HEALTHIER HENS

Kenyan cage-free farm visit report

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Executive Summary

To identify feasible pathways towards improving the welfare of egg-laying hens in Kenya, the Healthier Hens team conducted a scoping study across three key phases.

During the initial phase (I) of on-farm welfare scoping, it was observed that despite declining productivity, farmers tended to keep hens for extended periods due to market dynamics affecting profitability. Challenges such as delayed onset of lay and suboptimal feed consumption raised concerns about hen welfare. Additionally, the lack of biosecurity measures and inadequate access to veterinary support highlighted further risks to hen well-being.

Subsequent investigation into alternative welfare issues (Phase II) identified four priority areas for intervention scoping: biosecurity, thermal stress, feed/water access, and veterinary support. Initial quantitative assessments revealed the potential impact and cost-effectiveness of interventions in alleviating pain and improving welfare outcomes.

In the final phase (III), the Welfare Footprint Project's time in pain quantification provided insights into the potential benefits of targeted interventions. Measures to address thermal stress, and improve hen access to feed and water showed promise in reducing significant amounts of hours spent in pain.

The recommendations stemming from this initial assessment emphasize the prospect of implementing targeted interventions to address the identified welfare challenges facilitated by welfare-informed veterinary services. Collaboration with trained veterinary professionals would be crucial for intervention monitoring, evaluation, and addressing emerging welfare issues on farms.

Healthier Hens will continue acquiring better proxy data to check key assumptions and validate the supposed burden of the identified welfare issues. By prioritizing welfare issues posing the highest combined burden and cost effectiveness promise, we should be able to significantly enhance egg-laying hen welfare in the region.

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Their contributions enabled operations and enhanced the success and depth of the case study.

Introduction

Initially, upon scoping Kenya as a potential country for pilot operations, the Healthier Hens' team carried out desk research and in-person visit assessments in the country, aimed at testing the feasibility of a feed fortification intervention to improve egg-laying hen welfare. After a 3-week scoping exercise, various poultry farming systems, feed deficiencies, and regulatory gaps were identified in Kenya. Farmers were found to face challenges with rising feed costs and calcium deficiencies leading to health issues in the hens. Despite these challenges, there was an expressed willingness among stakeholders to collaborate on the intervention [Healthier Hens, 2022].

Throughout the last two years of on-the-ground activities in Kenya, the Healthier Hens teams carried out farm visits and surveyed cage-free egg farmers to better understand the prevalent hen welfare issues and challenges that the farmers face in identifying and preventing said welfare issues.

The visits also served as a scoping project aimed at identifying alternative issues - going beyond poor feed and/or hen welfare awareness and knowledge among farmers. Recording some proxy data also allowed us to get a better sense of how prevalent and/or severe the uncovered on-farm issues can be on deep litter farms in Kenya.

Expected value

The expected value of the farm visits followed the three main implementation phases and can be summarised as follows:

- Phase I (May 2022 to December 2023): initial scoping visits generally included observing on-farm conditions and practices, carrying out farmer key informant interviews (KIIs) and, e.g., collecting feed samples where applicable [Healthier Hens, 2023]. This helped identify potentially prevalent issues beyond those directly related to hen feed quality, consistency and supply.
- Phase II (November 2023 to December 2023): additional questionnaires were filled aimed at better understanding and quantifying three four main aspects: biosecurity, diseases, access to feed/water, and thermal stress. This data was to be used as proxies for evaluating the potential cost-efficacy of promising interventions aimed at addressing such hen health and welfare issues.
- Phase III (December 2023 to February 2024): farm visit data was collated and informed estimates were supplied to enable the Welfare Footprint Project team to run their AI-assisted pain-track models, quantifying the estimated time in pain experienced due to three issues:
- intermittent access to feed and water,
- thermal stress, and
- low access to quality veterinary support.

These values were then used to calculate potential cost-effectiveness of three interventions aimed at addressing the issues.

Table 1: Overview of the workload involved in the three phases of the farm visits.

	2022								2023												2024	
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2
I																						
II																						
III																						

Overall, we sought to understand better the issues farmers faced, their awareness of hen welfare and what welfare issues the hens face. In the end, this helped us identify promising alternative interventions, which we had prioritised and sought to evaluate in terms of their potential cost-effectiveness.

Methodology

Overall, farms in several counties were visited to get a broader representation of possible on-farm management practices and potential issues. As mentioned above, to this end, three active project phases were carried out: first scoping visits, followed by visits focused on promising alternative welfare issues, and time in pain quantification. The farms and flocks were chosen by making use of Healthier Hens' network with the local egg farming community, by identifying flocks that meet the criteria of the case study (commercial, cage-free).

Questionnaires were built and updated as the project progressed, with questions being tailored and targeted more and more towards welfare issues and concerns we were observing on the farms.

The case study was set out to also get insights into the welfare state of hens kept cage-free, noting how prevalent and how severe welfare issues such as poor bone health, poor feather condition or various injuries can be. To do this, 2 end-of-lay flocks were sought throughout Q4 of 2023. Of each flock, 20 hens were intercepted at the point of depopulation, when the welfare assessment of key indicators was performed in-vivo. The assessed indicators included: keel bone status; the condition of the neck, back, wing, tail, cloaca, breast, footpad and toes. The reader is advised to read more about the relevant vet training and the wider on-farm hen welfare indicator study [Healthier Hens, 2024].

The final time-in-pain estimates were carried out by the Welfare Footprint Project team, in accordance with their methodology, using data collected on the ground [Welfare Footprint Project, 2024].

General objective

- To get a better understanding of the state of egg-laying hen welfare on Kenyan cage-free farms.

Specific objectives

- Carry out KIIs aimed at scoping issues faced by the farmers and welfare risks for the hens.
- Carry out additional surveys aimed at getting data into the prevalence and possible severity of four key aspects: biosecurity, diseases, feed and water access, and thermal stress.
- Estimate the cost-effectiveness of potential interventions aimed at mitigating limited feed and water access, thermal stress and the lack of farmer access to regular and high-quality veterinary support.

Geography

The farms visited spun 6 counties and totalled in 33 distinct visits. The geographical distribution of the farms can be seen in the figure below.

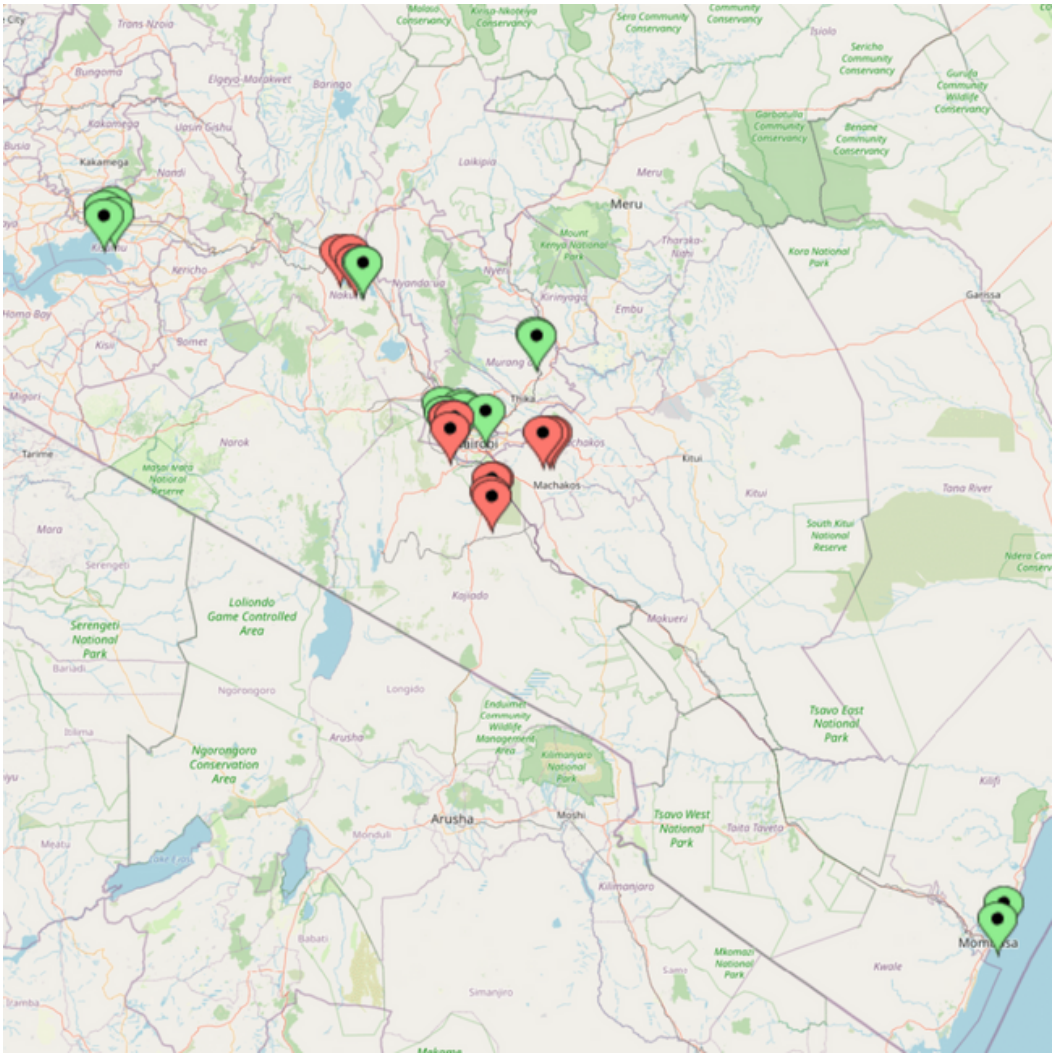

Figure 1. Map of the visited farms. GREEN: phase I visits, RED: phase II visits.

Three caged farms and 30 cage-free facilities were visited. The farmers kept 1250 (150-5450) hens per house on average. Upon visiting, the hens were 63 weeks of age (16-112 WoA).



Expected output

Through the farm visit project, we intend to generate the following outputs to aid our decision-making processes:

- Insights of on-farm conditions, practices and welfare risks
- Specific proxies for quantifying amount of time spent in pain (see more about Welfare Footprint Project's methodology here).
- First estimates of costs and potential impact (time in pain averted) of the promising alternative interventions.

Methodological limitations

- Organic reach of farms to be visited. We relied on county livestock offices (CLOs) and their staff to introduce us to cage-free farmers in their counties.
- We were only able to visit a limited number of farms in each county, not generating a representative overview of the on-farm situation. However, the case study does shed light on what conditions and practices can be observed.
- The follow-up (Phase II) visits did not take place when the risk for thermal stress would be the highest in the visited locations. This data collection bias is probably why apparent behavioural indications of thermal stress were low.
- Visited farmers received compensation for their time, potentially biasing their willingness, expectations and communication with us upon learning about the fact. We attempted to counter this by handing the compensation out at the end of the visit and not communicating that compensation would be provided upon reaching out to the CLOs.
- Most of the collected data was self-reported as the majority of farmers did not have consistent record-keeping systems in place.

Results and discussion

Phase I - On-farm welfare scoping

The farmers typically kept hens for longer than expected - an average of 100 weeks (76-144 weeks). While some farmers did depopulate prematurely - mainly due to poor market dynamics: higher than normal feed prices (global supply issues) combined with lower than normal egg selling prices (unregulated egg imports), most kept the flocks for two or more years. This was done despite low productivity in the latter production phases (<75%). The farmers would do so until they at least break even, postponing the eventual high upfront costs of getting day-old chicks.

All farmers depopulate their flocks by getting private brokers to come and collect their hens. On- or off-farm slaughter followed the emptying of the barns, off-farm being more frequent. This typically involves live transport of the hens, which can be a significant source of pain and suffering due to inadequate handling and transportation conditions.

Across the visited farms, hens typically started laying later than expected, at 21 weeks of age (WoA, 18-28). Factors contributing to this could include suboptimal diets and other management issues. Typically, delaying the onset of lay is regarded as a possible protective factor against bone issues later in life, thus this merits further investigation.
At the points of visits, in the flocks in production, the average reported productivity was 77% (45-96%). Productivity distribution based on hen ages is shown below, compared to the expected egg-laying levels in a similar breed, in the Global North.

	38-47 WoA	48-57 WoA	58-67 WoA	68+ WoA
On-farm productivity	89% (n=2)	67% (n=3)	92% (n=2)	68% (n=7)
ISA Brown producer productivity	94%	91%	87%	77%*

*** - producer data until 100 WoA, while farm data until 112 WoA.**

While the commercial ISA Brown breed of hen plateaus at 125 g of feed/hen/day in terms of dietary intake, We have observed that in Kenya, the consumption rate is typically higher: 135 g/hen/day (70-250). This corresponds with regional recommendations for feeding indigenous chickens. The reasons for the increased feed intake could include lower nutritional quality of the feed and higher energy expenditure - potentially due to higher hen activity in the typically lower-stocked deep litter barns. However, we have also observed a risk for underfeeding, where 52% of the visited farms provided less feed than expected in Kenya. There was also a non-negligible number of farms that fed just once a day - in the morning, raising further concerns about inadequate on-farm management via behavioural welfare issues such as hunger experienced due to competition for feed among the hens.

The questioned farmers typically bought feed once a week and only 16.7% of them did so less frequently - potentially putting the hens at additional risk due to unexpected changes in consumption or feed delivery that could involve delays in supply.

During the time of the visits, the farmers sourced feed at 0.34±0.04 $/kg and all expressed that the current market prices are too high, suggesting that 0.28 $/kg (a reduction of nearly 20%) would be a fair price for them to retain sufficient profit margins. 69% of the farmers do not provide ad libitum minerals to their hens. 23% expressed that they are not satisfied with the quality of their current feed, which reflects well the fact that many farmers tend to change feed providers during the production cycle. These often sudden market-induced changes pose a risk to the well-being of the hens as safe feed transition protocols are not always upheld.

We have also learned that a significant number (19%) of the farms do not have a vet who periodically visits and supports the farmers. 89% of the farmers had not encountered any cases of bone fractures among their flocks, despite there clearly being an issue at least with keel bone fractures [Healthier Hens, 2024]. However, we attribute this mismatch to low awareness of such health and welfare issues and assessment methods as confirmed during our farmer training workshops [Healthier Hens, 2023]. 56% of the farms did not have any biosecurity measures in place on their farms. Of those who did, disinfectant footbaths were typically employed. However, there is a risk that at least in some cases, the status of these measures was not maintained to ensure the effective elimination of pathogens. 81% of the farms also did not have any means for regulating the temperature in their barns, while only one visited farm had thermometers installed.



In two of the visited flocks, two trained veterinary professionals also carried out overall welfare indicator assessments, scoring how the hens fared in terms of several key indicators. The table below highlights the average hen scores. There is a clear difference in some of the scores, dependent on the specific farm, showing that the overall welfare of the hens can vary significantly from farm to farm.

On average, issues of poor keel bone, neck, back, wing, tail, cloaca and breast conditions were observed and could indicate a serious risk for the well-being of the hens, especially when occurring simultaneously. On the other hand, footpad and toe issues were not observed despite being of high concern in Global North flocks. Keel bone, neck, footpad and toe scores were the most consistent when comparing the two farms. On the other hand, average intraflock variation was the lowest in wing (22.5%), cloaca (33%) and neck (37%) condition scores, suggesting that, when present, damage to these body parts might affect most

individuals in a given flock. When looking at the worst scores of an individual farm (Farm 2) - there was very low variation (<22%) for back, wing and tail issues, highlighting how widespread damage to these areas can be.

	Keel bone	Neck	Back	Wing	Tail	Cloaca	Breast	Footpad	Toes
Farm 1	3.8	5.0	2.2	2.8	2.8	4.6	3.3	0.7	0.8
Farm 2	5.7	6.5	8.1	8.4	8.2	7.9	7.5	2.2	0.7

Phase II - Alternative welfare issues

Through this phase of the project, we looked at a range of welfare issues observed on farms, attempting to identify feasible interventions to address them. We took our confidence on whether the intervention would be net positive for the hens, if the intervention benefits both the hens and the farmers (tractability), and estimated costs per farm into account when shortlisting the issues. The initial list included the following issues:

- Not enough nest boxes
- No disinfectant or poor maintenance
- Poor nest box design
- Too high stocking density
- Feed and/or water not always there
- Farmers don't know when hens are too hot or cold
- In non-soil litter barns, hens don't have enough grit for digestion
- No perches
- Poor ventilation
- No enrichment
- Poor litter quality
- Pullet beak trimming
- Inadequate cleaning of nest boxes
- Inadequate farmer training

Of these, four particular areas stood out and were chosen for further data collection and quantification: biosecurity, thermal stress, feed/water availability and access to quality veterinary support.

Biosecurity measures

Out of the 15 farms visited while scoping alternative on-farm welfare issues, 53% of the farms did not use disinfectant foot baths at their facilities. Of those who did, 1 farm (14%) did not maintain the disinfectant properly, changing it only once a week or even more rarely. 47% did not have any other means of maintaining biosecurity, such as timely litter removal, thorough disinfection in between flocks, dedicated clothing, etc.

Collectively, we chose not to quantify the time spent in pain due to biosecurity issues. This decision was based on the following reasons:

- Based on the estimates of duration and frequency of the bouts, as well as the % of random flocks affected, addressing food/water access and thermal stress promised to have a larger impact on hen welfare than poor biosecurity, so we prioritized against biosecurity. Plus in the cases of hunger or thermal stress, there are also immunosuppression and the increased likelihood of infectious diseases as flowtrhough, chronic issues vs. the rather quick onset and cessation of pain in the event of a flock-wide outbreak.
- In the case of biosecurity, the goal would be to reduce the likelihood of pathogens getting into the barns. There are implementation issues here, as it is very difficult to control this, particularly for respiratory pathogens, which may enter through the air, and pathogens carried by vectors, such as mites, insects, etc.
- Even if a given intervention is effective at reducing pathogen exposure and the frequency of infectious diseases, measuring the impact, e.g., through carrying out controlled trials would be very difficult as such events are typically rare but with large consequences.
- Finally, given that biosecurity is an aspect closely linked to One Health and One Welfare aspects, we believe that larger organisations and research bodies, who are aware of the risks, are in a much better position to address this particular group of on-farm issues.

Thermal stress

We have observed that 67% of the flocks are at risk of heat stress due to the climatic conditions at the visited locations. We defined this as at least one month of average high outside temperatures at or above 27°C (assuming that barn temperatures are typically 3°C higher). Of the farms in these risk locations, the amount of time this issue is present ranged from 1.5 to 2.5 months during the year, typically within the first quarter (January-March).

60% of the farms did not have any active means to regulate the temperature, such as curtains or mechanical ventilation. Moreover, 93% of the farms did not have thermometers installed, indicating that many do not have the means to record the issue, not to mention how to address it. On the other hand, 80% of the observed flocks had good feather coverage at the time of the visits. Here, it is important to note that the visits did not take place during a seasonally appropriate period, when the risk for on-farm thermal stress is the highest (November-December instead of January-March, average monthly high temperatures in Nakuru: 24.5°C vs. 27°C, respectively.).

53% of the farms did not provide access to perches in the barns, potentially increasing the overall stocking density and preventing additional opportunities to thermo-regulate, not to mention the behaviour limitations for the hens to exhibit key natural behaviours such as perching and roosting. However, only 7% of the flocks exhibited signs of agitation and skittishness, typically suggestive of exposure to stress.

One location (Nakuru county) posed a risk of thermal stress due to low temperatures at night (<12°C) but, typically, farmers in this county made use of curtains, potentially raising the in-barn temperature overnight. 20% of the farms were at risk of experiencing flooding leading to, e.g., poor litter condition due to high accumulated precipitation in the visited locations.

Feed/water availability

33% of the farms put their hens at risk by providing too little feed. Moreover, 67% of the farms did not have enough caretakers to ensure that feeders and drinkers are properly maintained throughout the day. While 80% of the farms had automatic water provision systems installed, all employed manual feed addition and provision using round feeders. 87% of the farms did not provide enough feeders for their flocks and 33% of the farms did not have enough drinkers for the hens.

Access to quality veterinary support

Veterinary support was generally assessed by gauging on-farm disease-management practices, used protocols and vet visits. On 80% of the farms, ill hen isolation period and procedures were not clearly defined, where the farmers would typically isolate the hens and wait until they recovered or not. 60% of the farmers reported having hens fall ill every week or not knowing the frequency.

60% of the farms did not have a vet visit the farm at least twice a year, suggesting that access to any kind of veterinary services is limited. Qualitatively, the main reasons included costs, trust issues and not having the needed connections to local vet service providers. Finally, 53% of the farmers had experienced at least one disease outbreak on their farms.

Phase III - Time in pain quantification

Across the board, for all three main welfare issues to be quantified: thermal stress, feed and water access, preliminary analyses were carried out by The Welfare Footprint Project, considering the impact of direct effects only, without accounting for their flowthrough effects on disease burden, behavioural deprivation, fear, aggression, etc..

Thermal stress

Time in Pain that could potentially be averted by preventing heat stress in inland Kenya (per average hen):

	Cumulative Pain Average Hen Entire production
Excruciating	
Disabling	70 [37-120]
Hurtful	70 [37-120]
Annoying	6 [3-10]
No Pain	

A potential intervention was estimated to cost around $970 per 1250 hen farm. This includes equipping the farm with a thermo-hygrometer, sending regular SMS reminders to observe the temperatures mid-day, installing 10 mechanical roof ventilators and two vet visits. Total disabling pain that such an intervention could theoretically avert: 87.5k hours/farm (46.25k-150k). The estimated cost-efficacy: 0.77 $/hen, equating to 1.11 $cents/hour of disabling pain (0.65-2.09).

Feed/water availability

Time in Pain that could potentially be averted with more drinkers (per average hen):

	Cumulative Pain due to Water Deprivation (all levels) for the Average Hen
Excruciating	
Disabling	19 (10-28)
Hurtful	210 (130-310)
Annoying	400 (210-670)
No Pain	

A potential intervention was estimated to cost around $215 per 1250 hen farm. This includes getting an average of 8 additional drinkers per farm, paying for vet visits and drinker installation. The total disabling pain that could be averted: 23.75k hours/farm (12.5k-35k). The estimated cost-efficacy: 0.17 $/hen, corresponding to 0.9 $cents/hour of disabling pain (0.61-1.71).

Time in Pain that could potentially be averted with more feeders, but not a higher amount of feed (per average hen):

	Cumulative Pain per Average Hen (All Levels of Feed Restriction in properly managed farms but with a few feeders; sufficient feed but insufficient feeder space)
Excruciating	
Disabling	130(83-170)
Hurtful	600 (460-760)
Annoying	980 (750-1200)
No Pain	

A potential intervention was estimated at $280 per 1250 hen farm. This includes providing an average of 37 round feeders to a farm and paying for two vet visits. Total disabling pain that could be averted: 162.5k hours/farm (103.75k-212.5k). The estimated cost-efficacy: 0.22 $/hen, corresponding to 0.17 $cents/hour of disabling pain (0.13-0.27).

Time in Pain that could potentially be averted with more feeders AND proper feed to all hens (per Average Hen):

	Cumulative Pain per Average Hen (All Levels of Feed Restriction due to insufficient feed and insufficient feeder space)
Excruciating	
Disabling	290 (200-380)
Hurtful	1200 (930-1600)
Annoying	1800 (1400-2200)
No Pain	

A potential intervention was estimated at $1565 per 1250 hen farm. This included subsidizing the farmers to get the missing amount of feed at their preferred purchasing price, providing them with the missing feeders, and paying for two vet visits. Total disabling pain that could be averted this way: 362.5k (250k-475k). The estimated cost-efficacy: 1.43 $/hen, corresponding to 0.49 $cents/hour of disabling pain (0.38-0.72).

Access to quality veterinary support

All in all, we see coupling any or all of the above options with visits by welfare-trained and informed veterinary professionals. This would not only allow for measurement and evaluation activities but also permit continuous monitoring of on-farm welfare issues, supporting the farmers with other emerging issues, and closing the gap in access to quality veterinary support. Below is a table overviewing the cost efficacy ranges of the four identified options

Intervention	Total impact [hours of disabling pain averted/farm]	Cost efficacy [$/hen]	Cost efficacy [$cents/hour of disabling pain]
Thermal stress	87.5k (46.25k-150k)	0.77	1.11 (0.65-2.09)
Access to water	23.75k (12.5k-35k)	0.17	0.9 (0.61-1.71)
Access to feed (feeders)	162.5k (103.75k-212.5k)	0.22	0.17 (0.13-0.27)
Access to feed (feeders + feed)	362.5k (250k-475k)	1.43	0.49 (0.38-0.72)

Conclusions and recommendations

Based on the results obtained from the on-farm welfare scoping and the initial alternative welfare issue assessment, several conclusions can be drawn:

Farmers' Practices and Challenges

- Farmers tend to keep hens for longer periods despite declining productivity, primarily due to market dynamics affecting profitability and difficulties amassing the needed capital.
- The common depopulation method - using private brokers for off-farm slaughter, raises concerns about animal welfare during transportation.
- Delayed onset of lay may serve as a protective factor against bone issues but warrants further investigation.
- Apparent feed consumption in Kenya is often higher than recommended, possibly due to lower feed quality, higher feed losses and increased energy expenditure on the small-medium scale deep litter farms.
- Challenges such as rising feed costs, inadequate feed quality, and limited access to veterinary support are prevalent among farmers.

On-farm Welfare Indicators:

- Various welfare indicators, including poor conditions of keel bone, neck, back, wings, and tails, highlight risks to hen well-being.
- Lack of biosecurity measures, inadequate barn thermal regulation, and suboptimal access to feed and/or water further contribute to welfare concerns.

Intervention Prioritization:

- Four key areas—biosecurity, thermal stress, feed/water availability, and access to quality veterinary support—emerged as priorities for on-farm hen welfare interventions.
- Initial quantitative assessments indicate the potential impact and cost-effectiveness of interventions in alleviating pain and improving welfare outcomes.

Recommendations:

- Improving access to water and/or feed might be highly cost-effective interventions at the individual hen level.
- Improving access to feed by ensuring the hens have enough access to feeders shows promise as a potentially highly cost-effective intervention when expressed in cost per averted hour of disabling pain.
- Combining interventions, such as in the case of improving hen access to feed by providing both additional feeders and subsidising additional feed costs, shows promise at averting the most time spent in severe negative affective states.
- Irrespective of the chosen intervention, continued collaboration with welfare-trained veterinary professionals is essential for accurate intervention outcome monitoring, evaluation, and keeping track of emerging farm welfare issues.

In summary, based on initial data and observations on cage-free farms, addressing the identified welfare challenges through targeted interventions and enhanced veterinary support could lead to substantial improvements in hen welfare in Kenya. Healthier Hens will continue acquiring data of better proxies to check key assumptions and validate the prevalence and severity of the three identified welfare concerns.

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