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Current stage of development in furnished cages for laying hens

News of food and incorrect methods of keeping farm livestock are headline grabbers in the media. Scandals and the resulting insecurity of consumers have made poultry keeping the centre of conversation for many years now.

Critics of conventional battery cage systems concentrate especially on the fact that there is no possibility for the hens so housed to follow a variety of natural behavioural patterns. This is why a further improvement in the welfare of laying hens is encouraged through furnishing of cages and at the same time enlarging the available space per bird.

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The judgement of the federal constitutional court (BVerG) in Germany of July 6, 1999 declared the Poultry Production Act of December 10, 1987 (HhVO) as null and void. Almost simultaneous to the BVerG judgement, the new EU Directive 1999/74/EG for the determination of minimum requirements for the protection of laying hens was passed (July 19, 1999). This established that, EU-wide, from January 1, 2002 for new battery systems and from January 1, 2012 for existing ones, only cages with perches, nest boxes and sandbaths (furnished cages) will be permitted.

Avoiding behavioural deficits in layer cages

The advantages of alternative production (non-cage) systems compared with cages include:

- ousal traits (more variety of behavioural traits, increased complexity of environmental incentives)
- the high ethical evaluation of the non-cage systems by the consumer.

The consequent furnishing of cages – through simultaneous improvement of the movement freedom – enriches the behavioural repertoire of the birds. There are very many possibilities here. Large limiting factors however are costs and labour requirements.

Current technical solutions

The *table 1*, a few furnished cage models are presented and these are being tested at the moment.

Most models are designed for from eight to 20 birds. Being also tested are large-room cages with over 40 birds per cage. Current efforts in Germany cover the following points:

- evidence of practical applicability
- guarantee of higher egg quality and bird health (no cannibalism or feather picking)
- further optimising of cage form and structure including number of birds/cage as well as space available, and
- further optimising of interior fittings (design, positioning, material used)
- sinking of investment costs

The most difficult problem currently is the question of the optimum positioning of the sandbaths. The trials running at the moment are concentrating on:

- the size of sandbath/shape/positioning in the cage
- entry design for the hen during the day/discouraging of laying in the sandbath
- most suitable litter
- filling and cleaning of sandbath

Being tested as litter is sawdust, sand, straw pellets or rough maize chaff (*table 1*).

Sawdust has transport and hygiene problems (moisture, timber preserving treatments). For sand there is at the moment no cost-effective in-house transport system available. Straw pellets and maize chaff involve higher costs.

Because the hens eat material they find in the sandbath, bird hygiene aspects as well as possible residue problems in the eggs have to be considered. Also to be avoided is dunging in the sandbath/dustbath or the laying of eggs there.

An interesting solution recommendation for the cleaning of the sandbath if offered by the company „Salmet“ with a nest design so that it can be folded-up with a tipping-out system for the contents of the dustbath which is situated on top of the nestbox. A floor plate which can be folded-up is offered as a closable sandbath by Ten Elsen.

In the meantime all companies involved offer automatic littering/filling of the sandbath. Still not resolved at the moment is the necessary depth of the sandbath and, with that, the required amount of litter – which also is in direct proportion to the amount of dust engendered within the house.

It already appears that a higher proportion of cracked and dirty eggs are caused by the additional presence of sandbath, perch and nest, meaning that production costs not only rise through the higher investment requirements, but also through the reduced proportion of marketable eggs [7].

Finally, there is also the question of consumer acceptance of the new cage models. It has to be accepted that the hens are still in cages, a production system which will continue to be rejected by at least a proportion of consumers.

Company (location, country)	Description	Cage length (mm)	Cage depth (mm)	Cage floor area/ bird (cm ²)	Birds cage (number)	Sandbath filling (litter material) ¹⁾	Arrangement of sandbath/ nest	Nest area bird (cm ²)	Egg collection
Hellmann Poultry (Vechta, D)	Euro 500 (Sweden-model)	1205	500	753	8	Manuel/Automatic (wood, chipped)	Nest to the side Sandbath over nest	150	Exterior
	Euromodel Typ 640	1205	640	771	10	Automatic (wood, chipped)	Nest behind, sandbath over nest	153	Exterior
Big Dutchman Int. (Vechta, D)	Aviplus	1206	630	759	10	Automatic (sawdust)	Nest behind, separate sandbath over nest	151	behind (in battery middle) außen
	Eurovent EU 550-EU	1206	550	829	8	Automatic (sawdust)	Nest to side, sandbath over nest	165	
	Eurovent EU 625-EU	2412	625	753	20	Automatic (sawdust)	Nest behind, sandbath over nest	113	Exterior
Salmat Int.	Salmat AGK 2000/615	2000	615	768	16	Automatic (straw pellets)	Nest behind, sandbath over nest (nest able to be folded up with emptying system for litter)	83	Exterior
	Meller-Batterien -Joh. Kreyer, Apparatebau- (Melle, D)	Type 604 Euro 2000	2400	625	750	20	Automatic (various)	Nest behind, sandbath to the side and before	112
Ten Elsen GmbH (Sonsbeck, D)	System „Specht“ ²⁾	2400	1100	750	35	Automatic (wood shavings)	Nest to the side, sandbath adjacent (as folding up floor)	94	Exterior
Jansen Poultry Equipment (Barneveld, NL)	Laying-communal-system	2975	1500	797	50	Automatic (wood shavings)	Nest behind with ejection equipment, separate sandbath, artificial lawn at rear end of the cage	109	behind (near to egg collection-belt)

Table 1: Furnished cage models and their measures of some manufacturers (firm details)

¹⁾ Company information; ²⁾ Developed as parent at battery in Spelderholt (NL)

Results so far with furnished cages

According to own-experience the hens accept very well the following comforts:

- perches for resting
- nest/sheltered area for laying
- dustbath
- scratching.

Additional enrichment elements (perches) can, however, also have the effect of increasing the proportion of observed breastbone lesions, and the presence of perches can also encourage foot picking and cloacal cannibalism [9].

To be considered is also the recommendation from [8] of fitting moveable perches because these are mainly used at night.

The encouragement of more consequent furnishing of nest boxes within the cages stems from the characteristic pre-laying behaviour of the hen, i.e., an observed restlessness, e.g., in the form of stereotyped walking movements as well as mutual interference before the lay. Results so far indicate that nests in furnished cages are well received when they are opened early enough before the light period, and where sandbaths are kept closed during the mornings [3, 13, 7].

The availability of a sandbath is desirable from behavioural-biological points of view. It appears that an important point is sufficient space per bird in the bath in that activities there are preferably carried out in groups.

Own-observations indicate that the hens often (incompletely!) perform dustbath movements on the grating in front of the feed trough. Apparently the feed is an incentive that engenders the wish for sand bathing [5].

The EU Directive 1999/74/EG requires that cage area must be at least 750 cm² per hen, 600 cm² of which must be usable cage area with a minimum height of 45 cm. The enlarged cage area associated with the substantial increase in size of group per cage (≥ 8 hens/cage) increases the possible movement freedom of the birds. This increase in freedom of movement leads, according to [5] only, however, to a limited further increase of locomotoric activities (in contrast to various types of comfort behaviour (wing and leg stretching, body shaking, preening). This has been confirmed through investigations into resistance to breakages in various bones.

Current practical trials in Germany

The new cage models deviate in part substantially from earlier cage concepts. Because of the requirement for more development work – especially in Germany – practical trials for newly developed furnished cages are being carried out on the initiative of various associations and the BMVEL on seven practical farms (since the middle of last year). Precision trials of furnished cages have been additionally organised in various research facilities (Ruthe, Haus Düsse).

Because a trial programme lasts around a year and hardly any large changes in a production system are possible during a laying year, the first reports will probably be ready in the middle of this year.

Conclusive evaluations of a production system depend on results from several production cycles.

Conclusions

Furnished cages allow the expectation of substantial improvements in the movement freedom of birds. Compared with birds housed in conventional cages, the preening, laying or comfort behavioural requirements of birds are better met by furnished cages.

First furnished cages are now at the stage of „practical farm tests/market introduction“. However there currently are still not enough repeated results from recognised trials for conclusive evaluations.

Table 2: Proportion (%) of eggs laid in nest boxes and proportion (%) of cracked and dirty eggs in furnished cages

Parameter	%-share
Eggs laid in nest (%)	91-96 % ¹⁾
Cracked egg proportion	0,7-1,3 %
Dirty eggs proportion	0,9-2,7 %

Source: [3]; EMC=Edinburgh Modified Cage; 1) Nest opening 3 h before beginning of light programme