Cleaning and disinfection of layer house systems for table egg production

by Karel Bossuyt and Lieven Dambre, CID LINES, Waterpoorstraat 2, 8900 Ieper, Belgium.

The poultry sector is a dynamic one and the egg producers, who are part of it, are no exception to the rule. The traditional cage ban that was imposed in the EU at the beginning of 2012 is a prime example of how the poultry production industry needs to be flexible and ready for changes in order to be sustainable today and in the future.

The main goal of the ban on traditional cages is to raise the hen welfare standards, but what about the hygiene standards in alternative layer housing systems?

The cages scored well on egg and hen hygiene and had relatively less dust flying around in them.

However, hens are occupying the layer house for up to 58 weeks and a high level of soiling (manure, feed, dust, scale, etc) can be expected.

Which layer housing systems will also score well in terms of hygiene and are they easy to clean? The possibility to thoroughly clean and disinfect the layer house only occurs every 12-13 months.

Farmers should take this opportunity to aim for a pathogen free (salmonella, etc) house during this all-out phase before introducing the new flock into the layer house.

Trial of different systems

A trial was conducted by Karel Bossuyt where five different layer housing systems were cleaned and disinfected. A comparison was made in labour, water consumption, product consumption and cleaning and the disinfection results between the different systems.

The same cleaning company cleaned and disinfected all houses. In this way the modus operandi in terms of people and the equipment they used could not negatively influence the cleaning and disinfecting (C&D) results.

The C&D results were analysed by swabbing (RODAC plates). After incubation the remaining colony forming units were counted in order to analyse the hygiene

A simple foaming cup lance is used to apply the disinfectant.

result. Some 25 plates were taken per layer house and this took place twice – once after cleaning and once after disinfection.

These plates consisted of: 3 on the drinking system (pipe and drink cup), 1 on the egg belt, 1 on the hopper, 1 in the egg storage room (floor), 1 on the air inlet (grid), 3 in the laying nest grid, 3 on the laying nest side panels, 2 on the ceiling, 4 on the floor, 3 on the feeding system, 2 on the wall and 1 in the packing area.

The number of colony forming units (cfus) per plate were categorised by range and were given a score:

- 0 cfus per plate = 0
- 1-40 cfus per plate = 1
- 41-120 cfus per plate = 2
- 121-400 cfus per plate = 3
- More than 400 cfus per plate = 4
- Too numerous to count = 5

The swabbing, the incubation, reporting and interpretation of the scores were executed by an official and independent laboratory. In this case it was done by DGZ (Animal Health Care, Flanders, Belgium).

There are three possible interpretations:

- Score: ≤1.5: The C&D procedure has been done properly and is approved.
- Score: >1.5 and ≤3: The C&D procedure has to be done again before a new flock can be introduced to the layer house.
- Score: >3.0: The C&D procedure has to be done again and this time by a professional cleaning company, before a new flock can be introduced to the layer house.

Dare to compare

The five systems that were compared were:

- An enriched cage system with a central egg collection belt (A).
- A traditional cage system (B).
- An organic free range system (C).
- An enriched cage system with colony housing (D).
- An alternative housing system with winter garden (E).

It is clear that each system has its own specific design and therefore the critical points for each housing system will differ.

These critical points will influence the cleaning results in terms of labour costs. The time and personnel spent on dry and wet cleaning was taken into account. Some systems were more easy to clean than others. Of course when something is difficult to clean the risk of it not being cleaned properly is bigger.

This will reflect in the disinfection results. In addition, excessive organic soiling will influence the disinfection negatively. This cause and effect mechanism creates a vicious circle where some spots can really become infection sources that recontaminate each new flock over and over again.

The detergent used for cleaning was Kenosan at 1.5%, except for the traditional cage system. Here only water was used for cleaning. The detergent was applied by foaming.

For disinfection two products were used – Virocid or CID20. Both products are well tested and have a strong bactericidal, virucidal and fungicidal action. The difference was in the application of the disinfectant. Some fogged the disinfectant (at 20-25%) and others foamed it (wet disinfection at 1%). In Table 1 the different methods are specified.

In the enriched cage system (A) the laying mats had to be pulled out of the nests and

Continued on page 9

Company	Capacity	Dry Cleaning		Wet Cleaning		Product consumption	Average cleaning score	Disinfection method	Product consumption	Disinfection	
		hours	people	hours	people					hours	people
A – Enriched cage + egg belt	60,000 hens 1920m²	36	5	278	5	60 litres	3.9	Thermo fogging	30 litres	na	na
B – Traditional cage system	13,500 x 800³	20	2	60	5	water	4.6	Sprayer nozzles		na	na
C – Organic free range	7,200 hens 1,200m²	10	2	100	3	40 litres	3.8	Thermo fogging	10 litres	na	na
D – Enriched colony two floors	24,000 hens 780m²	25	3	120	3	20 litres	3.1	Foaming	40 litres	30	2
E – Alternative + winter garden	30,000 hens 3,500m²	70	2	130	3	60 litres	2.7	Foaming Thermo fogging	40 litres 20 litres	3.5 na	2 na

Table 1. The different methods of application.

Continued from page 7
cleaned outside the layer house. As this is a two floor system the dust and manure that comes from the second floor needs to be evacuated to the first floor.

A lot of dirt gets stuck between floors. These are the main two reasons why this system is more labour intensive in terms of cleaning.

The traditional cage system (B) was cleaned only with water which resulted in a poor average cleaning score of 4.6. In the organic system (C) grids, drinkers and feeders were dismantled and cleaned outside the house.

This explains the high amount of hours and people needed to clean a relatively small surface.

The colony housing system (D) proved to be fairly easy to clean. It scored on average 3.1. The critical points were the laying nests. The manure pit system (E) had no automatic manure belt but the drinking and feeders could be winched up which made the evacuating of manure easier.

However, all the floor grids needed to be dismantled and cleaned outside the layer house.

The laying mats were also evacuated and cleaned in an automatic system outside. The cleaning score was 2.7, so a dry cleaning phase, which is very labour intensive, resulted in a very good cleaning score if done properly.

Labour costs and product consumption is one thing but, needless to say, it is the score at the end of disinfection that needs to be equal or below 1.5 (the DGZ norm) in order to consider the C&D protocol successful. Table 2 shows the disinfection scores for each swab point and the average disinfection score for each system.

Disinfection results

If we look at the disinfection results we see that in the traditional cage system and the organic free range system the disinfection was not successful enough with a score of 1.7 and 1.6 respectively.

In the traditional cage only water was used to clean. The organic load was too high when the disinfection phase started. The nests still scored very high. The automatic sprayer system did not reach the nests efficiently.

The organic system only fogged 10L of CID20. With such a high level of soiling, a wet disinfection is absolutely imperative. It will improve the contact of disinfectant with the surface dramatically. The grids were made of wood and therefore scored the worst at 3.5.

The enriched cage system with a central egg collection belt (A) just performed at the norm with 1.5. The floor and packing room scored above the norm.

The best scores were definitely achieved with the enriched cage colony system (D) and the manure pit system with winter garden (E) with 1.1 and 1.3 respectively.

The bad score on the drinking system (3.3) in the alternative layer house (E) was due to the fact that the swab was taken underneath the drinking cup.

The drinking lines were winched down at the moment the disinfection was done. This place was not reached by disinfectant. Without this error the score would be 0.7.

Both applied the disinfectant Virocid by foaming. A simple foaming cup lance was used. In the alternative housing system (E) a fogging phase was also done after the wet disinfection. The score afterwards dropped from 1.3 to 0.8.

The different layer housing systems can influence the dry and wet cleaning phase but when this is done properly the disinfection results should not be influenced by them.

Foaming the disinfectant when correctly applied (dosage) proved to be crucial for a clean and pathogen free layer house.

Fogging should be seen as an additional measurement for disinfection executed after the wet disinfection. ■

Table 2. The disinfection scores for the different layer housing systems (the DGZ average was 1.5).

	Drinking system	Egg store	Egg belt	Hopper	Air inlet	Bottom of cage	Side of cage	Laying nest	Ceiling	Corridor	Grid	Floor	Feeding hopper	Feeding system	Packing room	Side panels
A – Enriched cage system (average score = 1.48)																
Score	2.0	2.0	na	0.0	0.0	na	na	1.3	0.5	na	1.0	2.7	na	0.7	3.0	1.5
B – Traditional cage system (average score = 1.7)																
Score	2.0	2.0	na	2.0	1.0	na	na	2.7	1.0	na	1.5	1.0	na	1.3	1.0	2.0
C – Organic free range system (average score = 1.6)																
Score	1.0	4.0	na	1.0	0.0	na	na	0.7	0.0	na	3.5	2.7	na	1.3	3.0	1.0
D – Enriched cage system with colony housing (average score = 1.1)																
Score	2.0	na	1.5	na	0.0	0.3	1.0	na	1.0	1.0	na	na	1.0	1.0	3.0	na
E – Alternative housing system (average score = 1.3)																
Score	3.3	1.0	na	0.0	0.0	na	na	0.5	1.0	na	0.7	1.0	na	1.0	na	na