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Additional author(s) and contribution	
Name	Organisation
Dr. T. Bartels	Friedrich-Loeffler-Institut (FLI)
Dr. J. Malchow	Friedrich-Loeffler-Institut (FLI)
Prof. Dr. L. Schrader	Friedrich-Loeffler-Institut (FLI)
Dr. K. von Deylen	Bundesverband Bäuerlicher Hähnchenerzeuger e.V. (BVH)
Dr. Anne Collin	French National Research Institute for Agriculture, Food and Environment, in the Avian Biology and Poultry Science Unit (INRAE)
Dr. Leonardo James Vinco	Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna (I.Z.S.L.E.R.)

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List of abbreviations

BIN	National Level Broiler Innovation Network
BP	Best Practice
DOA	Dead On Arrival
GP	Good Practice
GPET	Good Practice Evaluation Tool
PLF	Precision Livestock Farming
TEN	Thematic Expert Network

Executive Summary

This report summarizes the results for the Broiler*N*et WP 3 "Animal welfare". The three priority challenges that were identified by the National Level Broiler*N*et Innovation Network (**BIN**) groups of each participating country were "Improving on-farm welfare assessment and management", "Optimizing young chick management", and "Minimizing stress and injuries during catching". The BINs proposed in total 42 Good Practices (**GP**) as innovative best practice solutions to the identified challenges. Those GPs were evaluated by the Thematic Expert Network (**TEN**) with the use of the Good Practice Evaluation Tool (**GPET**). This evaluation resulted in a Top 10 of GPs for each challenge, out of which the TEN selected a Top 5 of Best Practices (**BP**) based on the technical quality, impact, and probability of success of a GP. For each challenge, one BP was awarded as Broiler*N*et Champion. The Broiler*N*et Champions were "EBENE® application: Perform your own animal welfare self-assessment" (Improving on-farm welfare assessment and management), "Preheating the poultry house" (Optimizing young chick management), and "Package of measures to minimize stress and injuries during catching of broiler chickens" (Minimizing stress and injuries during catching). In addition, a literature review was conducted with regard to the three challenges, which is also briefly described in this report.

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Chapter 1: Introduction of the three challenges

1.1 Improving on-farm welfare assessment and management

Assessing bird welfare on-farm can be a practical tool for broiler producers to examine, and ultimately improve, the well-being of their animals (Keeling, 2020; Michaelis et al., 2024). However, there seems to be a lack of uniform indicators and standardized assessment plans/accessible tools for the farmer (Keeling, 2020). Until now, there is not one single accepted definition of a welfare assessment protocol that is standardly used, but instead there exist various lists of welfare indicators with and without a description of the procedures to collect the required data on them (Keeling, 2020; Michaelis et al., 2024). Many welfare protocols focus on resource-based welfare indicators within a housing system (e.g. number of drinking places), whereas some also include animal-based indicators (e.g. gait score) that tell us more about the welfare of the animals (Caplen, 2020; Keeling, 2020). Common animal-based welfare indicators to assess broiler welfare comprise both qualitative indicators taken directly on the animal (e.g. measures of comfort and activity behaviors, such as time spent preening, resting, scratching, pecking, locomotion, wing flapping) and quantitative indicators (e.g. FCR, mortality rates, body weight, footpad health, water consumption) (Caplen, 2020; Keeling, 2020; Papageorgiou et al., 2023).

A widely accepted welfare assessment scheme in science is the Welfare Quality (WQ) Poultry Assessment Protocol that provides a thorough assessment of the impact of husbandry conditions on poultry welfare (de Jong et al., 2014; Sassi et al., 2016). However, among farmers there is only low to moderate acceptance of the animal welfare self-assessment approach, although recommended, due to working time required and costs associated with the self-assessment (Michaelis et al., 2024). Besides feasibility, another important issue with assessing animal-based indicators in practice is the problem of reliability (Keeling, 2020). Hence, the development and application of information technology for data collection, processing and analysis is rapidly increasing to support farmers in welfare assessment (Dawkins and Rowe, 2020; Rios et al., 2020; Michaelis et al., 2024). Given the large number of birds typically kept on a broiler farm, the use of modern precision technology for automated behavioral and animal welfare assessment is highly valuable (Rios et al., 2020; Michaelis et al., 2024). Recent advances in precision livestock farming (PLF) tools, such as sensors, camera systems, data processing algorithms, and machine learning methods provide the broiler industry with effective tools for monitoring broiler welfare indicators (Azarpajouh et al., 2022). Broiler activity and distribution patterns of the flock are of particular interest to farmers during their daily barn inspection, which can continuously and automatically be monitored with the help of PLF technologies (Fernández et al., 2018). Such automated monitoring systems allow for non-invasive welfare assessment of poultry behavior and environmental conditions by collecting information without disturbing the animals (Wathes et al., 2008; Rios et al., 2020). However, many farmers do not yet have the skills to utilize new technologies effectively, as it can be difficult to process and combine the great volumes of data in real time, and at the same time, analyze and understand the data coming from sensors in different formats and frequencies (van Hertem et al., 2017; Rios et al., 2020; Azarpajouh et al., 2022). Moreover, to date, there is a lack of standardized feasible welfare assessment schemes that afterwards provide an action plan to encourage a pro-active management by the farmer to improve welfare (Keeling, 2020), even though such feedback is much appreciated by farmers (Michaelis et al.,2024).

Hence, this Broiler*N*et challenge focuses on new possibilities for on-farm welfare assessment. Overall, welfare assessment tools should include both animal-based and resource-based indicators, and preferably include an aligned management/action plan based on the outcomes. This could include practical tips to optimize stockmanship or aid the early identification of potential welfare problems (Keeling, 2020).

1.2 Optimizing young chick management

After incubation in an artificial incubator for around 21 days in a commercial hatchery, broiler chicks hatch within a period of 24-48 hours (i.e. hatching window) (Jong et al., 2017). Once broiler chicks have hatched, they are still vulnerable and exposed to both nutritional and environmental stressors (Haas, 2020; Nielsen et al., 2023). First of all, after hatching in the artificial incubator, chicks have usually no access to feed and water until they arrive at the farm (Jong et al., 2017; Haas, 2020). Besides, the artificial incubator does not provide any light, so chicks remain in darkness until they leave the incubator (Haas, 2020). From incubation until arrival on the farm, chicks are often exposed to high noise levels, not only from the hatchery but also from each other (Haas, 2020). The chicks express high-frequency distress calls that naturally enable the mother hen to reply, reinstate with her chicks and provide comfort by brooding them (Edgar et al., 2016). Moreover, newly-hatched chicks have to go through the process of conveying, sexing and vaccinating in the hatchery before they are placed in transport boxes in another area of the hatchery and loaded onto the truck for transport to the farm (Haas, 2020; Nielsen et al., 2023). Current EU legislation (EC 1/2005) specifies that broiler chicks can be deprived of feed or water for, at most, 72 hours post-hatching. However, for the 72 hours' time-window the Animal Welfare Transport Ordinance does not count the time from the first hatched animal, but the time from when the incubator door opened after the majority of chicks hatched. It is thus very common that more than 72 hours have passed from the time the first chicks hatched inside the incubator are fed inside the barn. In general, day-old chicks can largely feed themselves for about 72 hours via the yolk sac reserves (Moran, 2007). Still, even in the first few hours of life, fast-growing fattening lines exhibit higher metabolic activity than laying hen lines, which means that the yolk sac reserves are usually already finished after 38 to 50 hours (Bergoug et al., 2013; Jacobs et al., 2016; Nielsen et al., 2023). Not only the high metabolic rates may deplete their energy reserves more quickly, the transportation process could also exacerbate the depletion of reserves and dehydration, through excessive thermoregulatory demands and stress (Jacobs et al., 2016; Haas, 2020). Post-hatch feed and water deprivation in broiler chicks can further lead up to lower body weight and mortality up to 6 weeks of life (Jong et al., 2017).

There are several methods that seem to reduce the stress in the first days of life. Some hatcheries offer feed and water post-hatch, so called early feeding. Early post-hatch feeding offers the chicks those resources that are beneficial for their early development in terms of their digestive tract, organs, immune and thermoregulatory systems (Jong et al., 2017; Hollemans et al., 2018; Hollemans et al., 2021; Li et al., 2022). Alternatively, in order to avoid both the post-hatch nutritional and environmental stressors at the hatchery, broiler producers can also decide to apply on-farm hatching where the chicks arrive on farm as 18-days incubated eggs and hatch inside the poultry house (Haas, 2020; Jong et al., 2020). There is some evidence that on-farm hatching can be beneficial for day-old chicks in terms of resting, foot pad health, and mortality (Jong et al., 2020; Giersberg et al., 2021; Guilloteau et al., 2024; Hanna et al., 2024). Another option to reduce stress at placement in the poultry house is the provision of dark brooders (Nielsen et al., 2023). A dark brooder is a dark, separated secluded heated area in the barn that provides shelter and a warm resting place (Jong et al., 2022; Sirovnik and Riber, 2022). A dark brooder offers temperature choice to the chicks and may also aid in reducing active chicks disrupting inactive or sleeping chicks. Disruption of sleep in young chicks negatively affects their welfare, as the brain does not get enough time to recover (Haas, 2020; Forslind et al., 2022). Still, insufficient information in ensuring the welfare of day-old chicks and practical difficulties for large scale broiler farms exist when it comes to implementing such welfare enhancing practices (Riber and Guzman, 2017; Nielsen et al., 2023).

Overall, the traditional hatching process may have long-lasting negative impacts on the health, welfare and performance of broiler chicks (Haas, 2020; Hanna et al., 2024). Generally, there is a need to minimize mortality rates in chicks during the first week of life, to enhance the welfare of day-old chicks, and to support optimal development (e.g. immune system, body weight) by reducing stressors in the first few days of life. Hence, this Broiler*N*et challenge focuses on strategies to improve young chick management.

1.3 Minimizing stress and injuries during catching

The catching process is the biggest stressor in broiler chicken production that directly impacts animal welfare through injuries and damages, dead birds, and suffering (Kittelsen et al., 2018; Dutra et al., 2021; EFSA, 2022). In most European countries, broilers are currently still caught and loaded into crates/containers by a contracted group of professional catchers entirely by hand. Broilers are caught by one leg, inverted, and carried upside-down by a catcher to the crate/container (Jacobs and Tuyttens, 2020; Dutra et al., 2021). This manual process usually generates physical damage to both the animals and workers, as well as economic losses to the industry (Delezie et al., 2006). First of all, during the catching, crating and loading of the animals, fractures, dislocations, subcutaneous hemorrhaging and lesions occur that cause pain and stress to the animals (Delezie et al., 2006; Jacobs and Tuyttens, 2020; EFSA, 2022). Second of all, those injuries and damages result in considerable economic losses to both the producer and the slaughterhouse due to partial and whole carcass rejections (Delezie et al., 2006; Jacobs and Tuyttens, 2020). Besides, the inverted position of the animal leads to respiratory distress and endanger cardiac activity due to intestinal pressure on the respiratory system and the heart (EFSA, 2022). Furthermore, broiler chickens are rarely handled by people throughout their life, so this limited contact can play a role in the acute stress experienced during human-animal interactions at harvesting (Jacobs and Tuyttens, 2020). Lastly, broiler chickens are taken off feed 6-8 hours prior to catching for transportation to the slaughter plant, which is highly stressful for broiler chickens that are genetically selected for their growth potential and thus strong appetite (Jacobs and Tuyttens, 2020; EFSA, 2022).

An alternative catching method to the traditional catching methods (i.e. lifting multiple birds upside-down in one hand) involves upright catching, one or two birds can be held in an upright position with the hand placed over the wings and the abdomen supported (Kittelsen et al., 2018; EFSA, 2022). This was found to reduce injuries and damages, and to reduce overall stress in broiler chicken (Kittelsen et al., 2018; EFSA, 2022; Delanglez et al., 2024), especially when carrying one broiler per catcher in an upright position (De Lima et al., 2019). However, upright catching takes longer (i.e., fewer birds per catch) leading to higher personnel costs and according to catchers it is physically more demanding (i.e., more squatting and more frequent bending over) (Langkabel et al., 2015; Kittelsen et al., 2018). Besides, catcher fatigue (Delezie et al., 2006) may set in after a certain time, which has negative effects on concentration and caution and could in turn lead to more animal injuries. Moreover, a longer catching process will also extend the period without feed and water and a longer exposure to noise and a poor climate, which could cause stress to the birds (Kittelsen et al., 2018; Delanglez et al., 2024).

Mechanical catching of broilers using harvesting machines is another alternative to the manual process. The most common commercial systems use sweeping mechanisms provided with soft rubber 'fingers', mounted on vertically rotating rotors, where the fingers sweep the birds onto a conveyor belt system that transfers them into the containers (EFSA, 2022). The use of mechanical catching systems is growing, as they become more reliable and improve working conditions for the workers, (Jacobs and Tuyttens, 2020; Dutra et al., 2021;). Although, compared to manual catching, mechanical catching has the potential to reduce handling stress and the risk of injuries for broiler chickens (Wolff et al., 2019; Smith and Pierdon, 2023), it is crucial that the harvesting machines are operated correctly by well-trained workers (Jacobs and Tuyttens, 2020; Mönch et al., 2020; EFSA, 2022). The risk of rough or inappropriate handling of birds, e.g. by grasping the bird by the neck or by one leg or wing, high conveyor belt loading speeds, tilting, dropping or shaking containers at loading or unloading, still exist for mechanical catching systems (EFSA, 2022). Besides, even when mechanical catching systems are used, there are some work steps that must still be performed manually, such as the manual height adjustment of the rear end of the caging belt to the container drawer being loaded (Mönch et al., 2020). High occurrence of severe injuries in mechanically loaded broilers can occur when the person adjusting the height is distracted and broilers bump against the upper, closed drawer before they land in the targeted one (Wolff et al., 2019; Mönch et al., 2020). Furthermore, the stopping and starting of the loading belts can disturb the balance of the transported broilers, which leads to startling reflexes, wing spreading and wing flapping resulting in hematomas (Wolff et al., 2019).

A recent study compared both manual upright and inverted catching to mechanical catching and revealed animal welfare benefits of upright versus inverted (less wing flapping, better catcher-bird interaction) and mechanical catching (less catch damage), whereas mechanical catching provided

the best labour conditions (Delanglez et al., 2025). Given the existing trade-offs among catching methods and the major welfare problems during broiler harvesting, this Broiler*N*et challenge focused on innovations and practices that optimize the catching and loading on farms while reducing stressors that negatively affect broilers in the pre-slaughter phase. This also included pre-catching management the days prior to catching and those practices that not only improve bird welfare but also make the job easier for the human bird catchers.

Chapter 2: Literature database

In order the facilitate knowledge exchange among relevant stakeholders within the European broiler sector, a database was established containing both scientific and grey literature. The database consists of, among others, scientific research and review papers, practical guidelines, project reports, and industry reports. Those sources relate to all three challenges for animal welfare and can contain knowledge about broiler welfare and examples of potential good practices.

Development of the database For each challenge both scientific and practice-based knowledge were collected. To this end, Web of Science and Google Scholar were used to search for scientific literature, and search engine Google was used to search for grey literature. For the challenge "Improving on-farm welfare assessment and management", the search criteria included: (animal OR broiler) welfare AND assessment AND (technology OR protocol OR indicator OR tool). For the challenge "Optimizing young chick management", search criteria included: broiler chick AND management AND animal welfare, broiler AND hatching. For the challenge "Minimizing stress and injuries during catching", search criteria consisted of: (catching OR depopulation) AND (animal OR broiler) welfare; broiler* AND welfare AND (container OR crate). Only those sources with full text available and English or German language were included. Other exclusion criteria were relevance, sources published prior to 2010, and publications about backyard production systems.

Usage of the database In total the database includes 60 references related to the three Challenges of the second Broiler*N*et cycle. For the purpose of simple and quick searching, sources are listed per Sector Priority Challenge for Animal Welfare. By these means, the end user can select its topic of interest within the database. For Sector Priority Challenge, a maximum of 10 scientific literature sources and 10 grey-literature sources are listed. Informative abstracts/summaries are provided for each source as well. By these means, the end user can find the most important information directly inside the database. Nevertheless, a digital object identifier/website link to the original source can be accessed by clicking the title of the abstract/summary. The database for animal welfare will be uploaded as separate file into the Broiler*N*et Knowledge Hub.

Chapter 3: Good Practices (GPs)

3.1 Short description of the GPET

The GPET was used by the TEN to evaluate the GPs suggested by the BINs. In total 42 GPs were brought forward by the facilitators of 12 countries (see Table 1-3). GPs were scored based on their technical quality, impact on the sector, and exploitability using a 5-point scale. Experts assigned scores and comments to each GP listed. For each GP, the sum score of the TEN was calculated and used to identify the Top 10 of GPs for each challenge.

3.2 Overview of all Good Practices including GPET results

3.2.1 Improving on-farm welfare assessment and management

A total of 12 different GPs from 8 project countries were collected for the challenge "Improving on-farm welfare assessment and management".

Table 1. Overview of all GPs for the challenge "Improving on-farm welfare assessment and management" including scoring results of the GPET, ranking and a short description

Challenge	Keyword	GP title	Country	Score	Rank	Short description
Improving on-farm welfare assessment and management	Software	Broiler management: The full picture in one software	Germany	133	1	The MCTotal™ software can provide an overview of animal performance (weight, feed/water intake, animal health), barn climate parameters and feed supply in real time. It offers functions for planning, analysis, optimization and forecasting per barn.
Improving on-farm welfare assessment and management	Application	EBENE® application: Perform your own animal welfare self-assessment	France	130	2	Evaluation of welfare of broiler chickens using the EBENE is a free mobile application (available in French, English, Flemish, and Dutch) for self-assessment of broiler welfare. The evaluation includes a questionnaire covering aspects like access to feeders, drinkers, perches, mortality, slaughter methods, enrichment, and natural behavior.
Improving on-farm welfare assessment and management	Software	Artificial intelligence to enhance broiler welfare: tracking behavioral activity	Germany	128	3	The VetVise system uses video cameras to assess the distribution of the animals in the barn and their behavioral activity. It sends farmers recommendations for management measures that could improve the condition of the herd.

Improving on-farm welfare assessment and management	Software	Use of technology/cameras to monitor bird health and welfare	UK	126	4	Camera system that provides automated, live updates to assist stockpersons with early alerts and to benchmark own performance over time.
Improving on-farm welfare assessment and management	Slaughterhouse	Evaluation of injuries/culls at the slaughterhouse	France	124	5	Upon arrival transport crates are assessed for DOA, heat stress, improperly loaded/trapped. Postmortem, 50 out of 8,000 chickens per batch are analyzed for: scratches, wing defects, scabby breasts, non-compliant legs, and tarsal burn. All data is communicated to the farmer.
Improving on-farm welfare assessment and management	Software	Monitoring the welfare of broilers using bioacoustics	Spain	120	6	To track broiler vocalizations, a microphone is installed at the center of the barn, above the chickens' heads. The system captures all vocalizations while filtering out external noises to assess stress level. The program updates a control panel that displays the records on the website or mobile app.
Improving on-farm welfare assessment and management	Software	Linking artificial intelligence with the traditions of farming	UK	119	7	AI tracks drinking behavior of flocks for 3 days and predicts the future drinking 15 minutes into the future, if the prediction model fails, the behavior has changed. The system analyses all available data to understand the likely cause of the behavior change. Farmers are then notified via an app.
Improving on-farm welfare assessment and management	Software	Automatic condition monitoring and reaction to changes	Finland	112	8	By using remote/continuous monitoring of feed/water intake, mortality, climate conditions etc., farmers can act fast when there is an abnormal change detected. If an unusual large number of birds died in a short period of time, try to find the causes as quickly as possible in cooperation with a veterinarian. If the first week's mortality exceeds the reporting limit, give feedback to a hatchery.

Improving on-farm welfare assessment and management	Software	Automatic, non-stop weighing	Poland	108	9	Continuous growth monitoring via automatic weighing of the flock allows for almost immediate detection of abnormalities. The JOTAFAN WGJ-8 system can weigh non-invasively through poultry weighing scales placed in the poultry house that are connected to the controller-recorder.
Improving on-farm welfare assessment and management	Training	Mandatory trained animal welfare representative in each poultry farm	France	106	10	This involves a certified training program consisting of a minimum of 7 hours in-person training (over 1 or 2 days) and 2 hours of e-learning. The mandatory theme addresses the general concept of animal welfare and societal expectations. The three other optional themes are: disease prevention, slaughter techniques, and the farming environment (including ambiance, etc.).
Improving on-farm welfare assessment and management	Action	Reduction in bird population density during the warm months	Greece	104	11	During the summer months, birds can experience heat stress, especially at older ages and during transport. Low bird density per square meter in farming helps improve control over living conditions (e.g. temperature, humidity) in the summer. A reduction of 15-20% in the number of birds initially placed leads to a corresponding decrease in turnover. However, this is offset by faster growth of the birds, allowing for shorter cycles and more productions per year.
Improving on-farm welfare assessment and management	Protocol	Development of (exchangeable) welfare indicators	The Netherlands	89	12	This GP is not yet specifically applied but can be a key to develop new welfare concepts, as it describes factors of relevance to high welfare concepts including: good litter, day/night rhythm with sufficient light during the day (> 20 Lux), ad lib water and feed (possibly partly with live insects), low stocking density to support activity and species-specific behavior), straw bales in the barn, (covered) outdoor area, low growth rate (keep for at least 56 days).

3.2.2 Optimizing young chick management

A total of 14 different GPs from 7 project countries were collected for the challenge "Optimizing young chick management".

Table 2. Overview of all GPs for the challenge "Optimizing young chick management" including scoring results of the GPET, ranking and a short description

Challenge	Keyword	GP title	Country	Score	Rank	Short description
Optimizing young chick management	Hatchery	The optimal start: select chicks from a hatchery providing early feeding	Germany	133	1	With the Hatch-Care system, newly-hatched chicks are immediately supplied with feed, fresh water and light. Hatched chicks enter through open spaces in the tray a clean, spacious post-hatch basket free of unhatched eggs and empty shells. In the basket, there are feed troughs on two sides, which contain enough feed for 24-36 hours. Drinking nipples in the basket provide a continuous supply of fresh flowing water.
Optimizing young chick management	On-farm	Preheating of the poultry house	France	131	2	The poultry barn should be heated 3 days before chick arrival, depending on external conditions and barn type. This ensures that not only the air but also the litter and floor reach the target temperature, optimizing the thermal comfort of the birds. To effectively implement preheating, the farmer follows a precise heating schedule to ensure a gradual and uniform temperature increase (e.g. at day-3: 25°C, day-2: 28°C, day-1: 30°C, day 0 (chick arrival): 32.5°C.
Optimizing young chick management	On-farm	Protected rearing of underweight chicks	Greece	128	3	A small percentage of underweight chicks emerge, which, due to competition, will have limited access to food and water, with many potentially dying. A small part of the house is separated, where during the first days, the underweight chicks are collected and placed. This area is specially designed for these birds, with the installation of specialized drinkers and feeders suitable for the chicks' access. Additional heating (brooder) is provided, with localized heating, and it is recommended to increase the temperature by +1°C from the desired temperature.

Optimizing young chick management	On-farm	Artificial intelligence to enhance broiler welfare: tracking behavioral activity	Germany	126	4	The VetVise system uses video cameras to assess the distribution of the animals in the barn and their behavioral activity. It sends farmers recommendations for management measures that could improve the condition of the herd.
Optimizing young chick management	On-farm	Smart Bedding Solution: Robots & Heating for Active Chickens	Slovenia	125	5	Implementation of an automatic loosening robot from day 4 onwards to stimulate bird activity and improve litter quality, as. underfloor heating alone was not sufficient to ensure excellent bedding quality. The system includes underfloor heating based on wood chips, electric panels, thermal insulation on all four sides of the building, and a robot for litter loosening.
Optimizing young chick management	On-farm	Heating the henhouse before adding litter	Finland	124	6	Before spreading the litter, the temperature of the breeding houses is raised to approx. 29°C. This measure also aims to ensure sufficient heating of the floor before applying the litter. The litter is spread in the poultry houses about 2 days before the arrival of the birds. The litter has time to warm up without drying out too much. Sufficient feed is also spread on the feeding paper upon arrival of the chicks.
Optimizing young chick management	On-farm	Underfloor heating in interaction with thermal insulation and electric panels	Slovenia	123	7	Brick building 100 x 22 m - 39,900 chickens per cycle; the building is above average insulated - floors insulated, not just the ceiling and walls (10 cm thick), electric panels on the roof, and waterproofing plus 10 cm insulation boards; heating is based on biomass/wood chips from the farm and is provided with underfloor heating and the use of a recuperator that additionally heats the air with a heater built into the recuperator. This to promote environmental sustainability and improve the quality of the bedding.
Optimizing young chick management	Hatchery/On-farm	On-farm hatching to improve broiler health and welfare from the start	France	123	8	On-farm hatching provides chicks direct access to light, space, water and feed, while avoiding the stress of transport and unloading. With the NestBorn® system, no major investments or modifications are needed in the poultry house. The hatchery brings and places the pre-incubated eggs directly on a litter bed in the barn. The farmer needs to control the

						egg temperature and the hatching process.
Optimizing young chick management	On-farm	Improved installation of chicks through partitioning of working areas in the barn	Germany	123	9	At chick arrival the barn is divided into two areas: one area is defined as pathway to bring in the trolleys and another area is used as animal area where the day-old chicks are placed into from the baskets. To this end, a half KG pipe (diameter: 150 mm) is installed along the entire length of the barn to separate the barn into these two areas. The pipe is attached to the ceiling of the barn with wire ropes and can be lowered to the floor where needed. A bulge prevents the animals from getting under the barrier or into the pathway of the trolleys.
Optimizing young chick management	On-farm	Combined welfare good practices applied during the first 24 hours of rearing	Greece	121	10	The first 24 hours are crucial for the welfare of the chicks to ensure a proper start for rearing and to minimize acclimatization stress in the new environment. Important processes: 1) Placement of chicks: confined space with plenty of food and water, 2) Temporary divider: along the side of the brooder ring to separate the working pathway, 3) Monitoring feed consumption the first 24h.
Optimizing young chick management	On-farm	Optimizing conditions for slow-growing chicks	Italy	118	11	The farming of slow-growing breeds requires different management measures compared to conventional breeds. For those breeds, it is necessary to stimulate the intake of feed and water by reducing the space, increasing the number of watering points and also increasing the average ambient humidity to facilitate thermoregulation.
Optimizing young chick management	On-farm	Complete management package to improve the start of the chicks in the first week	The Netherlands	113	12	Mortality rates are often too high, especially in the first week This GP suggests: house chicks in a well-cleaned, disinfected and heated stable. Make sure chicks have water and food immediately upon hatching. Temperature checks twice a day, for 12 chicks per house. Adjust light intensity to chicks' behavior.
Optimizing young chick management	On-farm	Infrared panels upon arrival	The Netherlands	109	13	For a better start-up, lower energy costs and less mortality, it is suggested to provide the chicks with infrared panels upon arrival on the farm. This extra local heating provides temperature

						choice to the chicks and more activity/search for feed and water.
Optimizing young chick management	On-farm	Use of chick-sized fans	Italy	100	14	This Good Practice was adopted to facilitate the adaptation phase of newly arrived chicks on the farm by recreating an environment similar to that which would be provided by the hen. The various precautions include, for example, keeping the room temperature at 30° and sealing the building to reduce the presence of draughts. In addition to the aforementioned measures, the farmer built small fans, similar to those found in industrial barns, in order to better regulate the temperature in the barn. The fans are located on the ceiling, near the two entrance areas at the end of the building, so that they can move the incoming air in a transverse direction. The fans have a diameter of approximately 30 cm, a power of 300-400 khW/h and an air flow of 700 m^3/h.

3.2.3 Minimizing stress and injuries during catching

A total of 16 different GPs from 9 project countries were collected for the challenge "Minimizing stress and injuries during catching".

Table 3. Overview of all GPs for the challenge "Minimizing stress and injuries during catching" including scoring results of the GPET, ranking and a short description

Challenge	Keyword	GP title	Country	Score	Rank	Short description
Minimizing stress and injuries during catching	Training	Training for catchers in animal welfare: "Ramass'Volailles Pro"	France	130	1	Training created in 2023 by ITAVI, non-mandatory but highly recommended, is 100% online and asynchronous (no contact with the instructor). The topics covered include biosecurity, animal welfare, and personal protective equipment (operator safety).

Minimizing stress and injuries during catching	Management	Package of measures to minimize stress and injuries during catching of broiler chickens	Greece	129	2	These measures collectively improve the welfare of the birds during collection: 1. Administration of antioxidants and electrolytes, 2. Training for catching staff, 3. Unannounced welfare inspections by the farmer, 4. Blue light during catching, 5. More collection points in a barn
Minimizing stress and injuries during catching	Management	Calming down birds through catching with blue light	Germany	127	3	For reducing stress during catching, the barn light should not be switched on. Blue light (external light source) creates a calm atmosphere for the animals and doesn't stimulate the activity.
Minimizing stress and injuries during catching	Management	Reception room for the catching team	France	125	4	A reception room for properly welcoming the catching team (coffee/tea, snacks), to provide a list of reminders of biosecurity rules, and for supervision by the farmer. The room provides also space for breaks and separate changing areas for women.
Minimizing stress and injuries during catching	Mechanical	Machine catching guidelines	Sweden	124	5	For machine catching of broilers on a conventional broiler farm (approx. 14,000 m^2), important aspects are education of the personnel and correct handling of the machine + correct preparations and farmer present during catching. Farmer preparations include for example: lower the temperature, have a plan for ventilation, briefing the catching crew. During catching, provide total darkness combined with blue light on the vehicles, adapt the speed of the catching machine and conveyor belt according to the animals' behavior. Afterwards evaluation together with farmer, catching team and slaughter company.
Minimizing stress and injuries during catching	Data assessment	Collecting transport related animal welfare data	Sweden	124	6	It is important to collect data (key indicators) such as DOA, wing damage and other transport related injuries. The data are reported to the catching team, the farmer and the Swedish Poultry Meat Association to foster improvements over time.

Minimizing stress and injuries during catching	Management	No thinning	Finland	122	7	Fasting and catching always stresses the birds. The All in–All out method is a requirement for ensuring biosecurity, it improves food safety (prevents the spread of campylobacter and salmonella) and reduces stress and injuries among the broiler chickens, as fasting and loading only occurs once during their life at the end of the fattening round.
Minimizing stress and injuries during catching	Training	Education and training of the catching teams	Sweden	122	8	Using machine catching as main catching method for broilers can enhance animal welfare, but also improve the working conditions for the people in the catching team. Yet, it requires good knowledge about how to handle the machine and how to adapt it according to animal behavior and surrounding conditions (such as weather, litter quality etc.). The catching team must also be aware of legislation regarding animal welfare. So, the Swedish Poultry Meat Association has developed an online training tool and invites the catching teams for a physical meeting every year to improve their knowledge in broiler welfare and catching techniques.
Minimizing stress and injuries during catching	Mechanical	Broiler harvesting 2.0: Mechanical catching	Slovenia	122	9	Mechanical catching with MX3 Aurora RACCOLTA results in fewer or the same number of injuries during catching, and the method of catching is consistent. This setup forces the farmer to take better care of the bedding, as the machine operates more optimally under these conditions. There is a reduction in labor costs, and the work becomes less stressful and strenuous for the farmer. The use of smooth, vibration-free conveyor belts, adjustable crate inclination, and a smart design minimizes stress and injuries for both poultry and operators.
Minimizing stress and injuries during catching	Mechanical	Mechanic catching machine	France	121	10	Enables automated collection of chickens (2-3 people mobilized vs. 8-12 in traditional collection). The machine (brand used by the farmer: ChicknCat) allocates them to boxes while respecting the

						indicated density, thanks to automatic weighing to better estimate.
Minimizing stress and injuries during catching	Transport	Management of heat stress in the trucks serving for catching (ventilation, misting, loading of crates)	France	120	11	The new trucks at the Ancenis site are equipped with a roof-mounted ventilation system, along with a blue micro-perforated tarp on the side of the truck during winter and for biosecurity. Upon arrival, the animals are placed in a refrigerated and covered waiting area, with a temperature gradient compared to the outside, using automated systems to create a temperature differential of 7 °C. Ventilation in the truck is only active during summer.
Minimizing stress and injuries during catching	Method	Innovative transport crates for small broiler farms	Germany	120	12	The self-designed containers consist of 5 levels that each can contain 9-11 animals (fattening age of 11 or 12 weeks, slower growing broilers). The containers are used for the transport of live broilers from the barn to the waiting area and the mobile slaughterhouse. The container shell is made of grids or perforated metal sheets (air-permeable), with the opening in the side of the rear wall to facilitate the cleaning of the container. The floors are made of smooth material (coated wooden boards).
Minimizing stress and injuries during catching	Method	Subdivisions of the chicken lot with movable fences	Spain	117	13	The practice that helps reduce animal stress is to confine groups of chickens between 500 and 1,000 animals. This is done using metal fences provided by the poultry farmer, approximately 80 cm high and 2 meters long. This practice is especially recommended when loading must be done during the day due to the availability of the loading crew or the needs of the slaughterhouse
Minimizing stress and injuries during catching	Method	Removal of handling aids at catching to minimize stress	Ireland	107	14	The farmer is present at catching and ensures all catchers are made aware of a ban on the use of bags in an effort to improve animal welfare. The farmer also instructs the catchers to double check birds are not on their back in the modules. This collaboration

						will result in better welfare for the birds without prolonging the handling. It is in the farmers' interest to ensure handling is carried out properly but there needs to be collective action from the catchers and drivers, as farmers cannot control all aspects of catching and transportation.
Minimizing stress and injuries during catching	Management	Music along the entire length of the batch	France	106	15	Music can reduce nervousness throughout the batch. It can help on catching day by smoothing out sudden thumping noises/ 3-4 radio stations can be installed inside the broiler house.
Minimizing stress and injuries during catching	Management	Guidelines for catching	The Netherlands	102	16	To ensure that the catching is as quiet/less stressful as possible, the lighting management is adjusted in the days preceding the depopulation. During catching, the stable is completely dark with only local light for the catchers. The containers must always be close to the chicks (ride along the team by using a mover with joystick). Catching during the least hot part of the day, sensors in the lorry that measure driving behavior, and euthanize chicks that are not fit for transport at the broiler farm.

Chapter 4: Top 5 Best Practices (BPs) & Broiler*N*et Champions

4.1 Top 5 Best Practices per challenge including abstracts

By means of surveys and intensive discussions during the TEN meeting, the Top 5 BPs and the respective Broiler*N*et Champion for each challenge were selected. The Champions included those GPs that were the most innovative and potentially ready-to-use ideas that could be implemented in the various European regions. For each challenge, the five BPs (including the respective Broiler*N*et Champion) will be described below.

4.1.1 Improving on-farm welfare assessment and management

Broiler Management: The Full Picture in One Software (Germany)

Adequate health and welfare of animals is a priority for every farmer. Therefore, there are a variety of parameters that need to be checked on a daily basis. The MCTotal™ management system can provide support here. The software-based management concept for broiler farming offers a variety of functions aimed at consistently achieving good runs. Experience from many fattening runs confirms that the concept reduces losses, treatment costs and feed costs while improving animal welfare and litter quality. The basic idea of the software is based on the fact that many animal welfare and health problems are caused by unbalanced feeding. The animals' needs change daily, but in practice the feed composition is only changed a few times throughout the entire fattening period. Therefore, MCTotal™ offers the possibility of automatically calculating a mixture from the available feed, which is continuously tailored to requirements in terms of protein and calorie content. In addition to feeding, the software also offers many other options. Entered data is automatically evaluated and its future course is predicted, so that impending problems can often be identified at an early stage. The most important results are clearly presented in various graphics. All fattening-related events can be conveniently planned in advance. Costs are automatically calculated and clearly listed. In addition, comparisons between barns or trials are easily possible. The MCTotal™ management concept, developed in collaboration with veterinarians, enables the reproducibility of good results thanks to its diverse functions.

EBENE® application: Perform your own animal welfare self-assessment (France)

Assessing the welfare of poultry on the farm is often a challenge, as many indicators have to be recorded simultaneously in order to obtain a true picture of the flock. The mobile application EBENE® can be used at the end of the batch, during the week preceding slaughter, and for sexed batches, before or after the removal of females. It allows the farmer to observe and validate the long-term improvements made and to check their effectiveness. The entire evaluation takes about 1 hour and 15 minutes for the complete version and 25 minutes for the simplified version, conducted once a year per poultry house. The evaluation includes a questionnaire covering aspects such as: feeder, drinker, and enrichment availability, and stocking density. The evaluation also includes the observations of animal-based indicators through such as: behavioral observations (e.g. dust bathing, wing flapping, stretching legs) and a health check (e.g. number of dead, lame, dirty, sick animals). There is a free access to the application (iOS and Android) after creating a user account plus a licensed access (€2000/year), providing additional features for professional use. The language can be set to Danish, Dutch, English, Finnish, Flemish, French, German and Italian. Results are presented in the form of radar graphs and compared with average data from both good and poor-performing farms of batches slaughtered in the quarter prior to the evaluation.

Artificial intelligence to enhance broiler welfare: tracking behavioral activity (Germany)

The distribution of the animals in the barn and their behavioral activity can be used as indicators for animal welfare and health. Bird distribution can be used, for example, to determine whether the animals are too warm (i.e. animals have greater distances to conspecifics) or too cold (i.e. form close groups). This is especially important after the day-old chicks arrived, since they are not yet able to regulate their body temperature. Bird activity can be used as indicator for stress, illness, local climate changes or the general circadian rhythm of the animals. Hence, VetVise developed an intensive species-specific automatic analysis system using artificial intelligence. The system consists of video cameras, a local computer in the anteroom of the barn and a network connection to the company VetVise. By recording 24/7 the entire floor area of the barn, the dynamics of the whole herd can be tracked and a general statement can be made about the condition of the animals. By these means, incorrectly set air vents or draught are early recognized, defective drinkers/feeding troughs can be signalized, and even dead animals can be localized. The real-time videos can be accessed at any time on mobile devices and/or PCs. On a daily basis, the software sends farmers barn-specific management recommendations that could improve the condition of the herd in case of behavioral anomalies. Overall, the system helps farmers to detect issues at an early stage and plan their next barn visit accordingly. Investment costs are approx. 15,000 €/stable, with running costs of approx. 2.6 ct/animal. Feed conversion rates improved by approx. 0.04 points.

Evaluation of injuries/culls at the slaughterhouse (France)

There are several approaches to evaluate injuries/culls either ante- or post-mortem. This GP suggests: 1) Ante-mortem inspection (conducted upon arrival for all batches from each farm) that involves sampling from transport crates to assess: the percentage of animals that are suffocated during transport, those experiencing heat stress upon arrival or while waiting on the loading platform, and those improperly loaded or trapped. This includes evaluating the information sheet from the food chain covering the last 30 days, which must be submitted 24 to 48 hours before slaughter. The condition of the batch is also assessed, noting if the animals are soiled with dirty manure, etc. 2) Post-mortem inspection where trained personnel remove animals from the processing line when the batches are found to be infected, showing bruises, pododermatitis, or other leg lesions, based on manual evaluation—this can vary from one slaughterhouse to another. When the slaughterhouse is equipped by camera, 100% of the animals are monitored for pododermatitis. Tarsal burns and blisters that may indicate friction injuries can be also observed. Besides, several criteria are evaluated for the majority of chickens in a batch, including the percentage of culls, automatic scoring for pododermatitis using integrated camera technology, and weight measurements for batch homogeneity. Salmonella data are also collected, with is mandatory testing for all poultry batches entering the slaughterhouse. Specifically, samples from two sets of 50 chickens per 8,000 chickens per batch are analyzed, noting scratches, wing defects, scabby breasts, non-compliant legs, and tarsal burns. Finally. all data is communicated to the farmer to provide feedback and stimulate management changes for better results. The costs are covered by the downstream segment of the poultry production chain, not by the farmer.

Monitoring the welfare of broilers using bioacoustics (Spain)

In various situations broilers use vocalization as a form of expression to communicate warnings, alarms, territoriality threats, stress, fear, satisfaction, hunger, among others. Analyzing the variations in frequency and patterns of these vocalizations allows for an accurate assessment of the animals' health and welfare. This good practice uses bioacoustics to obtain quantitative measurements of broiler stress in a non-invasive manner, avoiding any human intervention. The system consists of a microphone installed above the broiler' heads to capture their vocalizations and transmit the data to a processor mounted on the wall. This processor filters out background noise that does not originate from the animals, ensuring a clean and accurate capture of their sound emissions. Through continuous analysis of vocalization records, which are automatically updated every 15 minutes on a control panel, changes in vocalizations can be detected. The

system analyses variations in vocalizations based on different factors (e.g. chick age, work team, origin of the chicks, season) and also between different buildings. This facilitates the identification of specific elements that may lead to stressful situations (e.g., type of lighting, inadequate ventilation, ambient temperature). This system enables the identification of specific behavioral patterns related to the welfare of broilers, with the goal of improving farm conditions. Additionally, it aids in the early detection of health and welfare problems, contributing to a more efficient and healthier management of broilers.

4.1.2 Optimizing young chick management

The optimal start: select chicks from a hatchery providing early feeding (Germany)

In a commercial hatchery, broiler chicks hatch within a period of 24-48 hours in an incubator. Only once the hatching phase is over, all of the hatched animals are removed from the incubator and transported to the barns for rearing within a maximum period of 72 hours. All this time, no water or feed is available until they arrive in the poultry house. This delayed feeding can have detrimental effects on the chicks' early development in terms of their digestive tract, organs, immune and thermoregulatory systems. Therefore, the "Hatch-Care" system was developed, where newly-hatched chicks are immediately supplied with the basic necessities of life – feed, fresh water and light. This prevents dehydration and stimulates their growth and development. Hatched chicks enter through open spaces in the HatchCare tray a clean, spacious post-hatch basket free of unhatched eggs and empty shells. The basket hence provides chicks with about 40% more space than traditional systems. In the HatchCare basket, there are feed troughs on two sides, which contain enough feed for 24-36 hours. Drinking nipples in the HatchCare basket provide a continuous supply of fresh flowing water. Broiler producers can select a hatchery with HatchCare system for chick supply and benefit from stronger higher-welfare chicks for an optimal start. Animals with early feeding have a better weight development, lower mortality rate, and need less or no medication at the start. The farmer estimated a 5% return on sales as benefit due to a higher end weight. Rearing costs on the farm are estimated at €0.20 per animal per round. Additional costs for the hatchery are estimated at €0,02 per animal.

Preheating of the poultry house (France)

Ensuring optimal conditions for day-old broiler chicks upon arrival is crucial for their welfare, growth, and global performance of the farm. One fundamental good practice to achieve this is by preheating the poultry house, which helps create a stable and comfortable environment before chick arrival. Without adequate preheating, chicks may experience cold stress, leading to poor feed and water intake, reduced growth, and increased susceptibility to disease. To implement this practice effectively, the poultry barn must be heated several hours (36 hours), and often days (3 days) before chick arrival, depending on external conditions and barn type. This ensures that not only the air but also the litter and floor reach the target temperature, optimizing the thermal comfort of the birds. To effectively implement preheating, the farmer follows a precise heating schedule to ensure a gradual and uniform temperature increase (e.g. at day-3: 25°C, day-2: 28°C, day-1: 30°C, day 0 (chick arrival): 32.5°C. This stepwise approach prevents thermal shock and ensures that both the air, the litter and the concrete floor reach a uniformed temperature. The preheating costs around 700€ of gas per batch per broiler barn in winter, or an average €500 per batch per house throughout the year. This represents around €14,000 a year for the farmer (a farm with two barns of 1350 m², for 27,540 chickens each). Nevertheless, it results in a more uniform flock from day 1, more active animals, lower mortality, fewer colibacillosis (*E. coli* diarrhea) infections, and therefore a +10% of gain per year.

Artificial intelligence to enhance broiler welfare: tracking behavioral activity (Germany)

The distribution of the animals in the barn and their behavioral activity can be used as indicators for animal welfare and health. Bird distribution can be used, for example, to determine whether the animals are too warm (= animals have greater distances to conspecifics) or too cold (= form close groups). This is especially important after the day-old chicks arrived, since they are not yet able to regulate their body temperature. Bird activity can be used as indicator for stress, illness, local climate changes or the general circadian rhythm of the animals. Hence, VetVise developed an intensive species-specific automatic analysis system using artificial intelligence. The system consists of video cameras, a local computer in the anteroom of the barn and a network connection to the company VetVise. By recording 24/7 the entire floor area of the barn, the dynamics of the whole herd can be tracked and a general statement can be made about the condition of the animals. By these means, incorrectly set air vents or draught are early recognized, defective drinkers/feeding troughs can be signalized, and even dead animals can be localized. The real-time videos can be accessed at any time on mobile devices and/or computers. On a daily basis, the software sends farmers barn-specific management recommendations that could improve the condition of the herd in case of behavioral anomalies. Overall, the system helps farmers to detect issues at an early stage and plan their next barn visit accordingly. Investment costs are approx. 15,000 €/stable, with running costs of approx. 2.6 ct/animal. Feed conversion rates improved by approx. 0.04 points.

Smart Bedding Solution: Robots & Floor Heating for Active Chickens (Slovenia)

Managing chicken bedding is labor-intensive, but this innovative system streamlines the process by combining a robotic litter-loosening mechanism with underfloor heating. The 100 m x 22 m barn, heated with wood chips, ensures energy efficiency and environmental sustainability. A ventilation system maintains a stable climate, with a recuperate processing 22.5 m^3 of air per hour, supported by ceiling fans and tunnel ventilation for humidity control. Automated monitoring of temperature, humidity, and CO_2 levels optimizes conditions, boosting bird welfare and growth rates. The litter-loosening robot is introduced on day 4, navigating independently using coded coordinates on barn walls. It loosens bedding, encourages movement, and stimulates activity, ensuring better footpad health and higher body weights. Additionally, a laser deterrent system prevents bird clustering, while a phone app and on-site cameras allow remote monitoring. Farmers benefit from reduced labor, cost savings, and a quick return on investment. The robot costs €45,000 with no expenses for five years and an annual return on investment of €7,000. Additionally, a 30% non-repayable grant supports greenhouse gas reduction in farming. With rising energy prices, automation is the future-proof solution, improving efficiency, welfare, sustainability, and farm reputation across small- and large-scale operations.

On-farm hatching to improve broiler health and welfare from the start (France)

In a commercial hatchery, broiler chicks hatch within a hatching window of 24-48 hours in an incubator. Until arrival at the farm, no water or feed is available to the chicks. As this is a stressful start for the newly hatched chicks, an alternative is to hatch the chicks within the barn. By these means, the chicks have directly access to light, water and feed, while stress deriving from hatchery procedures, transport and unloading are avoided. One of the on-farm hatching system existing is the NestBorn® system, where no major investments or modifications are needed in the poultry house. The hatchery brings and places the pre-incubated eggs directly on a litter bed in the barn, using the NestBorn® egg placing machine. At arrival of the eggs, the floor temperature should be max. 28 °C. A temperature of 37-38°C should be maintained in the poultry houses for hatching. The temperature of the eggs should be maintained between 36-38°C and kept as constant as possible. To this end, wireless sensors are placed between the hatching eggs to keep a close eye on the three-day hatching process. Overall, the workload remains typical, except for the tasks of vaccination and the collection and disposal of unhatched eggs, which are traditionally handled by the hatchery. Vaccination has to be done by the farmer with nebulization, requiring about half an hour per barn. Overall, on-farm hatching results in a better growth and the sanitary advantage is

also significant with animals being born and raised in the same location. Pododermatitis can be reduced by 8-9 points. Nevertheless, this system costs nearly €0.60/m² more, with the cost of the chick shared between the hatchery and the farmer.

4.1.3 Minimizing stress and injuries during catching

Package of measures to minimize stress and injuries during catching of broiler chickens (Greece)

Catching live poultry at on farm is a critical process that can significantly impact bird welfare and product quality. During this phase, birds experience various stressors, including human handling, noise, lighting changes, and transportation preparation. Improper handling techniques and prolonged catching times can lead to injuries, increased mortality, and physiological stress responses. Implementing the following measures can enhance bird welfare during catching of live birds:

1. Providing antioxidants and electrolytes to birds 2-3 days before collection.
2. Training personnel involved in live bird collection.
3. Conducting unannounced welfare inspections to ensure proper handling and loading.
4. Using special blue lighting during collection.
5. Increasing the number of collection points (doors) in the poultry house to reduce transport distances and minimize handling time of live birds.

There are key benefits from this practice: Improved Animal Welfare, as proper handling techniques and optimized environmental conditions reduce stress and injuries, leading to better overall bird health and well-being. Another benefit is 10% reduction in water loss. Antioxidants and electrolytes are minimizing water loss, birds remain in better physical condition before processing, reducing carcass shrinkage and maintaining product consistency. An economic gain of approximately €0.01 per bird due to reduced water loss and lower stress-related mortality translate into direct financial benefits for poultry farmers. Meat quality is enhanced as a result of reduced stress and proper hydration before slaughter resulting in better meat texture, color, and overall quality.

Reception room for the catching team (France)

To smoothen and foster the welcoming of the catching team, this GP suggests farmers prepare a reception room and a list of guidelines that serve as reminders of biosecurity rules. This list is also available as a poster, but generally, the written document is to be disseminated among the teams. The farmer for this GP has arranged reception rooms (both for changing and breaks) in each building (35 m² for the smallest barn). This allows for a good reception environment for the catching team, typically consisting of 6-10 people. Here, the farmer provides the workers with coffee, tea, sweet/salty snacks depending on the time of day and a separate changing area or partition for women). The catching team enters the room about 15 minutes before the catching begins. The farmer briefs them (e.g. to take caution regarding the handling of chickens, no kicking, no dropping in the crates, respecting the number per crate, and not stacking them on top of each other). A 10-minute break in the reception room is offered between each truck. He has also set up a pressure washer for the catchers to clean their boots after the catching. By these means, the farmer aims to ensure biosecurity and a better human and animal welfare during catching. Moreover, supervising the catching by the farmer and proper welcoming conditions can contribute to less mortality and culls due to the catching and transport duration. The reception rooms costed about €3,000 per house, using recycled materials, and were built by the farmer.

Collecting transport related animal welfare data (Sweden)

Collecting and monitoring welfare data during catching, loading and transport is beneficial for the development of new practices and technology. In Sweden, data is collected from every flock that is sent to slaughter from several sources, e.g. manually assessing birds at arrival, the official veterinarians' inspections and condemnations at slaughter, and gathered in a national database.

The data is used as KPI's to monitor animal welfare during catching, loading and slaughter, to prevent systematic problems and as base for education. Examples of such data are transport mortality (DOA), injuries (bruising, wounds, wing damage) and making sure no animals have been trapped in the transportation crates. The data is used on both a national and farm level for quality insurance. Challenge with this kind of monitoring is calibration of assessors at the abattoirs and to identify the origin of the problem, which usually are multifactorial. The data collected are used as a foundation to develop guidelines on how to handle the birds with care during catching, loading and transport. Some examples of guidelines for mechanical catching (the most used practice in Sweden) are as follows: the loading machine must be equipped with a euthanasia station, and staff must be trained to euthanize sick or injured chickens in the correct manner; loading machines and forklifts must be fitted with blue working lights; the belt speed must comply with the requirements of the transport system and adapted to bird behavior; the containers must be manually checked to make sure no animals are trapped in any way.

Education and training of the catching teams (Sweden)

Educating the catching teams in proper catching techniques, basic bird biology and behavior and animal welfare legislation is an important step to improve animal welfare and minimize injuries on the birds. Besides, minimizing injuries, wing damage and bruising during catching and loading will also improve the meat quality and, thus, have an economical advantage alongside the improvement of animal welfare. Consequently. improving the meat quality and decreasing the number of condemnations due to DOA, bruising and injuries will increase the number of chickens that reach the end consumer and therefore have a positive effect on the sustainability of poultry meat production. So, the Swedish Poultry Meat Association has developed an online training tool and invites the catching teams for a physical meeting every year to improve their knowledge in broiler welfare. An online training tool is available to educate people working with catching and loading of broilers. It is mandatory for all new employees to do the online training session. In addition, physical meetings are arranged every year to educate the catching teams on basic bird biology, animal welfare and behavior, legislation and theory on catching techniques. Meeting are held on a weekend to match the working hours. Not only bird welfare is discussed, equally important is to listen to the catchers' requirements for their working environment. For instance, possibilities to change clothes, shower, take a break and eat a meal in a clean environment makes them more prone to do a good job and handle the birds with care.

Broiler harvesting 2.0: Machine Catching (Slovenia)

The mechanization of poultry harvesting is crucial for addressing labor shortages, improving efficiency, and maintaining productivity in the broiler sector. This system enables both small and large facilities to optimize workflow, as it operates efficiently regardless of its capacity. By reducing labor costs and physical strain on farmers while improving bird welfare, it ensures a more humane and sustainable working environment. The use of smooth, vibration-free conveyor belts, adjustable cage inclination, and a smart design minimizes stress and injuries for both poultry and operators. A dual redundancy system with backup circuits, valves, and pumps ensures continuous operation, reducing maintenance needs and enhancing reliability. While this system offers numerous advantages, its diesel-powered engine increases emissions, raising concerns about its long-term environmental sustainability. Farmers pay €0.03 per bird, while machine owners face a €190,000 investment plus operational costs. However, efficiency gains and labor savings make it a viable long-term investment, with an expected annual revenue of €25,000 and a payback period of 5 to 7 years. Designed for industrial use, the system reduces the number of required employees from seven to three. Operated through a collaborative model, it optimizes resource utilization, reduces financial burdens on farmers, and enhances overall profitability and sustainability in poultry production.

4.2 Broiler*N*et Champions

For the challenge "Improving on-farm welfare assessment and management", BP "EBENE® application: Perform your own animal welfare self-assessment" was selected as Broiler*N*et Champion by the TEN experts. This practice was considered to be most innovative, as it is a free app available in 7 languages that allows farmers to perform a self-assessment and benchmarking at any time.

For the challenge "Optimizing young chick management", BP "Preheating of the poultry house" was selected as Broiler*N*et Champion. This GP is ready-to-use for all European regions and addresses an important management measure that is highly beneficial for chick welfare but often overlooked by farmers.

For the challenge "Minimizing stress and injuries during catching", BP "Package of measures to minimize stress and injuries during catching of broiler chickens" was selected as Broiler*N*et Champion. The experts concluded that this package contains several, relatively easy, key measures that a farmer can take to reduce stress and injuries during catching on his production site and by that reduce animal suffering.

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