

Maintaining Feather Cover in Laying Hens

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PROJECT SUMMARY

A principal aim of the study was to examine the feasibility of developing and implementing a Feather Cover Action Plan (FCAP) bespoke to each farm in all systems of housing for laying hens. Producers of 29 flocks were recruited with attitudes towards FCAP varying initially from not regarding it as a priority, to engaged first adopters. FCAPs were successfully co-created by the project research officer, a trained and experienced facilitator. Implementation and welfare outcomes were measured for 26 flocks available for a second visit. Overall a substantial 80% of producers made changes to their management and added additional resources, with 90% of producers of free-range (FR) and half of those using enriched (colony) cage (EC) housing making changes. For the remainder, two did not need to alter management as they already had well-feathered flocks and two in the EC system had limited options for change. The exceptionally high level of behaviour change achieved was the more remarkable as producers chose to add up to 9 changes to their FCAP (average 3 on FR farms). While some changes were inexpensive, such as providing rope, plastic objects or balls in house, others were capital investments like verandas and/or time-consuming such as planting trees, renewing and strategically placing artificial shelters to encourage ranging, continually replenishing Lucerne or removing capped litter. Nevertheless, for FR farms, 67% of planned changes had been achieved by the second project visit, on average 9 months later. While most producers adopted validated ideas new to their farm, a few tried innovative approaches such as a trial of pecking rings in an EC system to determine whether they could assist in keeping non-tipped birds. Unfortunately, these did not help to maintain feather cover compared with control birds in the same house.

Undoubtedly the support of an experienced, trained facilitator with in-depth knowledge of managing feather cover was a major factor in these levels of achievement, being able to harness and maximise the willingness of producers to improve feather cover. Importantly, the high adoption of planned changes was independent of the number of strategies to manage feather cover already in place at the start of the project. This also indicates that, with support and sufficient motivation and engagement, FCAP could successfully be implemented nationally. However, if this is to be an addition to the flock Veterinary Health and Welfare Plan, the associated costs will need to be explored and accounted for. Discussions for this next step were initiated by the Operational Group, the Laying Hen Welfare Forum (LHWF) who gave a presentation and discussed the project and FCAP with specialist poultry veterinarians at their annual meeting in March 2019.

Producers commented that their main motivators for the maintenance of good feather cover were bird welfare, productivity, customer relations and pride. In this context pride means having a flock which is well-feathered and looks attractive (that the producer can be 'proud' to show other producers or the public). To help achieve this, their suggested incentives were grants for training, more on-farm trials and research, plus (financial) recognition for well-feathered flocks to offset some of the cost. Increased knowledge exchange (KE) supported by industry was also perceived as helpful. All producers had good relationships with their pullet rearers and were kept informed as to performance and husbandry. The majority visited their flock during rear.

Reflecting on the value of their FCAP, producers recognised that being part of the project not only raised their awareness of injurious pecking (IP) and the importance of maintaining good feather cover but also motivated them to make changes to achieve this. They recognised the value of facilitator

support and noted the motivational aspect that successful outcomes gave incentive to make further progress. Half the producers felt their FCAP had been successful in reducing IP within their flocks. Barriers to implementing planned changes were few but included financial and time constraints and having insufficient information to decide whether the change, given the cost, would bring sufficient benefit. A small proportion of producers had opportunities for change restricted by their housing system or by their already high adoption of possible control strategies.

Knowledge exchange was a key part of the project, which achieved high levels of engagement using many formats, concentrating on preferences expressed by the producers for receiving information on managing feather cover. Accordingly, there were 7 workshops and/or presentation and discussion events with producer discussion groups, 5 more with a range of stakeholders and 7 articles published in the poultry industry press with more planned to share the project results. As videos are a preferred route for KE, given they bring the actions on farm to life, producer-led professional quality videos filmed on commercial farms participating in the study were created. The video topics covered transition from rear, maintaining good litter quality, ideas for enrichments, a quality range and how to feather score. The LHWF [website](#) was developed early in the project and now contains a comprehensive [resources](#) page of information for managing IP to maintain good feather cover, which includes links to the videos and the well-used [Featherwel](#) website. Twitter proved the more popular social media site with 130 followers and over 100 tweets: the Facebook site attracted only 28 followers. An Open-Access [paper](#) has been published as part of a virtual conference at which we presented a video summary of the Motivational Interviewing approach and a PowerPoint summary of the work.

As the overarching aim of the LHWF is to support producers to manage IP and maintain good feather cover so that the industry can possibly move to managing flocks of hens with intact beaks, study tours were arranged to two countries which run mainly intact beak flocks. The visit to Austria (June 2019) indicated key factors in their ability to manage intact-beak flocks were higher egg prices in a small home market, smaller, family-run farms, winter gardens (verandas) on all housing (EU grant funded) and access to range delayed until 26 weeks of age. Other advantages included bespoke rearing as part of the integrated and supportive industry structure based around one main genotype in a national flock size of 6.9 million hens. The visit to the Netherlands suggested that some producers were facing challenges managing intact beak flocks to meet the demands of their predominantly export market and that their industry was prepared to accept poorer feather cover than would be the case in the UK. A move to white genotypes (which lay white eggs currently not preferred by UK consumers) was felt to be easier to manage as intact beak flocks (2018 data 35:65 ratio of brown to white birds). The first flocks managed without beak tipping saw average mortality rates increase from 5% to 9% and it was felt high nutrient feed with at least 5% fibre was beneficial. While both visits provided useful insights, there remain important differences to the UK, notably the number of commercial FR hens kept in the UK (26 million – 2019 data v Austria (1.6 million) and Netherlands (6 million).

In terms of bird welfare outcomes, nearly two thirds (62 %) of the birds in all project flocks had good feather cover at all ages. There was no significant difference in the feather cover measured at the two visits, which reflects the many variables at the time of measurements, including a very wide range of bird age (17 – 82w), the fact that approximately half the producers had a change of flock between visits and the sample size. These uncontrolled variables likely account for the lack of association found between feather cover and the number of strategies adopted from the FCAP; litter quality; levels of

engagement or motivation. However, these comparisons were not the focus of the study, which was not designed to measure the effectiveness of interventions, as this research has already been done (Lambton *and others*, 2013; Nicol *and others*, 2013). The focus here was to trial an approach to motivate producer uptake of evidence-based strategies to tackle IP.

Levels of production within the participation flocks were good, and mortality was in line with national figures: higher levels being associated with outbreaks of disease or smothering, and little (6%) being reported as due to IP. Observations indicated that IP behaviour towards conspecifics was not widespread: no vent or cannibalistic pecking was seen in any of the flocks. In the EC and barn flocks no severe pecking was seen, aggressive pecking was noted twice, and low levels of gentle feather pecking were seen in all flocks. In about half FR flocks, gentle, severe and aggressive pecking behaviours were not seen during the formal observations and in the others were low incidence.

As well as providing enriched ranges, and enhancing these during the study, participants provided numerous kinds of enrichment in the housing – all of which the birds were seen to engage with and peck at during short periods of formal observation. Litter in FR and barn aviary (BA) housing was predominantly friable owing to producers paying attention to litter quality by adopting an average of 2 and up to 5 strategies.

In conclusion, the project demonstrated that FCAPs can lead to changes in flock management with facilitated support using an approach based on Motivational Interviewing. Accordingly, the LHWF recommends that facilitation training is made available to enable successful rollout of FCAP nationwide. It is also suggested that grants are made available for producer and stockperson training and financial incentives are given to recognise those maintaining well-feathered flocks. It is also suggested that an 'Innovation Fund' is available to support producer led trials of innovative practices to maintain feather cover, where moderate infrastructure or equipment changes are required.

INTRODUCTION

There has been a driving force from industry to encourage poultry producers to further improve bird welfare on their laying farms. This has been influenced by consumer opinion and many of the assurance schemes such as RSPCA Assured and the British Lion Quality scheme via the Lion Code of Practice. Each system of egg production has associated welfare challenges. One of the most problematic issues in commercial egg production is Injurious Pecking (IP). This term is used for a group of unwanted pecking behaviours. It is identified by the pecking or pulling of the feathers of another flock member which can cause distress, feather loss or even death. Different kinds of pecking behaviour directed at other birds are recognised: light, gentle feather pecking (GFP) generally aimed at the tip of the tail, results in little damage not of welfare concern. Severe feather pecking (SFP) is pecking and pulling out the feathers of other birds with force, resulting in damage or plumage loss causing pain, fear and distress to the recipient bird (De Hass *and others*, 2010; Lambton *and others*, 2010). Vent pecking (VP) is targeted solely at the vent area and tends to start when the birds come into lay (Nicol *and others*, 2013). This can lead to severe wounds and birds are attracted to the exposed skin, which may lead to cannibalistic pecking (CB) (Appleby *and others*, 2004, Blokhuis and Arkes, 1984). Hens can also display aggressive behaviour towards one another, and this targeted at the head or neck region. However, this behaviour has a different underlying motivation and is generally performed to establish and maintain social hierarchies (Morrissey *and others*, 2016, Bessei *and others*, 2012; Lambton, 2008). IP is prevalent in all housing systems: conventional cages, furnished cages, barn and free-range systems. However, the spread of IP behaviour between birds is more of a problem in loose housing systems than in cage systems, where perpetrators have access to more victims (Nicol *and others*, 2013).

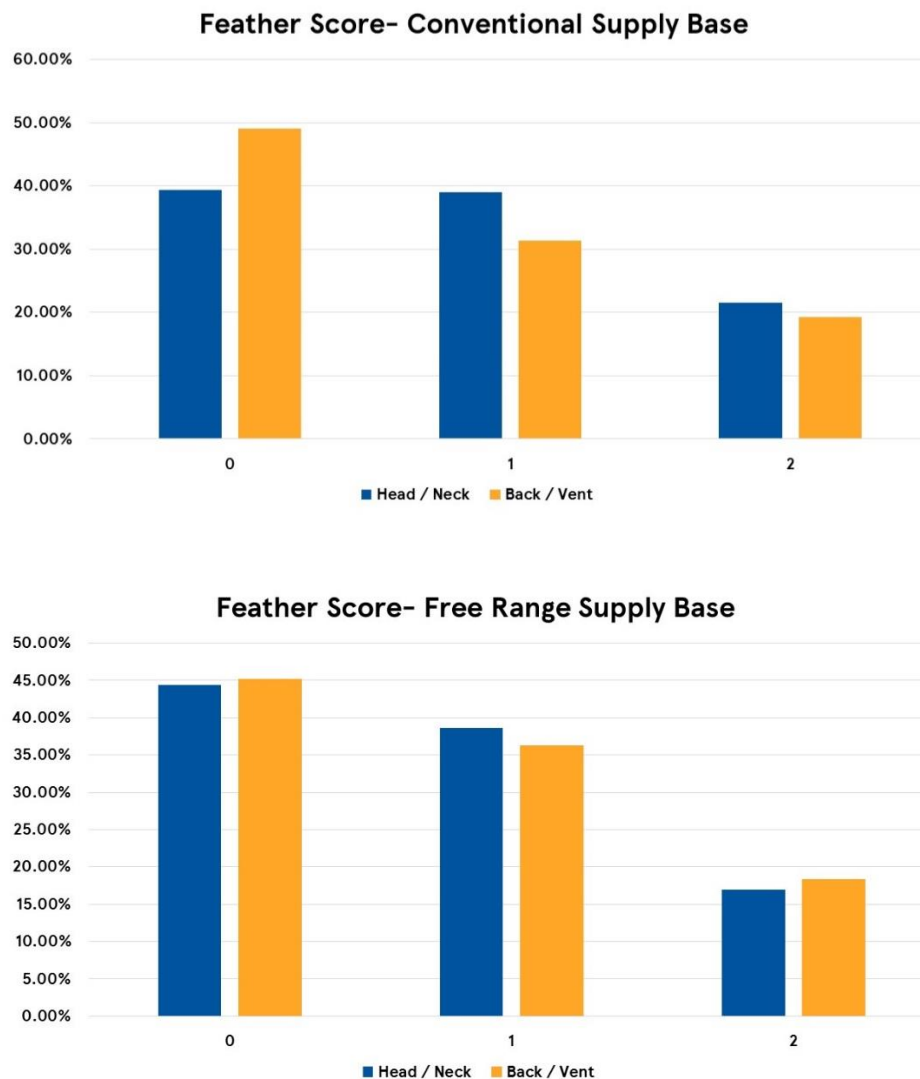
A survey reported 47% of UK free-range farmers had regularly witnessed IP and 57% of them had seen it in their last flock (Green *and others*, 2000). Lambton *and others*, (2010) found that out of 111 loose housed systems at 40 weeks, the majority (86%) of flocks contained hens that demonstrated SFP behaviour. IP has been shown to be heritable, with some genetic lines having the tendency to peck more at conspecifics (Rodenburg and Koene, 2002). Studies have indicated that there are high feather peckers (HFP) and low feather peckers (LFP). HFP have been shown to perform higher levels of SFP, GFP and vocalisation. Some research has proposed that GFP is correlated to SFP, but other researchers have found no correlation (Morrissey *and others*, 2016).

If an outbreak of severe IP occurs, it can result in high mortality and a welfare issue that can be commercially damaging (Nicol *and others*, 2013). Research has identified that IP is a multifactorial problem and can be triggered by an abundance of risk factors; environment, nutrition, and genetics (Nicol *and others*, 2013, Rodenburg *and others*, 2013). Birds that have poor feather cover can eat up to 40% more feed (Blokhuis *and others*, 2007) especially during spells of cold weather. It requires considerable effort, husbandry and management skills to maintain an environment in which this behaviour is less likely to occur.

Feather loss is a key indicator of laying hen welfare and producers are encouraged to implement good practices to maintain feather cover. Feather coverage is now commonly measured as part of welfare outcomes on farm. Many egg packers and retailers are requesting and evaluating feather coverage on their producers' farms. For example, a major retailer requires that feather coverage is assessed and scored in all commercial egg laying flocks from 40 weeks of age. This enables producers to monitor

conditions or behaviours that may result in feather loss and respond accordingly. A score of 0 indicates complete feather coverage, while a score of 2 indicates a degree of feather loss. These scores are independently verified during assessments. According to their website, the majority of the retailer's suppliers' birds retain all or most of their feather coverage whilst in lay (Figure 1).

Figure 1. Feather score data from suppliers to a major retailer (conventional includes colony cage and barn)



from: <https://www.tescopl.com/sustainability/downloads/animal-welfare-policy-group/welfare-outcome-measures/> Updated 1/08/2019.

The Lion scheme (over 90% of UK egg production) requires feather cover and mortality data to be recorded at 40 and 70 weeks of age. This is to be used for benchmarking by individual packers and across the wider industry. Latest figures from Lion Code producers are recorded as mean averages for feather loss (Table 1). The figures in the table are combined for both head and neck and back and vent at 40 weeks and again combined at 70 weeks. In combining all the production systems, hens appear to have very little feather loss throughout lay. At 70 weeks enriched (colony) cages have more feather loss, some of which will be from abrasion, but average numbers are comparable for all systems.

Table 1. Mean feather loss scores (0 is good cover 2 is poor) for Lion flocks at 40 weeks and 70 weeks of age (2019).

2019	40 weeks	70 weeks
All production systems	0.22	0.94
Enriched System	0.25	1.17
Barn	0.13	0.83
Free range	0.21	0.91
Organic	0.26	0.96

As animal welfare and sustainability issues have come to the fore, egg producers have responded to the need to improve welfare on farm. After many years of research, it has been recognised that the top-down method of telling producers what to do on farm has not always been well received and most importantly does not always evoke the necessary management changes. In order for people to make changes, it is important for them to consider the pros and cons, and take ownership over the problem, which includes coming up with their own ideas. So, more recently a more motivational approach has been tested in some areas of the animal sector for example the Hennovation project <http://www.hennovation.eu/> where a bottom up approach created opportunities and innovation within the poultry industry. As this project is solely about motivating actions which help maintain feather cover in laying hens it was recognised that to support producers the traditional top down method of telling producers a blanket recipe of interventions may not work, and indeed would not be tailor made to their farm specific circumstances. A more empowering and empathetic approach was required. This relatively new technique known as Motivational Interviewing (MI) was initially used in the medical profession but is now being used in the animal welfare field such as the veterinary and dairy industry (e.g. Bard and others, 2017). MI aims to encourage people to take ownership of their problem and provides a process for facilitating the decision-making process. The trained facilitator's role is to work alongside the producer to encourage and emphasise the producer's strengths and ability to make changes, the value of making changes, being a supportive listening ear and sound board for their ideas, as well as a source of energy, enthusiasm and benchmark, to guide and keep the producer focussed.

An important approach to managing IP includes the improvement or 'enrichment' of the birds' environment. Tailored management strategies that include environmental enrichment have been shown to reduce the risk of IP on the laying farm (Lambton, *and others*, 2013). Considerable research has investigated the use of environmental enrichment for various poultry species. One approach is to provide birds with alternative substrates with the aim of satisfying their motivation to peck at objects as part of their need to forage. Forms of enrichment should satisfy the bird's behavioural needs; therefore, enrichments must be attractive (Jones and Carmichael, 1999). They also need to retain interest to the birds and for practical and widespread uptake should be low cost, easily accessible and not labour intensive for the producer.

Poultry are motivated to forage, and access to litter is critical to their welfare to maintain good plumage condition, improve the feeling of satisfaction, and potentially reduce adverse behaviours such as severe feather-pecking (Lay *and others*, 2011; Rodenburg *and others*, 2013). Studies have found that birds will work for litter (Widowski and Duncan 2000), and even enter smaller cages in order to gain access to litter, indicating that it is a high priority. Maintaining friable litter enables birds to express dustbathing as well as foraging behaviour, both of which are of proven importance to hens (Weeks and Nicol, 2006). It is critical that enrichment can be independently shown to improve animal welfare rather than simply increasing the complexity of an environment (Newberry, 1995). Enrichment is now applied in poultry management settings to encourage chickens to express natural behaviours and help to discourage unwanted behaviours such as IP.

Aims and Objectives

The overarching objective is to reduce injurious pecking (IP) in all commercial laying hen flocks in England, as poor feather cover and pecking damage is associated with reduced health and welfare, increased mortality and inefficient use of feed alongside lower egg output in all types of laying systems. This is also a key first step and prerequisite to introducing intact beak flocks. This objective will be achieved by utilising existing knowledge from social science on MI by the experienced research team, in order to facilitate producer ownership over maintaining feather cover by the development and implementation of bespoke feather cover action plans (FCAP). With high on-farm losses associated with IP (Nicol *and others*, 2013), the project aims to improve the sustainability and productivity and therefore the value of the laying hen sector as well as the welfare of the hens. The LHWf has been tasked to take forward the recommendations of the Beak Trimming Action Group (BTAG) to reduce the incidence of IP in the national flock by feather pecking management strategies that can be incorporated into “bespoke action plans” i.e. FCAP.

The principal aim of the project is to build on practice and science-based evidence to test the best support approaches for commercial implementation and uptake of strategies aimed at reducing IP in laying hens. Depending on the housing system, the character of the flock, the producer and the henhouse, some measures will be more feasible than others. There is therefore no standard formula for prevention of feather pecking and each producer will start in a different place with regards to their existing management of the issue. Thus, a bespoke case by case approach needs to be taken on each farm where all known risk factors need to be evaluated and discussed, alongside barriers to action, before potential solutions can be considered.

This project will therefore use an innovative MI-based facilitation approach with the aim that the co-created, bespoke FCAPs deliver reduced feather pecking on farms. That is, focusing less on telling producers what they need to do and more on listening to and building on what they have already achieved and their own aims regarding maintaining good feather cover. Next, encouraging them to come up with their own ideas to trial and implement both innovative strategies and those evidence-based strategies which the producer has not trialled before. To this end, a trained facilitator will visit 29 trial farms to 1) co-develop bespoke FCAPs 2) measure key associated health and welfare outcomes and 3) establish producer attitudes and motives towards managing feather pecking. Between visits 1 and 2 the trained facilitator will 1) Share the FCAP with producers and provide additional facilitation and support, such as further information on how to apply a new intervention in practice. At visit 2, the facilitator will 1) Measure the uptake of FCAP across the study visit 2) revisit producers' attitudes and

motivation towards managing injurious pecking and 3) re-measure key associated health and welfare outcomes.

The long-term aspiration and objective of the LHWF, including this project, is to embed the FCAPs into veterinary visits and the 'Veterinary Health and Welfare Plan' (VHWP) to enhance an active VHWP which is overseen by a nominated veterinary surgeon. Therefore, the success and impact of this project will be measured by the ability of the facilitator to support uptake of new management strategies. Going forward, these bespoke FCAP's linked to an active VHWP are an innovation for the industry that, for the first time, will actively link injurious pecking risk management strategies with the ongoing flock health and welfare plan. Producer-friendly resources will be created for producers to use on farm to roll out, develop, refine and continually monitor their own bespoke action plans. Further measures of success that will be monitored and explored in the analysis include creation of FCAP tailored for each flock; the number of actions planned and successfully implemented; motivation of producers at the beginning and end of the project; and impact of MI and facilitation support on the development and implementation of FCAPs. The impact on animal health and welfare outcomes will also be explored, however it has to be noted that a direct comparison between the actions taken and the welfare outcomes achieved was not the intention of this study and is beyond the study scope.

Outline of the Report

The report provides a detailed summary, highlighting key findings and project outcomes. The project is summarised according to the two innovative approaches; firstly, to work closely with poultry producers and industry by developing bespoke FCAP to further undertake tailor-made practical management strategies to reduce IP and maintain feather cover on their own farms. Secondly the sharing of evidence-based knowledge that is specifically adapted to meet the needs of producers and their different styles of knowledge acquisition by using a range of multi-media platforms and dissemination events. Both positive and negative outcomes will be considered.

MATERIALS AND METHODS

Formation and operation of the Laying Hen Welfare Forum (Operational Group)

The Laying Hen Welfare Forum (LHWF) was established in 2015 and brings together expertise from industry, farm, veterinary, animal welfare and government to explore how flock management can be improved, and to work with producers to reduce IP amongst laying hens. Through practical studies, the group is seeking to establish economically positive ways of improving the welfare of laying hens and pullets. The LHWF will promote knowledge transfer to the wider egg industry to include both commercial and small non-commercial flocks. It will endeavour to encourage adoption of best practice by all, including facilitating producers to share effective innovative practices. Two Project Officers (PRO) were successively in post during the course of the project, recruited on the basis of their facilitation and MI skills as well as previous experience in projects using science and practice-based strategies for managing feather cover on farm.

Membership and the Terms of Reference of the LHWF are set out in Appendices 1 and 2.

Recruitment and Description of Project Farms

In total 29 commercial laying flocks were used in this study. Producers were recruited by the British Egg Industry Council (BEIC) through membership subscription, with a few other producers recruited by industry partners. Consenting participants were then approached by email giving more detail about the project. All the producers showed their support for the project, willingness for their flocks to be monitored for feather condition and to develop bespoke management strategies to maintain feather cover. A full range of producers were recruited to the study regarding their motivation and current management of feather cover. Some of the producers were motivated to join the study as they had recently experienced higher than average levels of IP and mortality in their flocks. Other producers, although willing to participate, initially felt that developing a FCAP was not a priority, while some could be said to be industry leaders in the management of feather cover, and several others were keen to learn for the benefit of the welfare of their flock. This was a deliberate strategy to test the viability of the approach to develop feather cover management plans to support all types of producers, regardless of where they were on their feather cover management journey.

The strategy of recruiting more than the 25 farms promised in the proposal was to account for fallout: 3 farms were not available for second visits due to change of ownership of farm, a disease challenge on farm and late recruitment. To preserve confidentiality, flocks are identified by an ID number in presenting some of the results. Table 2 summarises flock details.

Table 2: Farm and flock details

Location	System *	Beak status*	Flock Size	1st Visit age (w)	1st Visit (breed)	2nd Visit age (w)	2 nd Visit (breed)
Nottinghamshire	FR M/T	BT	16000	58	Bovan Brown	50	Hyline
Lincolnshire	FR M/T	BT	16000	69	Lohmann Classic	46	Lohmann Classic
Shropshire	FR M/T	BT	16000	27	Lohmann Lite	23	Bovan Brown
Yorkshire	FR M/T	BT	16000	54	Hyline Brown	41	Hyline Brown
Suffolk	FR M/T	BT	16000	23	Lohmann Brown	70	Lohmann Brown
Yorkshire	FR M/T	BT	16000	31	Lohmann Classic	68	Lohmann Classic
Yorkshire	FR M/T	BT	16000	52	H & N	No Visit	No visit
Yorkshire	FR M/T	BT	16000	48	Lohmann Brown	31	Lohmann Brown
Lancashire	FR M/T	NBT	14383	29	British Blacktail	67	British Blacktail
Yorkshire	FR M/T	BT	16000	33	Lohmann Brown	76	Lohmann Brown
Kent	FR M/T	BT	16000	40	Hyline	53	Hyline
Tyne & Wear	FR M/T	BT	16000	62	H & N	41	Lohmann
Powys	FR M/T	BT	16000	82	Hyline	No Visit	No visit
Rutland	FR F/D	BT	16000	39	Hyline Brown/white	37	Hyline
Denbighshire	FR F/D	BT	4200	56	Lohmann Brown	48	Lohmann Brown
Yorkshire	FR F/D	BT	10000	48	Bovan Brown	35	Bovan Brown
Norfolk	FR F/D	BT	12000	45	Lohmann Brown	25	Lohmann Brown
Yorkshire	FR F/D	BT	12000	32	Bovan Brown	74	Bovan Brown
Cumbria	FR F/D	BT	16000	38	Shaver	67	Shaver
Cumbria	FR F/D	BT	12000	43	Shaver	72	Shaver
Cornwall	FR F/D	NBT	3100	39	British Blacktail	66	British Blacktail
Devon	FR F/D	BT	12700	29	Lohmann Brown	59	Lohmann Brown
Devon	FR F/D org	BT	3000	56	Hyline	28	Hyline
Powys	FR F/D	BT	6000	32	Lohmann Classic	No Visit	No visit
Shropshire	BA	BT	273600	53	Novagen	30	Bovan
West Glamorgan	EC	BT	126000	17	Lohmann Brown	31	Lohmann Classic
Shropshire	EC	BT	223000	45	Novagen	23	Hyline
Kent	EC	BT	70158	39	Lohmann Brown	62	Lohmann Brown
Devon	EC	BT	124930	19	Hyline	56	Hyline

* EC=Enriched cage (colony), (colony) cage BA = Barn (aviary), FR = Free Range F/D = flat deck (single tier) M/T = multi-tier, org=organic, (N)BT = (Not) beak treated

Housing systems and flock size

Four flocks were housed in enriched (colony) cage systems (EC) and 1 in barn aviary (BA) (flock size range 70,000 to 124,000). The 24 free-range (FR) flocks (including 1 organic) were housed in either single-tier, flat-deck (F/D) (N=11) or multi-tier (M/T) aviary systems (N=13) with flock size from 3,000 to 16,000 birds.

Breeds

The 29 flocks that were available for this study included the following breeds at the first visit: Lohmann Brown, Lohmann Classic, Lohmann Lite (n=12), Hyline brown/white (n=6), Bovan Brown (n=3), Novagen (n=2), Shaver (n=2), British Blacktail (n=2), and H&N (n=2). Six producers had changed breed by the second visit when the number of flocks/breed were: Lohmann Brown, Lohmann Classic, Lohmann Lite (n=11), Hyline brown/white (n=7), Bovan Brown (n=4), Shaver (n=2), British Blacktail (n=2).

Beak status

Of the 29 flocks, 27 flocks had been beak treated by infra-red technology at day old at the hatchery and the other 2 flocks were intact beak flocks (Table 2).

Data collection

Data were obtained principally from 2 farm visits. There was a wide range of flock ages at each visit (Table 2). All 29 farms had an initial visit where the following information was obtained:

- Motivation to join the project and maintain feather cover
- Where producers currently get information about maintaining feather cover
- How would they like to receive future information about maintaining feather cover?
- Attitudes to change
- Good practice for managing IP actively on farm
- Current feather cover scores, production and mortality figures
- Bespoke actions to take forward

Questionnaire (visit 1)

The producer was interviewed (see questionnaire in Appendix 3) to obtain information. The interviewer was a trained and experienced facilitator able to use MI techniques, particularly when in conversation with the producer with regards to developing their FCAP as required.

Bespoke Feather Cover Action Plans (FCAP)

Following the visit, a report was prepared by the PRO which summarised information and highlighted the FCAP developed and agreed with the producer for the flock going forward.

Research and support package for the project farms

- Phone calls and emails were made to producers to monitor progress and to be actively involved if they required additional support
- The PRO undertook further research to help producers procure and specify enrichments or range enhancements for their FCAP

Evaluation of uptake of FCAP (visit 2)

The majority (26 farms) were available for second visits at which 14 had placed new flocks and 12 still had the same flock as at the initial visit. Discussions with the Operational Group and other stakeholders, together with research evidence, confirmed that as well as access to litter, matching the environment and a seamless transition between rear and lay is important for controlling feather pecking. Thus, it was deemed important to determine the degree of engagement with rearers of the birds before they came to the laying farm. Accordingly, a small questionnaire was developed to determine current rearing and transitioning practices.

The main purpose of the second visit was to gather evidence as to the effectiveness of the MI approach to develop FCAPs in terms of both changed management practice on farm and the response of the birds (e.g.) feather cover, mortality and productivity). As litter quality is a very important management strategy for maintaining feather cover (Nicol *and others*, 2013), this was evaluated in loose-housing systems. In addition, the use of enrichment objects was observed using standard methodology to indicate bird preferences as a guide for the industry. Thus, the following information was obtained:

- Motivation to adopt changes on farm – bespoke actions
- Reflection and barriers
- Assessment of outcome measures
 - Feather scores
 - Observations of feather pecking behaviour
 - Behavioural observations of enrichment use
 - Litter scores
 - Flightiness and Vocalisation
 - Range management and outdoor enrichments
- Production and mortality figures
 - Production figures at age of visit
 - Mortality figure at age of visit

On Farm Assessments

Producer motivation, the value of FCAP, barriers to implementing change on farm

To discover ‘what motivates producers to maintain feather cover’ a combination of motivational techniques was used. These included structured, but open-ended questions when interviewing the producers during the initial and follow up visits. Producers were asked several questions that focused on sharing progress and experiences of maintaining good feather cover. Producer-led development of bespoke feather cover action plans (FCAP’s) tailored to their own farms were developed by the PRO facilitating the discussion and using Social Science techniques such as MI. Producers were also consulted on preferred ways and means of receiving information about maintaining feather cover going forward. Questioning at the second follow-up visit probed and enabled producers to speak openly, reflecting on bespoke actions that worked well to help reduce IP and actions that did not. The facilitator actively encouraged producers to talk openly about challenges and barriers to making changes to improve feather cover, in order to give them an opportunity to talk through, process and take ownership of these challenges; a necessary first step to developing and implementing solutions.

Motivation Scoring

During the first visit the facilitator used MI techniques to gauge how motivated producers were in general and also how interested they were in making changes on farm to maintain feather cover. Motivation levels were assessed during the interview, following an informal discussion to allow the producer to be in a relaxed frame of mind when it came to the questionnaire. All questions were designed to be open-ended questions to allow full engagement. The first question was 1) What motivated you to take part in this project? This gave a good starting point to determine the level of interest in FCAPs. Producers who felt they needed support to manage IP problems on farm were categorised as 'engaged' (score 3), as were producers who were recognised as 'industry leaders'. Producers who did not express as much enthusiasm but were a little more attentive were considered 'interested' (score 2). A score of (1) was given to producers who had not been so forthcoming, recruited by other industry partners and generally seemed 'detached' and not independently self-motivated.

Secondly, responses to change were then measured. This was calculated by the number of changes producers themselves, with the support of the facilitator, planned to implement going forward. Motivation levels were grouped. Score (1) was 'low' only deciding to do 1 or 2 changes. A score (2) was for 'medium' level planned 2 or 3 changes, a score of (3) was ranked as the 'high', i.e. willing to achieve 3+ changes.

Feather Scoring

Feather condition was assessed using the LHWF scoring sheet (Appendix 4), based on AssureWel methods, with the producer with the aim of encouraging ownership over the feather cover monitoring process on both visits. Feather cover was assessed on a total of 50 hens with 5 birds scored in ten areas including on the system, scratch area and range to provide a representative sample. Birds at this point were not handled but were randomly selected by counting three birds to the right of the first bird to be focused upon (in line with AssureWel protocol). Feather cover was assessed and scored for 3 areas of the body - neck, back and rump. A 3-point scale was used (0 = No damage to 2 = Severe damage to skin and very large injured areas (>10cm²). The same method was used in enriched cages (EC) 5 birds scored in 10 random cages selected in different locations and levels of the house.

Feather pecking observations

Observations of pecking behaviour were recorded in areas of approximately 2 m² randomly selected with 2-minute observations of all instances of IP and aggressive behaviour during the same observation period repeated for 10 areas of the house avoiding obstacles which would obscure the view using Lambton *and others'*, (2015) methodology. Areas were selected where there was a reasonable sample size of hens (10 or more). These included on the multi-tier (or flat deck) system, scratch area (and range) (total of 20 minutes) to give a representative sample of birds. Observations also included bouts of gentle feather pecking (GFP) defined as continuous pecking until another behaviour was performed or the behaviour stopped for a 5 second gap (Kjaer and Sorensen, 2002). Individual incidents of severe injurious pecking (SFP), instances of vent pecking (VP), cannibalistic pecking (CB) and aggressive pecking (AP) were recorded (Table 3). In enriched cage systems, a similar method was used but observations of pecking behaviour were recorded for 2-minutes in 10 randomly selected cages throughout the house and at different levels.

Table 3 Definition of feather pecking behaviours

Behaviour	Definition
Gentle feather pecking (GFP)	Soft gentle feather pecking, without pulling and removal of feathers
Severe feather pecking (SFP)	To peck or pull out the feathers of other birds with force
Aggressive pecking (AP)	Forceful pecking directed at the head and neck region
Vent pecking (VP)	Pecking directly at the vent area
Cannibalistic pecking (CP)	Pecking at exposed skin creating wounds, leading to cannibalistic pecking

Observations of interactions with each in-house enrichment object

Two short periods of observations totalling 4-minutes were made on all different types of enrichments in the shed to provide a 'snapshot' assessment of their use by the birds. A 2-minute habitation period allowed the birds to become accustomed to the presence of the observer. Recordings were randomly taken on each of the enrichments, watching one bird using the enrichment for a 2-minute period and repeating for another bird = 2 birds per enrichment.

Litter Assessment

Litter was assessed at the follow up visit as maintaining friable litter to enable the birds to perform foraging and dustbathing behaviour (important behavioural needs) is a key strategy for managing injurious pecking. A 5-point scoring system was used using a similar method to the Welfare Quality protocol <http://welfarequalitynetwork.net/>: Litter was assessed by dividing up the shed into 4 areas (this is the general layout in most poultry sheds). Each quarter of the shed (four sections) was assessed individually by walking over the scratch area and examining the litter to derive an overall total for the whole scratch area. Table 4 defines the scoring system used.

Table 4 Litter scoring system

Litter score	A	B	C	D	E
Description	5-10cm completely friable & dry litter	5-10cm friable litter with small wet/capped patches	5-10cm friable litter with some wet/capped patches	Litter has as many wet/capped patches as friable areas	Mostly wet, capped litter with a few friable areas

Flightiness and Vocalisation Assessments

Flightiness was assessed by the PRO at both visits for FR, BA and EC flocks using the AssureWel protocol: <http://www.assurewel.org/layinghens/flightiness.html>. Sample size: Whole flock method of assessment: Observed the behaviour of birds during the assessment.

- Calm - In general, the birds appear undisturbed by your presence or actively approach you
- Cautious - In general, the birds' behaviour is disturbed by your presence, but the birds do not appear actively alarmed
- Flighty - The birds appear actively alarmed by your presence

Vocalisation was assessed only at the second visit for both FR, BA and EC flocks. Birds were observed and the observer listened to the birds in the house once the birds had resumed undisturbed behaviour after entering the house. Birds were assessed for 2 minutes and generally during the rest of the time spent in the house. Vocalisation was then recorded as described in Table 5. Whilst there is scientific interest in monitoring bird sound as a means of measuring welfare, there is no standard system to describe laying hen vocalisation.

Table 5 Description of hen vocalisation

Vocalisation					
Description	Contented Murmuring	'Chatty' but not particularly noisy	A few Squawks	Loud vocalisation (noisy)	Low vocalisation

Summary report for producers

The final report for each flock included feather scores for both visits, benchmarking their flock performance against industry (Assurewel) data and results of the observations of feather pecking. The uptake of actions in the FCAP that were discussed at the visit were also included. Where relevant (mainly in the FR and barn flocks) the interactions with each type of enrichment object from observations was included. Suggestions were made for actions going forward after the project support ended.



Data analysis

Descriptive statistics are used to summarise the quantitative data collected in the project, which was not designed to control variables such as flock age, thus statistical analyses are not possible with the exception of the relationship between litter management and litter scores, which were explored with an analysis of variance (IBM SPSS v 26).

Knowledge Exchange

The LHWF undertook two visits to mainland Europe - to Austria and the Netherlands - countries where untrimmed flocks are prevalent. The aim of these study tours was to understand their flock

management and determine whether their knowledge, experience or practices could be adopted in England to help better manage IP in laying hens and advance towards running untrimmed flocks.

Outcomes from these visits together with the LHWF project work on maintaining feather cover on farm and some key findings from the project farms were disseminated through multiple routes:

- 10 presentations with discussion groups
- 3 interactive workshops
- LHWF website
- 9 press articles in industry journals
- social media platforms
- 5 video case studies.

Workshops and presentations

The majority of presentations and workshops were arranged to coincide with existing egg producer group meetings. This was decided by the Operational Group (LHWF) due to egg producers' time constraints as an additional meeting may have resulted in a low attendance rate. It also helps to demonstrate that the industry is working together to advocate action on maintaining feather cover. At three out of the 10 events the LHWF was invited to share its work with the veterinary, farming, trade and research communities. The focus of our early dissemination events was to promote awareness of the project and that industry, together with scientists, NGOs and government representatives are working together to lead action in supporting producers to reduce IP through an Operational Group (LHWF). At the British Veterinary Poultry Association (BVPA) AGM (March 2019), a presentation of the key objectives was disseminated, as veterinary knowledge, skill-set and buy-in is crucial to the rollout of FCAP's nationwide if this project approach proves successful. Vets are a leading form of support and advice to producers.

The interactive workshops were arranged during the latter part of the project from October 2019 until March 2020. This critical stage was identified giving time to collate key results from the project trial farms and to share video case studies showing how to manage litter quality, enhancing the range, enrichment ideas for pullets and hens and farmer led feather scoring on farm.

Articles in poultry trade journals

A communication strategy was co-created by the LHWF. The mainstream poultry press was identified as a good route to both communicate and raise awareness about the project to producers across the industry as a means of demonstrating the value of the work, and to disseminate key findings, particularly innovative practices that were identified on farm by the facilitator. Articles were planned to share on-farm activities to inspire the uptake of good practices and new ideas to reduce injurious pecking on farms wider than the project group.

Website and Social media

As part of the communication strategy, the LHWF website < <https://lhwf.co.uk/> > was established at the start of the project, and Twitter and Facebook accounts were used to send out targeted social media posts to keep the industry abreast of project progress a new resources by using regular updates and feeds throughout the project timeline, as well as directing traffic to the website and emerging IP KE resources.

Videos

Feedback from the industry, particularly during initial visits, indicated the value and popularity of short videos as a means of acquiring information. Furthermore, [research](#) suggests that one third of online activity is watching videos, [82% of Twitter users](#) watch video content, and 45% of people in society watch more than an hour of Facebook or YouTube videos a week. Thus, five videos were commissioned and professionally filmed on the farms of producers involved in the trial, showcasing key actions taken to reduce IP. Importantly these were all producer/industry-led to maximise engagement for other producers and industry end users. Feedback from the LHWF members, stakeholder meetings and some producer group workshop sessions were also incorporated in the editing process to optimise the value of the videos to producers.

Stakeholder meetings

Two industry stakeholder meetings were held in July 2018 and September 2019, which included producers and representatives of animal welfare NGOs, organic certification bodies, industry trade associations, egg packers, veterinarians, and academics. At the first meeting, the background to the LHWF, its structure, aims, and current workstreams were presented, including the aims and objectives of the EIP-funded research project. The second meeting provided an overview on work carried out on the trial farms; developing bespoke producer-led FCAPs; reducing injurious pecking; the planned workshops and production of five videos. Both meetings were designed to allow the wider stakeholder group the opportunity to be informed and kept up to date with the work of the LHWF on the industry's behalf, as well as discuss, challenge and share knowledge on all aspects related to how everybody can further work together to reduce IP.

PROJECT RESULTS AND OUTCOMES

The project outcomes are presented in two main sections: Feather Cover Action Plans and Knowledge Exchange (dissemination activities).

I. Feather Cover Action Plans (FCAP)

The value of the bespoke FCAPs was assessed in three principal ways:

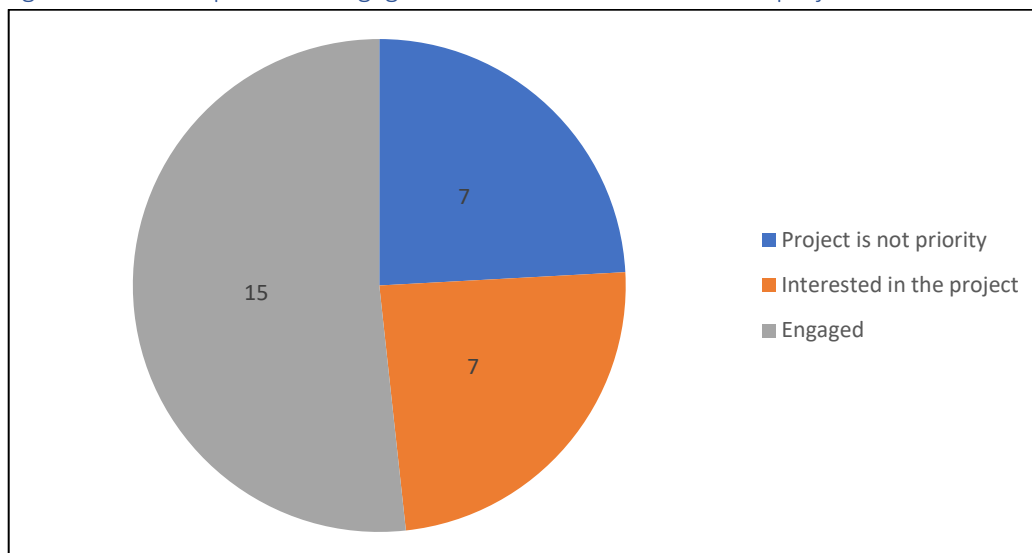
- 1) by evaluating Social Science aspects underpinning FCAP embedding:
 - producer perception of FCAP value in terms of ease of implementation, successes and barriers; both overall, and for specific measures
 - factors influencing behaviour change
- 2) by measuring FCAP implementation
- 3) by bird welfare outcomes and on-farm performance

1) Factors Influencing implementation of FCAP

Producer perception of FCAP value

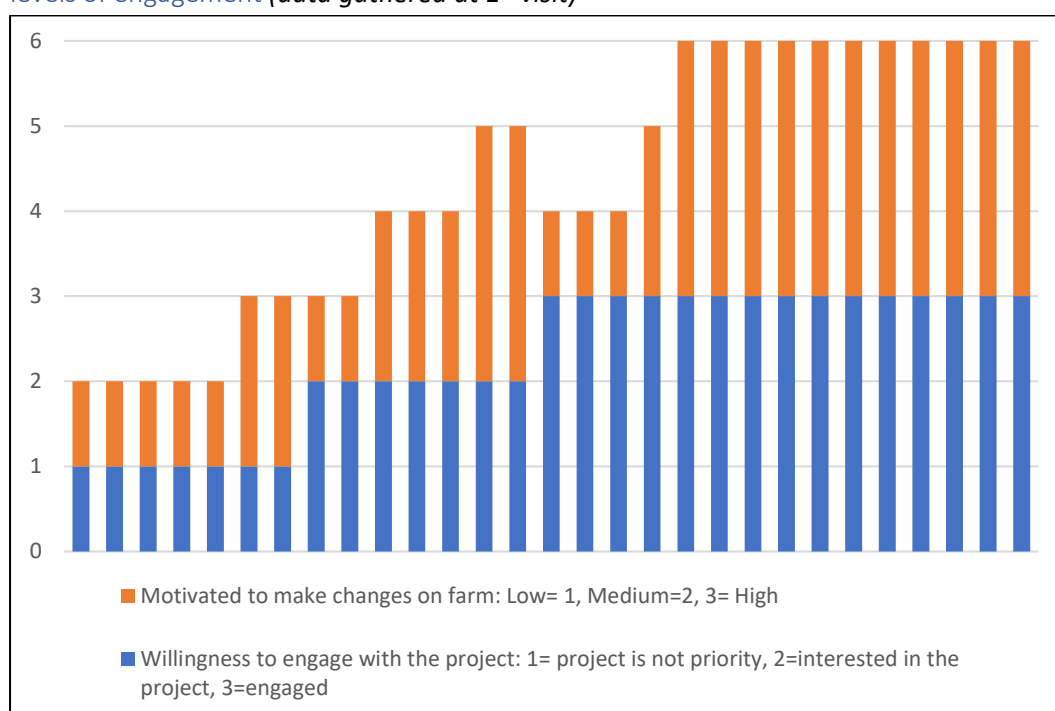
To determine whether FCAPs could work on farms, it was important to recruit producers with a range of attitudes and starting points in terms of their feather cover management. Therefore, at the beginning of the project, during the first visit, levels of engagement with the project were assessed. Figure 2 indicates that there was a range of engagement with the concept of managing feather cover via a FCAP.

Figure 2 Levels of producer engagement with FCAP at start of the project



Reflecting this, producers' motivation to make changes to manage feather cover on farm was probed. Figure 3, where farms are ordered according to their initial level of engagement, indicates that, unsurprisingly, those with greater interest from the start were in general more motivated to plan changes to their management: however, more than half had medium to high levels of motivation by the end of the first visit, which we suggest reflects the value of one: one motivation and facilitation.

Figure 3 Levels of producer motivation to plan changes to manage feather cover, compared with initial levels of engagement (data gathered at 1st visit)



2) Implementation of FCAPs

To summarise the uptake of planned changes in management practice within the FCAP (bespoke actions) Figures 4 and 5 illustrate for FR and EC housing systems respectively both the number of evidence-based actions already in place on farm and the additional actions implemented following facilitation of the FCAP. The flocks are ordered according to the number of actions in place at the start of the project, as for those already undertaking a large number of management strategies to control IP there is only a limited number of evidence-based additional actions they could take. Farms 5 and 9 each had flocks with above average, good feather cover so felt there was no need to change their management practices at this time, thus their FCAP was to continue with current management (Figure 4).

It is important to recognise that few options in terms of environmental enrichment are available to prevent or control IP within the enriched colony cage (EC) system, although for all systems optimal nutrition and disease control are important. Also, that potential strategies in FR systems vary widely in terms of the cost, complexity and ease of implementation – this will be discussed later in the report. The one large flock housed in the barn aviary (BA) system this being essentially the same as multi-tier, free-range housing but without access to the outside - was similar to mid-range FR flocks in that they had 10 strategies in place initially and implemented 1 of their 2 planned actions. Figures 4 and 5 indicate that there was no clear relationship between the number of relevant management strategies to manage IP and the number of additional strategies planned within their FCAP. This indicates that regardless of the number of strategies already employed, all producers can make improvements to maintain feather cover.

Figures 6 and 7, for FR and EC systems respectively, indicate the number of planned actions within their FCAP and the number of these already actioned by the time of the second visit, which was sometimes only a few months later (mean 9 months, range 6 weeks – 20 months).

Figure 4 Number of strategies used to manage injurious pecking at start and end of project showing high levels of adoption of FCAPs (FR flocks). Farm IDs are ordered according to the number of strategies in place at the start (blue). The green columns show the additional strategies adopted from bespoke FCAPs.

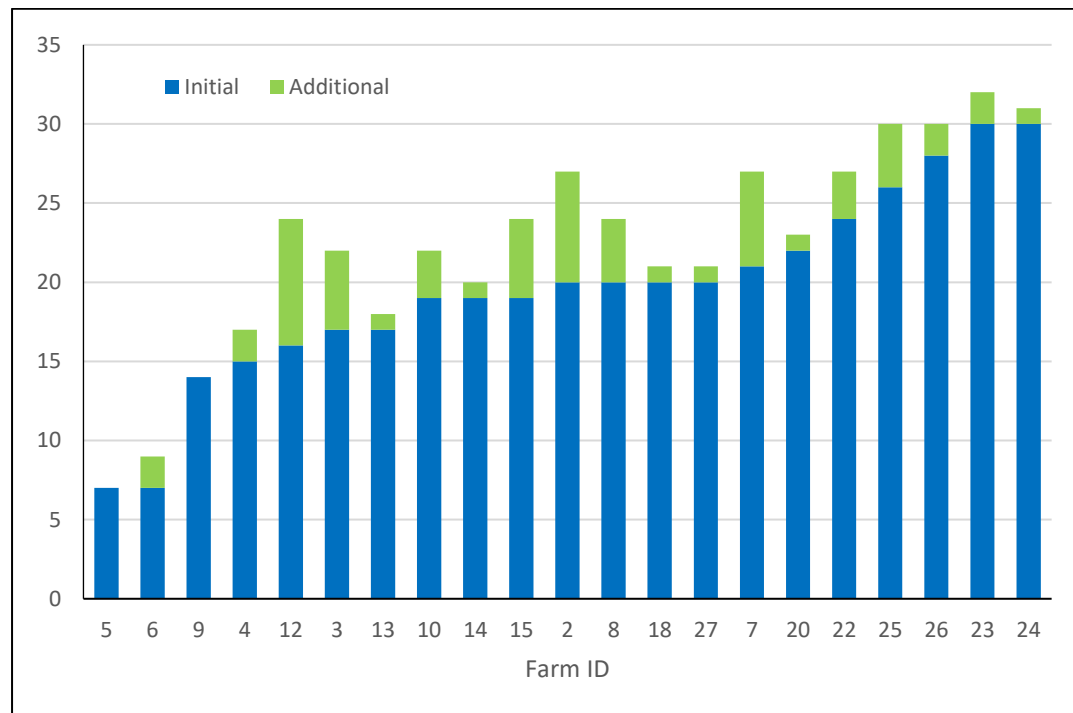


Figure 5 Number of strategies used to manage injurious pecking at start and end of project (EC flocks). Farm IDs are ordered according to the number of strategies in place at the start (blue). The green columns show the additional strategies adopted from bespoke FCAPs.

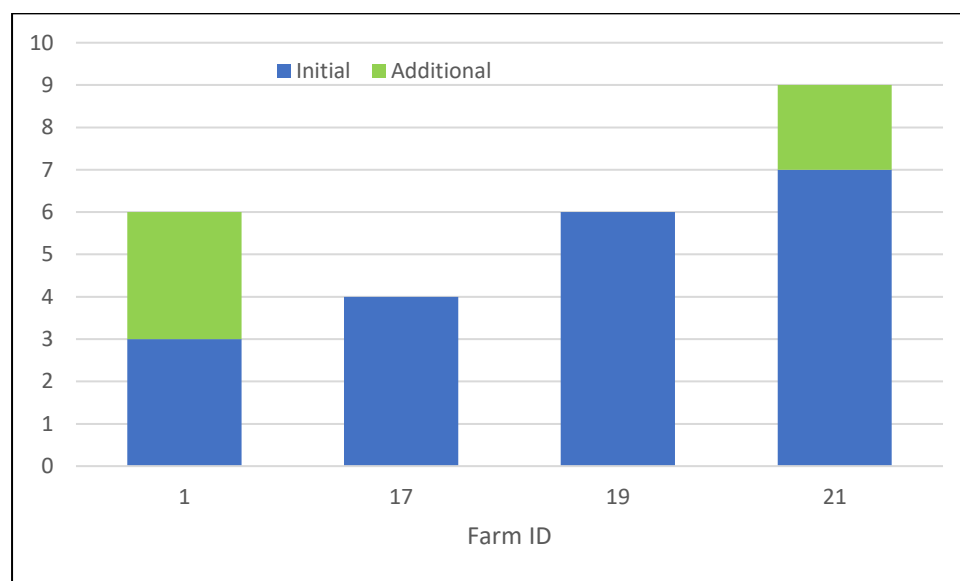


Figure 6 The number of bespoke new management strategies achieved from those planned in their FCAP (**FR flocks**) showing high levels of adoption and sometimes more actions than planned

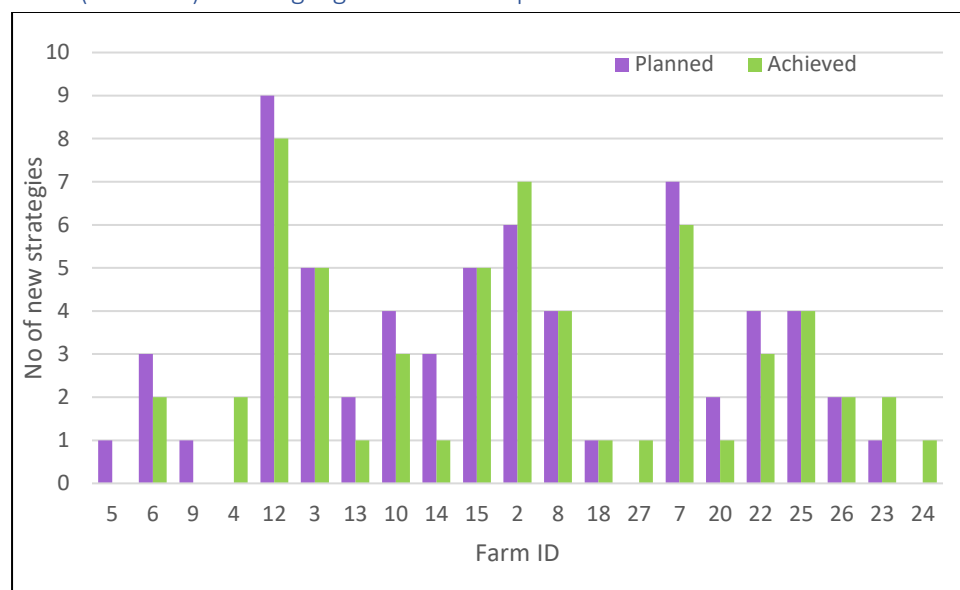
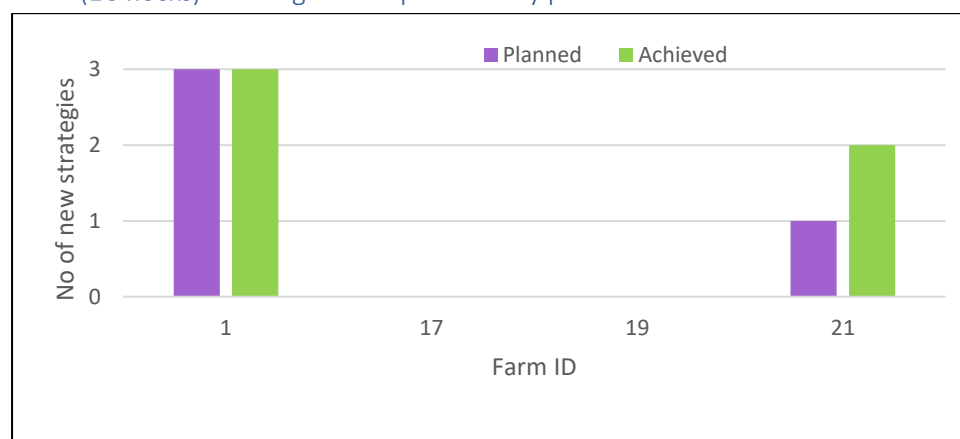


Figure 7 The number of bespoke new management strategies achieved from those planned in their FCAP (**EC flocks**) showing full adoption of any planned actions



The majority of producers participating in the study not only co-created their own FCAP, which often was ambitious in terms of the number of additional actions planned (range 0-9 for all flocks with an average for FR flocks of 3), but they were able to achieve implementation over the period of time between visits 1 and 2 (see Figures 6 and 7). For the FR flocks more than two thirds (67.8%) of planned changes were in place by the time of the second visit, on average 9 months later (range 1.5 - 20 months).

The high level of motivation was independent of the number of strategies already used on the farms at the start of the project – this is illustrated in Figure 8 but can also be noted from Figures 4 and 5. This indicates the importance of a facilitator to support further uptake of action. As Figures 4, 5 and 8 indicate, even in flocks already implementing as many as 30 strategies, some producers made even more relevant changes to manage IP than were documented in their FCAP. Five farms (including 2 EC) planned no actions and did not undertake any: of the remainder only 2 farms did not undertake any

planned actions in their FCAP within the relatively short time between the first and second visits, but one of these was already using almost all possible approaches (30). As already noted, two of the FR producers not planning further actions already had flocks with better than average feather cover, thus their FCAP was to continue with current management.

Three farms implemented further actions over and above their FCAP, which explains a success rate of up to 200% in Figure 8. Overall, in this study, there was no relationship between the number of strategies already in place on the farm and the proportion of additional measures successfully implemented from the FCAP (Figure 8). This indicated that facilitation of a FCAP using motivational interviewing techniques and follow up support can successfully promote implementation of new strategies for managing IP irrespective of the starting point on farm.

Figure 8 Successful implementation of strategies in their bespoke FCAP was both high and independent of the number of strategies already in place (26 flocks in all housing systems). *Note: a higher than 100% achievement reflects more actions done than planned in their FCAP*

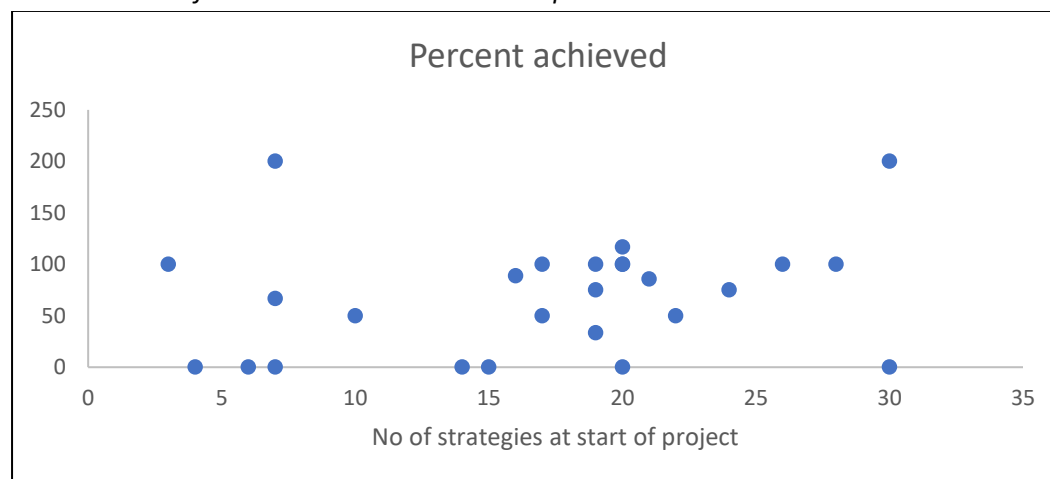
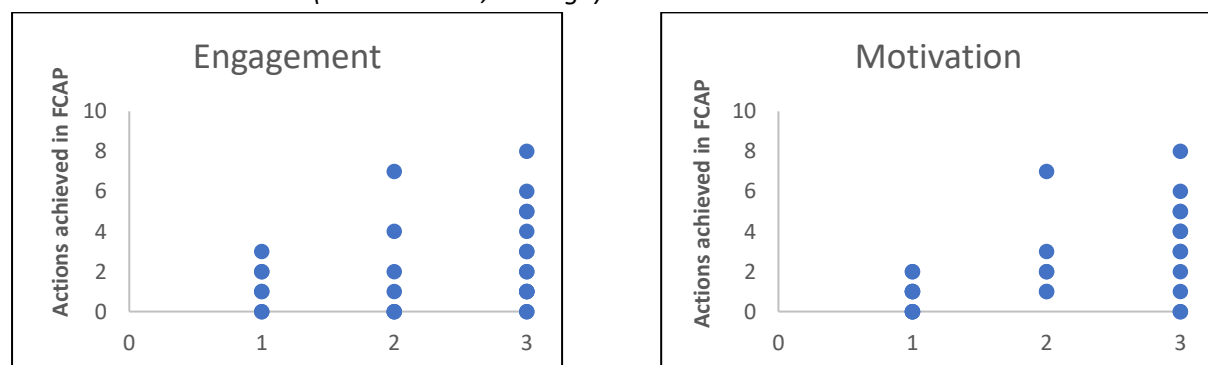


Figure 9 indicates that in general the higher the level of motivation and engagement with the project and their FCAP, the greater was the number of actions that were planned and achieved by the second visit.

Figure 9 Higher levels of motivation and engagement tended to be associated with achieving more actions within their FCAP (*Score 1 is low, 3 is high*)



Motivation was also evaluated at the second visit in light of the achievement of their FCAP. Out of the 26 farms only 2 farms had not undertaken any of their planned actions in their FCAP by the time of the visit, and 9 farms did not plan any actions for their own FCAP (in at least two cases with well-feathered flocks because they were not needed). Of these 9, 6 producers considered their motivation was the same and three producers did not answer either way. Although, the three producers who did not discuss their motivation levels did achieve some of the bespoke actions from their FCAP and all 6 producers carried out additional actions on their farms despite stating that their motivation level hadn't changed. One producer undertook no actions on farm as he considered his flock feather cover was good and he was already using a diverse range of management strategies. Nonetheless he was open to receiving new research on maintaining feather cover. The other producer, who was managing two trial farms of EC and BA systems, was not the original interviewee but had continued to investigate one of the bespoke actions from the first visit to possibly action later.

Figure 10 Bespoke actions planned on project farms at first visit

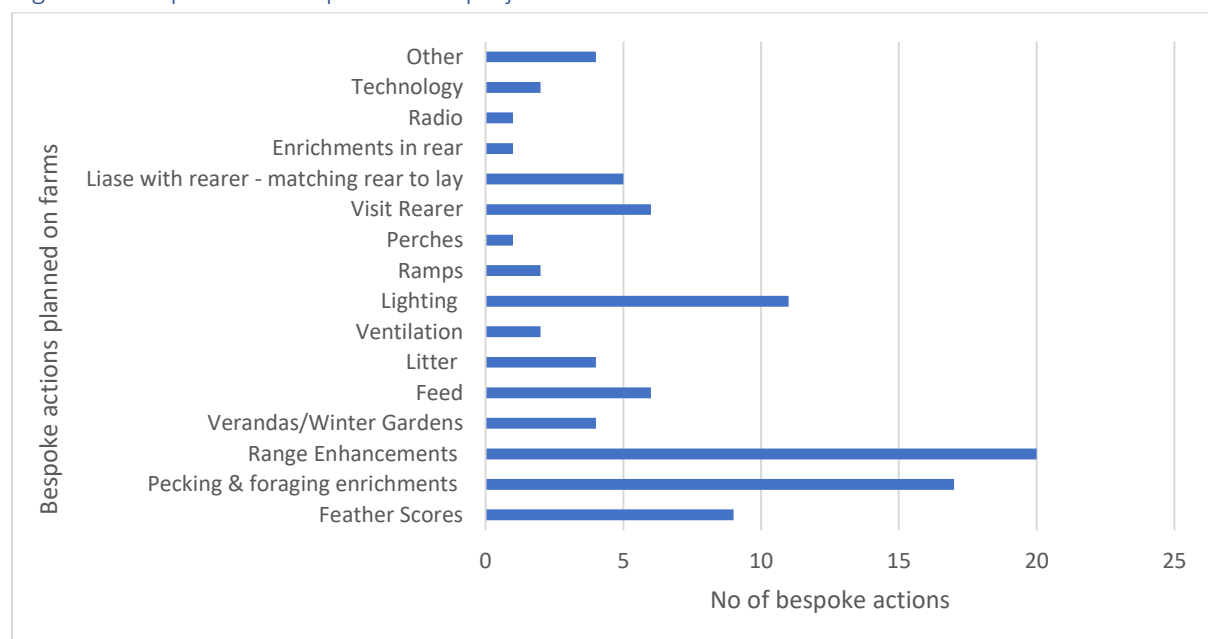


Figure 10 demonstrates the range of bespoke actions planned by project farms in collaboration with the facilitator at the first visit. The most commonly planned actions revolved around getting birds out to range by enhancing the range features, as well as introducing new pecking and foraging enrichments to encourage normal pecking behaviour. Lighting was also a popular action area, along with regular monitoring of feather cover in order to identify action points within the laying hen cycle.

The pecking rings shown in the Figure 11 below (right) were used in a colony cage system solely for this study. This was a proactive and forward-thinking trial to use pecking rings to provide an interesting enrichment for an enriched (colony) cage system and to gauge their potential for running an intact beak flock. A few more bespoke actions achieved on farms are also illustrated.

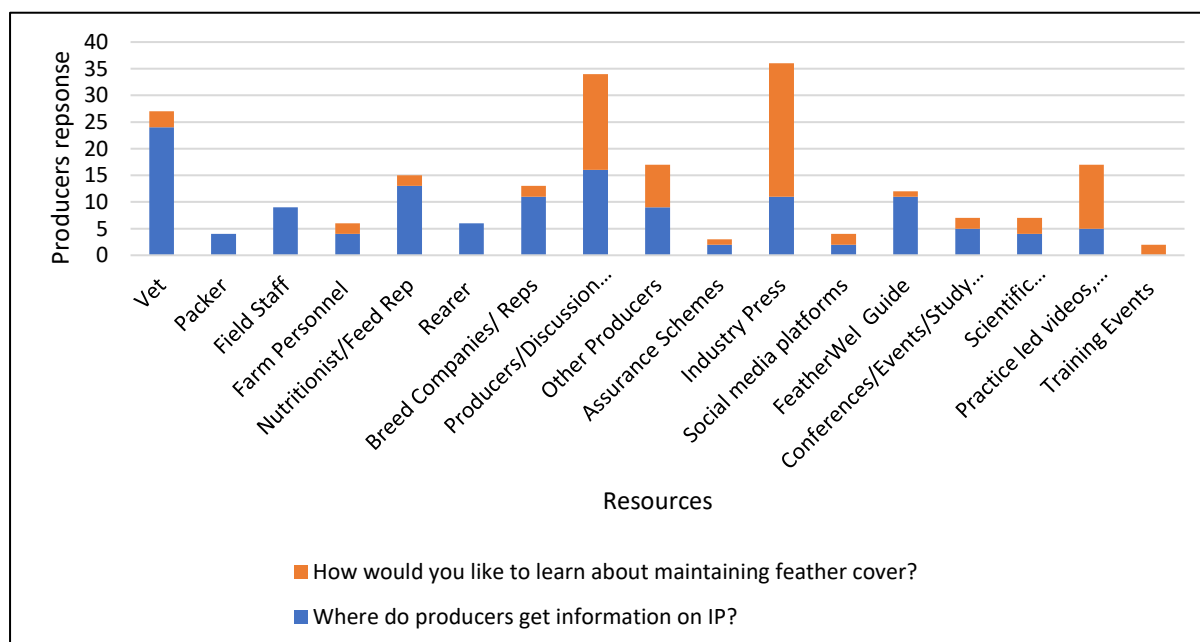
Figure 11 Some examples of enrichment (suspended lucerne bales, ramps and pecking discs)



Factors influencing behaviour change

To support the decision-making process underlying a decision to change current practices it is important both that the source of information that producers are referring to is trust-worthy, reliable and evidence-based, and that it is presented in a preferred format. At the first visit, producers were asked where they normally sourced information on feather pecking management strategies. During the second visit they were asked preferred sources and formats for receiving information in the future. Figure 12 summarises their responses – note that many would use more than one source. This indicates the need for a joined-up approach, using a variety of methods of communication across industry, to reach, support and inspire producers in their feather cover management.

Figure 12 Sources of information on IP for participating producers



The first visit sought to identify the role of their vet in terms of advice and support in the prevention of IP on farm. All producers were asked 'Do you talk to your vet about how to reduce injurious pecking and maintain feather cover?' This was to establish whether producers already had the relationship

with their vet to potentially develop and implement a FCAP together alongside the VHWP. Vets were used to help manage IP by 24 producers, with the other 5 project farms using different resources. In conversation, however, it became apparent that producers used veterinary intervention mainly when there was an acute problem with IP on farm rather than to discuss preventive measures. Nonetheless, their vet was seen as the most important trusted source of information. Thus, whilst it may be appropriate to engage with the veterinary community to add a FCAP to the flock health and welfare plan, there may be a need to further explore the facilitation element and the cost of preventative veterinary advice in this context.

Producer discussion groups, industry press and videos were other popular choices, which we have focused on in our knowledge exchange activities. By the end of the project these sources had become the preferred options for future dissemination. We have also linked the FeatherWel website to the lhwf website so that [resources for managing IP](#), including the new videos, are available from one page.

Further discussion encouraged producers to speak openly. One topic was ‘Why is it important to reduce injurious pecking and maintain feather cover?’ The majority of producers identified production/profitability and bird welfare to be of the highest of importance, followed by customer relations and pride (Table 6). Only one producer noted the potential banning of beak treatment. Comments included:

“Farmers’ pride. Bird welfare. Compassion - not nice to see [poorly feathered birds]. Good feather cover means better production and lower feed consumption. The bird will be a better bird if she maintains feather cover. Also, it is not good for the industry image and reputation”

“More production, mortality lower. To have good feather cover makes you feel you have done a good job”

“Better welfare - better profit. The threat of beak trimming ban”

Table 6 Producers’ reasons for maintaining good feather cover by reducing IP

	Bird Welfare	Production & Profitability	Customer Relations	Producers Pride	Beak treatment ban
Number of producer responses	22	22	7	6	1

As profitability was one of the main reasons, producers were also asked whether any type of incentive would encourage them further to maintain feather cover. Only 10 acknowledged a financial incentive would boost them to do more. However, when individuals were asked to indicate what other producers might think, 16 considered that many producers would welcome some sort of financial reward. A small sample (n=4) mentioned that they did not think a financial incentive would help and it was more about the welfare of the birds. In total 9 producers considered the welfare of the birds more important than any financial incentive, followed by pride.

“Pride is the main incentive. Doing the best for the birds. The key measure is how good they look when they are leaving the farm”

While some producers emphasised that badly feathered flocks should not be penalised, others felt this could be a good incentive to be rolled out across the board to actively encourage producers to do more. Government grants for training of staff, more research, on-farm trials and recognition of well feathered hens were also identified as incentives.

We also put the question to producers ‘Do you feel that industry support, incentives, resources are required to help you maintain feather cover?’ Out of the 26 producers 6 expressed that industry was already supportive. Although three considered industry was already doing a lot, they considered sharing knowledge through industry was important. Knowledge exchanged (KE) was viewed by most producers as the most important factor. A few mentioned financial incentives: educating the consumer was also highlighted (Table 7). Other comments were that industry could do more, and that there was a need to encourage consumers to buy British.

Table 7 Areas where producers felt Industry support was valuable to help maintain feather cover

	KE	Financial	Financial & KE	Industry support	Industry support but more KE	Education for consumers
Producer responses	6	3	3	6	3	2

The majority of the project farms were managing beak-treated flocks with the exception of 2 producers. The project wanted to gauge how producers felt about the possibility of managing intact birds and if they already felt they could transition from beak-treated birds to non-trimmed birds and when. On reflection, and after speaking to 27 producers running beak-treated flocks, there were polarised views:

- Some, who have managed intact flocks, are happy to continue
- Producers who have not are extremely nervous for health, welfare and financial implications of getting it wrong
- Producers expressed that future work is needed
- Beak blunting research was needed
- White bird market was also highlighted as a future potential avenue to explore
- More work on causes and triggers of injurious pecking first
- Needs some sort of insurance to buffer against higher mortality/loss of profit

Barriers to moving to intact flocks included:

- Adverse public opinion of bald or pecked flocks
- Cannot predict which flocks will peck
- Cannot predict disease as trigger
- Disease triggered by pecking
- More focus on rearing
- Consumer requirement for large egg market
- Managing flocks with poorer feather cover

Working relationships between rearers and laying hen producers

A short questionnaire was completed at one of the PRO's visits to find out the *status quo* between rearers and laying hen producers. The questionnaire was answered by 27 producers and was designed to give a basic yes or no answer. The main outcome was that there is a positive relationship between the two in terms of matching the environment for a seamless transition between rear and lay (see Table 8). A very high proportion (23/27) of participating laying hen producers visited the young pullets at least once during the rearing phase, with some producers visiting more frequently. It became apparent that larger companies are rearing their own birds meaning they have full control for managing the birds.

It was reported that rearers are trying to match the laying house environment with suitable equipment such as putting in tables to encourage birds to move up and down or rearing in a multi-tier system so the birds will have experience of moving in three dimensions when they arrive at the laying house. Drinkers, feeders, perches and provisions of enrichments seem to be planned according to the requirements of the laying hen producers (i.e., their customers). However, there were 6 producers who could not remember the litter substrate and provision of enrichments during their last visit to the rearing facility. All producers, with one exception, emphasised that they received all the relevant information about their pullets regarding bodyweights, diet changes, vaccinations, mortality and so on during their visit/s and/or received this information electronically on a weekly basis. In general, levels of trust develop between rearers and their customers such that focus on specific rearing details is not seen to be necessary where performance is historically good.

Table 8 Liaison between pullet rearers and laying hen producers

Rearing Questions	Yes	No	Unknown	N/A
1. Has a specific rearing program (lighting, nutrition, vaccination) for trial farm's next flock been discussed and agreed with rearer?	26	1	0	0
2. Has the next pullet flock's vaccination program been discussed and agreed with the trial farm's veterinary surgeon?	24	3	0	0
3. Have you visited and inspected your last pullet flock at the rearing farm premises?	23	3	1	0
4. During visit, have you seen rearing data on weight gain, CVs?	26	1	0	0
5. During visit, do you know drinker and feeder type at rear?	26	1	0	0
6. During visit, did you see provision of perches on rearing farm?	23	0	1	3
7. During visit, did you see litter type and access in rear?	17	1	6	3
8. During visit, did you see enrichment provision?	13	5	6	3
9. During visit, did you see range access (for organic)?	0	1	0	26
10. On delivery of last pullet flock have you received FULL pullet rearing production records, INCLUSIVE OF vaccination program, mortality, bodyweight graphs, lighting program & any veterinary inventions/treatments?	26	1	0	0

Factors influencing motivation, implementation, successes and barriers of the FCAP

During the second visit, the producers were encouraged to reflect on a personal level about various aspects of their experience of the project. This drew out details regarding the motivation of producers,

their successes and challenges to reduce IP on their own farms. Key themes emerging from the reflections were:

1. Awareness and being part of a group

Many producers (17/26) recognised that taking part in the project motivated them to review not only their current management strategies but to adopt new, bespoke actions.

“The motivation has always been there, but this project has given us extra tools in the toolbox”.

“The project has made me think more because of the welfare of the birds. Any information to help the birds is key, so we welcome any help and suggestions”

Common themes emerged that producers are generally motivated to make changes on farm. While some farms are more proactive, others felt that the project had given them support and guidance to do more. Some considered they were driven by having flocks with feather loss, whereas other producers stated having good feather cover kept the motivation. This indicates both proactive and reactive mind sets and may suggest different producers intervene at different trigger points. There were additional associations that adopting good practices on farm was good for customer relations and industry. A possible beak treatment ban was also linked to managing feather cover with the potential of moving to managing intact flocks.

2. Support of a facilitator

Producers recognised that having the support and seeking information from the PRO inspired them to do more. Many were happy to receive information and welcomed any help or suggestions.

“Project has helped me to be more motivated with the help of the LHWF PRO”

“Always been motivated. The project has just reinforced it. LHWF PRO visiting other farms and sharing their knowledge gives us a bigger picture to adopt good practice”

“Yes, LHWF PRO useful with ideas and suggestions”

The MI technique, facilitation and support offered by the PRO clearly motivated change, as over 80% of producers (21/26) made changes including 50% of those in EC systems, where opportunities are limited. There was a 90% success rate in achieving behaviour change and uptake of the FCAP on free-range farms.

3. Successful outcomes

All producers were asked to review the value of their FCAP and their bespoke actions. While most ideas were simple, relatively inexpensive changes such as providing string or plastic objects as enrichments in the house, others were more extensive and costly (for example adding verandas to the house). However, both were equally valued and important to help reduce IP on farm.

The bespoke actions that they were employing were felt by 13 producers to be successfully reducing injurious pecking on their farm. Comments regarding actions which were perceived as useful in managing IP are listed in Table 9. These focused on enrichment, lighting and range enhancement.

Table 9 Actions in their FCAP felt to reduce IP by participating producers

Successful actions tried on farms
<i>Multifactorial approach and getting the litter right. Especially, that the previous flock starting FP at 20 weeks</i>
<i>Birds use the ramps early so in the last 3 or 4 weeks added more ramps. Lucerne peckers are liked by the birds as they are lasting 10 - 14 days</i>
<i>Lucerne bales being used so a positive to reduce feather pecking</i>
<i>Pecking blocks</i>
<i>Replacing the Lucerne bales every 3 weeks</i>
<i>Lucerne bales seem to calm the birds down and keeping them entertained in the shed</i>
<i>The straw bales for litter management has helped and investigating the issue with the ventilation</i>
<i>Early days on trees. Pecking blocks are helping, as being used.</i>
<i>Changed to warmer glow LEDs and now feather cover is coming back</i>
<i>Turning the nest box lights off has helped reduce feather pecking</i>
<i>Enrichment - pecking blocks have calmed the birds down</i>
<i>Pecking stones are helping. Plus, the Lucerne bales, which we used before</i>

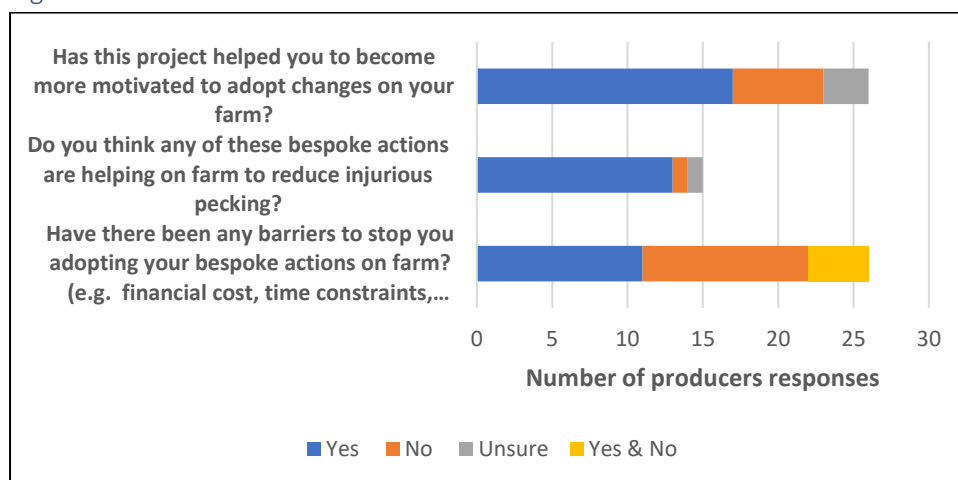
Barriers and challenges to implementing FCAP

In terms of shifting attitudes, a number of factors can be recognised from listening to the producers. A lack of success (in terms of failing to reduce IP or improve feather cover) in an innovative trial of pecking rings attached to enriched (colony) cages of intact beak and beak-tipped birds could have reduced motivation, yet the producer said: “*Limitations in a colony cage system. However, happy and prepared to try things.*” Another farm was unsure if the bespoke actions had helped as it was difficult to know with no control flocks/sheds to compare. However, the producer noted that he “*does have a calm flock*”. A few other bespoke actions caused unforeseen problems, such as new ramps incorporated into a FR multi-tier system needing to be discontinued as they encouraged floor eggs.

While there was very high uptake of the bespoke actions in the FCAP as well as further unplanned, additional actions, there were some challenges in implementing a proportion of the actions within the FCAPs on farm. The most common challenges/barriers, as in most agriculture settings, were financial cost and time constraints. Some producers also indicated that there was limited information, or they struggled to find resources. There was an even split between the number of producers who said it was easy to incorporate the bespoke actions/management strategies (n=11) and those who said it was difficult (n=11). The remaining four indicated that some of the actions were easy to achieve, where others were difficult to accomplish in the time between the first and second visit. Half of the flocks were the same flock for both visits, so the technical costly interventions, such as adding verandas or changing lighting, were planned during the first visit going forward with the new flock. Other issues

on farm such as smothering, disease challenges and other undetected problems may have resulted producers not being able to fulfil some of the actions on their FCAP. Figure 13 summarises these reflections on implementation of FCAP.

Figure 13 Reflections on the value of actions and FCAP



Reflection on facilitating FCAPs, it is usual practice, and part of the ongoing process of facilitation, for the facilitator to reflect on progress and relationships: what is going well, what is challenging and how to adjust to improve the dialogue and move towards the goals. Thus the PRO shares some insights from the process.

‘During the time of the project it became apparent that there was a diversity of laying hen producers. This was identified as early as the initial phone call to talk about the project or to arrange the first visit. Some producers were more eager for my visit over others, especially those who were experiencing pecking issues on farm and others who just wanted to talk about their birds in general. The majority of producers had already identified problems on farm before my visit but were looking for support and guidance on managing IP and maintaining feather cover. Many of the producers had good ideas, but just needed the encouragement to adopt and make the changes. Whereas others required more technical information such as when and how to plant cover crops or where to get help with grants for tree planting or information on new enrichments. From the conversations and discussions all producers spoke openly about the issues on farm and voiced their own opinions and many were happy to spend the time generating ideas and planning their bespoke actions together. FCAP’s were sent to all the 29 producers alongside any additional information required. Some producers did not want lots of information where others wanted scientific research publications, so this took a little more time in researching the desired papers. To keep the motivation of some, correspondence was generally made by email just as a courtesy reminder to see how they were getting on, if they required any support and to see if they had time to implement any of the bespoke actions. Out of the 29 producers I visited I built up good working relationships by listening and not judging and highlighting the positives currently on farm to motivate them to do more. Although, there were a few producers that hadn’t many or any bespoke actions they still were happy for me to visit again to help and support them on farm. While both visits have been completed I still get phone calls or text messages from some producers letting me know how they are getting on and support those that still require help from time to time.’

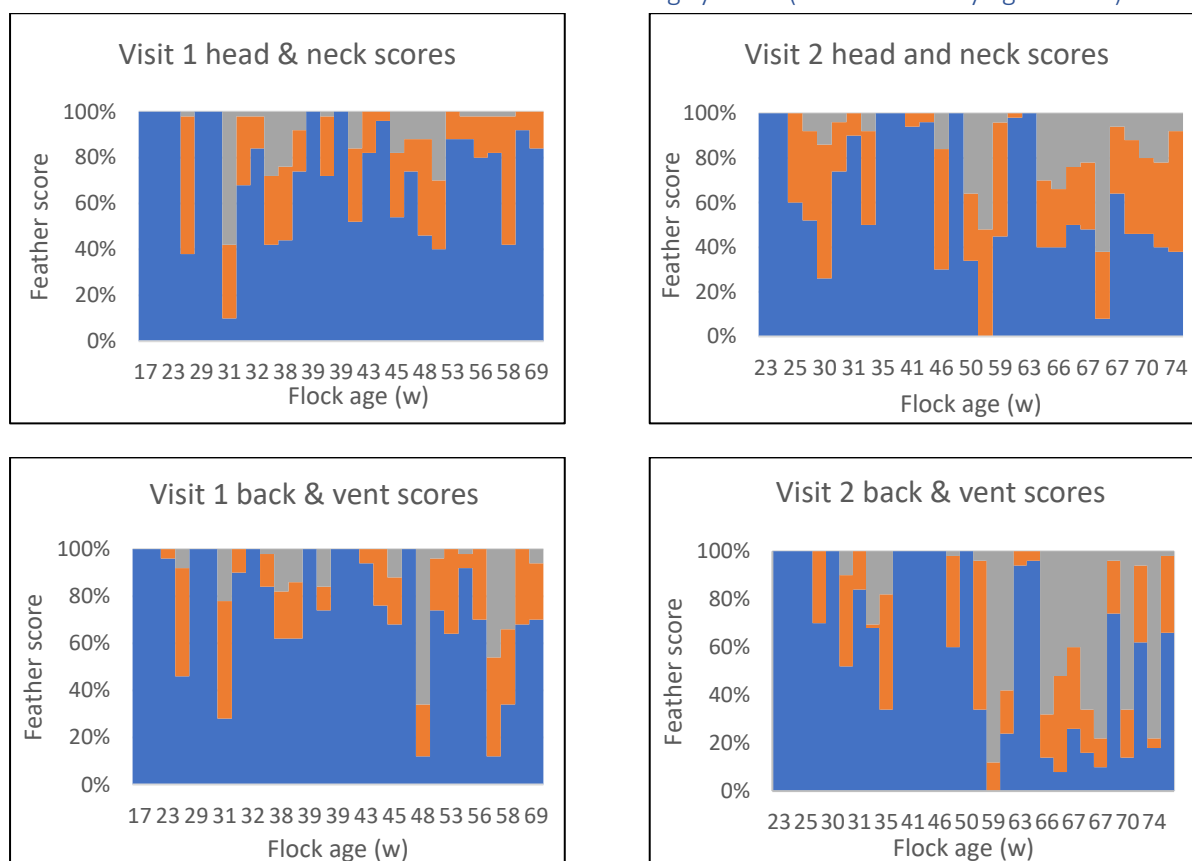
3) Outcome measures of FCAP

From a scientific perspective it is not possible to statistically compare results of outcome measures between the two visits and nor was it the intention to do so. This would have required a larger study with more control over the many variables, not least of which was the flock age at each visit and the fact that about half the farms had moved to a new flock between visits. Such work has already been undertaken (e.g. Lambton *and others*, 2013). In particular, feather cover and production data should be compared at specific age points (commonly 40 weeks of age). Therefore, outcome measures in this section serve primarily to indicate that the farms selected are typical of the range of flocks in England.

Feather Scores

As indicated above, the visits were carried out at a range of flock ages: for visit 1, between 17 and 82w and for visit 2 between 23 and 76w. There was variation between farms, which is reflective of the national picture (e.g. Assurewel, Lion Code and retailer data). Considerably more than half the birds had very good feather cover at all ages at both visits as shown in the blue areas of the graphs in Figure 14. The flock scores are arranged by age rather than by flock ID as feather cover tends to deteriorate slightly with age due to 'wear and tear.'

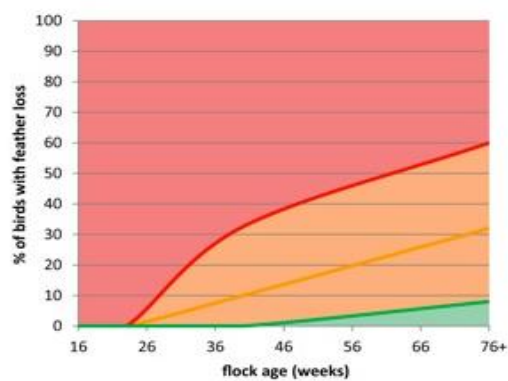
Figure 14 Feather cover in each flock (based on scores of 50 random birds/flock/visit) for head and neck and for tail and vent areas at visits 1 and 2 for all housing systems (flocks sorted by age at visit)



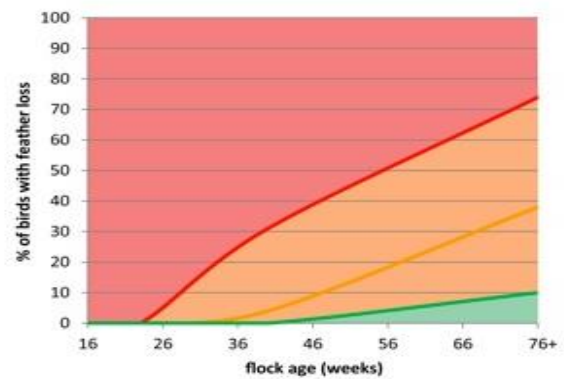
Key: Blue=score 0, orange=score 1, grey=score 2

There is no easy way to account for age differences between visits, so it was decided to benchmark each flock against Assurewel data, which was gathered for FR flocks (3% of which are also organic) in the national RSPCA Assured or Soil Association organic assurance schemes. Results of feather scores

during assurance visits have been subdivided into quartiles (i.e. the feather scores at each age for the best covered 25% of all flocks, then the next best 25%, the lower 25% and the final quartile for those flocks with poor feather cover (worst 25%)). In the farm reports for the current project, the performance of their flocks was plotted onto the Assurewel graph so that they could see where they stood in comparison with data modelled from the assured flocks. Please see <http://www.assurewel.org/layinghens/howisyourfeatherlossmeasuringup.html> for more details. The Assurewel graphs look like these for total feather loss (scores 1+2 combined):



Head and neck



Back & vent

The quartile (based on national Assurewel data) in which each flock fell at the age of the farm visit is compared for the two visits in Table 10 for all systems (Quartile 1 is best feather cover and quartile 4 is worst feather cover, using all feather loss combining scores 1+2).

Table 10 indicates the quartile in which each flock fell at the age of the farm visit.

System	Age Visit 1	Visit 1, Quartile H&N 1+2	Visit 1, Quartile B&V 1+2	Age visit 2	Visit 2, Quartile H&N 1+2	Visit 2, Quartile B&V 1+2
FR	58	2	4	50	1	1
FR	69	1	2	46	1	1
FR	39	1	1	37	1	1
FR	27	1	1	23	1	1
FR	56	2	3	48	4	3
FR	54	2	2	41	1	1
FR	48	4	3	35	4	3
FR	23	1	1	70	3	4
FR	31	1	1	68	2	2
FR	45	3	2	25	1	1
FR	48	3	1	31	3	2
FR	29	1	1	67	3	4
FR	32	4	4	74	4	4
FR	33	3	1	76	4	2
FR	40	1	1	63	1	1
FR	62	4	4	41	2	1
FR	38	4	3	67	4	4
FR	43	3	1	72	3	3
FR	39	4	4	66	4	4
FR	39	3	3	66	4	4
FR	29	4	4	59	4	4
FR	56	2	2	28	4	4
BA	53	4	3	30	4	1
EC	17	1	1	31	4	3
EC	45	2	3	23	1	1
EC	39	3	3	62	4	4
EC	19	1	1	56	4	4

* EC=Enriched cage (colony), BA = Barn (aviary), FR = Free Range

Pecking behaviour

Injurious pecking behaviour was not widespread when observed for a total of 20 minutes at the second visit: no vent or cannibalistic pecking was seen in any of the flocks. In the EC and barn flocks no severe pecking was seen, aggressive pecking was noted twice, and low levels of gentle feather pecking were seen in all flocks. As Table 11 shows, the other types of pecking behaviour were not seen during the formal observations on about half the free-range farms. Levels of aggressive feather pecking observed appeared to be correlated with the feather score for the head and neck area (Figure 15) which shows a positive linear relationship ($r^2=0.65$) between the two.

The short periods of observations of severe feather pecking had a much weaker positive linear relationship ($r^2=0.33$, Figure 16), possibly because they occur infrequently but also because they can be directed at areas of the body which were not scored for plumage damage (e.g. wings or back).

Producers should listen out for the squawks that often accompany severe feather pecking whilst walking the flock. Figures 15 and 16 illustrate the value of both observing birds for pecking behaviour and formally scoring feather cover to help the producer to understand if and where feather pecking occurs, aiding the adjustment of management strategies accordingly.

Table 11 A summary of the incidence of various types of IP observed in FR flocks

	Age (weeks)	GFP (bouts)	SFP (pecks)	AP (pecks)
No of flocks with some IP seen		11	10	10
No of flocks where IP not seen		8	11	11
mean	51.8	4.0	6.6	1.95
maximum	76	31	51	10
minimum	23	0	0	0

Figure 15 The relationship between observed aggressive feather pecking to the head and neck and feather loss in that region (FR flocks)

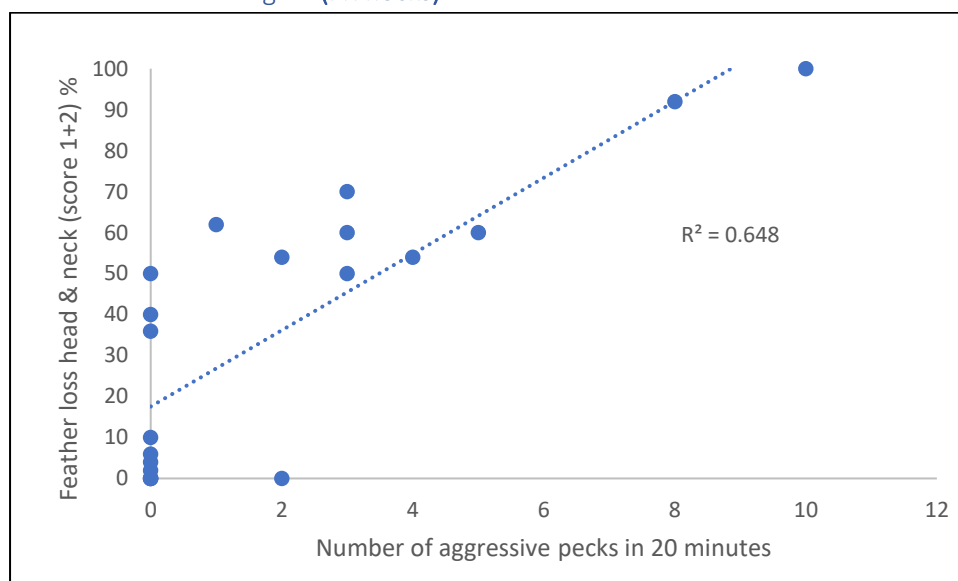
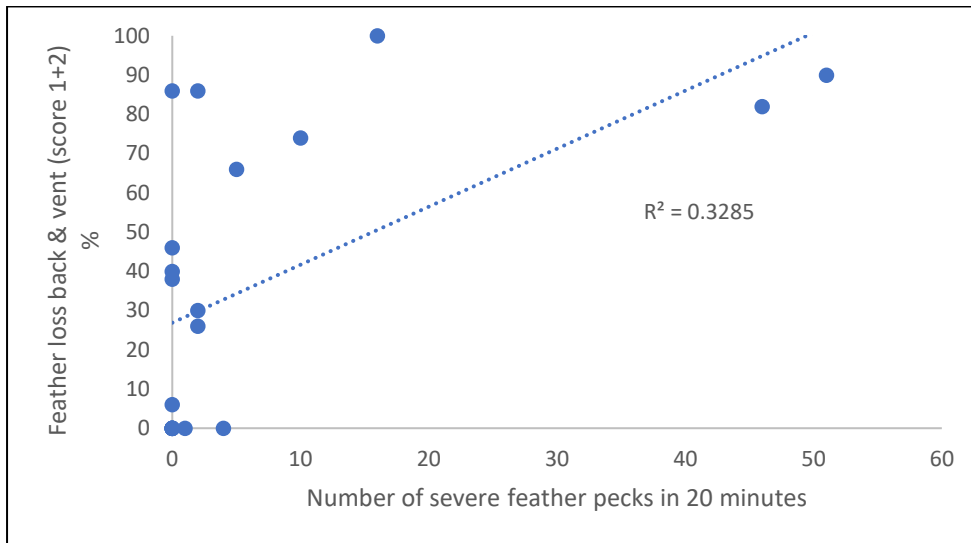


Figure 16 A short period of observation for severe feather pecking (in all body areas) showed a slight positive association with feather loss in the back and vent area (FR flocks)



Use of enrichment objects

The majority of farms provided a range of in-house enrichments. Figure 18 below shows all the types of enrichment used, together with the average number of pecks made to them during short periods of formal observation at the second farm visit. All the enrichments which were provided were used (pecked at) by the birds which demonstrates their importance as appropriate objects for birds to direct this behaviour toward. Figure 17 illustrates a few of the enrichments. Practical experience indicates that producers should observe bird interaction with enrichments and introduce novel ones if birds are no longer using one type as frequently.

Figure 17 A small selection of pecking objects provided as enrichment



Figure 18 Enrichment objects provided in FR flocks and one EC, together with an indication of their use by the hens (average number of pecks by 2 birds during 4 minutes of observation)

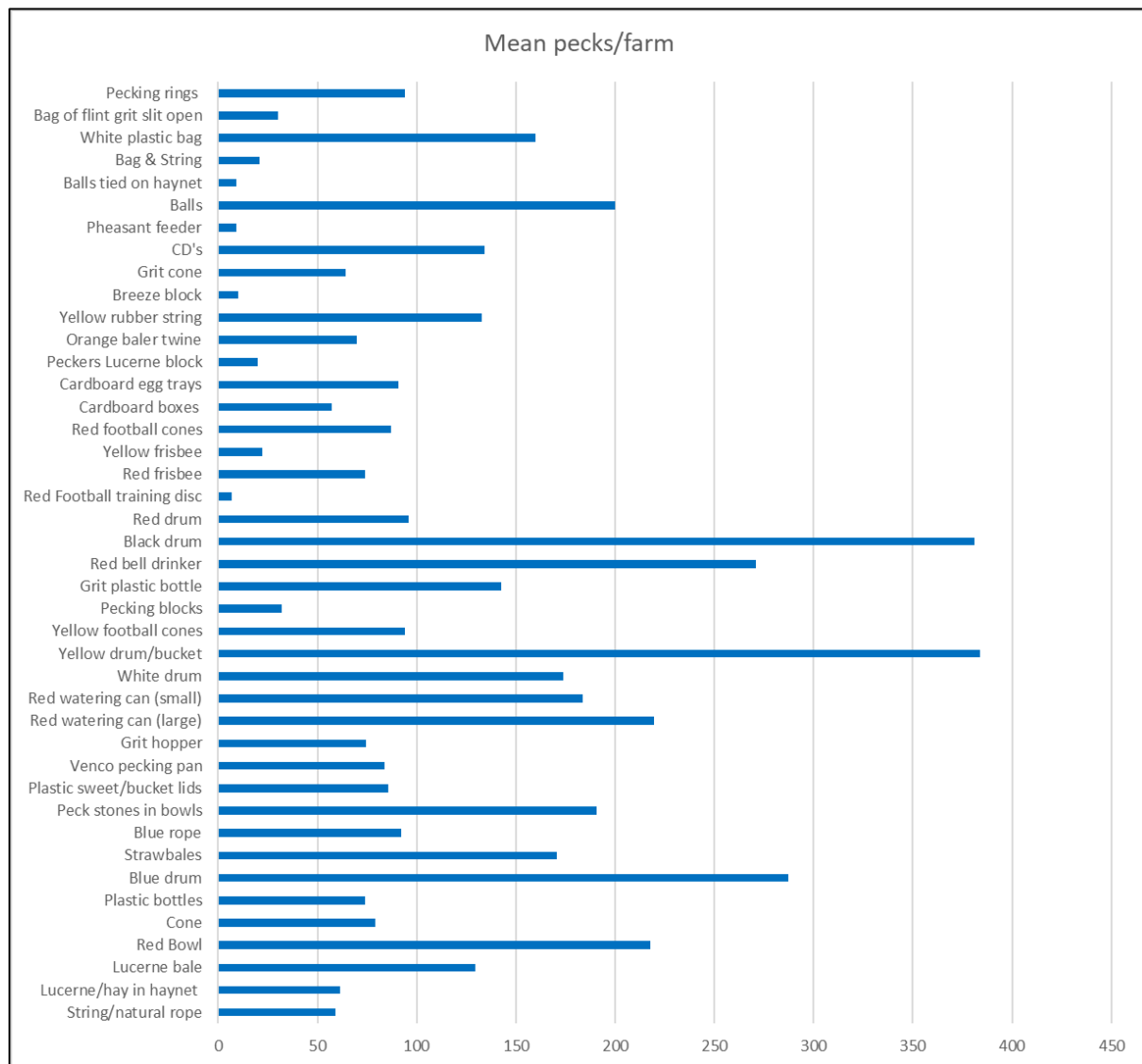


Table 12 combines the diverse enrichments into similar types or categories of object. In this case 'N' represents the frequency that the types of object were found on farms in the study: note that some farms provided different types of a given combination/category. It is important to highlight that birds tended to peck very rapidly at hard and/or hollow objects – possibly enjoying the feedback from the sound which their pecks produced. The hard, hollow objects listed in popularity were plastic drums, red bell drinker, small and large watering cans and red bowls. Other hard objects were football training cones and discs, frisbees, large cones and plastic sweet and bucket lids. Although the peck frequency was less for more friable objects such as forage, cardboard or string/rope, the birds could tug and tease these apart and in the case of forage, eat. Thus, the pecking frequency does not necessarily reflect the *value* of the object for the birds. This would need to be investigated as an experimental trial. Moreover, pecking interactions with the enrichment objects are just a snapshot: it is highly likely that use varies from day to day and at different times of day. All producers who provided enrichment emphasised the birds interact with some sort of enrichment on a daily basis. The most used enrichments that the producers highlighted were hard drums, lucerne/hay in haynets, pecking blocks, natural rope, plastic bottles, large plastic cones and bowls. Although the other enrichments were used,

they were not seen to be as popular in the producers' views. The take-home message is that birds do use (peck at) the wide variety of pecking objects which are provided on farm, and these producers were already or have since engaging with their FCAPs, implementing a very diverse range of pecking objects (Figure 18). A limitation arising from this variation in objects provided on farm and the comparatively small numbers of flocks in the study is that it has not been possible to link any particular kind of enrichment with improved feather cover.

Table 12 Categories of enrichment frequently provided on farm and well-used by the birds together with an indication of the cost of providing them and ongoing labour requirement.

Enrichments Management Strategies Poultry Shed Improvements	N	Mean pecks/farm	Cost Implementation			Labour Input		
			Low	Medium	High	Low	Medium	High
Hard, plastic objects	25	216	Low			Low		
Straw/lucerne/hay	19	104	High			High		
String/rope	14	69	Low			Low		
Pecking stones/blocks/rings	11	107	Medium			Low/Medium		
Cones	8	84	Low			Low		
Plastic discs	6	60	Low			Low		
Grit in containers	7	86	Low/Medium			Medium		
Cardboard boxes	2	74	Low			Low		
Veranda/ Winter Garden*	N/A	N/A	High			Low		
LED Lighting *	N/A	N/A	High			N/A		
Ramps*	N/A	N/A	High			N/A		
Artificial Shelters (on range)	N/A	N/A	Medium			Low		
Litter Substrate	N/A	N/A	Medium			Low/Medium		
Litter Management	N/A	N/A	Low			Medium/High		
Scattering of grit	N/A	N/A	Medium			Low		

* One-off capital investment

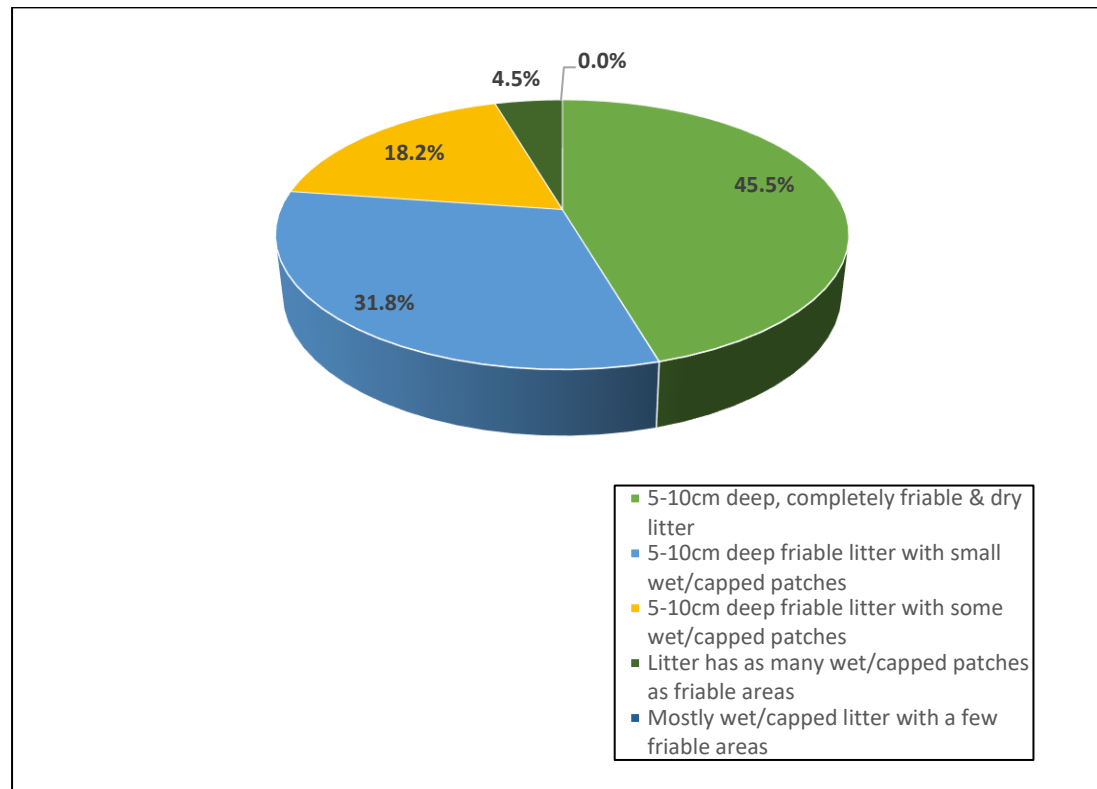
Note estimated costs per 1,000 birds/flock cycle: low <£20, medium £20-100, high >£100

Litter quality

Litter quality assessments were made in 22 houses (21 FR and 1 barn aviary) at the second visit. As Figure 19 shows, the majority of producers (87.3%) managed most or all of the scratch area to provide their hens with deep, friable litter (Scores A and B). Although flock age ranged between 23 and 72 weeks at the time of evaluation, many (12) were 50 weeks or more. This good litter quality may reflect that most producers were actively managing their litter. Producers were already aware of the importance of managing litter to maintain its friability, with a median number of 2 strategies employed and a range of 0 to 3. Those with the most friable litter (score A) reported using 0-2 strategies, whereas those with good litter quality (score B) reported using 0 to 3 strategies to manage their litter. It appeared that litter quality was harder to maintain in some houses: those scoring C all employed more strategies (2-3) to maintain litter quality but still did not achieve good friability over the whole litter area on the day of the second visit. This could have been down to weather conditions (most 2nd visits were during one of the wettest winters on record) or house topography. There was no difference in

litter quality between flat deck and multi-tier housing systems, nor any clear relationship between feather cover and litter quality when both were measured at the second visit. However, this is not surprising given the size of the dataset.

Figure 19 Litter quality assessment at the second visit



Litter management strategies

Table 13 shows the management strategies employed on the 1 BA and 21 FR farms to manage their litter. The table summarises the number of farms currently using each of the management strategies listed: note that many farms used a combination of approaches. In this study, some farms employed more than 5 strategies, but the majority used 2 management practices. One of the most effective and popular means of maintaining the litter was scattering grit onto the scratch area. Encouraging birds to forage not only keeps the birds occupied, but also “works the litter” so helping it to stay friable. Correct ventilation to avoid condensation was additionally regarded as important as was rotovating, removing capped litter and replenishing with fresh substrate.

The 5 farms with a veranda considered they helped keep litter more friable. Modelling the data for relationships between litter score and management strategies indeed revealed that the presence of a veranda was significantly ($p < 0.05$) associated with good litter scores. Verandas provide a buffer zone between the house and range so that driving rain cannot enter the house via popholes, and wet and muddy birds dry off to an extent before entering the house. The other strategy that was significantly ($p < 0.05$) effective in the model was ‘removing capped areas and forking over the litter’. With a larger dataset it is likely that many of the other strategies would be statistically proven as effective. Out of the 22 farms, 5 farms suggested that they did not struggle with maintaining litter quality when asked at the second visit. During the follow up visit, producers were asked “how often do you examine the

litter?” Of the 22 farms, 18 producers answered ‘daily’ and 4 answered ‘weekly’. The other options of ‘monthly’, or ‘when it is bad and wet weather’ were not selected.

Figure 20 Open Veranda on one of the project farms



Table 13 Principal ways of managing litter

Management Strategies to maintain litter quality	Number of farms
Scatter grit to work the litter	13
Ventilation management	8
Remove capped litter and replenish litter substrate	7
Rotovate/fork over capped litter	7
Remove capped litter and fork it over	6
Disinfectant/Additive	6
Rotovate/fork over and replenish with new litter substrate	5
Veranda (Winter Garden)	5
Replenish with new litter substrate (only)	2
Use absorbent litter/pellets	1
Mister	1

Flightiness and Vocalisation in all housing systems

Flightiness was measured in all 29 project flocks during the 1st visit and 26 flocks were assessed at the 2nd visit. Most of the FR flocks were calm for both visits; a few showed flightiness at the 2nd visit (Figure 21) but there was no difference between visits for the EC and BA flocks, which were predominantly calm (Figure 22). Three out of the 4 EC and the BA were new flocks and aged 23, 30 and 31 weeks, so relatively young birds. The BA flock showed calm behaviour at both visits with a changeover of breed. Five farms with the same FR flocks showed flighty behaviour at the 2nd visit perhaps reflecting extra challenges on birds as they become older. Three flocks, 1 EC and 2 FR flocks were flighty at both visits which could suggest some issues during the rearing phase or earlier problems in the laying house. Overall, there was no obvious effect of flock age, system, or breed on these behaviours.

Vocalisation was assessed in all 26 flocks at the 2nd visit. The majority (73%) of all flocks had vocalisations interpreted as contented murmuring whilst the PRO was in the shed. All the flocks in EC and BA systems were vocally 'content'. In the FR houses, a few squawks were heard in 3 of the flocks and 1 flock had louder than expected vocalisation, which the producer indicated was normal for this flock and was nothing unusual. However, 3 flocks were considered to be 'vocally discontented and extremely noisy'. Moreover, out of the 3 flocks, 2 of the flocks that were extremely vocal were the flocks that were flighty at both visits. Figures 21 and 22 illustrate these results.

Figure 21 Farm assessment of flightiness and vocalisation in FR flocks

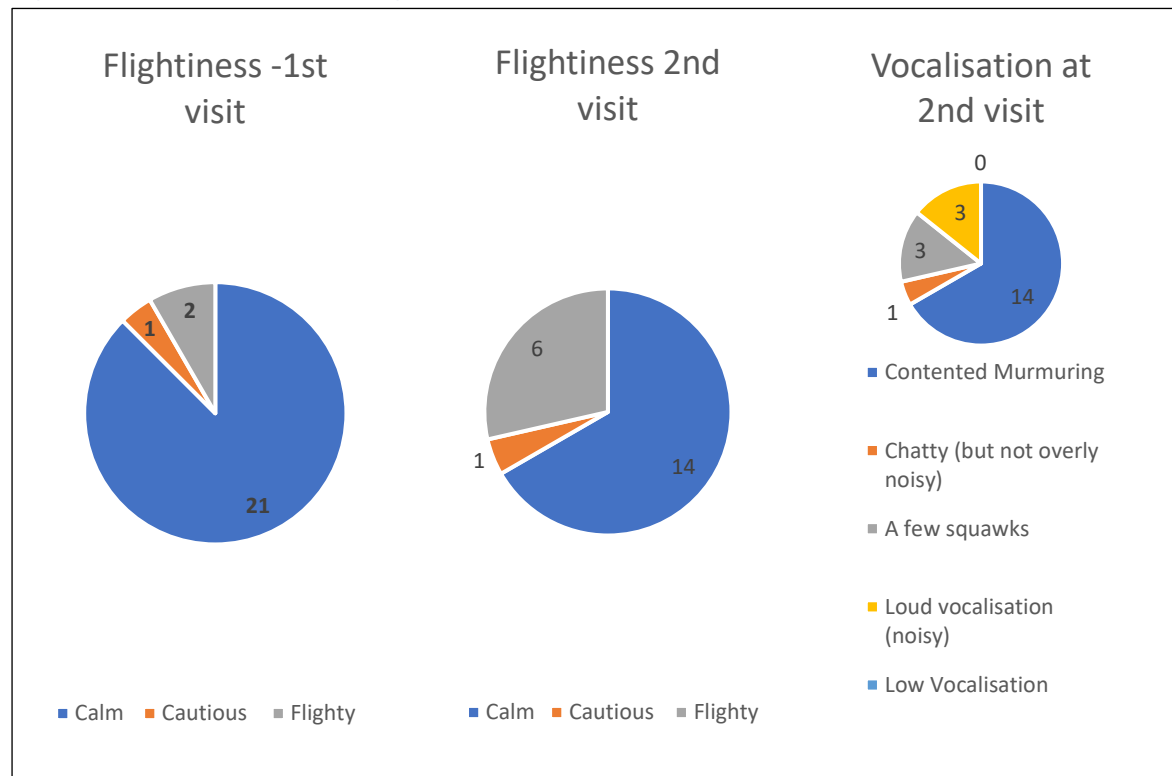
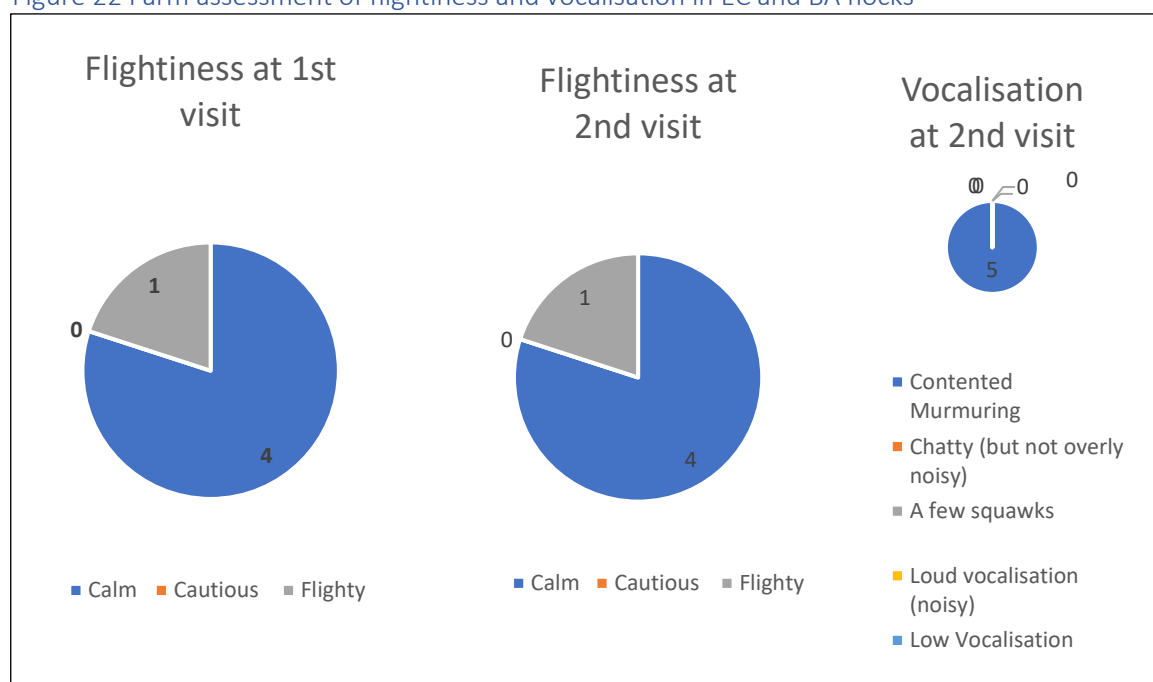


Figure 22 Farm assessment of flightiness and vocalisation in EC and BA flocks



Range management and enrichments

As indicated in Figure 23 and Table 14, all FR farms were already provided an enriched range and many actively managed the quality of the outdoor area, with the most prevalent provision being natural cover and/or artificial shelters. This could be in part due to the fact that a lot of effort has been put into promoting artificial and natural range cover by, for example, the RSPCA Assured scheme, as well as charitable organisations such as the [Woodland Trust](#) to encourage tree planting on ranges, given a scientific evidence base for the effectiveness of range cover for managing IP.

Figure 23 Range management and enrichments (the sector size indicates the proportion of farms providing each strategy)

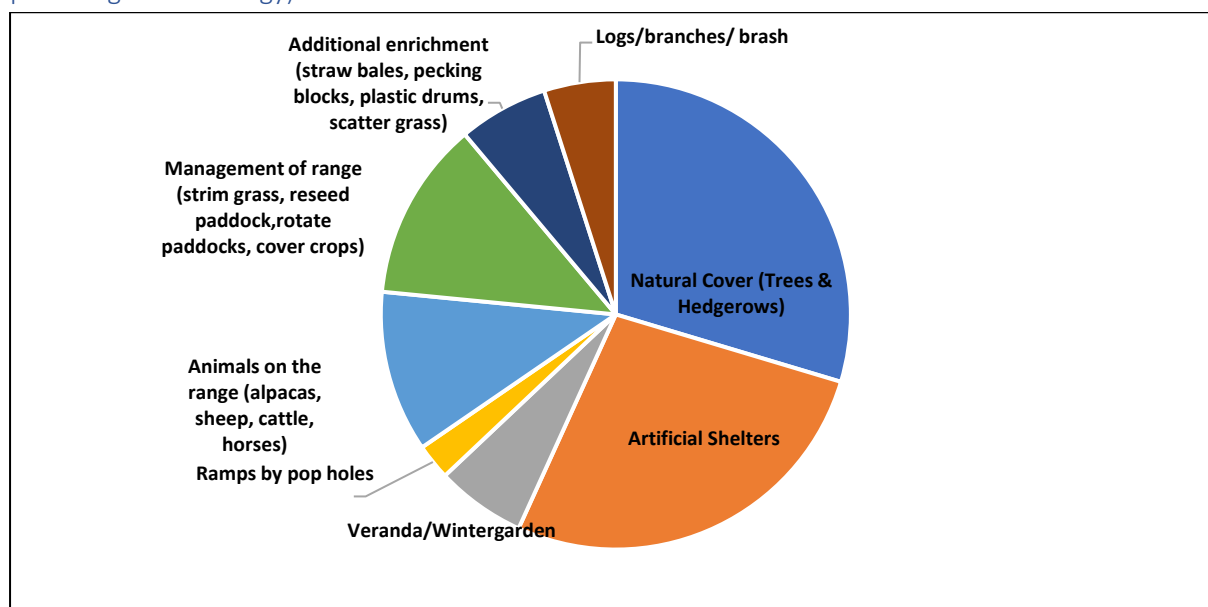


Table 14 summarises the number of range enrichments and management actions undertaken on FR farms at the first and second visits

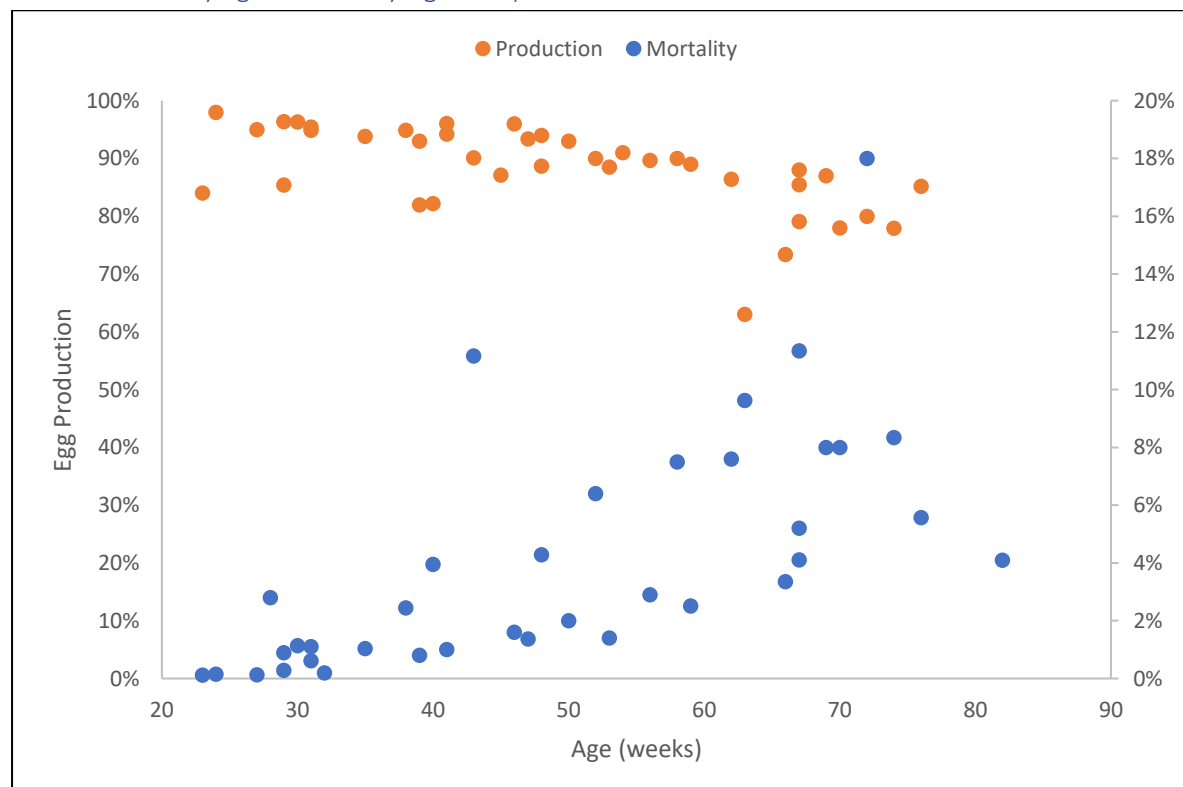
Number of range enhancements at visit 1	Count of farms	Number of range enhancements at visit 2	Count of farms
1	1	1	1
2	3	2	0
3	8	3	6
4	6	4	3
5	4	5	7
6	2	6	1
7	4	7	2
8	0	8	2
9	0	9	2

The majority of participants were already investing in enhancing the birds' outdoor environment to improve range behaviour with all 24 participating farms having a minimum of 1 and up to 7 management strategies to enhance their ranges. Nonetheless, 12 farms planned and implemented 1-3 further changes (Table 14).

Performance

Both egg production and the levels of mortality of flocks in the study were typical of the national flock (Figure 24). It is not realistic to compare pre- and post-FCAP figures owing to the number of variables which could affect these – not least of which being the wide age range and the fact that about half the farms had a change in flock. The cause of death was often unknown but, in some cases, could be attributed to smothering or disease. The flock at 43w reported high mortality to smothering issues. The other flock with high levels of mortality at 74w reported smothering issues early on and disease challenges as the birds increased in age. There were another 2 farms that reported deaths to injurious pecking. Both were FR flocks, one beak treated and the other was a small intact organic flock.

Figure 24 Egg production and levels of mortality for all FR flocks at the age of data collection (both visits, flocks ordered by age – mortality right axis)



To give further context to the project data, Table 15 summarises the mean average levels of mortality from the Lion flock's database for 2019 for all flocks in all housing systems at 40 and 70 weeks, including culls. The average (more than 90% of UK hen numbers) for all systems at 40 weeks was 1.84% but mortality increased with age, as expected.

Table 15 Mortality and culls combined for Lion flocks at 40 weeks and 70 weeks in 2019

2019	40 weeks (average mortality rate & culls %)	70 weeks (average mortality rate & culls %)
All production systems	1.84	6.46
Enriched (colony) cage	1.83	4.80
Barn	1.51	7.0
Free range	1.74	6.48
Organic	2.44	7.2

II. Knowledge Exchange

Study Tours

Study tours to two countries which mainly run intact beak flocks were arranged. The visit to Austria indicated key factors in their ability to manage intact-beak flocks were higher egg prices in a home market, with smaller family-run farms, winter gardens (verandas) on all housing and an integrated and supportive industry structure based around one main genotype. The visit to the Netherlands suggested that some producers were facing challenges managing intact beak flocks to meet the demands of their predominantly export market and that their industry was prepared to accept poorer feather cover than would be the case in the UK. A move to white genotypes (which lay white eggs currently not preferred by UK consumers) was felt to be easier to manage as intact beak flocks (2018 data – 35:65 ratio of brown to white birds). The first flocks managed without beak tipping saw average mortality rates increase from 5% to 9% and it was felt high nutrient feed with at least 5% fibre was useful. See also Appendix 7.

Dissemination Events

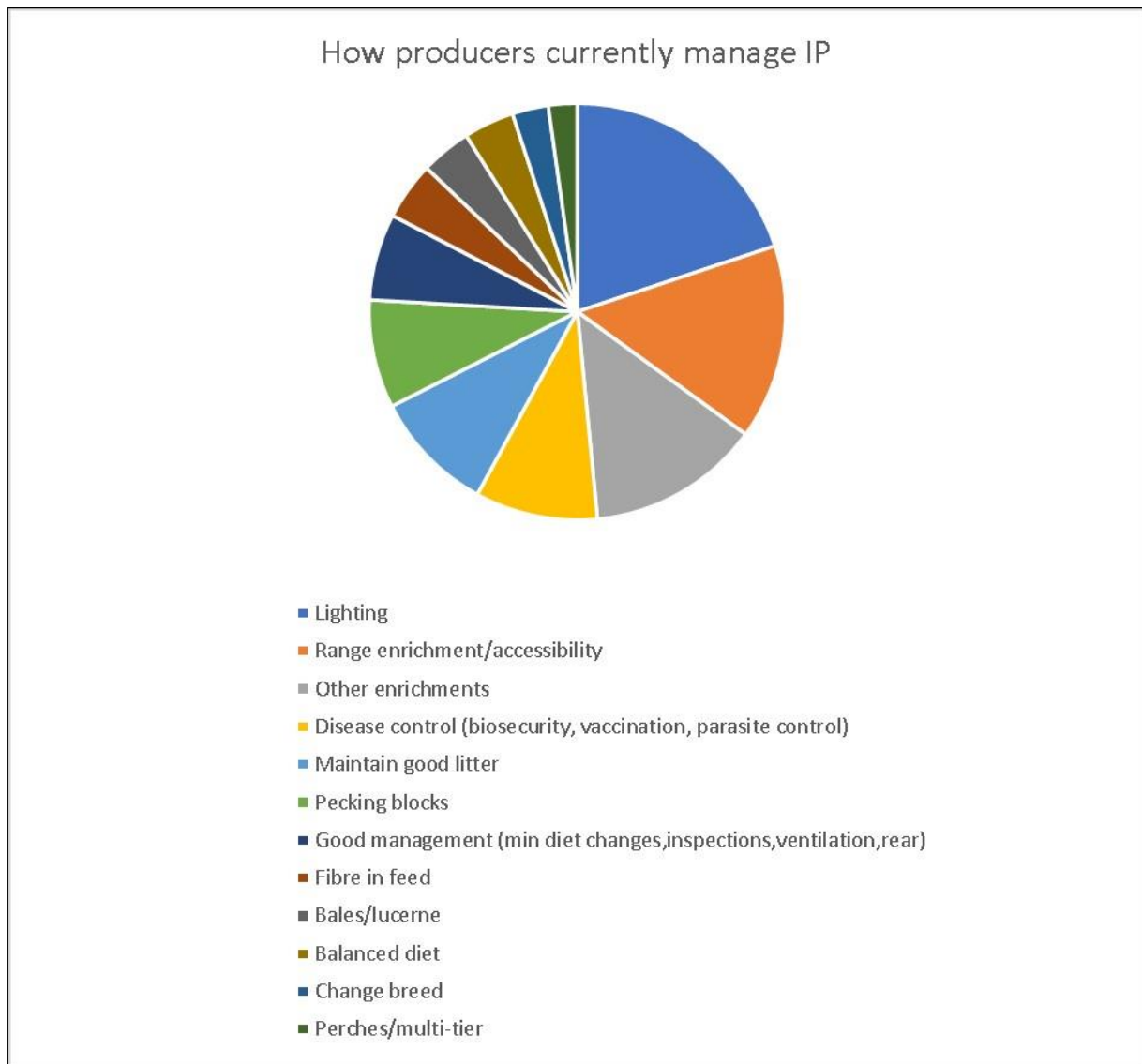
Eleven dissemination events were completed with a further 2 planned but having to be postponed owing to the Covid-19 outbreak. These represent considerable outreach, over and above what was planned in the project proposal. The majority of attendees at Producer Group meetings were laying hen producers, including pullet rearers, and invariably some representatives of the allied industries such as feed, building, equipment, breed companies and often specialist poultry veterinary surgeons. A few other events were also attended as indicated in Table 16.

Table 16 Dissemination events

Event	Date	Location	Dissemination	Attendance
British Free Range Egg Producers Association (BFREPA)	11/10/2018	Coventry	Interactive workshop	50
British Veterinary Poultry Association	15/03/2019	Harrogate	Presentation and discussion	70
Rettenmaier	24/09/2019	Bath	Presentation and discussion	23
East Midlands Poultry Discussion Group	16/10/2019	Newark	Presentation and discussion	50
Severn Valley Poultry Discussion Group	30/10/2019	Llandrindod Wells	Interactive workshop	61
Norfolk Suffolk Poultry Association	18/11/2019	Norwich	Presentation and discussion	40
University of Bristol	14/01/2020	Bristol	Presentation and discussion	31
Yorkshire Egg Producers Discussion Group	22/01/2020	York	Interactive workshop	43
NFU	11/02/2020	Warwickshire	Presentation and discussion	63
Midlands Free Range Discussion Group	05/03/2020	Shrewsbury	Interactive workshop	58
West Country Layers Association	March (postponed)		Interactive workshop	
The Lakes Producer Group	April (postponed)		Interactive workshop	

As an example of the outcomes, one meeting is used as a representative case study here. Overall, for their laying hen flocks, key concerns at this Producer Group workshop were disease challenges, litter quality and ventilation. Many producers stated they had found that providing enrichments, including pecking blocks, was useful in managing IP. The top 3 strategies for maintaining good feather cover were voted on by everybody for each of 6 lists per small group of all strategies in use by those present. The collated results are shown in the chart below, where the larger the slice the more votes received. Lighting, enrichments, ranging and litter quality were the main choices.

Figure 25 Actions taken to maintain good feather cover by producers attending one workshop



To conclude, everyone was asked where they felt they needed more help or information to manage their flocks, including more research. Clearly management could impact all and some, such as egg (shell) quality and size, which were mentioned, are multifactorial. Key topics were:

- **Housing** (Lighting, air quality, barn vs. free range, benefits of winter housing)
- **Diet** (Alternative protein sources, diet changes)
- **Disease control** (vaccine efficiency, red mite, Salmonella)
- **Bird characteristics** (breed comparison, genetics (including immunity), smothering and other behaviour (including floor egg laying)).

Figure 26 Discussing how to maintain feather cover at one workshop



Articles in poultry trade journals

The following articles have been published (see Appendix 8):

1. *Poultry World*: New project to improve feather cover – August 2018
2. *NFU Poultry*: More feathers equals better performance and welfare - 2018
3. *NFU Poultry*: Poultry People - Feb/Mar 2019
4. *The Ranger*: Producers positive on improving feather cover - June 2019
5. *The Ranger*: Welfare forum visit to Austria – July 2019
6. *NFU Poultry*: Communication is key – March 2020
7. *Farmers Weekly*: 8 management tips to help prevent severe feather pecking – March 2020

Scientific papers

An Open-Access [paper](#) 'Enabling behaviour change in laying hen farmers using Motivational Interviewing (MI)' has been published as part of a virtual conference at which we presented a video summary of the MI approach and a PowerPoint summary of the work. This has achieved 162 reads to date. Shared via LinkedIn, the post achieved 450 views.

Video Case Studies

The video case studies combined science-based evidence with current best practice examples on some of the participating commercial farms. They give practical, on-farm examples of how to achieve good feather cover by careful management of the birds and their environment. Five videos were professionally filmed on farms and were led by producers participating in this project together with some of their industry support advisers. The topics of the videos are:

1. ***Maintaining friable litter*** - The maintenance of good litter quality throughout the laying period (film duration 1m 18s), see <https://youtu.be/sQOnAHI9QTk>
2. ***A good range*** – Strategies to provide an attractive range to enhance birds ranging (film duration 1m 32s – click on the image below to view)



3. **Feather scoring on farm** – Producer-led discussion of the importance and demonstration of feather scoring on farm (film duration 3m 55s), see <https://youtu.be/PjeBXbiu2aY>
4. **What the Peck?** - A few ideas for enrichments for pullets and hens (film duration 57s), see <https://youtu.be/M4BYWn3laYQ>
5. **A seamless transition from rear to lay** - A brief introduction in managing chicks to pullets before they arrive at the laying house (film duration 3m 13s), see <https://youtu.be/xNmaGPKx9os>

Website and Media Platforms

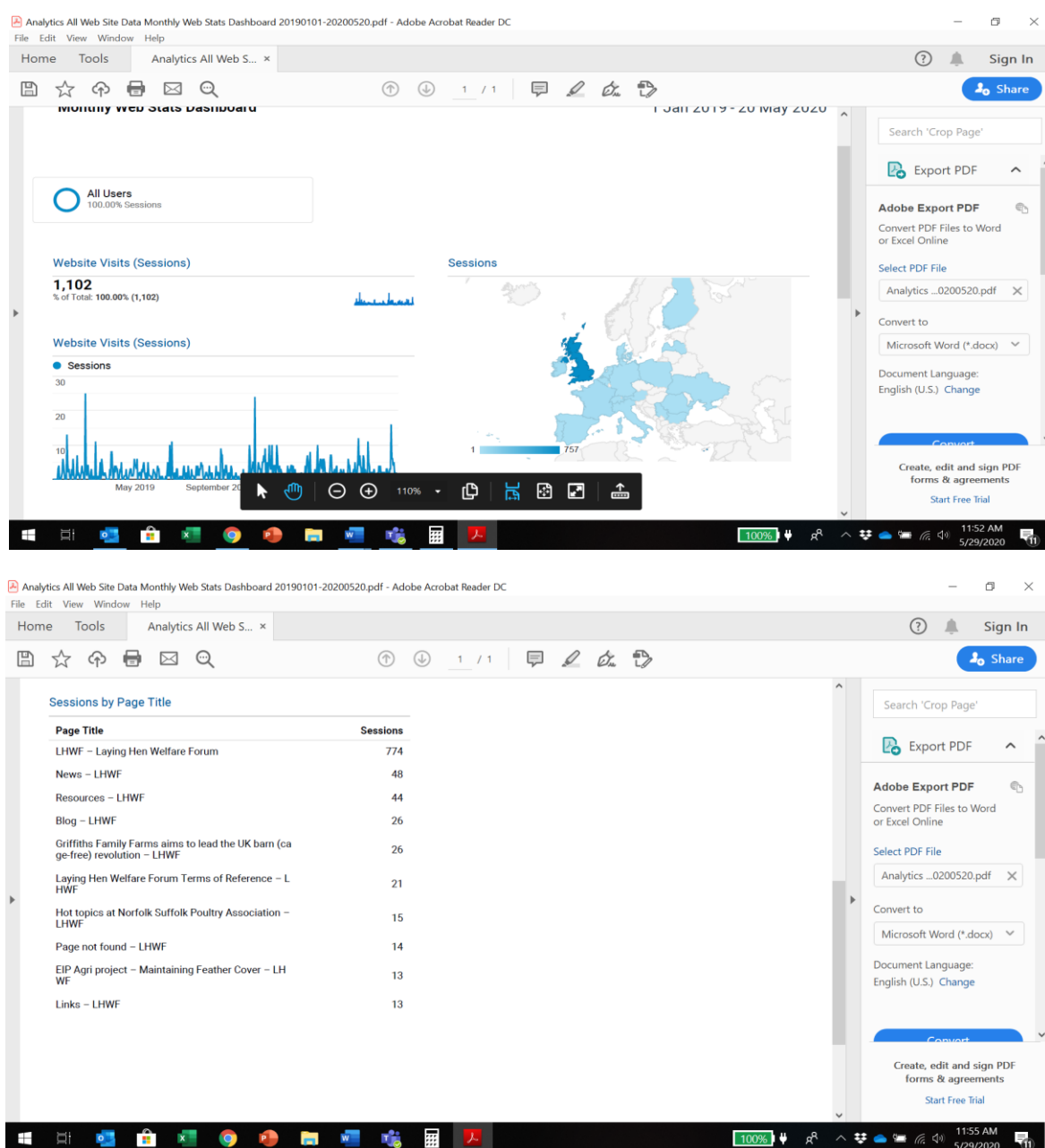
The LHWF [website](#) was established to disseminate practical information to all poultry producers and backyard poultry keepers. The website has provided examples of best practices to reduce injurious pecking on farm. This material includes illustrated resources and guides from scientific literature, including links to the bespoke videos created and linked to above. It continues to build on existing knowledge and resources such as the Featherwel guide and website www.featherwel.org. The PRO keeps abreast of the upcoming relevant research and delivers a news and blog page of the LHWF activities via the website.

Twitter and Facebook social media platforms were established to promote and encourage good practices to maintain feather cover on farm and disseminate outcomes hosted on the LHWF website to the wider laying hen industry. Tweets and Facebook posts aimed to highlight and show positive photographs and short films of current management strategies that help to reduce injurious pecking. In the same way as the website, relevant topical news is added to both platforms and traffic is encouraged to the website using these social media platforms. Table 17 summarises the use of these platforms. Twitter appeared to be the more popular of the two social platforms. This may be because the twitter account had been set up earlier in the project than Facebook and/or the followers correlate to the number of posts delivered. Twitter is also perhaps more widespread with laying hen producers as the platform focuses on keywords that people post, and the conversation will have a wider audience globally. Centred around real-time conversation, this allows quick and easy promotion of research, blogs and news article.

Table 17: Details of Social media platforms and website use

Media	Date Joined	Followers	Following	Tweets/Posts
Twitter	May 2018	130	144	118
Facebook	November 2019	28		16

The aggregate report shows visitor information up until 20th May 2020. The website has had 1,102 views. The news and resource page appears to be the most popular, indicating that producers are using the website for information.



DISCUSSION AND CONCLUSIONS

The process of producers co-creating planned changes to management and resource provision – i.e. developing bespoke FCAPs - with the one to one support of a trained and experienced facilitator was highly successful with up to 90% uptake (by FR producers). The mean number of 3 changes adopted by FR farms was the same as that reported by Lambton and others (2013) in flocks receiving 4 visits with ongoing advice and support to encourage adoption of management strategies. That study found significantly less plumage damage was associated both with the increased uptake in flocks supported on a one to one basis and with the overall number of strategies adopted on farm. Given that this and other studies (reviewed by Nicol and others, 2013) have established that evidence-based management strategies, such as maintaining friable litter and providing pecking objects as enrichment, result in improved feather cover, it was not necessary to design the LHWF study to compare the welfare outcomes of the additional interventions. Variables such as flock age were wide ranging and uncontrolled, so with a relatively small number of flocks in three different housing systems it is unsurprising that no differences in feather cover were measured between the two visits towards the beginning and end of the study.

Lambton and others (2013) concluded that “It is also notable that even in the flocks which adopted a bespoke management package, prevalence of all types of IP was high, and a large proportion of birds in each flock were affected by PD [plumage damage]. Thus, even with a bespoke management package, IP remained a significant problem. It is therefore important that interventions, such as genetic selection that have been advocated by FAWC (2009) should also be used to minimise IP. Furthermore, only a small proportion of the flocks in this study had intact beaks, so we cannot assume these management strategies will be as effective in such flocks. This raises further questions about our ability to manage IP if a ban on beak treatment is implemented.”

Many of these points are relevant for our study. However, it is encouraging to note that we observed no cannibalistic or vent pecking behaviour and that the proportion of birds in the study flocks with feather loss was less. Whereas Lambton and others (2013) recorded mean feather loss between 31% at 20 w and 84% at 40 w of age, our study, which recorded loss in birds up to 76 weeks of age at visit 2, found at the average age of 52.5 weeks the mean feather loss to be 32.4% in FR flocks (back and vent area), which can be taken to indicate the steady progress by industry since 2011 in managing the IP issue. Further evidence of the growing capacity of producers to manage IP is given in a paper by Mullan and others (2016) which analysed the records of feather cover measured in non-cage flocks during farm assessment visits by RSPCA Assured and the Soil Association assurance schemes from 830 and 743 farms in Year 1 and Year 2, respectively. From Year 1 to Year 2 (2011-2013) there was a significant reduction in the prevalence of feather loss from 31.8% (9.6% severe) to 20.8% (6% severe) for the HN region, and from 33.1 % (12.6% severe) to 22.7% (8.3% severe) for BV. Fifty-nine percent of 662 farmers reported they had made changes on their farms during Year 1 to improve bird welfare. Thus, alongside KE, the focus of the study, which was to determine whether FCAPs could be developed and their actions implemented is discussed here.

Whereas a few particularly proactive producers might independently make progress in managing IP, the evidence from this study and others is that some form of support and engagement is necessary to maintain motivation and value in taking action by keeping the issue on the producers' agendas. There is increasing evidence in the value of facilitation for behaviour change in agriculture. For example, Green and others (2020) achieved a reduction of prevalence of footrot in sheep from 7.6 to 4.3%. Their study recruited 29 farmers whose flock had a prevalence exceeding 5% and then led a facilitated discussion on treatment of footrot, and evidence-based new “best practice.” A year later, the participants reflected that an increased knowledge of the evidence-base, trust in the facilitator and

talking to other trusted farmers who had already adopted the new “best practice” overcame concerns and motivated change. Persistent change occurred because participants observed health benefits for their sheep and that the new “best practice” had saved time and money.

These motivators for change all emerged in the course of our study, with comments such as *“Project has helped me to be more motivated with the help of the LHWF PRO”* and *“Always been motivated. The project has just reinforced it. LHWF PRO visiting other farms and sharing their knowledge gives us a bigger picture to adopt good practice”*.

Furthermore, in the workshops it was evident that producers valued sharing knowledge with each other and, on questioning at the final visit, Producer Discussion Groups were given as a major source of information. Producers value both factual KE from presentations and shared knowledge of best practice between each other. Half (13/26) of the participating producers felt the FCAP had improved feather cover in their flocks. We did not investigate the cost/benefits of the FCAP, and this would be a useful exercise for future work.

The range of bespoke actions included adding new enrichments to the shed, enhancing the range and additional management strategies. Many producers said that the new enrichments, not previously used, such as lucerne bales and pecking blocks had helped reduce pecking problems on farm. Others felt that it was early days to see changes in planting more trees on the range but could see the future benefits once the trees have matured as they considered that ranging was one of the key factors to reduce IP on farm. Other bespoke actions such as adding more ramps were also seen to be beneficial to some flocks and adding additional foraging material such as straw bales, however with such a wide range of bespoke actions it has not been possible to recommend specific ones. Indeed, this may not be helpful as it is tailoring actions to meet the specific needs of the flock and producer which is most beneficial and impactful. Adding enrichments at placement is a proactive approach. In some flocks where IP is a problem and enrichments and/or management has not reduced pecking then perpetrators could potentially be culled to prevent the undesired behaviour. However, identifying and capturing perpetrators in loose-house systems (FR and BA) is a difficult procedure which can cause considerable stress to the rest of the flock. In EC and other systems if a single perpetrator can be identified and captured at an early stage then it may be culled to prevent the undesired behaviour spreading.

Many participants in the study were willing to invest time in providing resources for the hens and to invest in infrastructure such as changed lighting or installation of verandas. However, both time and cost emerged as barriers to implementing a few of the planned changes of which about a third had not been fulfilled at the time of the second visit. Additional motivators were bird welfare, productivity, customer relations and pride. The UK has the largest number of commercial free-range hens in the world, with considerable consumer buy-in to the perceived welfare benefits, which may explain the desire to meet expectations and have a flock which looks good.

The current aim of the LHWF is to incorporate feather cover action planning into the veterinary health and welfare plan using the producers’ own veterinary surgeon. We feel that for this to be widely successful, three potential barriers will need to be overcome. The first is that many producers tend to use their vet almost as a last resort to troubleshoot IP issues that they and other advisors cannot solve, so it requires a change in relationship to developing a forward-thinking, risk-assessment process with their vet before IP becomes an emergency issue. The second is the costs associated with veterinary

advice: there may be a need to perform a cost:benefit analysis of the value of this or to find other ways of mitigating the expense. Third is that, according to a study by Bard and others (2017), “veterinarians tend to communicate in a directive style (minimal eliciting of client opinion, dominating the consultation agenda, prioritising instrumental support), reflecting a paternalistic role in the consultation interaction.” Such an approach would be less likely to achieve the behaviour change achieved in our study where we have used a person-centred, facilitation approach. Thus, veterinarians would need to be trained to adopt a new style of communication. In addition to these barriers it would also be necessary for veterinarians to be familiar with the latest evidence-based practices for managing IP. Bard and others (2019) used a qualitative approach to understand how and under what circumstances veterinary advice has the potential to support and inspire farmer engagement with behaviour change on the UK dairy farm. They concluded that the optimum approach was to build trust, shared veterinarian-farmer understanding, and meaningful interpretation of advice at the farmer level that was most likely to enact change.

There is some precedence in the UK of veterinarians carrying out welfare outcome assessment in conjunction with an assurance scheme. Hockenhull and others (2019) assessed the perception of this scheme for pigs, called ‘Real Welfare’. Interviews with 15 farmers using the scheme found that ‘the value farmers placed on the addition of WOA appeared to reflect their veterinary surgeon's attitude towards the Real Welfare protocol. If the vet was engaged in the process and actively included the farmer, for example through discussion of their findings, the farmers interviewed had a greater appreciation of the benefits of Real Welfare themselves. It is recommended that future similar schemes should work with veterinary surgeons to ensure their understanding and engagement with the process, as well as identifying and promoting how the scheme will practically benefit individual farmers rather than assuming that they will be motivated to engage for the good of the industry alone.’ Possibly in the case of laying hens the vet could carry out feather scoring with the producer and use this as a basis for discussing a FCAP. As noted elsewhere in the report, already the main assurance scheme for eggs, Lion, requires measuring and reporting of feather cover as do other schemes and retailers.

Training was identified by some of the producers for themselves and their staff to have a knowledge base of measures supportive of good feather cover. The ways of achieving this and covering the costs need to be addressed and is something which the LHWF has already discussed. Incentivising good practice is another measure that could be considered. We are aware of one Egg Packer who has offered substantial price premiums to suppliers who planted trees on their range for example. If producers were paid more for achieving a well-feathered flock, and ultimately intact-beak flocks, this could incentivise change. However, 9 of the participants felt bird welfare and pride in their flock's appearance more important than financial incentives. This means that further work should also investigate the place of non-financial incentives, which leverage producers' pride and wellbeing, such as awards and social capital to motivate producers to maintain feather cover.

In conclusion, the project demonstrated that FCAPs can lead to changes in flock management with facilitated support using an approach based on Motivational Interviewing. Accordingly, the LHWF recommends that facilitation training is made available to enable successful rollout of FCAP nationwide. It is also suggested that grants are made available for producer and stockperson training and financial incentives are given to recognise those maintaining well-feathered flocks. The availability of an ‘Innovation Fund’ to support producer led trials of innovative practices to maintain feather cover, where moderate infrastructure or equipment changes are required is of proven value in supporting

change, as this was used in the successful EU [Hennovation](#) project and is being used in the Soil Association's [Innovative Farmers](#) network.

Future research

The results of the project indicate the need for further research on:

- Measure the cost/benefits of FCAP
- Investigate the place of non-financial incentives, which leverages producers' pride and wellbeing, such as awards and social capital to motivate producers to maintain feather cover
- LED lighting (optimal colour temperatures and spectra for bird welfare)
- Breed (genotype) comparisons for propensity to feather peck, smother and lay floor eggs. This could be achieved with a large epidemiological study analysing farm data much of which is collected by Assurance Schemes
- A follow on robust experimental or epidemiological trial to provide more conclusive evidence using more flocks and more visits to compare relative effectiveness of categories of enrichment and management (moving/changing frequently, number provided etc.) Further to evaluate the cost-effectiveness of enrichments and to establish the benefits of particular enrichments both in the rearing and laying house
- Feed and water quality. Effects of feed (particularly type of protein). Diet changes during rear and lay
- Housing. With the move to 'cage-free' to supply certain markets, producers need further information on systems, including maintaining air quality (ventilation), benefit of verandas
- Synchronicity of rearing period to laying period

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Appendix 1 Operational group members and their roles in the project

The operational group consists of the following partners:

Andrew Joret – BEIC chair with over 40 years of experience in the egg industry. Previously Technical Director at Noble Foods Ltd. Sits on the RSPCA Assured working group. Chair of LHWF.

Richard Kempsey – Richard was Technical Director at Stonegate Farmers before his retirement, as well as sitting on the RSPCA Assured working group and various other committees. Richard has been replaced by Mike Tyers, Producer Development Manager, Stonegate. Responsible for technical input and project dissemination.

Mark Williams – BEIC chief executive and previously EUWEP secretary-general with an extensive track record working in production and with industry and government. Provides the secretariat for the LHWF. Responsible for project dissemination.

Dr Claire Weeks – Honorary Senior Research Fellow in Animal Welfare, University of Bristol, with responsibility for the administration of the work and using academic studies to support the technical work.

David Brass - Nearly 30 years of Free-Range poultry experience covering some 20 million free range birds and considerable experience in running EU funded schemes. His role within the group is to provide expertise on the technical elements of improving flock management.

Gary Ford – Over 24 years in agriculture, Gary is chief poultry adviser to the NFU and has responsibility for communicating the work to farmers.

Robert Gooch – Chief executive of BFREPA, with a career spent as an agricultural expert. Helps with the communication aspect of the LHWF as well as relaying the practicalities of the research to the group.

Mia Fernyhough (RSPCA) - RSPCA Farm Animals Department, worked alongside industry and government. Acted as the expert on animal welfare, before leaving RSPCA to start a family. Replaced by Allan Pearson, Field Operations Manager - Farm Animals Department, RSPCA

Defra representative. Responsible for developing, implementing and promoting farm animal welfare policy and will be relaying the information to government.

Stephen Lister – Independent Poultry Veterinarian who has served on a number of advisory committees including as Chairman of the Defra Beak Trimming Action Group, a Former Member of Farm Animal Welfare Council (FAWC) and Chairman of Pigs, Poultry & Fish Standing Committee of FAWC. Founder and partner in Crowshall Veterinary Services before his retirement. He is instrumental in liaison with other poultry vets as to how this system will provide improved welfare outcomes.

APHA representative – Expert in field with the APHA, who provides the conduit for the group to the APHA.

Dr Jessica Elizabeth Stokes – Original PRO and developer of project design and execution. Now member of LHWF in her capacity as Lecturer in Farm Animal Welfare Science and Policy at the Royal Agricultural University.

Appendix 2 Terms of reference of the LHWF (Operational Group)

The Laying Hen Welfare Forum was set up in 2015 to take forward initiatives to improve laying hen welfare and was subsequently tasked to take forward the recommendations of the Beak Trimming Action Group (BTAG).

Specifically:

1. Establish economically positive ways of continuing improvement in laying hen and pullet welfare.
2. Prioritise animal welfare issues affecting laying hens and pullets.
3. Prioritise research and development needs for pullets and laying hens.
4. Establish, monitor and report annually on animal welfare indicators.
5. Promote knowledge transfer to the wider egg industry, including the domestic poultry keeping sector, and endeavour to encourage adoption of best practice by all.
6. Advise on training requirements for the industry.
7. Act as a liaison body for pullets and laying hens with the Centre for Innovation Excellence in Livestock (CIEL).
8. Liaise with the Poultry Health and Welfare Group.
9. Seek to establish links with any comparable bodies in the EU or third countries.
10. Maintain a LHWF website to help promote the aims of the LHWF, to assist in knowledge transfer and use the website as a vehicle for reporting on animal welfare indicators.
11. All parties on the steering group to agree the content of any communications from the LHWF.
12. Support Defra and the devolved administrations in dealing with notifiable diseases.
13. Create specialist sub-groups for specific welfare topics, set their terms of reference and propose their membership.
14. Make recommendations to appropriate bodies to improve laying hen and pullet welfare.

Website address

<http://lhwf.co.uk>

Appendix 3 Questionnaire visit 1

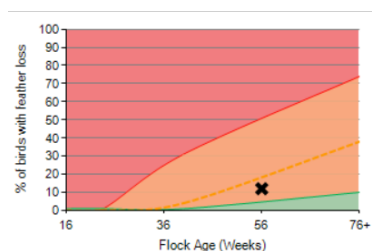
Motives, learning styles and incentives

- 1) What motivated you to take part in this project?
- 2) Why is it important to reduce injurious pecking/maintain feather cover? What is the value to you and your business?
- 3) Where do you currently go to find out about information on reducing injurious pecking/maintaining feather cover?

(Vet/packer/field staff/farm assurance scheme/nutritionist/rearer/other producer/discussion group/industry press/instagram/facebook/twitter/websites/featherwel guide)

- 4) Do you talk to your vet (or other support actors) about how to reduce injurious pecking and maintain feather cover?
- 5) How would you like to learn about maintaining feather cover? What feather cover resources/activities best suit you?

Visual learners prefer graphs, charts, maps, diagrams and symbols.



Aural learners depend on hearing, speaking, group discussion, radio, lectures, web-chat and talking things through.



Read/write learners prefer words, especially books, manuals, articles, reports, essays and quotes.



"This guide will support laying hen producers maintain feather cover by regularly assessing their flock and implementing recommended husbandry changes where necessary"
Dr Jessica Stokes, AssureWel, Soil Association



Kinaesthetic learners depend on experience and practice, such as demonstrations, videos, case studies and applications.



- 6) Are there any actions that need to be taken to reduce injurious pecking to maintain feather cover that are out of your control?
- 7) How would you like this to be addressed? (*eg rearer, supply chain, supermarket, industry, government intervention*)
- 8) What can your rearer, vet, feed rep, farm assurance scheme, egg packer, industry rep or DEFRA do to help?
- 9) Is there anything that would incentivise you to maintain feather cover more?
- 10) How do you think other producers would be incentivised to maintain feather cover?

Pride in higher animal welfare/legal requirements/financial incentives/discounts on membership to farm assurance schemes or reduction in scheme or government audits/market recognition/award scheme

- 11) What would it take to feel ready to run a flock of intact beak birds and what would incentive you?

Appendix 4 LHWF feather scoring guide

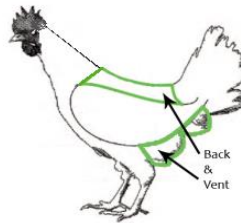
FEATHER SCORING GUIDE

Working together to reduce injurious pecking

METHOD AND SAMPLING

- Visually assess the back/vent area of the bird
- Score at least 50 birds per shed i.e. 5 birds in each of 10 different areas of the house and/or range
- If borderline e.g. 0/1 or 1/2, allocate the lower score
- Feather re-growth = feather loss

AREAS TO BE SCORED



SIZE GUIDE

Less than ruler = score 1



More than ruler = score 2

When this guide is printed on A4 this ruler is 5cm in size

BACK/VENT SCORE 0 No bare skin visible, no or slight wear, only single feathers missing



BACK/VENT SCORE 1: Moderate wear, damaged feathers or 2 or more adjacent feathers missing up to 5cm bare skin



BACK/VENT SCORE 2: 5cm or more bare skin visible



Photographs courtesy of AssureWel

Appendix 5 Questionnaire visit 2

Producer motivation, reflection and barriers questionnaire

- 1) Since our last visit have you changed your views on what motivates you to maintain feather cover? (Yes/No) Comments...
- 2) How were you motivated to make changes on your farm?
- 3) Has this project helped you to become more motivated to adopt changes on your farm?
- 4) Where do you get your information about maintaining feather cover from and how do you prefer to receive it and by whom?

Visual learners prefer graphs, charts, maps, diagrams and symbols.	Aural learners depend on hearing, speaking, group discussion, radio, lectures, web-chat and talking things through.	Read/write learners prefer words, especially books, manuals, articles, reports, essays and quotes.	Kinesthetic learners depend on experience and practice, such as demonstrations, videos, case studies and applications.
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Vet Packer Breed Rep Feed Rep Rearer Producer/discussion group Industry press

Social media (Instagram, Facebook, twitter) Youtube Websites FeatherWel guide Other

Additional details.....

- 5) Since the project started have you used different resources than you did before to find out more information about maintaining feather cover? Has the project led you to discover anything new? (Yes/No and comments)

Bespoke Actions on farm

- 6) Which new actions did you prioritise and why?
- 7) How easy was it to make changes on your farm?
- 8) Do you think any of these bespoke actions are helping on farm to reduce feather pecking? (which ones)
- 9) Which actions haven't worked so well on farm, why, & could you have done anything differently?
- 10) Have you done anything extra not discussed on the FCAP to maintain feather cover?

- 11) Have there been any barriers to stop you adopting your bespoke actions on farm? (e.g. financial cost, time constraints, limited information or resources).
- 12) Have you shared any of your ideas with other producers?
- 13) Do you feel that industry support, incentives, resources are required to help you maintain feather cover?
- 14) Is there anything else you would like to include?

Appendix 6 Dissemination activities

Website address

<http://lhwf.co.uk>

1. ***Maintaining friable litter*** - The maintenance of good litter quality throughout the laying period <https://lhwf.co.uk/video-litter-management/>
2. ***A good range*** – Strategies to provide an attractive range to enhance birds ranging <https://lhwf.co.uk/video-a-good-range/>
3. ***Feather scoring on farm*** – Producer-led discussion of the importance and demonstration of feather scoring on farm <https://lhwf.co.uk/video-feather-scoring-on-farm/>
4. ***What the Peck?*** - A few ideas for enrichments for pullets and hens <https://lhwf.co.uk/video-what-the-peck/>
5. ***A seamless transition from rear to lay*** - A brief introduction in managing chicks to pullets before they arrive at the laying house <https://lhwf.co.uk/video-a-seamless-transition/>

Social media platforms

Twitter: Laying Hen Welfare Forum@L_H_W_F

Facebook: Laying Hen Welfare Forum

Articles (see also main text)

Farmers Weekly: 8 management tips to help prevent severe feather pecking – March 2020
<https://www.fwi.co.uk/livestock/poultry/layers/8-management-tips-to-help-prevent-severe-feather-pecking>

Appendix 7 Executive Summaries of Study Tour visits to the Netherlands and Austria

Summary of Laying Hen Welfare Forum (LHWF) Study Tour to The Netherlands (29 30 October 2018)

(This summary includes some UK statistics¹ for comparison).

Dutch layer sector:

- 35 million hens
- market share - Barn 72%, 12% free range, 8% organic, 8% enriched cage
- NL has approx. 6m free range hens (UK has 26 m)
- self-sufficiency more than 300% - need to produce low cost egg for export
- 65% white birds, 35% brown
- White eggs started out as a discount egg in the Netherlands.
- Laying hen enterprises are family run farms in the Netherlands which sell eggs to a packer. Different to the UK
- Mortality can be 5% in beak treated flocks, compared to 9% in non-treated flocks
- Significantly higher cost of running flocks with intact beaks – housing, feed, enrichment, rearing cost = +0.50 eurocent per egg
- NL appears to accept poorer feather cover and higher mortality in their intact birds (not acceptable in UK)
- Hendrix genetics - Trends in layer business:
- Change to alternative systems
- Longer cycles – parents and commercials
- Animal welfare pressure on bird management, for example moulting and male day-old chicks
- More by-products as feed ingredients e.g. DDGs
- Call for efficient use of resources, feed, water, energy and land environmental footprint
- Quality of feed. In NL, which is moving to non-trimmed birds, nutrition is very important (and rearing)

¹ <https://www.egginfo.co.uk/egg-facts-and-figures/industry-information/data>

Summary of Laying Hen Welfare Forum (LHWF) Study Tour to Austria (4 - 5 June 2019)

(This summary includes some UK statistics¹ for comparison).

Key points from a study tour to Austria during June 2019 (hosted by Lohmann). This included a visit to 1 rearing and 2 layer farms:

- Lohmann distributor (trading as Schropfer GmbH in Austria) has approximately 80% of the Austrian market and all pullets are reared in Austria
- Beak trimming is still legally allowed, but since 2007 not practised and is prohibited in the private AMA - Marketing - QM Programme. All laying hens producing eggs for the retail market must take part in the AMA system
- National flock size is 6.9 million (UK 41 million)
- Self-sufficiency 90% (UK 87% in 2018)
- Production systems are free-range (23%), organic (11.7%) and barn (64%) with the few enriched cage farms being phased out by the end of 2019. (2018 UK data: 44% cage, 52% FR, 2.5% organic, 1.5% barn). Birds reared organically do not require an outdoor range
- As in the UK, Austria is predominantly a brown egg market. Most farms are family-run with a maximum free-range flock size of 9,600 birds
- Typical depopulation age 72-80 weeks (similar to the UK)
- All FR houses have winter-gardens, whereas these are rare in the UK. Birds typically do not have access to the range until 26 weeks of age (in the UK for FR and organic this is from placement at approximately 17 weeks of age).
- Lighting is generally 20 lux high frequency LEDs with no nest box lights used
- It was stated that in-house enrichments are not normally provided, although a few rearers and layer producers in Austria use straw bales or pecking blocks. Pecking blocks were seen on the rearing site visited. In the UK enrichments are standard practice (Lion Code and other assurance schemes require at least 2).
- A survey by Schropfer GmbH of 900,000 layers indicated no more than 10% feather damage, but it was unclear how the damage was assessed
- It was stated that examination of birds at slaughter indicated that keel damage is not an issue. However, methodology and sample size were unclear and is contrary to data from several European countries where keel damage is widespread in laying hens.
- Selection by Lohmann for feather cover is only 1 trait in an index which covers some 23 commercial characteristics. It is undertaken in 3 countries on the basis of behaviour and plumage damage around the tail and cloaca within family groups
- Lohmann has determined the heritability of beak length, which they are reducing to improve feather cover

- A lot of importance was placed on rear and getting the rear right (e.g. matching rear with lay and rearing in aviary systems). Rearers receive a management fee of €1 per pullet with most variable costs covered by the breeding company
- Mortality levels in intact beak flocks are estimated to be a third higher than beak tipped
- Farm gate price is significantly higher than UK prices: €0.72/dozen Small; €1.10 Medium; €1.32/dozen Large and €1.44/dozen for Very Large. (UK FR egg average 79p/dozen3 (approximately €0.92))
- Egg size, XL – more than 73g, L 63g – 73g, M 53g – 63g and S – under 53g
- EU grants of 25% are available in Austria to cover both the building and equipment
- The Austrian experience of managing intact flocks is to pay particular attention to the quality of pullets, lighting, feed and water, housing and ventilation; and overall management.