



Protocol for

Practical welfare assessment for pullet and laying hen commercial flocks

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Introduction

Systematic welfare assessment of commercial pullet and laying hen flocks can help producers to detect early signs of welfare issues at early stages before they impact health and flock performance. The protocol described here based on the transects method [1, 2, 3, 4], it is intended to be a practical and time efficient approach to get a useful quantitative assessment on the welfare status of pullets and laying hens in commercial flocks. The protocol has been designed to maximize the reliability of the assessment. However, other protocols may be equally suitable to assess hens' welfare. Therefore, this protocol must not be regarded as a particular recommendation of the Commission.



1. Transect definition and evaluation procedure according to the production system

The transect method is a practical quantitative method to assess pullet and laying hen animal welfare in a simple, but efficient manner. It permits farmers to detect and quantify subtle changes in the welfare status of the flock easily. The transect method is based on regular data collection of standard production parameters, and on the collection of flock animal welfare indicators. The collection is carried out by simple walks through the poultry house carried out in a standardized manner.

The protocol described here is based on the transect method (and can be used at the discretion of the users and purposes. If problems are observed, the frequency should be increased to have better chances to control the emerging issues.

The transect method is similar to the daily flock checks conducted by producers and should, therefore, be easy to apply in laying hen and pullet flocks. A transect is defined as the longitudinal area between a wall and a resource line (feeders, drinkers, nests, perches...), or between two resource lines.

Birds' assessment should, in this method, be conducted within the transects. Thus, the first step should be to define the number of transects and their dimensions (length and width) in the house where the flock to be assessed is housed. The method varies slightly depending on the housing system used: a) single tier systems, and b) multilayer systems. The transect division approach should be adapted accordingly (see sections 1.1 and 1.2 below).

If possible, the producer should make the assessment at a similar time of day. In houses with a covered veranda and in free-range and organic systems, the birds should be confined indoors until the end of the assessment. Thus, in these systems, the assessment should be performed in the early morning. After this, hens/pullets should be allowed to access the outdoor area, as usual. To minimize birds' disturbance during the assessment, the producer should move slowly through the flock. The outdoor evaluation should be performed once the flow of hens/pullets hopping in and out of the house has stabilized, to provide enough time for the hens/pullets to normally use the range.

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Table 1 shows the 29 indicators proposed for assessment in this protocol, their definition and examples for calculation. Using these indicators and the transect method approach as explained below should allow producers to perform periodic assessments of the health and welfare of the animals under their responsibility. Assessment with this method is based on

counting the number of birds (N) showing the welfare issue addressed by the respective indicator, and results are calculated as percentage [%] of the total number of observed hens/pullets. This has been shown to be a good estimation of total flock occurrence. Annex 1 proposes a template for data collection of the different assessed animal welfare indicators.

Table 1. Hens' animal health and welfare indicators, and their description.

	Indicator	Measurement	Description
INDICATORS EVALUATED WHEN ENTERING THE HOUSE (GROUP 1)	Panic reactions	Yes/No	Presence (Yes) or absence (No) of crowd movement or panic reactions.
	Panting/wings open	Yes/No	Presence (Yes) or absence (No) of a significant % of pullets /hens in the flock (for instance $\geq 25\%$) that are breathing rapidly in short gasps, with open wings to dissipate heat.
	Huddling	Yes/No	Presence (Yes) or absence (No) of a significant % of pullets /hens in the flock (for instance $\geq 25\%$) hens/pullets that perform huddling behaviour. Do not count hens/pullets that pile up for reasons other than cold stress, such as panic reactions.
INDICATORS EVALUATED DURING THE TRANSECT WALK (GROUP 2)	Inappropriate beak trimming	N birds	Count birds with beak problems caused by inappropriate beak trimming at the hatchery, i.e. upper beak section being trimmed substantially shorter than the lower beak section or both beak sections trimmed too short. Only the tip of the beak should be trimmed.
	Feather loss on head	N birds	Count birds that have missing feathers on the head, for instance $\geq 5\text{ cm}$ in diameter.
	Feather loss on back	N birds	Count birds that have missing feathers on the back, including the wings, for instance $\geq 5\text{ cm}$ in diameter.
	Feather loss on breast	N birds	Count birds that have missing feathers on the breast, for instance $\geq 5\text{ cm}$ in diameter.
	Feather loss on tail	N birds	Count birds that have clearly visible missing or damaged feathers on the tail and around the cloaca.
	Wounds head	N birds	Count birds with fresh or older wounds on their heads, including the comb.
	Wounds back	N birds	Count birds with clear signs of fresh or older wounds on the back, including the wings.
	Wounds tail	N birds	Count birds with clear signs of fresh or older wounds on the tail and cloaca area.
	Pariah birds	N birds	Count birds that present an evident phenotypic difference compared to normal bird phenotype. Birds may be noticeably smaller, have distinct morphological features and are often a target for aggressions; they are often found isolated and perching to avoid aggressive flock mates.

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Indicator	Measurement	Description
INDICATORS EVALUATED DURING THE TRANSECT WALK (GROUP 2)	Sick birds	N birds
	Prolapse ²	N birds
	Trapped hens	N birds
INDICATORS EVALUATED DURING A ROUTINE CHECK WALK (GROUP 3)	Red mites	0 to 2 scale
	Light intensity	Lux
	Litter quality	0 to 4 scale
	Feathers on floor	0 to 2 scale
INDICATORS EVALUATED IN FREE RANGE (GROUP 4)	Range use	% birds
	Range homogeneous use	Yes/No
PRODUCTION TRAITS EVALUATED THROUGH WRITTEN RECORDS AND IN THE EGG PACKING ROOM (GROUP 5)	Produced eggs ²	N eggs
	Dirty eggs ²	N eggs
	Pale eggs ²	N eggs
	Broken eggs ²	N eggs
	Eggs with (other) problems ²	N eggs

Indicator	Measurement	Description
PRODUCTION TRAITS EVALUATED THROUGH WRITTEN RECORDS AND IN THE EGG PACKING ROOM (GROUP 5)		
Stray eggs (also referred to floor eggs) ²	N eggs	Number of eggs laid outside of the nests throughout the house for the day of assessment (or within the week of assessment).
On-farm mortality	N birds	Sum the total number of dead birds until the day of the assessment, not considering culled hens/pullets. The results should be presented as % of mortality with respect to initial number of hens/pullet of the flocks.
On-farm culls	N birds	Sum the total number of hens/pullets culled by the producer until the day of the assessment. The culling reasons should be noted on the daily check. Results should be presented as % of culled hens/pullets with respect to initial number of hens/pullets of the flock.

¹ The scales in this Table are proposed based on the logical/practical point of view of the Authors but are only examples. Other scales can be used according to the needs of the final end-user.

² This indicator to be considered for laying hens' evaluation only.

The indicators are organized in five groups, according to the order of their evaluation. All groups of indicators should be collected on the same day, or sequentially within the same week (For instance, Groups 1 and 2 of indicators can be collected on one day, and the rest on the next day). All data collection should be done within the same week so that values can be reliably associated. Group 1 indicators should be assessed at first sight of the flock. Group 2 should be evaluated during the transect walks. Indicators from Groups 3, 4 and 5 should be evaluated during routine check walks within the same week of age. The variables marked with footnote 2 are specific for laying hens' assessment protocol, not for pullets.



1.1. Single-tier system

1.1.1. Transect definition

Figure 1 shows a schematic layout of a typical single tier system. This system normally consists of a central, elevated, slatted platform (grey area) on which different lines of nests, feeders, drinkers, and perches are mounted. At each side of the slatted platform there are two floor sections (pink area) that are normally covered with bedding and may also have feeders. Producers should use floor sections as wall transects, and divide the central, elevated platform into several transects that are large enough taking advantage of the perch/feeder/drinker/nest lines.

Once transects are defined, they should be numbered from left to right, (Figure 1). The producer should always assess two transects per house, one wall and one central transect. The central transect should be selected avoiding the evaluation of two contiguous transects to avoid risk of bird double counting (examples of evaluation in Figure 1: if we choose T1 as the wall transect, then we will have T3, T4 or T5 as possible central transects; but if we choose T6 as wall transect, then we will have T4, T3 or T2 as possible central transects).

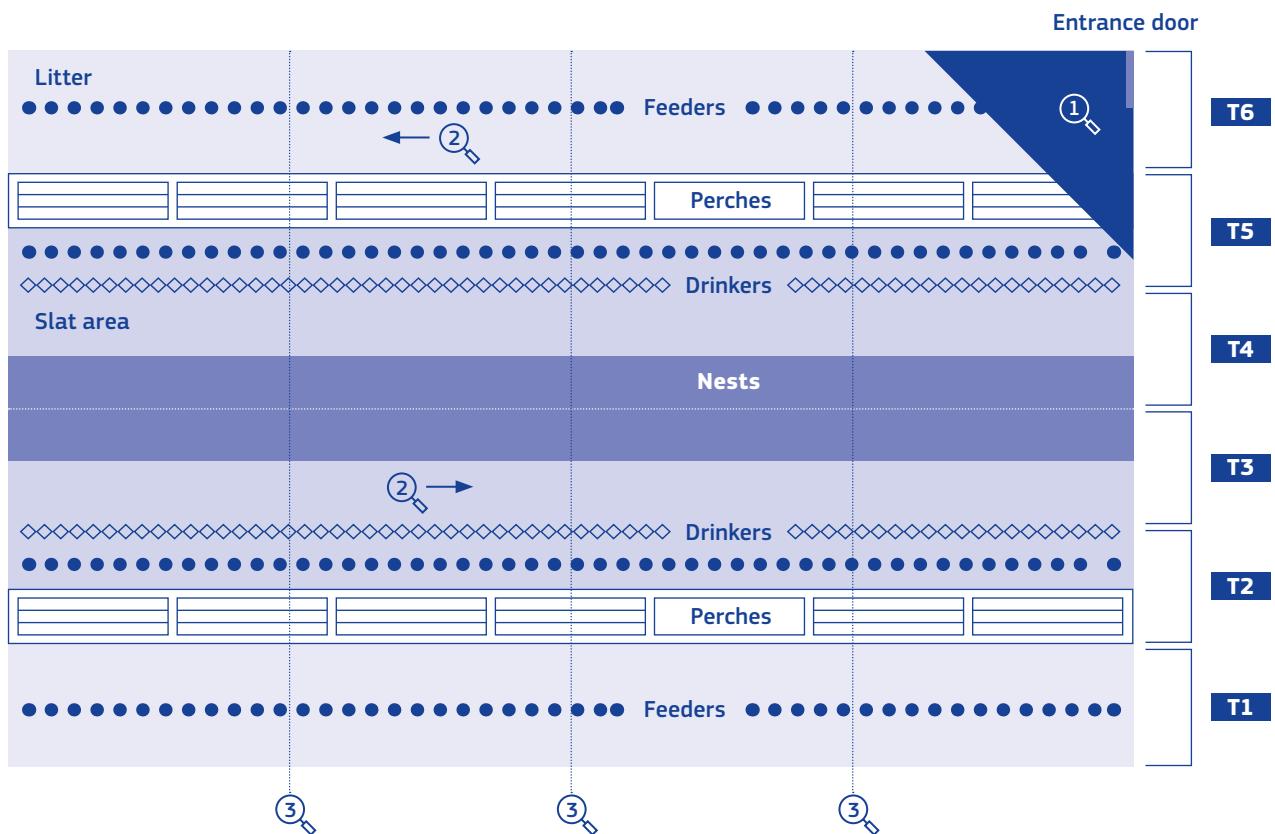


Figure 1. Diagram of the assessment points for single tier house (T=transect 1 to 6). Magnifying glasses and numbers inside respectively represent an assessment location and the Group of indicators that should be assessed in that location.

1.1.2. Indicators evaluated when entering the house

Once the producer opens the house door, a visual assessment of Group 1 indicators (panic reaction, panting and huddling; Table 1) should be carried out from the distance, to avoid bird perturbation. The producer should observe the birds for at least 5 minutes to allow an accurate assessment of these indicators.

1.1.3. Indicators evaluated during a transect walk

While walking along one wall and one central transect (Figure 1), the producer should count the number of birds showing any of the predefined welfare problems of Group 2 (Table 1). The producer should restrict visual inspection within the boundaries of the assessed transect, ignoring anything ongoing in adjacent transects. The producer should only identify welfare problems observed in front of them as they walk, what would make turning back unnecessary.

Once the first transect has been assessed, the producer should move to the second transect and repeat the process.

1.1.4. Indicators evaluated during a routine check walk

In order not to hinder the evaluation during the transects, Group 3 (Table 1) indicators should be assessed during a daily routine check walk performed on a different observation day at 3 different locations, avoiding the beginning and the end areas of the house. So, according to the length of the house, three equidistant locations should be selected (for instance, approximately at 25, 50 and 75 % of the length of the house; Figure 1).

To assess light intensity, the producer can use a luxmeter or a free smartphone application. Data about bedding quality, red mites, and the number of feathers on the floor should be registered at the three defined locations. For red mites, at the same three locations, the producer should check locations likely to host red mite nests.

1.1.5. Indicators evaluated in free range

Outdoor evaluation should be done once the hen/pullet flux through the pop holes has stabilized after opening the pop holes. If outdoor evaluation is done the same day as the transect evaluation, this should be done after completion of the transect evaluation. During the outdoor evaluation, corresponding to Group 4 indicators, the producer should first estimate the percentage of hens/pullets which are using the free range, based on a, for instance, 4-point scale (0-10 %, 10-25 %, 25-50 %, >50 %). Then, the producer should walk through the free range and should estimate if the range vegetation cover is presenting signs of being homogeneously used (Yes or No). In addition, as the presence of birds in the free range will depend on climatic conditions, the general weather conditions observed during the evaluation day should be recorded using, for instance, the categories: sunny, cloudy, windy, snowy, rainy.

1.1.6. Production traits evaluated through written records and in the egg packing room

The evaluation of production traits (Group 5 of indicators; Table 1) is an essential decision-making aspect for farmers. The decrease of productivity is indicating problems. Production traits to be collected should include on-farm mortality, on-farm culls, and, for laying hens, egg production parameters (Table 1).

For on-farm mortality and on-farm culls the producer should sum-up the total number of animals for both indicators until the day of the assessment.

1.2. Multitier systems

1.2.1. Transect definition

In the case of multitier systems, aviary structures should help producers to define the limits of each transect (Figure 2). Wall transects should be defined as the space from a wall to the aviary structure, and central transects should be defined as the space between 2 aviary structures (Vasdal et al., 2022). The transect area assessed during each transect walk should comprise the littered floor area between 2 aviary lines, as well as half the width of the space under each aviary structure, and each tier of the structure; on one side of wall transects, and on both sides of central transects.

Once transects are defined they should be numbered as previously described. Welfare assessment should always include two transects per house, one wall transect and one central transect. The central transect should be selected avoiding the evaluation of two contiguous transects (example of evaluation: T1 and T3, or T2 and T4), to avoid bird double counting.



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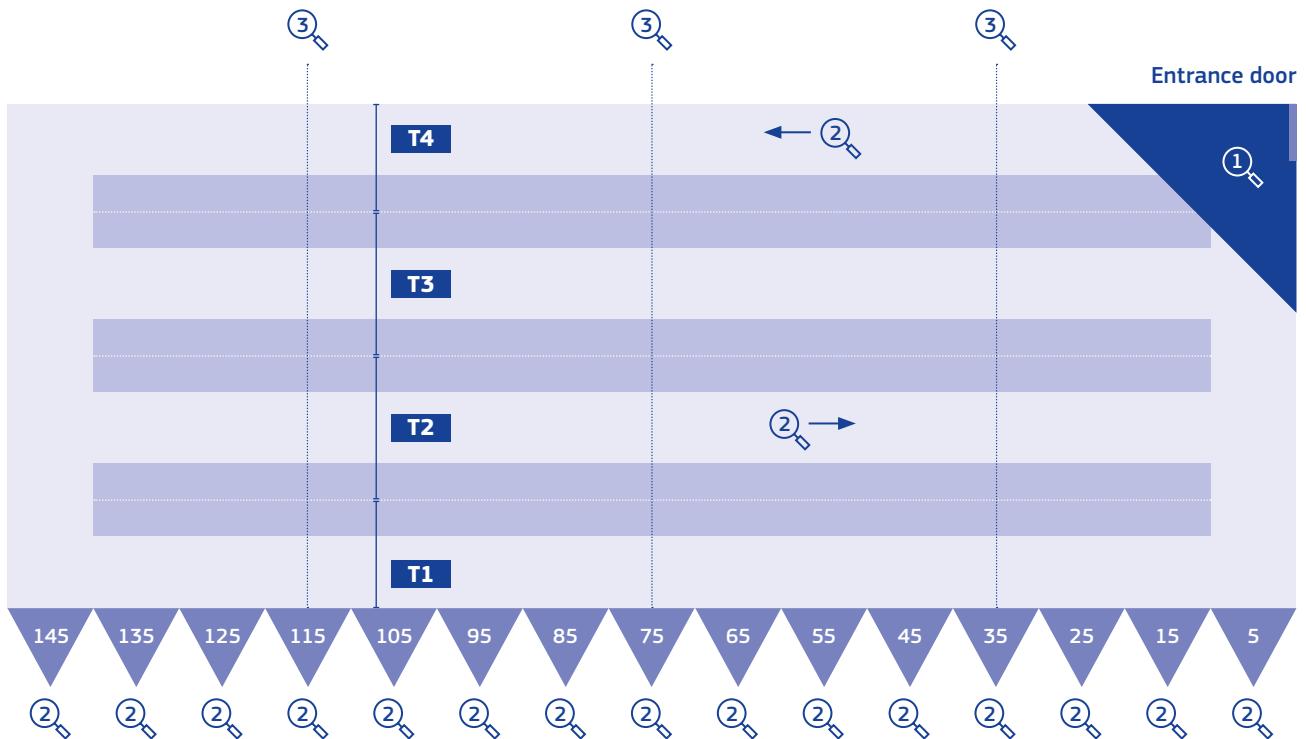


Figure 2. Transect definition in multitier systems (modified from Vasdal et al., 2022). Magnifying glasses and number inside respectively represent an assessment location and the Group of indicators that should be assessed in that location. Yellow triangles with inserted numbers on the bottom of the figure indicate the distance from the beginning of the transect on which the observer should stop, and the area that should be inspected during visual assessment of inaccessible tiers. For instance, the triangle with a 5 indicates that assessment should be made after walking 5 m from the beginning of the transect, and that assessed area should comprise that area between 0 and 10 m from the beginning of the transect.

The pair of evaluated transects should be intercalated between consecutive assessments.

1.2.2. Indicators evaluated when entering the house

Once the producer opens the house door, a visual assessment of Group 1 indicators (panic reaction, panting and huddling; Table 1) should be carried out from the distance, to avoid bird perturbation. The producer should observe the birds for 5 minutes to allow for a correct evaluation of these indicators.

1.2.3. Indicators evaluated during a transect walk

When walking along the selected transect, the producer should count the number of individuals showing any of the predefined welfare problems in Group 2 (Table 1). The producer should restrict the assessment to the birds

within the transect area, ignoring problems detected on adjacent transects. Stops should be made as necessary to allow assessment of birds on the floor underneath the aviary and on all tiers that are within visual reach for proper inspection. To assess visually inaccessible tiers, the producer should make an initial evaluation at, for instance, 5 meters away from the beginning of each transect and then every 10 meters until the end of the transect (Figure 2). On each of these locations birds should be assessed 5 meters behind and 5 meters ahead of the producer. To observe birds on the top tier, the producer should use steps or platforms on the side of the structure.

1.2.4. Indicators evaluated during a routine check walk

In order not to hinder the evaluation during the transects, Group 3 (Table 1) indicators should be assessed during

daily routine check walks performed on a different observation day (Table 1). The assessment should be performed at 3 different locations, avoiding the beginning and the end areas of the house. So, according to the length of the house, three equidistant locations should be selected (for example, at approximately at 25, 50 and 75 % of the length of the house; Figure 2).

Light intensity should be assessed on the selected points. To assess light intensity, the producer can use a free smartphone application. Data about bedding quality, red mites, and the number of feathers on the floor should be registered at these locations. For red mites, at the same three locations, the producer should check locations likely to host red mite nests.

1.2.5. Indicators evaluated in free range

Outdoor assessment should be done once the hen/pullet flux through the pop holes has stabilized after opening the pop holes, and after transect assessment in case they are performed on the same day. During the outdoor evaluation, corresponding to Group 4 indicators, the producer should first estimate the percentage of hens/pullets which are using the free range, based on a, for instance, 4-point scale (0-10 %, 10-25 %, 25-50 %, >50 %). Then the producer should walk through the free range and should estimate if the range vegetation cover is presenting signs of being homogeneously used (Yes or No). In addition, as the presence of birds in the free range will depend on climatic conditions, the weather observed during the evaluation day should be recorded using, for instance, next categories: sunny, cloudy, windy, snowy, rainy.

1.2.6. Production traits evaluated through written records and in the egg packing room

The evaluation of daily production traits (Group 5 of indicators; Table 1) is an essential decision-making tool for companies. The decrease of productive parameters is indicative of problems, which are altering the correct farm performance. Thus, the daily assessment of some productive traits can help to identify animal management problems and solve them. The recommended production traits to be collected should include on-farm mortality, on-farm culls, and egg production indicators (Table 1). For on-farm mortality and on-farm culls the producer should sum the total number of animals with both incidences until the day of the assessment.

1.3. Pullet rearing on floor, single-tier, and multitier systems

When pullet rearing is carried out on floor systems, the proposed methodology should be the same as previously described for single tier systems, with the only difference that the definition of transects should be done using the drinker and feeder lines (Figure 3).

For pullets reared in single tier systems, please refer to section 1.1. For pullets reared in multitier systems, please refer to section 1.2.

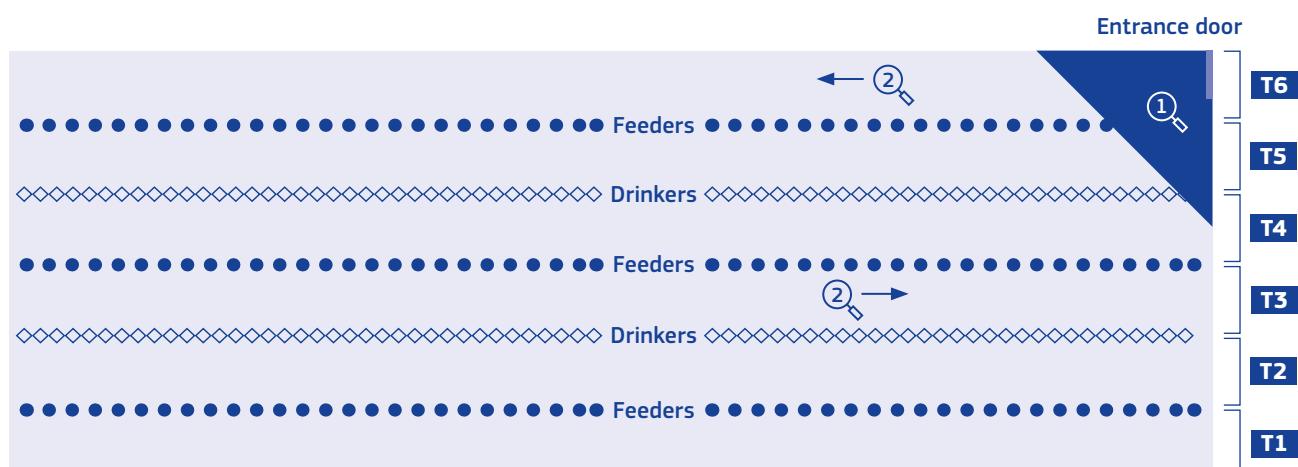


Figure 3. Transect definition on floor systems (Marchewka et al., 2013).

1.4. References

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<http://dx.doi.org/10.3382/ps.2012-02943>
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1.5. Annex

Annex 1 Example of template for data collection of the assessed animal welfare indicators

Evaluation data:	Evaluator:	House number:																																																																																																																																																																																																																															
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