiding overheating. Vaccination has to be done on-farm except if it is possible to order vaccinated eggs from the hatchery at 18 days of incubation. Recommended use of 6 cm of litter.


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##### Applicability

Theme: on-farm hatching, slow-growing chicken, organic, outdoor Geographical coverage: avoid too large a day/night temperature range Application time: Four days ahead the usual arrival of the chicks
Period of impact: more effective in warm-hot seasons (lower energy costs for heating eggs)
Equipment: gas radiant or heating blanket + moderate/ventilating electric heater and on-farm hatching commercial device
Best in: well-isolated chick facilities

#### 3.1.1.2 On-farm hatching trial in Germany

On-farm hatching will be semi-experimentally tested on a BIOLAND-certified farm in the North of Germany. The farm has different areas of operation: dairy cattle, crop production, biogas plant, hatchery for chicken with parental flock on-site, broiler production.

##### Problem addressed

Long transport of small batches of chicks of specific slow-growing strains and delay in feeding and drinking between hatching in the hatcher and on-farm chick start.

##### Solution

On-farm hatching after the transport of the eggs at 18 days of incubation limits chick manipulation and perturbation, weight loss, and dehydration (especially during hot seasons) with the possibility for the chick to eat and drink whenever ready to do so. With the biogas plant on site, heating the barn is not as much of a financial burden on the chick rearing. In addition, having the parent flock and a hatchery (incubators) on the farm means that the production costs for hatching eggs can be conveniently integrated. These aspects make the on-farm hatching process economically viable for this specific farm, even though this innovation is not valorized by the butcher with a premium price.

##### Practical recommendations

The dimensions of the hatchholders used (supplied by one2born) did not fit the farm's normal procedures and technical equipment, resulting in a longer preparation time. This must be taken into account when introducing the innovation. The barn must be well insulated in order to obtain controlled temperature curves and to be able to adjust if necessary. Measuring temperature in Fahrenheit instead of °Celsius is more accurate and helps to optimize ambient and eggshell temperature (with sensors or laser thermometers). If incubation is carried out on the farm, it is recommended that this is well established and functioning before introducing on-farm hatching to avoid hatching problems of the chicks due to incubation problems.

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## Applicability

Theme: higher chick vitality, slow-growing chicken, organic, outdoor, on-farm hatching
Geographical coverage: avoid too large a day/night temperature range
Period of impact: rather in warmer season
Equipment: gas radiant or heating blanket + moderate electric heater and on-farm hatching commercial device; if possible, incubator on farm
Best in: well-isolated chick facilities

### 3.1.2 Rearing dual-purpose breeds in low-input outdoor and organic farms

The adoption of innovations in poultry farming, such as the dual-purpose concept integrating females for both egg and meat production while utilizing males for meat production, addresses critical issues like the ethical concerns surrounding the culling of day-old male layer chickens. However, further research is essential to refine nutrient requirements and diet compositions, enhancing the sustainability of dual-purpose genotypes and improving egg and meat quality.

As an alternative to usual breeds either selected for egg or meat production, rearing dual-purpose breeds avoids the culling of one-day-old male chicks that can be reared for meat production while females are reared for egg production.

The focus of the on-farm trials presents a certain level of diversification and is reported by the involved partners as follows:

(1) Denmark (males and females of dual-purpose genotypes )
(2) France (males and females of dual-purpose genotypes )
(3) The Netherlands (Layers with covered veranda and environmental enrichments)
(4) Germany (males and females of dual-purpose genotypes)
(5) Italy (Broilers and environmental enrichments)

#### 3.1.2.1 Dual-purpose genotypes laying hens and broilers in Denmark

Optimal rearing of pullets near the production site is emphasized to minimize transportation stress, advocating for local hatcheries to support this model. Long-term expectations by NPGs highlight the potential of these innovations to revolutionize organic poultry production, with successful trials demonstrating consumer value and ethical benefits. Yet, challenges remain, including consumer education on product differences and ensuring economic viability and stable supply of dual-purpose genotypes. Comprehensive studies are needed to assess the overall impact on productivity, welfare, and environmental sustainability, essential for broader acceptance and implementation among farmers and consumers alike.

##### 3.1.2.1.1 Dual-purpose genotypes in organic egg production and effect on egg quality

Dual-purpose genotypes were evaluated for their egg quality and compared to an effective layer genotype. The study was carried out in mobile houses with access to outdoor area. Eggs were collected from 21-54 weeks of age. Parameters for egg weight, proportions of shell, yolk and albumen, along with quality parameters were measured. The control layer genotype produced the smallest eggs with the lowest frequency of blood and meat stains, compared to eggs from the two dual-purpose genotypes. However, one of the dual-purpose genotypes laid eggs of comparable shell quality, dry matter content in the albumen and yolk weight, and with the darkest and most reddish-yellow yolk.

Problem addressed

Laying hens of different genotypes have been selected for generations for high yield and egg quality. This has resulted in efficient feed conversion and low body weight; whereby they are not suitable for meat production. Male chickens of egg-laying genotypes are therefore killed as day old.

Solution

Females of dual-purpose genotypes can be used for egg- and meat production and from an egg quality perspective some dual-purpose genotypes are comparable with the more efficient layer genotypes. At the same time the male chickens can be used for meat production, making the overall dual-purpose concept more sustainable.

### Benefits

Use of the dual-purpose concept is more ethical as killing of day-old male layer chickens can be avoided.

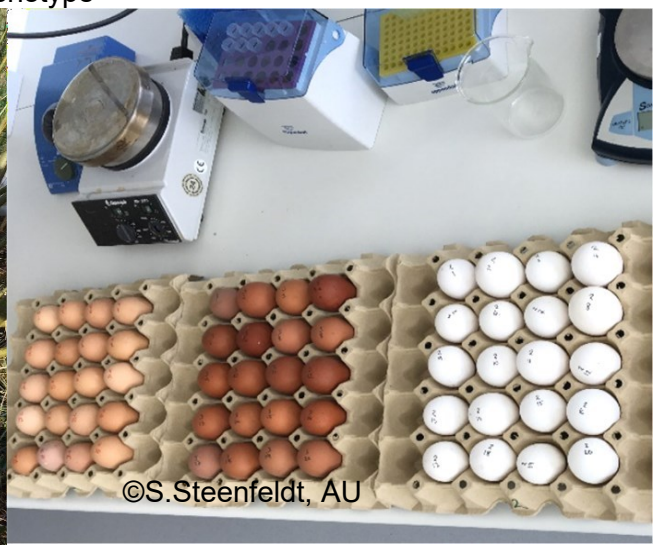
### Practical recommendations

Dual-purpose genotypes produce less efficient than the pure layer genotypes, so it is important to select a female that can produce eggs of a high quality as this is important for the consumers' willingness to pay a higher prize. A high shell quality also reduces the number of cracked eggs and therefore the cassation percentage.

### Photo/pictures


Dual-purpose genotype


Control layer genotype




Eggs for quality measures

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#### 3.1.2.1.2 Dual purpose genotype concept introduced in practice

When using dual-purpose genotypes, it is possible to use the females for both egg- and meat-production and the males for meat production. This concept could be a good alternative to the egg production using very efficient layer genotype, but the male chickens are killed as day-old as they cannot be used for meat production.

A dual-purpose genotype was selected, which was characterized as an egg-layer type hen, but less efficient than the commercial used layer genotypes. Further, the males were expected to have an acceptable growth for meat production.

Using the same genotype, females were used for egg production and the brother chickens used for meat production at two organic farmers. The chickens are received as day-old at both farms. Performance parameters as well as welfare and behavior (e.g. use of outdoor area) are obtained.

##### Problem addressed

To avoid the killing of day-old layer male chickens, which is considered as an ethical problem and that has resulted in a national ban in both Germany and France.

##### Solution

Make farmers interested in using dual-purpose genotypes, where the females can be used for egg- and meat production and the male chickens can be used for meat production. Dual-purpose females often have a lower egg-production than efficient egg layers, but taken into account that the hens can be used for meat-production at the end of lay make the overall dual-purpose concept more sustainable.

##### Benefits and practical recommendations

Use of the dual-purpose concept is more ethical and killing of day-old male layer chickens can be avoided. Both females and males of the same genotypes are used, which could attract some consumers supporting higher animal welfare.

Dual-purpose genotypes are often very active, both females and males, and especially the male chickens can appear very active compared with conventional chickens. An attractive outdoor area is recommended so the bird can express their natural behaviour. Such conditions can prevent feather pecking. Rearing of dual-purpose females are extremely important and access to foraging material, access to perches in-door and access to an attractive outdoor area are important tools to prevent unwanted behaviour. Feeding is also important and breeding companies should be asked for their recommendations. Cooperation among farmers specialized in egg or meat production may be supportive.

## Photo/pictures


Rearing of dual-purpose pullets on-farm in Denmark


Dual-purpose females on out-door area


Dual-purpose males on out-door area – 4-weeks


Dual-purpose males on out-door area – 14-weeks

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### 3.1.2.2 Dual purpose genotypes France

Rearing males, pullets, and females from dual-purpose breeds were semi-experimentally tested on a small-scale organic farm in the East of France (females) and a bigger organic farm in the Southeast part of France (males and pullets)

#### Problem addressed

The killing of one-day-old male chicks from layers strains is no longer permitted in France and Germany. Raising social concern to the killing of one-day-old chicks throughout Europe

#### Solution

3 strategies are possible: in-ovo sexing, rearing of males from layers strains, or rearing dual-purpose breeds accepting a compromise between the performances of the females and the ones from the males.

#### Benefits

Ethical and environmental solution, genetic diversity.

#### Limitations

Regarding the long-term expectations of these innovations expressed by NPGs, uncertainties persist. While dual-purpose breeds could offer an alternative to layer breeds, economic viability remains a challenge due to production costs and marketing complexities. Despite initial optimism, farmers in France who tested this innovation did not continue rearing dual-purpose males and females due to economic reasons.

#### Practical recommendations

Be careful at the arrival of the chicks which might be smaller than what farmers are used to. Some strains can be very active, provide enough feed and water easily accessible, and enrichments in the pen early during rearing.


#### Authors, contact persons

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### Applicability

Theme: dual-purpose strains, organic, outdoor
Geographical coverage: /
Application time: at all seasons Period
of impact: at all seasons
Equipment: adapted to the size of the chicks at arrival Best
in: system with access to an outdoor run

#### 3.1.2.3 Dual-purpose males and females on an organic farm with direct marketing, Germany

The adoption of the mentioned innovations addresses several issues. Dual-purpose poultry serves as an alternative to the banned chick culling, especially as in-ovo sexing methods are accepted only temporarily by most organic associations in Germany. Further research is needed to understand dual-purpose poultry better. On-farm hatching mitigates stressful transport and promotes animal welfare by providing vital chicks directly on the farm.

The laying period of a dual-purpose genotype is semi-experimentally tested on a small-scale organic farm in the West of Germany. The performance was compared to a control group which was Lohmann classic, a commonly used layer strain. Both groups were kept in mobile housing near to the farm's shop. diversified farm (livestock (cattle and chicken), crop production, farm shop)

### Problem addressed

The killing of one-day-old male chicks from layers strains is no longer permitted in France and Germany.

### Solution

Rearing dual-purpose breeds accepting a compromise between the performances of the females and the ones from the males.

### Benefits

Ethical solution, genetic diversity, raise awareness among consumers through direct sales approach

### Limitations

Regarding long-term expectations expressed by NPGs, the opportunity to trial dual-purpose chickens alleviates financial pressure on farms and fosters ongoing dialogue on feeding, health, welfare, and performance parameters, crucial for long-term adoption. Farms express continued interest in dual-purpose poultry due to their robustness and product quality, although marketing complexities and the need for higher prices are acknowledged. The NPG emphasizes the importance of communicating the ethics and value of dual-purpose poultry but notes a lack of a unified strategy, calling for collaboration among various stakeholders.

### Practical recommendations

Dual-purpose genotypes may be more active than common genotypes. Provide enough feed and water easily accessible (more space is required because dual-purpose females are bigger than hybrid layers). Enrichment during the rearing period of the pullets is important, especially in case of restricted outdoor use due to Avian Influenza requirements.


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### Applicability

Theme: dual-purpose poultry, organic, outdoor, no chick culling
Geographical coverage: No geographical constraints
Application time: at all seasons
Period of impact: at all seasons
Equipment: close
Best in: system with access to an outdoor run and direct contact to consumer

#### 3.1.2.4 Dual-purpose genotypes laying hens, Netherlands

The primary issues addressed by the innovations include feather pecking and plumage condition in hens, particularly during periods of confinement due to Avian Influenza restrictions or predator threats, and the risk of footpad lesions from wet soil when chickens are confined in mobile houses. The long-term expectation for these innovations, expressed by the NPGs, is to expand their use across a wider range of farms. These innovations are anticipated to remain in place as they have been well-received by farmers for their cost-effectiveness and ease of self-implementation. Further upscaling is not deemed necessary at this stage.

### Context of the Implementation

- **Farm**: Small-scale farms in the Netherlands.
- **Country**: Netherlands.
- **Agricultural System**: The farms use mobile houses placed in orchards where hens roam freely, maintaining soil quality and foraging. Confinement occurs during Avian Influenza outbreaks or predator threats.

### Problem

Feather pecking during confinement and footpad lesions due to wet soil.

### Solutions

Improved environmental enrichment in the covered veranda, including diverse items like hanging vegetables, tree branches, and straw.

Testing different hybrids, dual purpose (DP) vs. layer hybrids (LH) to determine the best fit for this environment and to find the most suitable breed for mobile house conditions.

### Benefits

- Improved foraging behavior and reduced fearfulness in DP hens.
- Better plumage condition and regrowth of feathers in environments with diverse enrichment.
- Reduced feather pecking in DP hens.

### Limitations

No specific limitations reported

### Practical Recommendations

- Use dual purpose hybrids (DP) for better adaptation in mobile house conditions.
- Provide high-quality environmental enrichment in covered verandas to reduce feather pecking and improve hen welfare.
- Use dry bedding materials like straw to prevent footpad lesions.

Photo/picture

### 3.1.2.5 Dual purpose genotypes and use of enrichments, Italy

The integration of tree species such as olive, fruit, and hazelnut trees in free-range systems addresses several key issues in poultry farming. Primarily, it mitigates the seasonal impacts on grazing activity, with optimal conditions observed during spring and autumn but challenges are noted during extreme weather conditions like hot summers or cold, rainy winters. The enrichment aims to enhance outdoor environments, providing shade and protection from predators, thereby encouraging chickens to utilize outdoor spaces more effectively, including grazing on grass. However, challenges persist, particularly with young or small trees initially having limited effectiveness, highlighting the need for ongoing implementation and growth of green cover over time to maximize benefits. Additionally, the suitability of chicken genotypes in adapting to grazing conditions remains crucial for long-term success and scalability of this innovation in poultry farming practices.

#### Enrichment and use of valuable genotypes of slow-growing selected by the WP 6.1

In December 2021 during the 3rd NPG held in Bologna (15.12.2021), UNIPG members reported the preliminary results of the experiment carried out in WP 6.1. One of the members of the NPG (a big company specialized in broiler production sold in the GDO) asked to implement the use of slow-growing genotypes in one of their farms and to test also the enrichment. The activities have been carried out using a self-funding by the farm. It has used different trees (i.e. olive, fruit, hazelnut trees) on the basis of the farming availability; a free-range system has been tested. The test took place from March 2022 to September 2022.

#### Problem addressed

Many free-range farming systems use chicken genotypes that are not suited to the type of farming. in particular they use chickens that are too heavy and are not able to graze and are not very resistant to the environment. Many free-range systems have an outdoor run without grass cover.

#### Solution

Change the genotype used, with more adapted one.

#### Benefits

Genetic diversity, increase of animal welfare, increase quality of products

#### Limitations and Practical recommendations

Too small trees may affect the results (do not encourage the animal to be outside), stressed by hot waves or very damp periods. Grass cover should be maintained consider pasture rotation andirrigation in hot climates. Use of genotypes adapted to free-range systems.

Photo/pictures


*Outdoor run with small trees.*

*Outdoor run without grass.*

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Applicability

Theme: chicken strains, organic, outdoor
Geographical coverage: southern Italy – mediterranean climate Application time:
at all seasons
Period of impact: at all seasons
Equipment: adapted to the size of the chicks at arrival
Best in: system with access to an outdoor run

### 3.1.3 Not adopted innovations: poultry

Other solutions developed during the PPILOW project had not reached the stage of applicability on-farm or need further studies:

- Testing of a feed from Fermentation Experts company was halted due to its lack of organic certification. Limited availability of organic rape seed included within this feed meant the raw product would have been conventional, discouraging willing farmers from participation in the trial of a non-organic product.

- Early life management, green light and larvae to prevent feather pecking (to be further investigated) were not ready for adoption alongside with some reported restriction in the use of larvae.

- Design of outdoor areas was not specifically adopted while the benefits of enriched environments and a covered veranda were implemented thanks to farmer's interest.

- Anti-parasitic effects of plant extracts in poultry were not ready for adoptions (to be further investigated)

## 3.2 Pigs: on-farm implemented innovations

### 3.2.1 Sow hut experiment, Italy, France, Belgium and Denmark

Outdoor rearing and pasture rotation facilitates high animal welfare and meat quality. However, piglets survival is threatened by crushing and by high summer temperatures. Therefore, innovations to address piglet mortality and to facilitate general management are required.

Description of the experiment/innovation

Different levers have been identified to reduce piglet mortality. One was to develop new hut design aimed at reducing mortality, facilitating care and management, and therefore the general welfare of sows and piglets in outdoor rearing.

Mobile shelters can be very effective in low in-put and organic outdoor systems protecting piglets from temperature extremes and favoring pasture rotation. Often these shelters are realized by the farmer with limited resources.

Adopting the mentioned innovations has addressed several issues including piglet mortality, high summer temperatures, and facilitating easier management of sows and piglets by farmers. The long-term expectation expressed by NPGs is that these innovations last because of an increasing interest in the system by farmers. However, concerns exist regarding swine fever and biosecurity in extensive systems, which could potentially hinder adoption. Economic and supportive policies are deemed crucial given the cost of these facilities that address both animal and workers welfare and safety.

#### Problem addressed

Piglet mortality, high / low temperatures, safe management of the sow and the piglets by farmers and workers, pasture rotation.

#### Solution

Mobile hut (for 2 or 4 farrowing sows) designed to increase welfare of sows, piglets housing conditions and safe management by farmers.

#### Benefits

Reduction in piglet mortality, better housing conditions and temperature.
Good working environment for farmers: safe working conditions, comfort for piglet care and easy cleaning

#### Limitations

- Steep hilly slopes without level area preventing the installation and mobility of the shelters
- Feeding and watering are time consuming particularly providing water in summer
- Adaptations to hot climates is still necessary
- Competition between sows – consider individual huts
- Costs: the production costs of the huts, reflecting in selling price, are higher than those of huts for outdoor pig production currently on the market.
  The technical results did not always meet the expected decrease in mortality during lactation. Given the challenging economic conditions in organic farm, the huts may be considered too expensive by the farmers. As a result, further implementation and upscaling of this innovation may be needed to achieve more conclusive results and cost-effectiveness.

## Practical recommendations

Reinforcement of the structure may be needed for non-commercial breeds .
Improve ventilation in hotter climated
Farmers' management and animal care (e.g. feeding and watering) may need adjustment.

photo/pictures:

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## Applicability

Theme: piglet mortality, better sows housing conditions
Geographical coverage: anywhere. Avoid steep areas Period of impact: all year round
Best in: level surface area

## PIGLOW APP, France

Animal welfare is a significant issue for farmers and a major concern for European consumers. In France, farmers are required to be trained on animal welfare, but there were no existing apps to help them evaluate pig welfare on farms. To address this need the PIGLOW app has been developed in the PPILOW project and is now available in several languages. All NPG facilitators have promoted it, notably IFIP and ITAB who have built a training program before the on-farm tests. The farmers' long-term expectations for these innovations may vary. The use of the PIGLOW app depends on the time farmers have, as their daily routines are already demanding.

Nevertheless, a dedicated training was considered relevant to receive significant feedback

### 3.2.1.1 PIGLOW app training

The PIGLOW application, developed by partners of the European project PPILOW, helps pig farmers assess the well-being of pigs in organic and low-input outdoor systems. It was tested on farms but has not been widely adopted by French pig farmers.Problem addressed

Farmers tend to be reluctant to use the PIGLOW app while interested to assess the levels of animal welfare. Dedicated training can highlight the manifold benefits of using the app and supports dissemination of the application, encouraging farmers, advisers and technicians to use the app, gathering direct and comparative feedback.

#### Solution

Develop a training guide for the PIGLOW application. Train farmers to use it so they can operate it independently at least once and decide the most appropriate detection times. Gather feedback from farmers and practitioners.

#### Benefits

An animal welfare self-diagnosis application for extensive farming, distributed and used in France.

#### Limitations

Animal welfare is a main concern of organic farmers but the difficult economic context of organic pig production in France is causing a shift in priorities where farmers are more focused on reducing costs and finding new markets. This hinders the widespread adoption of the PIGLOW app which may be time consuming. In a better economic context, the spread of the PIGLOW app would likely be easier.

#### Practical recommendations

Develop a simple training and dissemination guide for using the application. Raise awareness among farmers and technicians about its use.

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#### Applicability

Theme: welfare, pigs (grower and finisher pigs, sows farrowing and pregnant, loading management), organic, outdoor, self-diagnosis application Geographical coverage: France for the French version Application time: All season
Period of impact: continuously
Equipment: Training support of Piglow in French
Best in: outdoor systems

### 3.2.2 Medicinal plants to limit parasitism and pathogenic bacteria, Romania

At the beginning of the project, the Romanian NPG focused on testing and implementing several innovations, including the individual use of selected medicinal plants and interpreting their anti-parasitic, antimicrobial resistance, and immune-enhancing potential in different age categories of pigs (piglets, fatteners, sows). The combined use of medicinal plants by grouping 2, 3, or all (currently in progress) was also tested, along with defining the adequate dosage to maximize these effects. These innovations addressed the issue of improving health and welfare by controlling parasitic and microbial infections, including enhancing antimicrobial resistance through boosted immune resistance. The long-term expectation of these innovations, as expressed by the NPGs, involves expanding the number and range of farms adopting the designed plant therapy schemes developed in WP6. The results have been well-received by farmers due to the lower costs compared to allopathic medication and the ease of self-implementation. There is no significant need for further implementation to upscale these innovations, as they are already effective and welcomed by the farming community.

#### 3.2.2.1 Context of the implementation (low input farms, Romania)

##### Problem addressed

Parasites and antibiotic resistant bacteria represent a serious threat to health and welfare of pigs in low-input and organic outdoor production systems, with subsequent consequences for productions and reproduction, thus economically impacting and jeopardizing the farm sustainability.

##### Solution

Medicinal plants were traditionally used to lower the parasitic load and improve the welfare of pigs in Romanian low input farms. A well-balanced, weight and age category tailored treatment with selected, locally available medicinal plants (*Calendula officinalis, Cucurbita pepo, Artemisia absinthium, Satureja hortensis, Allium sativum* and *Coriandrum sativum*) was aimed to improve welfare by controlling the parasitic diseases, harmful bacterial load and enhance the individuals' immunity.

##### Benefits and practical recommendations

Control and eventual containment of parasitic diseases and bacterial load in pigs. The local plant combinations presented as ready-to-use formulas enhance the farmers task to increase productions, while improving the health and welfare of the swine subjects, also providing an environment and consumer friendly solution to disease control.

##### Photo/pictures

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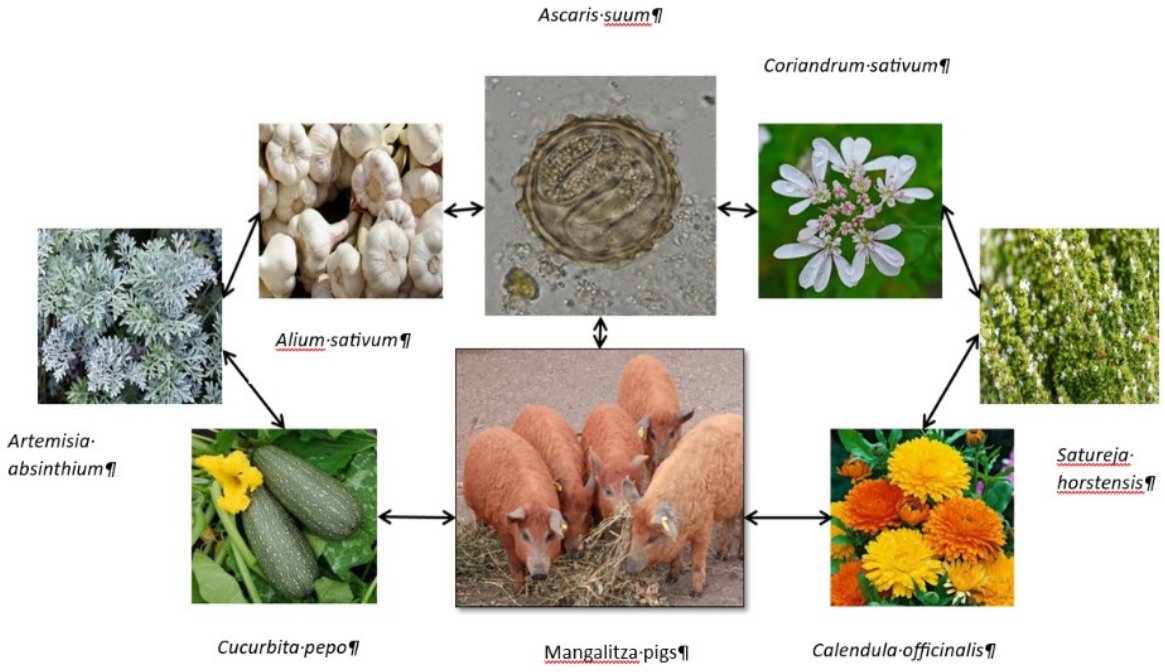


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### 3.2.3 Not adopted innovations: pigs

In France, a new protocol mandates the use of anesthesia and analgesia during the castration of piglets, making the process more complex and time-consuming for farmers. To avoid this new protocol in organic systems, stopping castration altogether is an option, but there were limited references on rearing entire male pigs in organic systems. The PPILOW project provided valuable references in this area from the Task 4.3. Among the innovations investigated for pig farmers expressed interest but were not able to implement the rearing of non-castrated pigs.

# 4 Conclusion

The catalogue outlines various experimental practices and innovations aimed at enhancing animal welfare in low-input and organic farming systems, focusing primarily on poultry and pigs. The National Practitioners Groups (NPGs) facilitated the detailed exploration and implementation of these innovations.

The implementation and adoption of these innovations by farmers highlight several key achievements. For poultry, practices such as the elimination of day-old male chicks through the adoption of dual-purpose breeds, the enrichment of pastures to encourage better outdoor exploration, and on-farm hatching to minimize stress during transport were successfully implemented. These practices not only enhanced animal welfare but were also well-received by farmers in various countries. In some contexts, limitations are reported and the innovations require further investigation to be widespread.

In the case of pigs, the use of medicinal plants to control parasitic diseases and bacterial load proved successful in Romania. This practice improved animal welfare and offered an economically viable alternative to traditional medications.

The document emphasizes the effectiveness of a multi-actor approach, involving researchers, farmers, technicians, and private companies. This collaborative effort ensured that the innovations were practical and aligned with farmers' needs, facilitating smoother implementation and higher adoption rates. Cooperative solutions with various actors of the production chain have been reported in some trials

Not all innovations were adopted or successful. NPGs reputed that some innovative practices required further development to be transferred on-farm or did not consider them feasible under certain farm conditions. These failures are acknowledged in the document as important learning opportunities, fostering a culture of continuous improvement and adaptation in agricultural practices.

The innovations implemented are expected to remain in place and potentially to be upscaled. Positive feedback from farmers and practitioners indicates a willingness to continue using these practices. The document stresses the importance of ongoing support and training to ensure the sustained adoption and further implementation of these innovations. Practical recommendations for each innovation include the need for training guides, awareness-raising among farmers, and the development of simple dissemination materials. These steps are crucial for the broader adoption and long-term sustainability of the practices.

The document also highlights the significant benefits of the innovations to improve animal welfare, enhancing production efficiency, and providing environmentally friendly solutions to disease control. The successful practices are expected to contribute to more sustainable and resilient farming systems across the EU. Overall, the document serves as a comprehensive guide for practitioners, offering detailed descriptions of the innovations, practical recommendations, and contact information for further guidance. It underscores the importance of participatory research and the continuous exchange of knowledge to drive advancements in organic and low-input farming system