June, 29 2021 (revised November, 5 2021)

Final report

for the CORE Organic Cofund funded project

"Optimizing the use of the free-range as the key to improve organic chicken production FreeBirds"

Period covered: April 1st 2018 – March, 31 2021

Organic broiler chickens
(Photo Stefan Gunnarsson)

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1. General information

1.1 Project information

Project information			
Project acronym	FreeBirds	**Project ID**	2062
Project title	Optimizing the use of the free range as the key to improve organic chicken production		
Project website	https://projects.au.dk/coreorganiccofund/research-projects/freebirds/		
Details of the project coordinator			
Name:	Gunnarsson	**First name**:	Stefan
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Institution:	Swed. Univ. of Agric. Sci. (SLU)	**Country**	Sweden
Start of project	April 1st 2018	**End date of project**	March 31st 2021
Duration in months	36 months	**New end date in case of a project extension due to COVID-19**	No changes

Partner no.	**Country**	**Institution/ organisation name**	**Type of institution/ organisation**[1)]	**Functions**[2)]	**Involved in WPs**	**Contact person**[3)]
1	Sweden	Swed. Univ. of Agric. Sci. (SLU)	University	PC/WPL	WP1, WP3, WP5	stefan.gunnarsson@slu.se
2	Italy	Università degli Studi Milano (UMIL)	University	WPL	WP3, WP4	valentina.ferrante@unimi.it
3	Denmark	Aarhus Uni.	University	WPL	WP1, WP5	anja.riber@anis.au.dk
4	Netherlands (NL)	Louis Bolk Institute	Private research institute	WPL	WP3	m.bestman@louisbolk.nl
5	Poland	Institute of Genetics and Animal Breeding Polish Academy of Sciences (IGAB PAS)	University	WPCL	WP3, WP5	J.Marchewka@ighz.pl
6	Belgium	ILVO	Public research centre	P	WP2, WP4	frank.tuyttens@ilvo.vlaanderen.be
7	Turkey	Uludag, Bursa	University	WPCL	WP5	aipek@uludag.edu.tr
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1) University, Public research centre, Private research centre, Company, Other
2) PC = Project coordinator, WPL = Work package leader, WPCL = Work package co-leader, P = Participant
3) inclusive e-mail address

2. Summary

2.1 Final project summary suitable for web publication for a wider audience

(Please focus on results, conclusions and take away messages and order them according to the user groups addressed. Please consider that this text will be read by the general public, which requires a different language than a summary for a scientific paper, maximum 1 page of narrative presentation – font size 11)

The FreeBirds project has generated more insight in the relation between birds' free-range use and health and welfare of layers and broilers, as well as to the consequences for the nutrient load of the soil. Furthermore, health and welfare of different strains of layers and broilers in organic systems was we investigated.

In both broiler chickens and layers there was considerable individual variation in range use, and those "consistent rangers" could be distinguished from "inconsistent rangers", who only visited the range on some days. Furthermore, it was found that broilers walked longer distances in the willow zone than in the grass zone of the range, which may indicate that the birds preferred the willow. When studying the ranging of layers, most of hens were found in the barn, but they also visited the other areas frequently. No relationships were found between welfare problems and range use in individuals.

Manure and soil samples were analysed for parasite egg from 40 farms in Italy, Sweden and the Netherlands. Eggs from Ascaridia/Heterakis, the most common roundworms, were found in 71% of the farms. Furthermore, eggs from Capillaria (commonly called hair worm) were found in 7% of the manure samples. Very low levels or no parasite eggs were found in the soil samples in all countries. No relationship was found between parasite infection and free-range use, production or mortality in the hens. Flocks that had been treated with anti-parasite drugs had the same levels of parasites compared to the non-treated flocks.

Nutrient load of the soil was studied in Italy and Belgium. On the Italian farms, high values were found for nitrate and phosphorus, and the highest concentrations were found close to the house and then in the superficial layer of the soil. Furthermore, differences were found in concentrations of total nitrogen and organic carbon in the surface soil layers and deeper layers. A decrease in soil pH was found in all the farms when sampling was moved away from the houses. In the Belgian farm outdoor runs with willow were found to have more mineralised nitrogen, than runs with hazelnut. This was probably due to that the runs with hazelnut had a regular grass mowing between the trees, and mowing was not performed in the runs with willow.

The studies on the suitability of different strains of laying hens and broilers for organic production revealed that there were differences between hybrids regarding welfare and production. The Polish studies showed that the local broiler breed, Green-Legged Partridge, was more robust than the Sasso hybrid, and thereby more suitable for outdoor systems. In the Turkish study, white Atabey hens had higher egg production and a better feed utilisation than brown Atak-S hens. The Danish study found that Bovans Brown layers were either superior or equal to DeKalb White layers (DW) regarding all bird welfare and egg quality indicators. Furthermore, shelters in the range were highly used by the layers, and they seemed even more important for DW birds. The Swedish study found that gait score was significantly better in broilers in the outdoor range than in birds assessed indoors, although the number of chickens ranging at the time of visits was low in all flocks.

The FreeBirds project suggest that in order to promote bird welfare, as well as, to mitigate nutrient accumulation, the birds should be encouraged to range more extensively. Furthermore, rotation of the free-range areas are strongly recommended, to reduce the soil nutrients and parasite eggs. Moreover, to decrease the nutrients the outdoor run should be used more extensively, and the ground cover close to the house could be covered with material that can be periodically removed and refreshed.

It is important to note that both broiler and layer strains that are more suitable for organic production, in terms of welfare and range use, also are the strains that produce less.

2.2 Process *update of the whole project*

*(Please explain if the project achieved all its objectives and if not, what was the impact of deviations on fulfilment of the overall project objectives (e.g. what was not performed, why, what happened, what mitigation measures were employed, etc.). Please indicate possible deviations from the original project implementation plan per WP, maximum 1 page – font size 11)***.**

The FreeBirds project has been running according to the plan in general. The few parts that were reported to have been slightly postponed in the mid-term report, have now been finished.

Early in the project the methodology and the scoring protocol for both layers and broilers were developed, discussed and agree on, to have a consensus on data recording and enable data from the WPs to be possible to merge and interpret in the same way. A scientific paper of synthesising the whole project is drafted and will be submitted during autumn.

The technical problems with the tracking system of the individual hens in WP2 was solved and did not affect the progress of the project. This has required substantial effort from the people involved in that WP, and they have made a very good job.

Data recording of parasites and soil samples in WP3 were pooled, and a manuscript of the analysis has been submitted to a scientific journal.

Deviation from the original plan in WP4 was proposed, discussed and agreed between UMIL, ILVO and FCSR about carrying out soil sampling once, at the end of the production cycle, instead of twice. Nevertheless, data recording and analysis was performed within the time frame of our project.

All sub-studies of WP5 have been performed according to plans, and in total six papers have been published, and 4 more are drafted. Data recording in SE in WP5 was performed later than planned to fit with the criteria for timing of the data recording. However, in December of 2020 the final farm visits were made. Therefore, the severe outbreak of Bird flu in Sweden (Nov. 2020–March 2021) did not affect the activities of FreeBirds.

In summary, the few emerging problems of the FreeBirds project have been solved and there are no delays. Thus, the project has been running as planned, thanks to a well-working and dedicated group of partners.

Figure 1 a and b. Laying hens (Lohmann Selected Leghorn, LSL) in organic egg production

3. Outcomes of the project

3.1. Main results, discussion, conclusions and fulfilment of objectives

WP1	Project coordination, knowledge synthesis and dissemination

WP leader: Stefan Gunnarsson (SLU)
Responsible partners: Anja Brinch Riber (AU), all others

Overall summary of main results, discussion and conclusions of WP1
(maximum 1/2 pages per WP, font size 11)

The consortium has had workshops within the project group to connect the full network and establish common protocols for scoring and to calibrate the method. Regular well attended video meetings have kept the consortium scientists in close connections, even during the COVID-19 period. Thus, we have had discussions of facilitating the implementation of the plans, as well as discussion and planning of the dissemination of the results. The main part of the knowledge synthesis and dissemination has been performed during the latter half of the project, when the scientific publications have been elaborated, and a synthesis manuscript aimed for a scientific journal is under drafted during Autumn of 2021.

The project final webinar attracted >150 participants from 19 countries, which means that the FreeBirds project has reached out to stakeholders and scientists in countries without direct participation in project.

On national level the project has performed collaboration with national stakeholders, and partners have made presentations at national organic and/or poultry meeting on average once a year in every participating country. (For details see the list of 4.4.) Furthermore, during the project advisors in several countries e.g., in DK, SE and IT are continuously involved in the project, including participating in farm visits for data recording.

In total FreeBirds have had >90 publications, presentations, and other dissemination activities on national or internal level, and ~15 more are planned in near future (after June 2021).

Report on the results obtained (A), and fulfilment of objectives (B) comparing to the original project proposal *(maximum 2 pages per WP, font size 11, graphs and tables are allowed and included within maximum 2 pages limit per WP)*.

A- results obtained and structured in relation to the user groups they are relevant for:
The consortium has had three workshops within the project group; the 1st workshop was held in April 2018 in Gent with the focus to connect the full network and establish common protocols for scoring behaviour, performance, health and welfare parameters and to calibrate the methods for sampling, as well as analyses of parasitic load, gut health and soil nutrients. The 2nd workshop (in Oct 2018 in Bunnik NL) focused on updates on the practical work in all WP and discussion of adjustments of the plans. The 3rd workshop took place in Billund, DK in Oct 2019 and focused on the progress of the experiments in all WP and analysis of collected data. Furthermore, dissemination of the results was discussed, including presentations at conferences, articles for journals and fact sheets for end-users. Archiving dissemination material in the Organic E prints was also discussed.

On national level the project has collaboration with the EU project National practitioner groups in the Low-Input Farming and Territories and some dissemination activities were performed together, e.g. Furthermore, during the project advisors in several countries e.g. in DK, SE and IT are continuously involved in the project, including participating in farm visits for data recording.

Due to Covid-19 the final project workshop/seminar became a webinar. The zoom-webinar was held on the 22 of April 2021 at 9am-1 pm, and there were 179 registered participants from 19 countries. In a panel discussion at the end of the webinar three stakeholder representatives from NL, IT and SE were participating giving their view of the topics. Out of the participants 150 came from other organisation than the partner organisations, and out of these 102 were from outside the academia, i.e. advisory organisations, companies, media and governmental organisations. The 77 academy associated participants included researchers/teachers as well as graduate and undergraduate students. We were surprised to reach out so widely, and in this case the Covid-19 restrictions and use of webinar seem to have attracted more participant than a real-life event. Time as well as, natural resources was used efficient and environmental-friendly (e.g. no air flights needed).

B - fulfilment of objectives:

The WP has ensured effective internal and external project communication so information from the different WPs will be coordinated optimally, and gaps have been mitigated.

Furthermore, we have made sure the work in the various WPs have been linked to each other for efficient use of resources, e.g. data collected for WP3 has been performed in conjunction with the data recording for WP4 and WP5.

We performed coordinate training in scoring and other calibrations of methodology needed for data recording during the first workshop in Gent, as well as coordinated training of scoring with in WP5 for PL, DK and SE. The data recording in WP4 in IT and BE has also been calibrated.

An overview to project implementation provided and the leadership has monitored progress, and the quality of data recording has been assured, by regular video meetings within the full group, as well as within the group of WP leaders. Within all countries the partners have had regular contact with stakeholders, e.g. farmers participating in the projects and national advisors within organic poultry. FreeBirds partners have also made presentations at national events and produced national information materials aimed for national stakeholders.

All objectives described in the proposal has been fulfil with exception for that no physical meeting or workshops had been possible to perform during the COVID-19 pandemic, however, farm visits and experiments has not been obstructed by the pandemic restrictions.

WP2	Behaviour and welfare aspects

WP leader: Bas Rodenburg
Responsible partners: *UU, ILVO*

Overall summary of main results, discussion and conclusions WP2

More insights have been generated regarding the relation between individual chickens' free range use behaviour, health, welfare and performance. Two different approaches have been used: 1) the analyse of tracking data from a previous experiment on free range broilers at ILVO, 2) an experiment was conducted with free range laying hens to study preferences in range use and the relationship between range use and welfare problems. Both experiments took place at the research facility of ILVO, where broilers or laying hens were housed in mobile chicken units with access to two types of vegetation area, short rotation coppice and grassland with small hazelnut trees.

The broiler study was conducted with four groups of slow growing broilers (Sasso). Their free-range use was tracked using an ultra-wideband system, and active tags on the birds in a small backpack, which allows determining the exact location of individual birds. The birds' individual variation in free range was large, and we found that consistent ranger birds could be distinguished from inconsistent rangers, who only were outdoor on some days. Further, birds had a longer distance walked in the willow zone than in the grass zone of the free range, which may indicate a preference for the willow zone (Stadig et al., 2017).

The laying hen study was conducted in two rounds with two groups of laying hens (Novogen Brown). Their free-range use was tracked with a passive RFID system, with a leg ring and the birds' movements were tracked with antennas. The majority of the birds was registered in the barn, but they also visited the other areas. Besides a good health in general, most common welfare problems were footpad dermatitis, keel bone damage, comb damage. However, no significant relationships were found between these problems and range use, although it has previously been found that hens with keel bone fractures are range less. This could be because in our study relatively small mobile houses were housed, which may stimulate free range use even in birds with welfare problems and because welfare problems were relatively limited.

We conclude that offering variation in the free range is important to stimulate range use in both broiler and layers.

References

Stadig, L. M., T. B. Rodenburg, B. Ampe, B. Reubens and F. A. M. Tuyttens (2017). "Effects of shelter type, early environmental enrichment and weather conditions on free-range behaviour of slow-growing broiler chickens." Animal **11**(6): 1046-1053.

Report on the results obtained (A), and fulfilment of objectives (B) comparing to the original project proposal

A- results obtained and structured in relation to the user groups they are relevant for: free range poultry farmers and farm Adv.

The objective of WP2 was to generate more insight in the relation between individual chickens' free range use behaviour and their health, welfare and performance. This objective was addressed by two different approaches: 1) tracking data from a previous experiment at ILVO focused on free range broilers were analyzed, 2) an experiment was conducted with free range laying hens to study preferences in range use and the relationship between range use and welfare problems. Both experiments took place at the research facility of ILVO (Flanders Research Institute for Agriculture, Fisheries and Food, Belgium), where broilers or laying hens were housed in mobile chicken units with

access to two types of vegetation area, short rotation coppice and grass with small hazelnut trees (Figure 2).

Figure 2. Overview of the study site, with the two houses in the middle and the willow and grass area on either side of the house. In each experiment, each experimental group had access to a part of the free range with willows and a part with grass.

The broiler study was conducted with four groups of slow growing broilers (Sasso). Their free-range use was tracked using an ultra-wideband system. This system operates with active tags that are placed on the bird in a small backpack. The signal is received by beacons, which allows determining the exact location of individual birds. Based on these tracking data, we found that there was considerable individual variation in free use between broilers and that consistent rangers could be distinguished from inconsistent rangers, who only visited the free range on some days. Further, birds had a longer distance walked in the willow zone than in the grass zone of the free range. This may indicate a preference of the broilers for the willow zone (Table 1).

Table 1. Minimum distance walked in the broiler experiment in the mobile house, the area with grass and the area with willows.

Distance walked	**Zone**		
	Mobile house	Grass area	Willow area
Group 1	0.46 ± 0.01^{a}	1.09 ± 0.02^{b}	1.57 ± 0.07^{c}
Group 2	0.56 ± 0.01^{a}	0.86 ± 0.02^{b}	1.31 ± 0.06^{c}
Group 3	0.51 ± 0.01^{a}	0.89 ± 0.02^{b}	2.26 ± 0.06^{c}
All groups	0.51 ± 0.01^{a}	0.95 ± 0.01^{b}	**1.76 ± 0.04^{c}**

The laying hen study was conducted in two rounds with two groups of laying hens (Novogen Brown). Their free-range use was tracked with a passive RFID system. Each bird was fitted with a leg ring with a light passive RFID tag. Antennas were placed in the barn, near the barn, in the grass area and in the willows. The majority of the birds was registered in the barn, but laying hens also visited the other areas. No relationships were found between welfare problems and free-range use, based on the number of registrations by the RFID system and the time spent outside. Most commonly detected welfare problems were footpad dermatitis, keel bone damage, comb damage or a combination of these (Table 2).

Table 2. Number of registrations per animal and average and maximum time spent outside for hens with comb damage, footpad dermatitis, keel bone fractures or a combination of mild or severe welfare problems. No significant differences in free range use were found between groups.

Classification (n)	Number of registrations	Average time spent outside (min)	Maximum time spent outside (h)
Comb damage (7)	19.4 ± 3.8	31.5 ± 4.6	5.40 ± 2
Foot pad dermatitis (14)	16.7 ± 2.6	35.2 ± 5.5	4.16 ± 2
Keel bone fracture (13)	28.2 ± 4.4	22.1 ± 2.7	3.02 ± 1
Combination (23)	20.6 ± 2.2	26.5 ± 3.9	3.59 ± 1
Mild welfare problems (38)	22.3 ± 1.8	28.0 ± 2.1	3.46 ± 1
No welfare problems (4)	25.7 ± 8.9	24.2 ± 3.4	5.08 ± 3

B- fulfilment of objectives:

1. Understanding how free-range use influences behaviour and welfare of individual laying hens (fearfulness, plumage condition and keel bone damage): *see layer results.*
2. Knowledge on the potential of dark brooders to increase free range use (by comparing groups reared with and without dark brooders): *No effect of dark brooders found on free range use (not reported in detail here).*
3. Knowledge on the preferences of laying hens regarding free range cover (by comparing use of the SRC and hazelnut areas): *See broiler results.*
4. Detailed knowledge on the effects of external factors on individual free range in laying hens (age of the hens, time of day, weather conditions, and indoor conditions): *This has been difficult, due to malfunctioning of the ultra-wideband system for tracking laying hens. This question has partially been addressed by the approach with the passive RFID system (see results).*
5. Information on the possibilities of combining egg production with plant production and on effects of laying hens on parasites (WP3) and nutrients in the soil (WP4): *See WP3 & WP4 descriptions – finally only the collaboration with WP4 was realized. The work of WP3 was focused on on-farm research, and therefore the direct collaboration was less relevant.*

Publications

De Haas, E. N., T. B. Rodenburg and F. A. M. Tuyttens (2019). Visualising behaviour of individual laying hens in groups. Proceedings of the 53rd congress of the ISAE, Bergen, Norway, Wageningen Academic Publishers.

De Haas, E. N., T. B. Rodenburg and F. A. M. Tuyttens (2018). Fearfulness and keel bone damage in laying hens - does one lead to the other? ISAE Benelux – Regional meeting

Campbell, D. L. M., E. N. de Haas and C. Lee (2019). "A review of environmental enrichment for laying hens during rearing in relation to their behavioral and physiological development." Poultry Science 98(1): 9-28.

Stadig, L. M., F. A. M. Tuyttens, T. B. Rodenburg, P. Verdonckt, E. Wauters, L. Borremans and B. Reubens (2020). "Opportunities for short rotation coppice production on free-range chicken farms in Flanders: farmers' perceptions and cost-benefit analysis." Renewable Agriculture and Food Systems 35(3): 286-295.

WP3	Parasites and gut health

WP leader: Monique Bestman, Louis Bolk Institute
Responsible partners for gut parasites: Wageningen Livestock Research (NL), Swedish University of Agricultural Sciences (Sweden), Università degli Studi di Milano (Italy).
The results of the studies on gut health done by the Institute of Genetics and Animal Breeding of the Polish Academy of Sciences will be discussed in work package 5.

Overall summary of main results, discussion and conclusions of WP3

We investigated the relation between free-range use and infections with ascarids (Ascaridia galli and/or Heterakis gallinarum) and Capillaria spp. in organic laying hens, in order to find directions for preventive measures within the context of organic/free-range egg production. Therefore, we collected data from 40 commercial farms in total from IT, SE and NL. In all farms 6 mixed soil and 14 mixed manure samples were analysed with McMaster method. Furthermore, the farmers were interviewed about relevant management aspects of the farm and performance of the current flock.

We found that 71 % (median) of the manure samples contained ascarid eggs, with a median of 143 eggs/gram (EPG). The prevalence of ascarid eggs was highest in Sweden, followed by the Netherlands and Italy. Capillaria eggs were found in 7 % (median) of the manure samples, a median EPG of 5, and the proportion of manure samples with Capillaria eggs was (nearly) zero in Sweden and 14 and 18 %, respectively, the Netherlands and Italy. Of the soil samples, 0 % (median) contained ascarids eggs, with the lowest (nearly zero) in Sweden, followed by 17 % (median) in the Netherlands and Italy. Furthermore, Capillaria eggs were only detected in Italian soil samples: in 83 % (median) of the samples, with a median EPG of 83.

We did not find any significant relationship between parasite eggs in manure and the different parameters for range use or with flock health (as estimated by the farmer), egg production and mortality at 60 weeks of age. Solely the Dutch flocks were treated with anthelmintics, on average 4.8 times till 60 weeks of age. Despite these treatments, the infection level in Dutch flocks was like untreated Italian flocks.
The absence of clear relationships between parasite infections and flock health and production, gives space for further studies on preventive or tailor-made approaches aiming at a reduced use of anthelmintics.

Report on the results obtained (A), and fulfilment of objectives (B) comparing to the original project proposal *(maximum 2 pages per WP, font size 11, graphs and tables are allowed and included within maximum 2 pages limit per WP)* Please refer and link to published documents to illustrate results obtained and explain the results more in detail.

A- results obtained and structured in relation to the user groups they are relevant for:
Based on the Dutch results, a poster was presented at the ISAE Congress (http://www.isae2019.com), an abstract is submitted for IAHA, a preconference of the OWC (https://owc.ifoam.bio/2020/pre-conferences/organic-animal-husbandry-systems), an article was published in the Dutch farmers magazine 'Pluimveehouderij', presentations were given for on a Dutch organic fair and on the FreeBirds final results webinar and a scientific paper is submitted (June 16, 2021).

B- fulfilment of objectives:
Aims according to B4 (p.2) of the FreeBirds proposal applicable to WP3:

- generate more insight in the relation between chickens' free-range use and their health, performance and welfare.

- develop smart tools and management strategies for improvement of the free-range system in organic poultry production.
- create awareness among farmers about the relation between their management and health, welfare and environment and improve performance and production.
- contribute to a more sustainable organic poultry production, as well as to increased consumer acceptance and improved marketing of the organic products, as the knowledge acquired will enable farmers to optimize range use, in accordance with the intentions of the organic farming concept.

More insight in the relation between range use and gut parasites is obtained. The absence of clear relationships between parasite infections and flock health and production, gives room for further studies on preventive or tailor-made approaches (tools) aiming at a reduced use of anthelmintics. This is being communicated with target groups of farmers, veterinarians, advisors and scientists.

WP4	Nutrient load of the soil

WP leader: Valentina Ferrante, IT
Responsible partners: BE

Overall summary of main results, discussion and conclusions of WP4

The results of the WP lead to the recommendation to 'rotate' the free-range hens on various outdoor runs, to reduce the accumulation and risk of nutrient losses. It could be useful to use, in the rotation, crops with high needs of P. Moreover, since the nutrient concentrations close to the houses resulted high it is suggested to use outdoor running more extensively as well as spreading, in the area close to the hen house, wood shavings or a layer of litter to be periodically removed (for composting) and refreshed. These suggestions came both from Italy and Belgium trials. In fact, regarding Italian farms some statistically significant differences were found between the concentrations of total nitrogen and organic carbon in the surface layer (0-10 cm) and those of the second layer (10-30 cm), especially in the farm with fine textured soil. A decrease in pH was observed in all three farms as one moves away from the poultry house, with statistically significant results in two out of three cases. Hen droppings contribute to maintaining the pH of soils above neutral (7) and up to 7.5 where hens are more likely to be present (close to the house D1). Somewhat unexpectedly, total nitrogen concentrations seem to have an increasing trend as one moves away from the poultry house, with the highest values in the test area. The same is the case for organic carbon in the farm with artificial shelter with a light soil (rich in sand), for which the differences are even more pronounced, and the order is confirmed, with an increasing trend as one moves away from the poultry house (D1<D2<D3<T). This is supposed to be due to the hens' presence, which reduces the vegetation cover on the soil and consequently makes it more prone to organic matter loss. Finally, in all three farms, high values were found for both nitrate nitrogen (>50 mg NO3--N kg), and Olsen phosphorus (maximum values up to 500-1000 mg P/kg), particularly in the area close to the poultry house and for the most superficial layer (0-10 cm). The main results obtained in Belgium are related to the comparison between hazelnut and willow outdoor runs, in the second monitoring period (i.e., round 2), that resulted in large amounts of mineral nitrogen in the soil profile (0 – 90 cm) behind the willow, for all hens' pressures. This difference may be due to the removal of nitrogen from hazelnut through mowing and removing grass between the trees, while in the case of willows a large part of the nitrogen captured in the leaves is recycled on site. Moreover, the willow in the vicinity of the hen house could capture up to 60% of the excreted ammonia. Also, phosphorus and soil organic carbon (OC) contents seemed to be slightly higher in willows than in hazels in both in the topsoil and deeper. An increase in OC under willow might be a logical trend as high density of willows produces a large amount of litter and root material that is not removed.

Report on the results obtained (A), and fulfilment of objectives (B) comparing to the original project proposal.

A- results obtained and structured in relation to the user groups they are relevant for:

More knowledge and suggestions have been generated regarding how to manage the free range. The trials have been carried out in three Italian farm and in the experimental facilities at ILVO- Be. In Italy farms with free range enriched with forest, orchard or artificial shelters were tested; at ILVO the free range has willows and hazelnut. The following chemical parameters were determined on each sample: Dry matter, pH, total organic carbon, total Kjeldahl nitrogen, nitrate nitrogen, available phosphorus (Olsen method). Moreover, each farm has been characterized for texture (free range with forest), conductivity, cationic exchange capacity, total phosphorus, exchangeable potassium, and calcium carbonate (total and active). The main differences were found between the concentrations of the first layer (0-10 cm) and those of the second layer (10-30 cm), especially in the farm with fine textured soil. The differences were more marked for total nitrogen (Figure 3) and organic carbon, both more concentrated in the surface layer. Total nitrogen concentrations seem to have an increasing trend as one moves away from the poultry house, with the highest values in the test area. The same is the case for organic carbon in the farm with artificial shelter with a light soil (rich in sand), for which the differences are even more pronounced.

This is supposed to be due to the hens' presence, which reduces the vegetation cover on the soil and consequently makes it more prone to organic matter loss. In all three farms, high values were found for

both nitrate nitrogen, and Olsen phosphorus, particularly in the area close to the poultry house and for the most superficial layer (0-10 cm).

Figure 3 NO3-N in the different soil layers in farm with forest in the free range

This represents the most critical point in the results, with a strong accumulation especially for phosphorus and a risk in terms of runoff and leaching of two elements that can contribute to surface water (particularly phosphorus) or groundwater (particularly nitrogen) contamination. At the experimental facilities of ILVO two production rounds of organic laying hens were monitored. During the day, the hens had free access to the house by means of pop holes. In order to determine the effect of the presence of hens on soil quality, measurements were compared between sampling sites with variable animal pressure, in both types of outdoor runs: chicken-free reference zones versus frequently to rarely used by the hens. Soil monitoring at the end of the first monitoring period resulted in few or no significant differences in pH, OC and nutrients between the zones where there are likely to be none, few or many hens. However, some trends indicate that hens close to the house (chicken pressure high) stay more often or longer at the willow. At the end of the second monitoring period nitrate residue was higher especially near the house. This may be the nitrogen that can leach into ground and surface water during winter, and such high values indicate a potential source of pollution. The comparison between hazelnut and willow outdoor runs resulted in large amounts of mineral nitrogen in the soil profile behind the willow, for all hens' pressures. This difference may be due to the removal of nitrogen from hazelnut through mowing and removing grass between the trees, while in the case of willows a large part of the nitrogen captured in the leaves is recycled on site. Also, phosphorus and soil organic carbon contents seemed to be slightly higher in willows than in hazels in both in the topsoil and deeper. An increase in OC under willow might be a logical trend as high density of willows produces a large amount of litter and root material that is not removed.

B- fulfilment of objectives:

The aim of this work package was to provide knowledge that can help to reduce the environmental problems and the waste of nutrients in the soil of ranging areas around fixed stables. This will be done by development and testing of practical solutions and facilities (best practices) aimed at stimulating the birds to make optimal use of the range area, while at the same time maintaining the level of welfare that free-range systems provide. In each range area the vegetation cover was assessed, and samples of the soil was taken at different depths and distances from the stable for analyses of nutrient load, i.e. mineral nitrogen and phosphorus. In all the experiments was found a high level of nutrients close to the hen's house. To reduce it the suggestion are to rotate the free-range with crops with high requirement in P, moreover wood shavings or a litter layer can be applied, periodically removed (for composting) and refreshed.

WP5	Suitability of different strains

WP leader: Anja Brinch Riber, DK
Responsible partners: PL, TR, SE

Overall summary of main results, discussion and conclusions of WP5

The studies performed in WP5 on the suitability of different strains of laying hens and broilers for organic production revealed that there were differences between the examined hybrids in respect to welfare and production levels. The PL studies showed that the local breed of broiler chicken, the Green-Legged Partridge, is more robust than the Sasso hybrid and highly suitable for systems with outdoor access. However, it is not nearly as feed efficient as Sasso. In the TR study, Atabey hens (white) showed a higher egg production rate with better feed utilisation than Atak-S hens (brown). Furthermore, Atak-S hens were more prone to keel bone damage and development of feather pecking, but they showed less foot health issues and were less fearful at the individual level. The DK study revealed that Bovan's Brown layers seemed to be either superior or equal to DeKalb White layers in all the measured welfare indicators and egg quality parameters. However, DeKalb White had a higher egg production. Another key finding was that shelters in the range were highly used and seem to be more important for DeKalb White. The SE study showed that gait was significantly better in birds assessed in the outdoor range than in birds assessed indoors, but the proportion of chickens ranging at the time of visits was low in all flocks. Common for both organic broiler and laying hen farms was limited vegetation cover, other than pasture, and artificial shelters.
Thus, the studies showed that the hybrids most suitable for organic meat and egg production, as based on their welfare status and range use, mainly were those that also had a reduced production efficiency.

Report on the results obtained (A), and fulfilment of objectives (B) comparing to the original project proposal *(maximum 2 pages per WP, font size 11, graphs and tables are allowed and included within maximum 2 pages limit per WP)* Please refer and link to published documents to illustrate results obtained and explain the results more in detail.

A- results obtained and structured in relation to the user groups they are relevant for:
SE: Broiler chicken farm visits were performed in 2018 and included 8 out of (at the time) 12 commercial organic farms, on which either Rowan Ranger or HubbardJA57/HubbardJA87 were reared.
Each farm was visited for one day each (average flock age at farm visit 55±6 days). Data collection included farmer interviews, indoor environment assessments, behavioural observations, clinical examinations, gait scoring and an assessment of the free-range and chicken ranging behaviour. Clinical examinations revealed no severe remarks, however, minor to moderate plumage dirtiness, food pad dermatitis and hock burns were found in 47%, 21% and 13% of the birds observed, respectively. Higher body weight was significantly correlated to an increased prevalence of hock burns and dirty plumages. No severe walking impairments were observed, however, minor to moderate gait abnormalities were seen in two-thirds of the birds. Gait in birds assessed in the outdoor range was significantly better than in birds observed indoors. Results regarding housing and broiler health have been published (Göransson et al., 2020). The proportion of chickens ranging at the time of visit was low in all flocks. On six of the eight farms the observed free-range areas consisted of more than 80% pasture. Four of these contained no vegetation cover, or trees and bushes were only scarcely scattered throughout the range. Only in two farms did trees and bushes cover one fifth or more of the entire free-range area. A manuscript on the results regarding broiler behaviour and ranging behaviour is to be submitted soon.
The laying hen farm visits were performed during 2020 and included 11 commercial organic farms, predominantly with the Bovans White hybrid. Each farm was visited for one day each (average flock age at farm visit 74±2 weeks). Observations followed the same structure as the aforementioned broiler study. The data collected is yet to be analysed. Some preliminary results, however, include breast blisters found in 51% and keel bone deviations observed in 65% of the birds assessed. The free-range areas

consisted mainly of large areas of pasture, with limited vegetation cover and artificial shelters. However, farmers considered outdoor access to be the main advantage of organic poultry production.

PL: A local slow growing broiler hybrid, Green-legged Partridge (GLP) was compared with a commercially available slow-growing genotype of broilers, Sasso. We ranked the birds based on their range use frequency and distributed them into 3 ranging profiles: outdoor-preferring ranging profile, moderate-outdoor ranging profile and indoor-preferring ranging profile. Positive associations between ranging profiles and different welfare indicators were identified within each breed examined (Marchewka et al., 2020). Next focus was on the gastrointestinal tract morphometrics, small intestine microstructure, amount of pasture and feed ingested (Marchewka et al., 2021). We found that intestinal villi in terms of their height and area were the lowest for indoor-preferring Sasso, as compared to outdoor-preferring ones. In the crops of the moderate-indoor GLP there was more pasture matter identified, as compared to other ranging profiled birds of that breed. Therefore, the level of the development of the gastrointestinal tract and its content may be considered as potential retrospective indicators of the birds ranging profile. Furthermore, associations between weather parameters and range use were identified for 30% of GLP and Sasso chickens. Weather explained up to 35% of the range use variability. Between breeds, range use associations with different weather parameters were identified: negative associations with relative humidity were most frequently observed in GLP, while positive associations with atmospheric pressure was most common in Sasso (Sztandarski et al., 2021). These findings support the idea that ranging areas design should accommodate individual preferences/needs, e.g. by including provision of multiple construction and vegetation elements. Finally, positive associations between neck plumage, beak darkness measurements, comb length and comb height and frequency of range use were identified for Sasso. Sasso hens scored with darkest neck plumage and biggest comb size ranged the most, while their external features were positively correlated, except beak darkness and comb length (Sztandarski et al., accepted). No associations between ranging and external features were found in Green-legged Partridge birds, except that their comb height was positively correlated with neck plumage and beak darkness. The examinations of gastrointestinal tract in birds with different ranging profiles, weather effects on the range use and external features associations with range use were top-up investigations to the one on welfare originally planned in the proposal.

TR: Two experiments were performed in Uludag University farm using laying hens and broilers, respectively. In the first experiment with laying hens, the suitability of two local egg-type genotypes from the Turkish Poultry Research Institute (Atak-S, brown egg genotype, and Atabey, white egg genotype) were evaluated in a free-range system for their production performance, behaviour and welfare during the entire laying period (19-72 weeks of age). The findings are reported in Sözcü et al. (2021) and Sözcü et al. (submitted). Atabey hens showed a higher egg production rate with better feed utilisation, as well as better yolk, albumen, and eggshell quality, than Atak-S hens. However, the Atak-S hens gave higher egg weight, darker yolk colour, stronger shell structure, and a lower level of SFAs in yolk. Furthermore, Atak-S hens were more prone to keel bone damage and development of feather pecking, but they showed less foot health issues and were less fearful at the individual level. These findings on genotype effects could help producers in their choices for profitable production and for meeting consumer demands on egg quality and egg yolk fatty acid levels. The findings could contribute to more sustainable poultry production by improving the use of safe and more natural production systems and increase customer satisfaction.
In the second experiment, two alternative slow growing broiler genotypes (Sasso and Hubbard ISA Red JA) were used to determine the broiler performance, welfare assessment and behavioural patterns. The experiment is completed and the data is presently being analysed.

DK: Two commonly commercially available layer hybrids, DeKalb White (DW) and Bovans Brown (BB), were compared in regard to range use and different welfare indicators during the first third of the laying period (age 17-38 of age; Riber et al., in prep). The results showed that more DW hens were observed present anywhere on the range in weeks 17-25 and fewer in weeks 27-32 than BB. In terms of ranging

distances, DW had the longest in weeks 17-24, but shortest in weeks 26-38. A larger proportion of DW used the shelters compared to BB throughout the experimental period. At the end of the experimental period, a larger proportion of bare ground was recorded in ranges of BB compared to DW. The vegetation height was generally lower in ranges of BB but increased with distance from the pop holes for both hybrids. The plumage condition was better in BB hens than in DW. The prevalence of keel bone fractures furthest away from the tip was more than three times more likely for DW compared to BB, whereas keel bone fractures in the section closest to the tip were more common in BB than DW. Fractures at the tip are considered less severe than those further up on the keel bone. It was 3.5 times more likely for DW compared to BB to have footpad lesions. The prevalence of comb wounds, which is most often caused by aggressive pecks, was higher in DW than BB. DW had a higher mortality compared to BB. BB weighed more than DW and had a lower egg production. DW laid more floor eggs (i.e. second grade eggs), lighter eggs that also had a lighter eggshell. Thus, BB seemed to be either superior or equal to DW in all of the measured parameters, except egg production and, based on existing knowledge, likely also feed efficiency. Another key finding was that shelters in the range were highly used and seem to be particular important for DW. Data were also collected on the individual level, allowing for examination of associations between range use and different welfare indicators. These data are planned to result in an additional peer-reviewed article to the one on hybrid suitability originally planned in the proposal.

B- fulfilment of objectives:
According to the FreeBirds proposal, the objective in WP5 was to evaluate the suitability of different genotypes for organic meat and egg production using a range of welfare indicators, including production parameters. This was fulfilled by all partners in WP5.

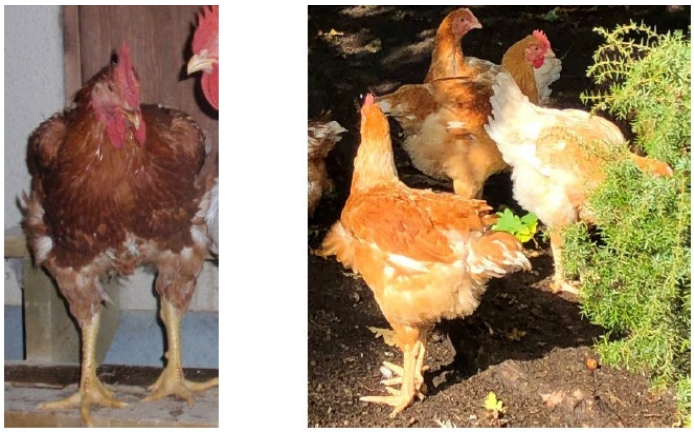

Figure 4. The strains of broiler chickens, Rowan Ranger and HubbardJA57/HubbardJA87 *studied in Sweden (Photo: Stefan Gunnarsson)*

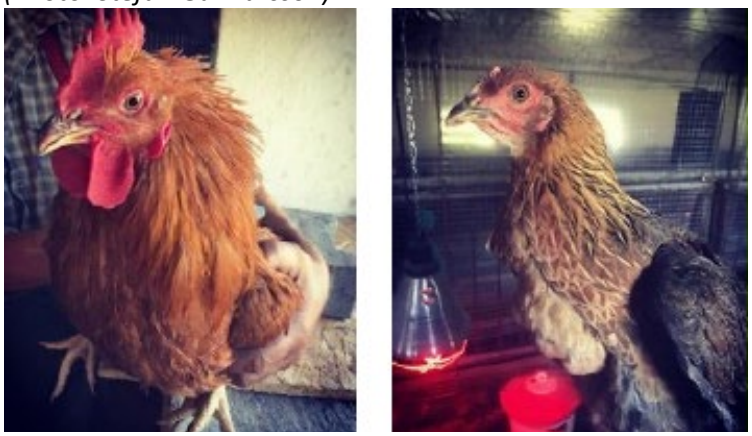

Figure 5. The strains of broiler chickens, Sasso C44 and Green-legged partridge, studied in Poland (Photo: Joanna Marchewka)

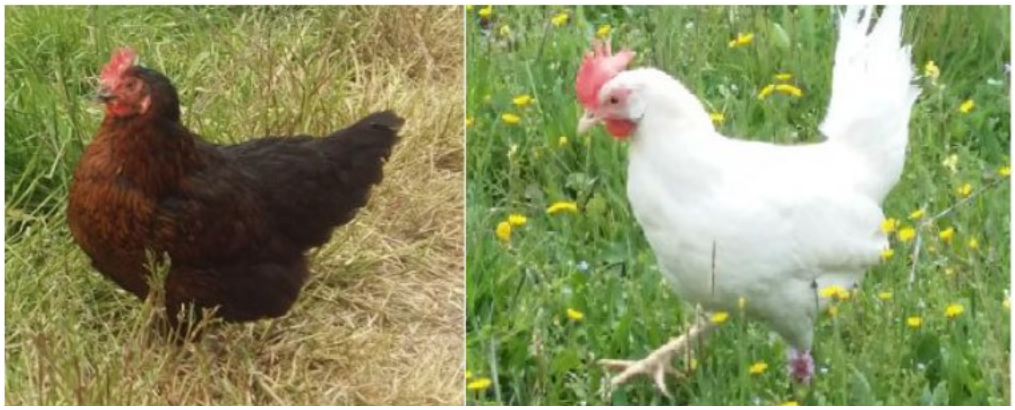

Figure 5. The strains of layers, Atak-S, and Atabey, studied in Turkey (Photo: Arda Sözcü)

Figure 7. The strains of layers, Bovans Brown and DeKalb White, studied in Denmark (Photo: Anja Brinch Riber)

3.2 Deliverables and milestones status

Deliverable No.	Deliverable name	Link to the document[2)]	Planned delivery month[1)]	Actual delivery month[1)]	Reasons for changes/delay and explanation of consequences in case of delay, if any
D1.1	1st Annual report		12	12	NL (2 times), DK (2 times), PL has performed annual report to national funders.
D1.2	Mid-term report		18	18	
D1.3	2nd Annual report		24	24	NL (2 times), DK (2 times), PL has performed annual report to national funders.
D1.4	Prototype of national leaflet		35	36	Under development
D1.5	National leaflets		36	36	Under development
D1.6	Final report		36	36	
D2.1	Effects of individual free-range use on laying hen behaviour and welfare		36	36	Under development, D2.1, 2.2 and 2.3 combined in single paper
D2.2	Effects of dark brooders and range cover on laying hen range use		36	36	Under development, D2.1, 2.2 and 2.3 combined in single paper
D2.3	Factors affecting individual range use in laying hens		36	36	Under development, D2.1, 2.2 and 2.3 combined in single paper
D3.1	Protocols for soil and manure sampling, range management in hens		3	3	
D3.2	Protocol for gut health and range use in broilers		3	3	
D3.3	Database studies on parasites in hens		24	30	
D3.4	Database gut health in broilers		24	24	
D3.5	Final report/paper parasites in hens		32	36	
D4.1	Set up of protocol for on farm data collection		3	3	
D4.2	Data base with all the collected data		24	24	
D4.3	Paper on relation between free range design and nutritional load		30	36	
D4.4	Data collection in experimental facilities		24	24	
D4.5	Paper on free range use and nutritional load		30	30	
D5.3	Database for all WP5 studies		24	24	
D5.4	Assessment on commercial farms (broilers and layer)		24	24	

D5.5	Suitability of commercial breeds of organic laying hens in Denmark		30	30	
D5.6	Suitability of commercial breeds of organic broiler in Poland		30	30	
D5.7	Suitability of commercial breeds of organic chickens in TR		30	30	
D5.8	Suitability of commercial breeds of organic broiler and layers in Sweden		30	30	

1) Measured in months from the project start date (month 1)

2) E.g. documents as orgprints.org/33121 or other types of deliverable (e.g. APPs or devices)

Milestone No.	Milestone name	Planned delivery month[3)]	Actual delivery month[3)]	Reasons for changes/delay and explanation of consequences, if any.
M1	Project workshop 1: Detailed work plans for all WP including contingency plan agreed	1	1	
M2	Consensus in experimental methodology laying hens	3	3	
M3	Consensus in experimental methodology broilers	3	2	
M4	Consensus in experimental methodology	3	2	
M5	Experimental studies start	6	4	
M6	Project workshop 2: Facilitate practical data recording in WP2-5	7	7	
M7	Experimental studies finish	24	24	
M8	Data collection finished and database created layers	24	24	
M9	Data collection finished and database created broilers	24	24	
M10	Data collection finished and database created	24	24	
M11	Project workshop 3 Facilitate data analysis	24	24	
M12	Submission of peer reviewed Articles – IT/BE	30	30	
M13	Submission of peer reviewed Articles - AU	30	30	
M14	Analyses finalised	32	32	
M15	Project workshop 4 and scientific workshop	33	36	FreeBirds Final Zoom Webinar 22 of April 2021
M16	Reporting	36	36	
M17	Results disseminated at national levels	36	36	
M18	Submission of peer reviewed articles or congress contributions	36	36	
M19	Results disseminated at national level- IT/BE	36	36	
M20	Results disseminated at national level - DK	36	36	

3) Measured in months from the project start date (month 1)

4. Publications and dissemination activities

4.1 List extracted from Organic Eprints

(Publications affiliated to European Union > CORE Organic *Cofund > "project acronym", grouped by Eprint type,* with *date* of *extraction)*

(The list can *have these headers:* ***http://orgprints.org/view/type/***
Publications that are not allowed as open access should be deposited as "Visible to: Depositor and staff only". The funding bodies *and project evaluators* will be granted access to these during the evaluation. *Guidance on the use of Organic Eprints can be found here: http://orgprints.org/help/ and* ***a screenshot*** *manual is available here:*
http://coreorganic2.org/Upload/CoreOrganic2/Document/2013_%20Screenshot%20manual_orgeprints.pdf)

{Project} FreeBirds: *FreeBirds - Optimising the use of the free range as the key to improve organic chicken production.* Runs 2018 - 2021. Project Leader(s): Gunnarsson, Dr Stefan; Anja Brinch Riber, Dr Anja; Bestman, Dr Monique; Rodenburg, Prof. Bas and Ferrante, Dr Valentina, Swedish University of Agricultural Sciences (SLU) .

Ak, İbrahim and Duman, İbrahim (Eds.) (2019) Türkiye 6. Organik Tarım Sempozyumu. [6th symposium on organic agriculture.] İzmir Fuarcılık Hizmetleri Kültür ve Sanat İşleri, İzmir.

Aydın, İpek and Arda, Sözcü (2018) Uludağ Üniversitesi'nde FreeBirds Projesi. [Introduction of FreeBirds in Uludag University.] Uludag University , Bursa, Turkey. Online at https://uludag.edu.tr/haber/view/4136: Introduction of the organic egg production, accessed on: February 2018.

{Project} *Introduction to the FreeBirds project.* Runs 2019 - 2019. Project Leader(s): İpek, Dr. Aydın, Bursa Uludag University.

Bestman, Monique (2021) Worminfecties bij biologische leghennen. Lecture at: [Completed]

Bestman, Monique; Niekerk, van, Thea; Göransson, Lina; Ferrante, Valentina; Gunnarsson, Stefan; GRILLI, GUIDO; Haas, de, Elske; Rodenburg, Bas and Arndt, Saskia (2021) Gut parasite infections and free-range use in organic laying hens. Speech at: FreeBirds - Encouraging organic chickens and laying hens to be more outdoor. Final project webinar, Online, April 22, 2021. [Completed]

Bestman, Monique; Niekerk, van, Thea; Haas, de, Elske; Ferrante, Valentina and Gunnarsson, Stefan (2019) Role of range use in infections with parasites in laying hens. *CORE Organic Newsletter October 2019*, 2019.

Bestman, Monique (2019) Health and welfare in organic egg production. .

Bestman, Monique (2018) Verbeteren van de biologische pluimveehouderij aan de hand van de kippenuitloop. Lecture at: Presentation at Organic food & farming fair., Zwolle, the Netherlands, 17 January 2018. [Completed]

Bestman, Monique; Niekerk, van, Thea; Haas, de, Elske; Ferrante, Valentina and Gunnarsson, Stefan (2019) Role of range use in infections with parasites in laying hens. *CORE Organic Newsletter October 2019*, 2019.

Ferrante, Valentina; Ferrari, Lorenzo and Tognoli, Cristina (2019) FreeBirds leaflet - Introduction to the project. .

FERRARI, LORENZO; FERRARI, PAOLO; MANTOVI, PAOLO; GRILLI, GUIDO and FERRANTE, VALENTINA (2020) Più benessere per polli e galline. [More welfare for hens and broiler.] *AGRONOTIZIE*, 2 July 2020, p. 1.

Göransson, Lina; Yngvesson, Jenny and Gunnarsson, Stefan (2020) Bird health, housing and management routines in Swedish organic broiler chicken farms. *Animals*, 10 (11), p. 2098.

Kongsted, A.G. (2021) Improving sustainability and welfare in organic poultry and pig production. Speech at: joint conference of four research projects, OK-Net EcoFeed, PPILOW, FreeBirds and POWER, 25-26/01/2021.

Loon, van, M (2018) Minder worminfecties bij optimaal gebruik uitloop. *Pluimveeweb*, 2018, 7 Marc.

MOERMAN, Marie and RONDIA, Alain (2019) L'élevage des volailles en agriculture biologique - LE PARCOURS AMÉNAGÉ. [Poultry breeding in organic agriculture - the outdoor run enrichment.] Centre wallon de Recherches agronomiques, Belgique, Gembloux.

Schotman, T (2018) Minder worminfecties als kippen uitloop veel en verspreid gebruiken. *Pluimveeweb*, 2018.

Tahamtani, Fernanda; Berenjian, Atefeh; Gunnarsson, Stefan and Riber, Anja B. (2019) Presentation at ISAE 2019 - Bergen, Norway. In: *Proceedings of the 53rd Congress of the ISAE*, Wageningen academic publishers, p. 199.

Tahamtani, Fernanda and Brantsæter, Margrethe (2019) Discussion of the project with the manager of the Norwegian Poultry Association. . [Completed]

Tahamtani, Fernanda and Riber, Anja B. (2019) Finding the best laying hens for organic farms - CORE Organic Cofund newsletter. *CORE Organic Newsletter, October 2019*, October 2019, p. 4.

Vaarst, Mette; Roderick, Stephen; Martin, Guillaume; Gunnarson, Stefan; Neff, Anet Spengler; Bieber, Anna and Kongsted, A.G. (2020) Potentials, challenges and visions for future European organic animal farming. In: Schmid, Otto; Johnson, Marion; Vaarst, Mette and Früh, Barbara (Eds.) *Proceedings of the Organic Animal Husbandry systems – challenges, performance and potentials*, pp. 11-22.

Züleyha, Kahraman; Aydın, İpek and Arda, Sözcü (2019) Avrupa Birliği Projesi (FreeBirds) Kapsaminda Yerli Ticari Yumurtacı Hibritlerimiz Serbest Sistem Yetistirme Sartlarinda Denenmesi. [Comparison of Turkish layer hybrids in organic project by EU project (Freebirds).] TAGEM , Poultry Research.

Schmid, Otto; Johnson, Marion; Früh, Barbara and Vaarst, Mette (Eds.) (2020) Organic Animal Husbandry systems – challenges, performance and potentials-Proceedings of the IAHA Video-Conference on Organic Animal Husbandry - 21. and 22. September 2020 linked to the 20th Organic World Congress of IFOAM 2021. 3 p. 1. Proceedings of IAHA Video-Conference on Organic Animal Husbandry, video, 21. and 22. September 2020. [Completed]

Ipek, Aydın (2019) Encouraging organic chickens and hens to be more outdoors-FreeBirds. Bursa Uludag University , Department of Animal Science, Bursa.

Date of *extraction: 29th of June 2021.*

4.2. Stakeholders oriented articles in the CORE Organic newsletter

- *(Please insert* links to the articles *and order them according to the user groups addressed)*

Layer sector, Farmers, advisors, researcher etc.

1. CORE Organic Newsletter: Role of range use in infections with parasites in laying hens https://projects.au.dk/coreorganiccofund/news-and-events/show/artikel/what-is-the-role-of-range-use-for-infections-with-parasites-in-laying-hens/
2. CORE Organic Newsletter: Range use and plumage condition of two laying hen hybrids in organic egg production https://projects.au.dk/coreorganiccofund/news-and-events/show/artikel/finding-the-best-laying-hens-for-organic-farms/
3. CORE Organic Newsletter: Free range soil: more management, less nutrient levels, better environment https://projects.au.dk/coreorganiccofund/news-and-events/show/artikel/free-range-soil-more-management-less-nutrient-levels-better-environment/

Broiler sector, Farmers, advisors, researcher etc.

4. CORE Organic Newsletter: How is the bird health at Swedish organic broiler farms? https://projects.au.dk/coreorganiccofund/news-and-events/show/artikel/how-is-the-bird-health-at-swedish-organic-broiler-farms/
5. CORE Organic Newsletter: Organic chickens using the free-ranges are often in better welfare condition https://projects.au.dk/coreorganiccofund/news-and-events/show/artikel/organic-chickens-using-the-free-ranges-are-often-in-better-welfare-condition/

4.3. Practice abstracts

(Please insert links to the practice abstracts from the platform: https://organic-farmknowledge.org/)

1: Promoting laying hens to use the outdoor range more (under publication in June 2021)

2: Promoting broiler chickens to use the outdoor range more (under publication in June 2021)

4.4. *Other dissemination activities and material*

(List other dissemination activities or dissemination material which cannot be uploaded to Organic Eprints. Please sort them by partner countries and indicate activity/material type)

Country	No	Title	Target group	Language	Activity	Date
SE	1	Introduction to the FreeBirds project http://projects.au.dk/coreorganiccofund/research-projects/freebirds/:	Farmers (Farm.), Advisors (Adv.) Breed. Comp, Researchers (Res.)	Eng.	Web activ.	Nov 2018
	2	Hur mår svenska ekologiska slaktkycklingar? Centre for Organic Food and Farming (EPOK), Swedish University of Agricultural Sciences (SLU) https://www.slu.se/ew-nyheter/2020/5/hur-mar-svenska-ekologiska-slaktkycklingar/	Farm., Adv.	Swed.	Web.	20 May 2020
	3	FreeBirds - Encouraging organic chickens and laying hens to be more outdoor https://www.slu.se/freebirds	Farm., Adv., Poult. comp., Res., Breed., Policy Makers (PM)	Eng.	Web.	Jun 2021
	4	Göransson, L. Free-ranging and bird welfare in broiler chickens and laying hens on Swedish organic farms. Half-time seminar (PhD project), SLU.	Res.	Eng.	Seminar (Sem.) /worksh ops (WS)	29 Sep 2020
	5	Gunnarsson, S. Presentation of FreeBirds At the "National organic advisor day" in SE (virtual meeting)	Authorities (Auth.), Farm. Adv.	Swed.	Sem. WS	6 Oct 2020
	6	Gunnarsson, S. Presentation of FreeBirds At the "Animal health for organic Adv." by EPOK SLU (virtual meeting).	Auth., Adv., Stakeholders (SH) and Res.	Swed.	Sem. WS	3 Dec 2020
	7	Gunnarsson, S. Presentation of FreeBirds At the "National veterinary poultry meeting" in Sweden (virtual meeting).	Auth., Adv., SH and Res.	Swed.	Sem. WS	14-15 Apr 2021
	8	FreeBirds - Encouraging organic chickens and laying hens to be more outdoor. Final project webinar, 9:00h-13.00h. Oral	Farm., Adv., Poult.	Eng.	Sem. WS	22 Apr 2021

		presentations by all participating partners and panel discussion.	comp., Res., Funders (Fund.)			
	9	Eko-kycklingar som är mer utomhus är friskare, Swed. research newsletter about results from Polish study https://www.slu.se/friskare/	Farm., Adv., Res.	Swed.	Popular article	Nov 2020
	10	Hälsa och välfärd hos långsamväxande slaktkycklingar. Swed. research newsletter. https://www.slu.se/langsamvaxande/	Farm. Advis. Res.	Swed.	Pop art	Mar 2021
	11	Lockande uteliv ger friskare höns. Swed. research newsletter. https://www.extrakt.se/lockande-uteliv-ger-friskare-hons/ In "Electronic Newspaper "from funder Formas	Farm., Adv., Res.	Swed.	Pop art	Apr 2021
	12	Biannual Swed. Poultry science meeting National veterinary institute (SVA) (Oct 2018)	Adv., Poult. comp.	Swed.	Poult. conf.	Oct 2018
	13	Göransson, L Bird welfare in slower-growing hybrids on Swedish commercial organic broiler chicken farms. Virtual conference, European College of Animal Welfare and Behavioural Medicine (ECAWBM) http://www.ecawbm.com/2020-awsel-virtual-meeting/	Res.	Eng.	Poult. conf.	1 Oct 2020
	14	Farm visits (2 times) together with national poultry advisor	Adv.	Swed.	Other diss. activ. (Other)	Autumn 2018
	15	Gunnarsson, et al. Presentation in CO science café in Bari, Italy	Res.	Eng.	Poster	30 Jan 2019
IT	16	FreeBirds, il progetto per incoraggiare i polli e le galline a stare all'aperto. Web news about project description and aims. http://www.crpa.it/nqcontent.cfm?a_id=20866&tt=crpa_www&sp=crpa	Farm., Adv., Res., Poult comp.	Ital.	Web	Jul 2020
	17	'FreeBirds', the project encouraging organic chickens and hens to be outdoor. Web news about project description and aims. http://www.sinab.it/node/23344	Farm., Adv.	Ital., Eng.	Web	Jul 2020
	18	Avicoltura a congresso. Web news about final project webinar.	Farm., Adv.	Ital.	Web	Mar 2021

		https://agronotizie.imagelinenetwork.com/zootecnia/2021/03/26/avicoltura-a-congresso/69851				
	19	Webinar FreeBirds, il 22 aprile saranno illustrati i risultati del progetto di ricerca. Web news about final project webinar. https://zootecnica.it/2021/03/17/webinar-freebirds-il-22-aprile-saranno-illustrati-i-risultati-del-progetto-di-ricerca/	Farm., Adv., Poult comp.	Ital.	Web	Mar 2021
	20	FreeBirds, pratiche efficaci per l'avicoltura biologica all'aperto. Web news about final project webinar. http://www.crpa.it/nqcontent.cfm?a_id=22141&tt=crpa_www&sp=crpa&print_in=1	Farm., Adv., Res., Poult comp.	Ital.	Web.	April 2021
	21	Allevamento biologico della gallina ovaiola e utilizzo del parchetto esterno, il 24 giugno il webinar FreeBirds. Web news about project national webinar. https://www.unaitalia.com/allevamento-biologico-della-gallina-ovaiola-e-utilizzo-del-parchetto-esterno-il-24-giugno-il-webinar-freebirds/	Farm., Adv., Poult comp.	Ital.	Web.	May 2021
	22	FreeBirds "Allevamento biologico della gallina ovaiola e utilizzo del parchetto esterno". Web news about project national webinar. http://www.esp.unimi.it/ecm/home/aggiornamenti-e-archivi/tutte-le-notizie/content/freebirds-allevamento-biologico-della-gallina-ovaiola-e-utilizzo-del-parchetto-esterno.0000.UNIMIDIRE-92244	Res., students	Ital.	Web.	May 2021
	23	Webinar Allevamento di polli e galline al pascolo. Web news about project national webinar. https://www.biozootec.it/zootecnia/webinar-24-6-2021	Farm., Adv.	Ital.	Web.	May 2021
	24	Zootecnia biologica: allevamento di polli e galline al pascolo. Web news about project national webinar. http://www.sinab.it/bionovita/zootecnia-biologica-allevamento-di-polli-e-galline-al-pascolo	Farm., Adv.	Ital.	Web.	May 2021
	25	Ovaiole in libertà	Farm., Adv.	Ital.	Web.	Jun 2021

		Web news about project national webinar. https://agronotizie.imagelinenetwork.com/zootecnia/2021/06/17/ovaiole-in-liberta/70800?utm_source=notifiche&utm_medium=email&utm_campaign=notifica-azienda-7725&utm_content=kANArticolo-70800				
	26	CRPA Informa n. 13 – giugno 2021 Web news about project national webinar. http://www.crpa.it/media/documents/crpa_www/blog/CRPA_Informa_13_2021_002.pdf	Farm., Adv., Poult. comp.,	Ital.	Web.	Jun 2021
	27	Freebirds - Allevamento biologico della gallina ovaiola e utilizzo del parchetto esterno. Project national webinar, 17:00h-18:30h. Oral presentation and Q&A session.	Farm., Adv., Poult. comp., Res., Fund.	Ital.	Sem WS	24 Jun 2021
	28	V. Ferrante, L. Ferrari, P. Mantovi e P. Ferrari. FreeBirds etica e benessere animale per l'allevamento biologico all'aperto di polli e galline. https://agrimpresaonline.it/wp-content/uploads/2021/05/6-2021low.pdf	Farm., Adv., Poult comp.	Ital.	Pop art	May 2021
	29	Ferrante, V.,Tognoli, C., Ferrari, L., Ferrari, P., Bestman, M., Gunnarsson, S. (2021). Relation between range use and parasitic infection in Italian organic laying hens. 7th Mediterranean Poultry Summit, Cordoba, Spain.	Res.	Eng.	Poult. conf.	8-10 Jun 2022
DK	30	Farm visit together with national organic poultry advisor	Adv.	Dan.	Other	Autumn 2019
	31	Tahamtani, F.M., Riber, A.B. Progress report to Innovation Fund Denmark	Fund.	Eng.	Other	Nov. 2018
	32	Tahamtani, F.M., Riber, A.B. Annual progress report to Innovation Fund Denmark	Fund.	Eng.	Other	Mar 2019
	33	Riber, A.B. Annual progress report to Innovation Fund Denmark	Fund.	Eng.	Other	Mar 2020
	34	Riber, A.B. Final report to Innovation Fund Denmark	Fund.	Eng.	Other	Mar 2021
	35	FreeBirds project on personal Research gate site of De Haas E.N. Encouraging organic chickens and hens to be more	Res.	Eng.	Web.	Aug 2018

		outdoor https://www.researchgate.net/project/Freebirds				
NL	36	FreeBirds: Kippen stimuleren om meer buiten te lopen (2018-2021). https://www.pluimveeloket.be/Bio-pluimveehouderij/Uitloop	Farm., Adv.	Dutch	Web.	May 2019
	37	Internal information on the Freebirds project at the ILVO intranet site and for the general public open access ILVO information site www.ILVO.be	Farm., Adv., Breed., Res.	Dutch and Eng.	Web.	Sep 2019
	38	FreeBirds project mentioned on personal LinkedIn site of De Haas E.N. with link to project site	Res., industry, NGO's	Eng.	Web.	Sep 2019
	39	Bestman, M. Worminfecties, ontwormen en aanbevelingen voor pluimveehouders. Oral presentation. Location: Pittem, Belgium.	Farm. Adv.. (N = 20)	Dutch	Sem. WS	9 Mar 2020
	40	Bestman, M. Worminfecties, ontwormen en aanbevelingen voor pluimveehouders. Oral presentation. Location: Ramsel, Belgium.	Farm. Adv.. (N = 12)	Dutch	Sem. WS	9 Mar 2020
	41	Excursions to Agroforestry systems with chickens (Netherlands and Belgium)	Farm., Adv., Poult. comp.	Dutch	Excur.	Sep 2018
	42	Bestman M, Niekerk T van, Haas EN de, Ferrante V, Gunnarsson S (2019). Role of range use in infections with parasites in laying hens. Abstract for 53rd Congress of the International Society for Applied Ethology. Bergen, Norway Poster	Res., Adv.	Eng.	Poult. conf.	Aug 5th-9th 2019
	43	Rodenburg, T.B. Annual progress report to NWO (Netherlands' Organisation for Scientific Research)	Fund.	Eng.	Other	Autumn 2019
PL	44	Joanna Marchewka, Patryk Sztandarski, Zaneta Zdanowska-Sąsiadek, Krzysztof Damaziak, Franciszek Wojciechowski, Anja B. Riber, and Stefan Gunnarsson. 2020. Associations between welfare and ranging profile in free-range commercial and heritage meat-purpose chickens (Gallus gallus domesticus). Poultry Science. 99:4141-4152. https://doi.org/10.1016/j.psj.2020.05.044	Adv., Res.	Eng.	Scient publ	Sep 2020

	45	Sztandarski, P., Marchewka J., Wojciechowski, F., Riber, A.B., Gunnarsson, S., Horbańczuk, J.O. 2021. Associations between individual free range use by commercial and heritage chickens and weather conditions. Poultry Science. https://doi.org/10.1016/j.psj.2021.101265	Adv., Res.	Eng.	Scient publ	Apr 2021
	46	http://www.ighz.edu.pl/projekty-zagraniczne	Res., students	Pol. Eng.	Web.	May 2018
	47	Marchewka J. (2019) Excursion to organic poultry breeder	Farm., breeders	Pol.	Other	25 Jul 2018
	48	Marchewka J. (2019) Excursion to organic poultry breeder	Farm., breeders	Pol.	Other	25 Jul 2018
	49	Marchewka J. Annual progress report to NCBiR (Pol. funder)	Fund.	Pol.	Other	Mar 2019
	50	Marchewka, J., Sztandarski, P., Zdanowska-Sąsiadek, Z., Adamek-Urbańska, D., Damaziak, K., Wojciechowski, F., Riber, A.B., Gunnarsson, S. 2021. Gastrointestinal tract morphometrics and content of commercial and heritage meat-purpose chickens with differing free-ranging profiles. Animals 2021, 11, 1881. https://doi.org/10.3390/ani11071881	Adv., Res.	Eng.	Sci. publ.	June 2021
	51	Sztandarski, P., Marchewka J., Wojciechowski, F., Riber, A.B., Gunnarsson, S., Horbańczuk, J.O. Neck plumage and beak darkness, as well as comb size, are associated with ranging frequency in Sasso chickens. In Print Poultry Science. *Accepted*	Adv., Res.	Eng.	Scient publ	May 2021
BE	52	LEGCOMBIO: Optimaliseer de uitloop van uw kippen! In the newsletter of the Pluimveeloket. https://mailing.ilvo.be/mailcamp/display.php?List=12&N=219.	Farm., Adv.	Dutch	Web.	May 2020
	53	Bracke, J. Duurzame combinaties van plantaardige teelten met uitloop voor pluimvee. https://www.ccbt.be/?q=node/4112	Farm., Adv.	Dutch	Web.	Oct 2020
	54	Van Grimbergen D, Decroos T. Exchange visit to Agroforestry system with chickens in a forestry system.	Farm., Adv., Poult. comp.	Dutch	Sem. WS	6 Dec 2018
	55	Tuyttens F, De Haas E.N., Van Grimbergen D., Decroos T (2019) Site	Farm., Adv.,	Dutch	Sem. WS	Apr 2019

		visit to Freebirds experimental facility, exchange or results and discussion on results and experiment.	Poult. comp., Res., Breed.			
	56	Bracke J. 'De uitloop: meer dan een speeltuin voor kippen?'. ILVO Webinar: 'Aandacht voor dierenwelzijn in de veehouderij'. https://www.pluimveeloket.be/Webinarsveehouderij_2020_dierenwelzijn#presentatie3	Farm., Adv., Poult comp., Res., PM	Dutch	Sem. WS	17 Dec 2020
	57	De Haas E, Rodenburg T, Tuyttens F. 'Doordacht inrichten van de vrije uitloop bij pluimvee'. ILVO Webinar: 'Aandacht voor dierenwelzijn in de veehouderij'. https://www.pluimveeloket.be/Webinarsveehouderij_2020_dierenwelzijn#presentatie3	Farm., Adv., Poult comp., Res., PM	Dutch	Sem. WS	17 Dec 2020
	58	Niekerk T van, Bestman M, Rodenburg B, Haas E de, Tuyttens F (2018). Wormbelasting in de uitloop. Pluimveehouderij 8	Farm., Adv.	Dutch	Pop art	Nov 22-23 2018
	59	Stadig et al., 2018 An automated positioning system for monitoring chickens' location: Accuracy and registration success in a free-range area	Farm., Adv., Res.	Eng.	Other	Apr 2018
	60	Stadig et al., 2018 Effects of dark brooders and overhangs on free-range use and behaviour of slow-growing broilers	Farm., Adv., Res.	Eng.	Other	Aug 2018
	61	Stadig L.M. et al., 2017. Monitoring individual chickens' position in a free-range area using Ultra-Wideband-technology. In: Proceedings of the Xth European Symposium on Poultry Welfare (France). Presentation	Res., Adv.	Eng.	Other	19-22 Jun 2019
	62	Stadig L.M. et al., 2017. The effect of dark brooders and overhangs on fearfulness and free-range use in slow-growing broiler chickens. In: Proceedings of the Xth European Symposium on Poultry Welfare (France). Poster	Res., Adv.	Eng.	Other	19-22 Jun 2019
	63	Stadig et al., 2017. Advantages and perceived disadvantages of combining free-range chickens with production of short rotation coppice. In: Proceedings of the Xth European Symposium on Poultry Welfare (France). Poster	Res., Adv.	Eng.	Other	19-22h Jun 2019
	64	Legcombio project in Belgium (https://www.agroforestryvlaanderen.be	Farm., Adv., Res.	Dutch	Other	Oct 2020

		/Portals/89/documents/Brochures/20201020_LEGCOMBIO.pdf). This study was on creating added value in organic agriculture by sustainable combinations of plant production and free-ranging poultry. Part of this study included our work for FreeBirds.				
	65	Study visit: De Haas E.N. Decroos, T. 2018 3 different study visits to Agroforestry system with chickens in BE and NL (organized by LBI)	Farm., Adv., Poult. comp.	Dutch	Excur.	18 Sep and 20 Sep 2018
	66	Exchange day for chickens in agroforestry systems (Belgium)	Farm.	Dutch	Excur.	Dec 2018
	67	Site visit with study group of chickens in agroforestry systems (Belgium)	Farm., Adv., Poult. comp.	Dutch	Excur.	Apr 2019
	68	Site visit: Agroforestry day (Belgium)	Adv. Farm	Dutch	Excur.	23 Oct 2019
	69	de Haas E.N., van Grimbergen D., Reubens B., Rodenburg T.B., Tuyttens F.A.M. (2018) Fearfulness and keelbone damage in laying hens – does one lead to the other? ISAE Benelux. Presentation	Res., Adv.	Eng.	Poult. conf.	10 Oct 2018
	70	T-shirt with FreeBirds logo	Farm., Adv., Breed., Res.	Eng.	Pop. publ.	2019
	71	Elske de Haas (2019). Beschadigend gedrag bij leghennen. Onderzoek, risico factoren en preventieve maatregelen. Presentation on damaging behaviour in laying hens. Including information on the Freebirds project. (Belgium). *Presentat.*	Vets	Dutch	Other	28 Jan 2019
	72	Bestman M, De Haas E.N. (2019) Excur. to organic poultry breeder	Farm., breed.	Dutch	Other	4 Oct 2019
	72	Tuyttens, F et al. (2021) FREEBIRDS, Kippenvolgenin de vrijeuitloop. Presentation at the MINI SYMPOSIUM BIO-ONDERZOEK	Farm., Adv., Breed., Res.	Dutch	Org. conf.	23 June 2021
TR	74	Sözcü, A., İpek, A., Kahramanc, Z., Gunnarsson, S., Riber, A.B. 2021. Comparison of performance, egg quality and yolk fatty acids profile in two local laying hen genotypes (Atak-S and Atabey) for grazing in a free range system. Animals. *11*(5), 1458; https://doi.org/10.3390/ani11051458.	Adv., Res.	Eng.	Scient publ	May 2021

	75	https://uludag.edu.tr/haber/view/4136: Introduction of the organic egg production	Farm., Adv., , Res., students	Turk.	Web.	Feb 2018
	76	İpek, A., Sözcü, A., Kahraman, Z. Organik tavuk üretiminin geliştirilmesi için serbest alan kullanımının optimize edilmesi. 6th Symposium on Organic Agriculture	Farm., Adv., Breed., Res.	Turk.	Poult. conf.	15-17 May 2019
	77	Introduction to the FreeBirds project – brochure	Res., students	Turk.	Pop. Publ.	2019

4.5 Future dissemination actions

(It is strongly recommended to upload your scientific publications and dissemination material in the Organic Eprints also after the end of the project implementation)

List publication/deliverables/activities arising from your project that you are planning for the future (By the 5th of November some activities has been finished, these are in Bold text.)

Country	No	Title	Target group	Language	Activity	Date
SE	**F1**	**Göransson, L., Gunnarsson, S. Wallenbeck, A. and J. Yngvesson, J. 2021. Behaviour in Slower-growing Broilers and Free-range Access on Organic Farms in Sweden. Animals 11, 2967. https://doi.org/10.3390/ani11102967**	**Adv., Res.**	**Eng.**	**Scient publ**	**Oct 2021**
	F2	**Göransson, L. Presentation of Broiler and layer results form FreeBirds At the "National organic conference" (Eko-konferensen) in Sweden (virtual meeting).**	**Auth., Adv., SH and Res.**	**Swed.**	**Sem. WS**	**20-21 Oct 2021**
	F3	Göransson, L., Yngvesson, J. and S. Gunnarsson. Bird health, housing and management routines in Swedish organic layer farms. Peer-reviewed paper being prepared for submission to a scientific journal.	Adv., Res.	Eng.	Scient publ	Dec 2021
	F4	Göransson, L., Yngvesson, J .and S. Gunnarsson. Behaviour and free-range access in organic Layer farms in Sweden. Peer-reviewed paper being prepared for submission to a scientific journal.	Adv., Res.	Eng.	Scient publ	Feb 2022
	F5	S. Gunnarsson and all partners, FreeBirds project synthesis. Peer-reviewed paper being prepared for submission to a scientific journal.	Adv., Res.	Eng.	Scient publ	Dec 2021
	F6	**Göransson, L. 2021. Animal welfare in slower-growing hybrids on Swedish commercial organic broiler chicken farms. Presentation at WAFL conference 2021 (online).**	**Adv., Res.**	**Eng.**	**Sem. WS**	**Aug 2021**
IT	**F7**	**Ferrante, V.,Tognoli, C., Ferrari, L., Ferrari, P., Bestman, M., Gunnarsson, S. (2021). Relation between range use and parasitic infection in Italian organic**	**Res.**	**Eng.**	**Poult. conf.**	**6-8 Oct 2021**

		laying hens. 7th Mediterranean Poultry Summit, Cordoba, Spain.				
	F8	**Ferrante, V. Final report to MIPAAF (Italian funder)**	**Funder**	**Ital.**	**Other**	**Jul 2021**
DK	F9	Riber, A.B., Berenjian, A., Foldager, L., Tahamtani, F.M., Thodberg, K. Commercial layer hybrids kept under organic conditions: a comparison of range use, welfare and egg production in two layer strains. Peer-reviewed paper being prepared for submission to a scientific journal.	Adv., Res.	Eng.	Scient publ	2021
	F10	Riber, A.B., Foldager, L., Tahamtani, F.M., Thodberg, K. Associations between range use and welfare indicators in two commercial layer hybrids kept under organic conditions. Peer-reviewed paper being prepared for submission to a scientific journal.	Adv., Res.	Eng.	Scient publ	2021
NL	F11	Bestman, M., van Niekerk, T., Göransson, L., Ferrante, V. Gunnarsson, S., Grilli, G., de Haas, E., Arndt, S. and Rodenburg, B. (2021). Parasite infections and free-range use in organic laying hens. Peer-reviewed paper for submission to a scientific journal.	Adv., Res.	Eng.	Scient publ	Nov 2021
	F12	**Bestman, M.; Niekerk, van, T.; Haas, de, E.; Ferrante, V. and Gunnarsson, S. (2019/2020). Parasitic worms in organic laying hens – relation with range use. Lecture at: IAHA preconference at Organic World Congress, Rennes, France, September 2020. [Accepted; conference due to Covid postponed to September 2021]**	**Res. SH**	**Eng.**	**Poult. conf.**	**Sep 2021**
PL	**F13**	**Sztandarski, P., Marchewka, J., Adamek-Urbańska, D., Damaziak, K., Wojciechowski, F., Riber, A.B. and S. Gunnarsson 2021. Associations between neck plumage and beak darkness, as well as comb size measurements and scores with ranging frequency of Sasso and Green-legged Partridge chickens. Poultry Science, 100(9):101340. https://doi.org/10.1016/j.psj.2021.101340**	**Adv., Res.**	**Eng.**	**Scient publ**	**July 2021**

TR	F14	Sözcü, A., İpek, A., Kahramanc, Z., Gunnarsson, S., Riber, A.B. 2021. Comparison of behavioural time budget and welfare indicators in two local laying hen genotypes (Atak-S and Atabey) in a free range system. Peer-reviewed paper, will be submitted in Nov to a scientific journal.	Adv., Res.	Eng.	Scient publ	Nov 2021

List publications/deliverables arising from your project that more specifically Funding Bodies could disseminate in the respective national contexts;

Country	**No**	**Title**	**Target group**	**Language**	**Activity**	**Responsible partner**	**Date**
DK	1	Tahamtani F.M., Berenjian A., Gunnarsson S., Riber, A.B. (2019). Range use and plumage condition of two laying hen hybrids in organic egg production. Abstract for 53rd Congress of the International Society for Applied Ethology. Bergen, Norway Oral presentation. https://www.applied-ethology.org/res/ISAE%202019%20Congress%20proceedings.pdf	Res., Adv., Breed.	Eng.	Conf.	AU	Aug 5th-9th 2019

Indicate publications/deliverables that could be useful to translate (Please indicate targeted language and user groups).

Country	**No**	**Title**	**Target group**	**Language**	**Activity**	**Responsible partner**	**Date**
DK	1	Tahamtani F.M., Berenjian A., Gunnarsson S., Riber, A.B. (2019). Range use and plumage condition of two laying hen hybrids in organic egg production. Abstract for 53rd Congress of the International Society for Applied Ethology. Bergen, Norway Oral presentation. https://www.applied-ethology.org/res/ISAE%202019%20Congress%20proceedings.pdf	Res., Adv., Breed.	Eng.	Conf.	AU	Aug 5th-9th 2019

4.6 Specific questions regarding dissemination and publications

Is your CORE Organic Cofund project website up-to-date (Please contact the webmaster);

Yes, a separate website at SLU in SE (https://www.slu.se/freebirds) has been established and is linked to the CORE Organic Cofund website

List the categories of end users relevant to the research results and how they have been addressed or will be addressed by dissemination activities (Please order them according to the user groups).

Organic broiler farmers and advisors on national level (in all countries) – national popular press and national meetings

(The numbers of publications are referring to the number in the previous publication list, OE =Organic E

Country	No	Title	Target group	Language	Activity	Responsible partner	Date
SE	2	Hur mår svenska ekologiska slaktkycklingar? Centre for Organic Food and Farming (EPOK), Swedish University of Agricultural Sciences (SLU) https://www.slu.se/ew-nyheter/2020/5/hur-mar-svenska-ekologiska-slaktkycklingar/	Farm., Adv.	Swed.	Web.	SLU	20 May 2020
	9	Eko-kycklingar som är mer utomhus är friskare, Swedish research newsletter about results from Polish study https://www.slu.se/friskare/	Farm., Adv., Res.	Swed.	Pop art	SLU	Nov 2020
	10	**Hälsa och välfärd hos långsamväxande slaktkycklingar. Swedish research newsletter.** https://www.slu.se/langsamvaxande/	Farm., Adv., Res.	Swed.	Pop art	SLU	Mar 2021
	14	Farm visits (2 times) together with national poultry advisor	Adv.	Swed.	Other	SLU	Autumn 2018
NL	41	Excursions to Agroforestry systems with chickens (Netherlands and Belgium)	Farm., Adv., Poult. comp.	Dutch	Excur.	LBI	Sep 2018
PL	46	http://www.ighz.edu.pl/projekty-zagraniczne	Res., students	Pol. Eng.	Web.	IGAB PAS	May 2018
	47	Marchewka J. (2019) Excursion to organic poultry breeder	Farm., breeders	Pol.	Other	IGAB PAS	25 Jul 2018
	48	Marchewka J. (2019) Excursion to organic poultry breeder	Farm., breed.	Pol.	Other	IGAB PAS	25 Jul 2018
BE	52	LEGCOMBIO: Optimaliseer de uitloop van uw kippen! In the newsletter of the Pluimveeloket.	Farm., Adv.	Dutch	Web.	ILVO	May 2020

		https://mailing.ilvo.be/mailcamp/display.php?List=12&N=219.					
	54	Van Grimbergen D, Decroos T. Exchange visit to Agroforestry system with chickens in a forestry system.	Farm., Adv., Poult. comp.	Dutch	Sem. WS	ILVO	6 Dec 2018
	56	Bracke J. 'De uitloop: meer dan een speeltuin voor kippen?'. ILVO Webinar: 'Aandacht voor dierenwelzijn in de veehouderij'. https://www.pluimveeloket.be/Webinarsveehouderij_2020_dierenwelzijn#presentatie3	Farm., Adv., Poult comp., Res., PM	Dutch	Sem. WS	ILVO	17 Dec 2020
	59	Stadig et al., 2018 An automated positioning system for monitoring chickens' location: Accuracy and registration success in a free-range area	Farm., Adv., Res.	Eng.	Other	ILVO	Apr 2018
	60	Stadig et al., 2018 Effects of dark brooders and overhangs on free-range use and behaviour of slow-growing broilers	Farm., Adv. and Res.	Eng.	Other	ILVO	Aug 2018
	64	Legcombio project in Belgium (https://www.agroforestryvlaanderen.be/Portals/89/documents/Brochures/20201020_LEGCOMBIO.pdf). This study was on creating added value in organic agriculture by sustainable combinations of plant production and free-ranging poultry. Part of this study included our work for FreeBirds.	Farm., Adv. and Res.	Dutch	Other	ILVO	Oct 2020
	65	Study visit: De Haas E.N. Decroos, T. 2018 3 different study visits to Agroforestry system with chickens in Belgium and The Netherlands (organized by LBI)	Farm., Adv., Poult. comp.	Dutch	Excur.	ILVO, UU	18 Sep and 20 Sep 2018
	66	Exchange day for chickens in agroforestry systems (Belgium)	Farm.	Dutch	Excur.	ILVO	Dec 2018
	67	Site visit with study group of chickens in agroforestry systems (Belgium)	Farm., Adv., Poult. comp.	Dutch	Excur.	ILVO, UU	Apr 2019
	68	Site visit: Agroforestry day (Belgium)	Farm.	Dutch	Excur.	ILVO	23 Oct 2019

Organic layer farmers and advisors on National level (in all countries) – national popular press and national meetings

Country	No	Title	Target group	Language	Activity	Responsible partner	Date
SE	11	Lockande uteliv ger friskare höns. Swedish research newsletter. https://www.extrakt.se/lockande-uteliv-ger-friskare-hons/ In "Electronic Newspaper "from funder Formas	Farm., Adv., Res.	Swed.	Pop art	SLU	Apr 2021
IT	18	Avicoltura a congresso. Web news about final project webinar. https://agronotizie.imagelinenetwork.com/zootecnia/2021/03/26/avicoltura-a-congresso/69851	Farm., Adv.	Ital.	Web.	UMIL	Mar 2021
	19	Webinar FreeBirds, il 22 aprile saranno illustrati i risultati del progetto di ricerca. Web news about final project webinar. https://zootecnica.it/2021/03/17/webinar-freebirds-il-22-aprile-saranno-illustrati-i-risultati-del-progetto-di-ricerca/	Farm., Adv., Poult comp.	Ital.	Web.	UMIL	Mar 2021
	20	FreeBirds, pratiche efficaci per l'avicoltura biologica all'aperto. Web news about final project webinar. http://www.crpa.it/nqcontent.cfm?a_id=22141&tt=crpa_www&sp=crpa&print_in=1	Farm., Adv., Res., Poult comp.	Ital.	Web.	UMIL	April 2021
	21	Allevamento biologico della gallina ovaiola e utilizzo del parchetto esterno, il 24 giugno il webinar FreeBirds. Web news about project national webinar. https://www.unaitalia.com/allevamento-biologico-della-gallina-ovaiola-e-utilizzo-del-parchetto-esterno-il-24-giugno-il-webinar-freebirds/	Farm., Adv., Poult comp.	Ital.	Web.	UMIL	May 2021
	22	FreeBirds "Allevamento biologico della gallina ovaiola e utilizzo del parchetto esterno". Web news about project national webinar. http://www.esp.unimi.it/ecm/home/aggiornamenti-e-archivi/tutte-le-notizie/content/freebirds-allevamento-biologico-della-gallina-ovaiola-e-utilizzo-del-parchetto-esterno.0000.UNIMIDIRE-92244	Res., students	Ital.	Web.	UMIL	May 2021

	23	Webinar Allevamento di polli e galline al pascolo. Web news about project national webinar. https://www.biozootec.it/zootecnia/webinar-24-6-2021	Farm., Adv.	Ital.	Web.	UMIL	May 2021
	24	Zootecnia biologica: allevamento di polli e galline al pascolo. Web news about project national webinar. http://www.sinab.it/bionovita/zootecnia-biologica-allevamento-di-polli-e-galline-al-pascolo	Farm., Adv.	Ital.	Web.	UMIL	May 2021
	25	Freebirds - Allevamento biologico della gallina ovaiola e utilizzo del parchetto esterno. Project national webinar, 17:00h-18:30h. Oral presentation and Q&A session.	Farm., Adv., Poult. comp., Res., Fund.	Ital.	Sem. WS	UMIL	24 Jun 2021
	26	L. Ferrari, P. Ferrari, P. Mantovi, G. Grilli e V. Ferrante. Più benessere per polli e galline. https://agronotizie.imagelinenetwork.com/zootecnia/2020/07/02/piu-benessere-per-polli-e-galline/67343	Farm., Adv.	Ital.	Pop art	UMIL	Jul 2020
	27	V. Ferrante, L. Ferrari, P. Mantovi e P. Ferrari. FreeBirds etica e benessere animale per l'allevamento biologico all'aperto di polli e galline. https://agrimpresaonline.it/wp-content/uploads/2021/05/6-2021low.pdf	Farm., Adv., Poult comp.	Ital.	Pop art	UMIL	May 2021
DK	30	Farm visit together with national organic poultry advisor	Adv.	Dan.	Other	AU	Autumn 2019
NL	38	FreeBirds project mentioned on personal LinkedIn site of De Haas E.N. with link to project site	Res., industry, NGO's	Eng.	Web.	ILVO, UU	Sep 2019
	38	Bestman, M. Worminfecties, ontwormen en aanbevelingen voor pluimveehouders. Oral presentation. Location: Pittem, Belgium.	Farm. (N = 20)	Dutch	Sem. WS	LBI	9 Mar 2020
	40	Bestman, M. Worminfecties, ontwormen en aanbevelingen voor pluimveehouders. Oral presentation. Location: Ramsel, Belgium.	Farm. (N = 12)	Dutch	Sem. WS	LBI	9 Mar 2020
	Org e-	Bestman, M. Worminfecties bij biologische leghennen. Oral presentation. Online meeting organised	Farm. and other intereste	Dutch	Sem. WS	LBI	22 Jan 2021

	print (OE)	by BioKennisweek: https://www.bio-beurs.nl/nieuwsberichten/452/123/41-Core-Organic-Europees-onderzoek-voor-de-biologische-sector	d people (approx. N = 45),				
	OE	Loon M van (2018). Minder worminfecties bij optimaal gebruik uitloop. News item Pluimveeweb 7 March.	Farm., Adv.	Dutch	Pop art	LBI	7 Mar 2018
	OE	Schotman T (2018). Minder worminfecties als kippen uitloop veel en verspreid gebruiken. News item Pluimveeweb 23 January 2018.	Farm., Adv.	Dutch	Pop art	LBI	23 Nov 2018
	42	Bestman M, Niekerk T van, Haas EN de, Ferrante V, Gunnarsson S (2019). Role of range use in infections with parasites in laying hens. Abstract for 53rd Congress of the International Society for Applied Ethology. Bergen, Norway 5th-9th August. Poster	Res., Adv.	Eng.	Poult. conf.	LBI	Aug 2019
PL	46	http://www.ighz.edu.pl/projekty-zagraniczne	Res., students	Pol. Eng.	Web.	IGAB PAS	May 2018
	47	Marchewka J. (2019) Excursion to organic poultry breeder	Farm., breeders	Pol.	Other	IGAB PAS	25 Jul 2018
	48	Marchewka J. (2019) Excursion to organic poultry breeder	Farm., breeders	Pol.	Other	IGAB PAS	25 Jul 2018
BE	53	Bracke, J. Duurzame combinaties van plantaardige teelten met uitloop voor pluimvee. https://www.ccbt.be/?q=node/4112	Farm., Adv.	Dutch	Web.	ILVO	Oct 2020
	55	Tuyttens F, De Haas E.N., Van Grimbergen D., Decroos T (2019) Site visit to Freebirds experimental facility, exchange or results and discussion on results and experiment.	Farm., Adv., Poult. comp., Res., Breed.	Dutch	Sem. WS	ILVO, UU	Apr 2019
	57	De Haas E, Rodenburg T, Tuyttens F. 'Doordacht inrichten van de vrije uitloop bij pluimvee'. ILVO Webinar: 'Aandacht voor dierenwelzijn in de veehouderij'. https://www.pluimveeloket.be/Webinarsveehouderij_2020_dierenwelzijn#presentatie3	Farm., Adv., Poult comp., Res., PM	Dutch	Sem. WS	ILVO	17 Dec 2020
	58	Niekerk T van, Bestman M, Rodenburg B, Haas E de, Tuyttens F (2018). Wormbelasting in de uitloop. Pluimveehouderij 8 nov: 22-23.	Farm., Adv.	Dutch	Pop art	ILVO	Nov 2018

	59	Stadig et al., 2018 An automated positioning system for monitoring chickens' location: Accuracy and registration success in a free-range area	Farm., Adv. and Res.	Eng.	Other	ILVO	Apr 2018
	64	Legcombio project in Belgium (https://www.agroforestryvlaanderen.be/Portals/89/documents/Brochures/20201020_LEGCOMBIO.pdf).	Farm., Adv. Res.	Dutch	Other	ILVO	Oct 2020
	68	Site visit: Agroforestry day (Belgium)	Farm. Adv.	Dutch	Excur.	ILVO	23 Oct 2019
	69	de Haas E.N., van Grimbergen D., Reubens B., Rodenburg T.B., Tuyttens F.A.M. (2018) Fearfulness and keelbone damage in laying hens – does one lead to the other? ISAE Benelux. Present.	Res., Adv.	Eng.	Poult. conf.	ILVO	10 Oct 2018
	70	Elske de Haas (2019). Beschadigend gedrag bij leghennen. Onderzoek, risico factoren en preventieve maatregelen. Presentation on damaging behaviour in laying hens. Including information on the Freebirds project. (Belgium). *Presentation*	Vets	Dutch	Other	ILVO, UU	28 Jan 2019
	OE	Bestman M (2019). Health and welfare in organic egg production. Faculty Veterinary medicine, Utrecht	Master students	Dutch	Other	LBI	13 Feb 2019
	72	Bestman M, De Haas E.N. (2019) Excursion to organic poultry breeder	Farm., breeders	Dutch	Other	LBI, ILVO, UU	4 Oct 2019
TR	75	https://uludag.edu.tr/haber/view/4136: Introduction of the organic egg production	Farm., Adv., , Res., students	Turk.	Web.	UUTUR	Feb 2018
	OE	https://arastirma.tarimorman.gov.tr/tavukculuk/Haber/40/Avrupa-Birligi-Projesi-Kapsaminda-Yerli-Ticari-Yumurtaci-Hibritlerimiz-Serbest-Sistem-Yetistirme-Sartlarinda-Denenmektedir: Comparison of Turkish layer hybrids in organic project	Farm., Adv., , Res., students	Turk.	Web.	UUTUR	Apr 2019
	76	İpek, A., Sözcü, A., Kahraman, Z. Organik tavuk üretiminin geliştirilmesi için serbest alan kullanımının optimize edilmesi. 6th Symposium on Organic Agriculture	Farm., Adv., Breed., Res.	Turk.	Poult. conf.	UUTUR	15-17 May 2019
	77	Introduction to the FreeBirds project – brochure	Res., students	Turk.	Pop. publ.	UUTUR	2019

Directed towards both organic layer and broiler farmer and advisors (in all countries) – national popular press and national meetings

Country	No	Title	Target group	Language	Activity	Responsible partner	Date
SE	2	Introduction to the FreeBirds project http://projects.au.dk/coreorganiccofund/research-projects/freebirds/:	Farm., Adv., Breed., Res.	Eng.	Web.	SLU	Nov 2018
	4	FreeBirds - Encouraging organic chickens and laying hens to be more outdoor https://www.slu.se/freebirds	Farm., Adv., Poult. comp., Res., Breed., PM	Eng.	Web.	SLU	Jun 2021
	6	Gunnarsson, S. Presentation of FreeBirds At the "National organic advisor day" in Sweden (virtual meeting)	SLU, Auth., Farm. and Adv.	Swed.	Sem. WS	SLU	6 Oct 2020
	7	Gunnarsson, S. Presentation of FreeBirds At the "Animal health for organic Adv." by EPOK SLU i (virtual meeting).	Auth., Adv., SH and Res.	Swed.	Sem. WS	SLU	3 Dec 2020
	8	Gunnarsson, S. Presentation of FreeBirds At the "National veterinary poultry meeting" in Sweden (virtual meeting).	Auth., Adv., SH and Res.	Swed.	Sem. WS	SLU	14-15 Apr 2021
	9	FreeBirds - Encouraging organic chickens and laying hens to be more outdoor. Final project webinar, 9:00h-13.00h. Oral presentations by all participating partners and panel discussion.	Farm., Adv., Poult. comp., Res., Fund.	Eng.	Sem. WS	All partners	22 Apr 201
	13	Biannual Swed. Poultry science meeting National veterinary institute (SVA)	Adv., Poult. comp.	Swed.	Poult. conf.	SLU	Oct 2018
IT	17	FreeBirds, il progetto per incoraggiare i polli e le galline a stare all'aperto. Web news about project description and aims. http://www.crpa.it/nqcontent.cfm?a_id=20866&tt=crpa_www&sp=crpa	Farm., Adv., Res., Poult comp.	Ital.	Web.	UMIL	Jul 2020

	18	'FreeBirds', the project encouraging organic chickens and hens to be outdoor. Web news about project description and aims. http://www.sinab.it/node/23344	Farm., Adv.	Ital., Eng.	Web.	UMIL	Jul 2020
	30	Introduction to the FreeBirds project - leaflet	Farm. Adv. Poult. Comp	Ital	Pop. publ.	UMIL	2019
	31	FreeBirds project national webinar - leaflet	Farm., Adv., Poult. comp., Res., Fund.	Ital.	Pop. publ.	UMIL	2021
DK	30	Farm visit together with national organic poultry advisor	Adv.	Dan.	Other	AU	Autumn 2019
NL	39	Freebirds project on personal Research gate site of De Haas E.N. Encouraging organic chickens and hens to be more outdoor https://www.researchgate.net/project/Freebirds	Res.	Eng.	Web.	ILVO, UU	Aug 2018
	40	FreeBirds: Kippen stimuleren om meer buiten te lopen (2018-2021). https://www.pluimveeloket.be/Bio-pluimveehouderij/Uitloop	Farm., Adv.	Dutch	Web.	ILVO	May 2019
	41	Internal information on the Freebirds project at the ILVO intranet site and for the general public open access ILVO information site www.ILVO.be	Farm., Adv., Breed., Res.	Dutch Eng.	Web.	ILVO, UU	Sep 2019
	38	Freebirds project mentioned on personal Linkedin site of De Haas E.N. with link to project site	Res., industry, NGO's	Eng.	Web.	ILVO, UU	Sep 2019
PL	46	http://www.ighz.edu.pl/projekty-zagraniczne	Res., students	Pol. Eng.	Web.	IGAB PAS	May 2018
BE	53	Bracke, J. Duurzame combinaties van plantaardige teelten met uitloop voor pluimvee. https://www.ccbt.be/?q=node/4112	Farm., Adv.	Dutch	Web.	ILVO	Oct 2020
	56	Bracke J. 'De uitloop: meer dan een speeltuin voor kippen?'. ILVO Webinar: 'Aandacht voor dierenwelzijn in de veehouderij'. https://www.pluimveeloket.be/Webina	Farm., Adv., Poult comp., Res., PM	Dutch	Sem. WS	ILVO	17 Dec 2020

		rsveehouderij_2020_dierenwelzijn#presentatie3					
	64	Legcombio project in Belgium (https://www.agroforestryvlaanderen.be/Portals/89/documents/Brochures/20201020_LEGCOMBIO.pdf). This study was on creating added value in organic agriculture by sustainable combinations of plant production and free-ranging poultry. Part of this study included our work for FreeBirds.	Farm., Adv. and Res.	Dutch	Other	ILVO	Oct 2020
	65	Study visit: De Haas E.N. Decroos, T. 2018 3 different study visits to Agroforestry system with chickens in Belgium and The Netherlands (organized by LBI)	Farm., Adv., Poult. comp.	Dutch	Excursion	ILVO, UU	18 Sep and 20 Sep 2018
	68	Site visit: Agroforestry day (Belgium)	Farm.	Dutch	Excur.	ILVO	23 Oct 2019
	72	Bestman M, De Haas E.N. (2019) Excursion to organic poultry breeder	Farm., breeders	Dutch	Other	LBI, ILVO, UU	4 Oct 2019
TR	75	https://uludag.edu.tr/haber/view/4136: Introduction of the organic egg production	Farm., Adv., , Res., students	Turk.	Web.	UUTUR	Feb 2018
	77	Introduction to the FreeBirds project – brochure	Researchers, students	Turk.	Pop. publ.	UUTUR	2019

5. Project impact

(Comparatively assess the impact of your research project achievements in relation to your original project proposal. For the different categories of end-users/main users of the research results, please explain to what extent the project has been able to reach these target groups (when possible provide a quantitative data also) and any other known impact in relation to the organic sector). Please mention if you have any suggestions for activities that can be useful to create further impact after the end of the project (maximum 1 page))

The impact of the project is in general in agreement with what was intended in the project plan. The end-users/main users of the research results are primarily farmers, advisors and poultry companies but also other stakeholders in the participating countries.

In all countries the partners have been in close contact with the national stakeholders, primarily with the advisors in the organic poultry sector. This can be illustrated by the fact that, in the countries (NL, DK, IT and SE) were on-farm studies have been performed, the identification of suitable study farms has partly been performed in collaboration with the national organic advisors. Furthermore, in all counties the partners have disseminated knowledge and results from FreeBirds to national popular press and several presentations have been made at national meetings.
Dissemination nationally has been performed through publications in national languages, as well as national popular press. Furthermore, there have been presentations at national meetings within the organic sector as well as within the poultry sector. The activities are listed (in detail in section 4.5.)

International activities such as participation in the OK- Net Ecofeed online conference 25-26 January 2021, (https://ok-net-ecofeed.eu/2021/press-release-solutions-for-sustainable-feeding-and-animal-welfare-in-organic-farming-research-projects-contribute/ made FreeBirds reach out to a wide range of stakeholders, e.g. policy makers, certification bodies, NGOs, actors in the food chain of organic poultry products.

The final project webinar of FreeBirds attracted 179 participants from 19 countries. Out of the participants 102 were from outside the academia, i.e. advisory organisations, NGOs, companies, media and governmental organisations. As mention earlier the reach out was more extended than expected at a real-life event (which is more time consuming and costly to the participants). Furthermore, we know that we reached out to researchers and stakeholder in countries that are not directly involved in FreeBirds.

Participants of the FreeBirds project (NL and BE) are also involved in other European organic projects such as the PPILOW project (HH2000) and the OK-net Ecofeed project.

The FreeBirds project has collaborated in publication together with all other animal directed CO Co-fund projects at Pre-Conference on Animal Husbandry 21-22 September 2020 linked to the 20th Organic World Congress 2021. (Vaarst et al. 2020), and similar presentations will be made on national level, e.g. at the annual Organic conference in Sweden in October 2021.

Based on the results of FreeBirds WP3 and the expressed interest by the Dutch farmers, a follow-up project proposal will be submitted to a Dutch funding body. The new proposal will investigate strategic deworming strategies in layers, aiming for a reduction of the use of allopathic anthelmintics**.**

6. Added value of the transnational cooperation in relation to the subject

(Please describe the main advantages of the transnational research cooperation compared to a national research project approach in relation to the subject of the project. You may in particular expand on specific research materials and methods developed or harmonised, research cooperation established during the project, research funding obtained, etc. (maximum 1 page))

FreeBirds main advantages are that within the project we have collaborated internationally regarding important challenges for organic poultry production, including national perspectives, e.g. local breeds. Furthermore, we have investigated the questions related management outdoor areas in several countries with various climatic conditions.

In all countries, the organic poultry sector has been involved in the dissemination of the results from the FreeBirds project. Several activities (incl. presentations >50) have been made in the partner countries, and many of these activities have been made after invitations by stakeholders, authorities, etc. Furthermore, the final webinar of FreeBirds in April 2021 attracted a wide audience of stakeholders, as well as scientists. It can be noted that the participant list also included people from >10 countries that were not directly involved in project.

Within FreeBirds, methodology for data recording of health, parasite infection, soil nutrient analysis was developed based on previous scientific research. The methodology was harmonised and calibrated when needed, and in some cases (e.g. parasite analysis) data recording and analysis were performed cross countries. Publication and dissemination were made across countries when relevant. Two examples of that is:

1. Results from WP5 studies in Poland was translated into a Swedish context, and disseminated in Swedish (https://www.slu.se/friskare/)

2. Several dissemination activities in NL and BE were performed collaborative for farmers and advisors in both countries.

Within the FreeBirds consortium, several scientists have collaborated in research projects, of which Core Organic has previously funded some e.g. HealthyHen. However, the consortium was expanded beyond the researchers that already had collaborated and e.g. the Turkish researchers have been an important part of the project and connected to primarily DK and SE.

The collaboration within the FreeBirds consortium will continue in some parts, as new members of new consortia, even if the same partners are not involved in all these activities.

The cooperation with the industry has varied between the different countries, i.e. in Sweden we have regular contact with the national advisor in organic production. In the other countries there are also networking. It is hard to know what will be future. Collaborations with industry is depending on tasks or projects, so if there are 'projects' on-going there is collaboration. Furthermore, Stefan Gunnarsson has coordinated an application in AW in broiler production submitted October, 6th to Horizon Europe CSA with 25 partners in 13 countries, and some of these partners include FreeBirds partners.

A new call for Core organic are under the application process, and several of the FreeBirds partners are collaboration in new Core Organic applications, depending on the availability of national co-funding.

7. Suggestions for future research

(Based on the results obtained in the project, please suggest research areas and ideas relevant for future research in organic food and farming sector)

Based on the results from FreeBirds, important areas of future research would be important to further investigate these aspects.

- Productivity and welfare of strains, is there a conflict? We found that higher producing strain of layers and broilers seem to perform less ranging behaviour. Therefore, the relationships between productivity levels and the ranging behaviour, as well as welfare, would be important to investigate.
- Bird ranging profile and individual welfare. Apart from strain differences in relation to productivity and behaviour, the wide individual differences in bird ranging behaviour needs to be studied further. This includes also investigations of the causality behind difference in individual welfare scores (e.g. gait score), and ranging behaviour.
- Tailor made parasite prevention. The absence of clear relationships between parasite infections and flock health and production, gives room for further studies on preventive or tailor-made approaches (tools) aiming at a reduced use of anthelmintics.
- Farm adapted soil nutrient strategy. Regarding soil nutrients, methods for monitoring and mitigating nutrient leakage need to be develop further. This will supply organic poultry farmers with preventive knowledge to develop tailor-made management strategies for mitigating problems related to the specific environment at the farms, e.g. what vegetation should be favoured, and how should the soil be managed.