Compassion in World Farming Trust

# LAID BARE....

## THE CASE AGAINST ENRICHED CAGES IN EUROPE

A report for

**Compassion in World Farming Trust**

2002

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Advancing farm animal welfare

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## THE CASE AGAINST ENRICHED CAGES IN EUROPE

**2002**

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**The inhumane conventional battery cage (right) which is banned from 2012 and (left) the 'enriched' cage which offers no worthwhile welfare benefits as compared with the conventional cage.**

# EXECUTIVE SUMMARY

EU Agriculture Ministers recently ushered in a new era for Europe's egg industry. This came with the agreement to phase out conventional battery cages under the new Laying Hens Directive (1999/74/EC). The Directive represents a monumental victory for animal welfare. In common with much legislation, however, it is not perfect. The Directive needs to be strengthened to protect fully the welfare of laying hens. Perhaps the most pressing concern is the fact that the Directive allows the use of modified, or so-called enriched cages.

Under the terms of the Directive, barren battery cages will be banned in the European Union (EU) from 2012. The only cage permitted from this time will be the enriched cage. "Enriched" cages must provide at least 750 $cm^2$ per hen, of which 600 $cm^2$ is "usable area", the rest being shared space for items such as a nest box, etc. Enriched cages must be 45 cm high over most of the cage. This compares with 450 $cm^2$ of cage space per hen in battery cages and a height of 40 cm. Enriched cages must also have a nest, "litter such that pecking and scratching are possible", 15 cm of perch space per hen, and a claw-shortening device.

This paper examines the scientific and practical evidence relevant to "enriched" cages and the welfare of hens.

## Space Needs

The provision of adequate space for hens is one of the most important determining factors for good welfare. Hens need to perform natural behaviours such as foraging, exercising, preening, dust-bathing and nest-building (Broom, 1992). Without sufficient space, these behaviours are restricted or inhibited leading to poor welfare.

Scientific study shows that the average space used by hens to perform basic behaviours is between 475 $cm^2$ and 1,876 $cm^2$, although the top end of the range is up to 2,606 $cm^2$. Almost all normal behaviours require significantly more usable space per bird than the 600 $cm^2$ per bird provided in EU "enriched" cages.

"Enriched" cages prevent hens from carrying out meaningful exercise to such an extent that bone weakness results – a clear indicator of poor welfare.

Feather cover, a valid indicator of welfare, is generally worse in cages than in other systems. Plumage condition improves when caged hens are given substantially higher space allowances than those found in conventional battery cages. Further improvement is likely through abandoning cages altogether.

## Cage Height

Cage height is important to hens. Scientific study shows they strongly prefer cages that are higher than those currently in use in the EU. Adequate cage height is necessary to prevent frustration of natural behaviours leading to poor welfare.

Current cage heights in Europe restrict 25-30% of the hens' natural head movements. Hens will use up to 56 cm of cage height if given the opportunity. Preference tests have shown hens to have a strong preference for higher cages, and that they will shun cages lower than 46 cm at the front and 37 cm at the rear. Increasing cage height has been found to increase the rate at which hens perform certain behaviours such as head stretching and body shaking, leading to stronger wing bones. It also reduces the rate of abnormal and repeated cage pecking, a sign of poor welfare.

From 2012, all EU cages will have to provide at least

45 cm of headroom for hens. Research shows that the newly raised minimum headroom of 45 cm under the 1999 Laying Hens Directive will still be too low to satisfy the needs of the hen.

To truly protect the welfare of laying hens, minimum headroom in any system should be set at a minimum of 46 cm above the perching surface. "Enriched" cages must provide perches, and are normally set at least 7 cm above floor level. Measuring headroom from the perch therefore (46cm + 7 cm), would mean that the minimum cage height headroom from the floor should be set at no less than 53 cm high. Bearing in mind that hens will use up to 56 cm of cage height if given the opportunity, and that perches may be set at 7 cm above floor level, the minimum headroom from the floor to protect bird welfare should be set at 63 cm.

## Nest boxes

Hens have a strong preference for laying their eggs in a nest and are highly motivated to perform nesting behaviour. Standard battery cages deprive hens of a nest, causing great suffering. If hens are deprived of a suitable nest site they will display abnormal behaviours, which indicate frustration, such as increased pacing and restlessness or abnormal behaviour in the form of vacuum nesting.

Under the EU Directive, "enriched" cages must provide hens with a nest. This is defined as "a separate space for egg laying". The exact level to which a nest box placed within the restricted confines of an 'enriched' cage fulfils the hens' behavioural needs is questionable. Competition for nesting facilities within the confined cage environment is likely to alter or curtail the hens' natural laying behaviour.

Up to 35% of eggs from "enriched" cages in Swedish trials have been laid outside the nest box, with UK trials currently reporting 10-15%. Given the close proximity of the birds to the nest, these proportions suggest that nest boxes in "enriched" cages are not fully satisfying the welfare needs of the birds.

## Dust Bathing

Hens are highly motivated to perform dustbathing behaviour and have a strong preference to carry it out on a littered floor area.

Most modified cage designs have a loose litter area – or 'dustbath' - sited on top of the nest area, which is positioned width-ways at one end of the cage. Access can be controlled to prevent hens from entering at certain times of the day and laying eggs in the litter. Scientific research has found that only 26.7% of dustbathing bouts occur in the dustbath when access is unrestricted. This falls to 8.3% where access is restricted. Most 'dustbathing' occurs as abnormal vacuum dustbathing on the wire floor – activity that fails to satisfy the birds' behavioural needs.

The 1999 Laying Hens Directive stipulates that "enriched" cages must have "litter such that pecking and scratching are possible". The Directive defines "litter" as "any friable material enabling the hens to satisfy their ethological [behavioural] needs". There is strong evidence to show that litter areas provided in modified cages do not meet the behavioural needs of the hens, leading to deprivation and frustration.

Where hens do use dustbaths in modified cages, the behaviour tends to be abnormally short and incomplete, leading scientists to conclude that, "dust bathing in cages will never be optimal." Clearly, the minimalist approach to dustbathing facilities in modified cages fails to satisfy the ethological needs of the hen as required under the EU Laying Hens Directive.

## Perches

Hens are strongly motivated to seek a high perch on which to roost at night. Perches provided in "enriched" cages are unable to fulfil the hens' motivation for a raised perch for roosting, as they are generally sited 7-10 cm from floor level in cages with low ceilings. Scientific evidence suggests that low perches in cages are perceived as a different floor quality by the hens, but not as a perch. Perches

therefore provide a means to escape the discomfort of the sloping wire floor used in cage systems. They otherwise fail to fulfil the birds' behavioural needs.

## Claw-Shortening Device

Scratching and pecking are important behaviours to hens and represent distinct 'needs' separate from the ingestion of food. In standard battery cages, hens' claws can grow too long and are easily damaged by breaking. This problem is due to lack of wear, as the birds are completely unable to scratch at the ground or forage.

The impoverished environment of "enriched" cages cannot satisfy foraging behaviour, which would normally occupy almost half of the hens' daytime activity. Claw-shortening devices only tackle the symptoms – overgrown claws – rather than the cause of the welfare problem, which is the inability of caged hens to scratch and peck meaningfully.

## Economics: Enriched Cages versus Alternatives

It has been suggested that "enriched" cages have an economic advantage over alternative systems. The industry argument goes that the Laying Hens Directive sets a maximum stocking density for alternative systems that is too stringent, thereby tipping the economic balance in favour of cages. This is based on a **false** assumption that alternative systems are limited to an absolute maximum stocking density of 9 birds/m$^2$ of *floor space*. The new Directive does **not** place an overall maximum on house stocking. Instead, it stipulates a maximum number of hens per square metre of "usable area".

The new Directive states that the stocking density in alternative systems "must not exceed 9 hens per m$^2$ usable area". The Directive allows for "usable area" to include up to 4 different levels or tiers. If one level is the house floor, then up to 3 tiers or platforms can be used to give an overall *floor space* stocking density that could be considerably higher than 9 birds/m$^2$.

Latest egg industry figures suggest that capital costs for "enriched" cages are likely to be significantly higher than those for barn/perchery systems. They also suggest that the production cost of an "enriched" cage-produced egg is just 0.5 pence (sterling) less than that produced in a barn system stocked at 12 birds/m$^2$. This differential would be partly offset by the higher capital cost of the "enriched" cage system. If hens in alternatives were stocked at slightly higher densities, then this differential would be eroded further.

Hens in alternatives should not be overstocked. However, stocking densities of more than 9 birds per m$^2$ of *floor space* are achievable under the Directive. For example, an alternative system constructed with two tiers of raised platforms mounted above each other would only need to cover one sixth of the surface area of the hen house to achieve a maximum *floor space* stocking density of 12 birds/m$^2$. This is the stocking density currently used by much of the UK industry. Stocking to this level would help maintain the competitive position of higher-welfare alternatives over the "enriched" cage system. These alternatives would also have a marketing advantage in the EU over their cage-produced competitors as, from 2004, cage eggs – "enriched" or not - must be labelled by law as "eggs from caged hens".

## Overall Conclusion

**Barren battery cages have inherent severe disadvantages for the welfare of hens. "Enriched" cages fail to overcome these severe welfare problems. The space and facilities provided in "enriched" cages are so inadequate that this system deprives hens of the ability to meaningfully fulfil natural behaviours, leading to abnormal behaviours, frustration, suffering and body degeneration.**

**Scientific and practical evidence strongly supports the European Union decision to prohibit barren battery cages from 2012 on welfare grounds. CIWF Trust believes that the EU should strengthen the 1999 Laying Hens Directive by also prohibiting the use of "enriched" cages. Only non-cage alternatives offer the potential for high standards of welfare.**

# INTRODUCTION

EU Agriculture Ministers recently ushered in a new era for Europe's egg industry. This came with the agreement to phase out conventional battery cages under the new Laying Hens Directive (1999/74/EC). The Directive represents a monumental victory for animal welfare. Recent statements by the International Egg Commission indicate that this decision has sent a ripple around the world, with the global cage industry fearing a domino effect in other countries such as the USA, Canada and Australia.

Whilst the 1999 Directive marks the start of a welcome move away from battery cages, the legislation is far from perfect in welfare terms. Perhaps the most pressing concern is in permitting the use of modified, or so-called "enriched" cages.

Under the terms of the 1999 Laying Hens Directive, barren battery cages will be banned in the European Union (EU) from 2012. The only cage permitted after then will be the so-called "enriched" cage. "Enriched" cages must provide at least 750 $cm^2$ per hen, of which 600 $cm^2$ is "usable area", the rest being shared space for furnishings such as a nest box, etc. "Enriched" cages must be 45 cm high over most of the cage. This compares with 450 $cm^2$ of cage space per hen in battery cages and a height of 40 cm. "Enriched" cages must also have a nest, "litter such that pecking and scratching are possible", 15 cm of perch space per hen, and a claw-shortening device.

The following paper examines the scientific and practical evidence relevant to "enriched" cages and the welfare of hens. It outlines why modified cages offer no solution to the serious welfare problems affecting caged hens. It concludes that to prevent the suffering of laying hens, well-managed cage-free systems offer the only welfare-friendly way forward for the egg industry.

## Structure of the Egg Industry

There are an estimated 4.7 billion laying hens in the world. The 15 countries of the European Union (EU) house 271 million laying hens, second only to the 800 million birds in China. Other major egg producing regions include the USA (270 million birds), Japan (152 million), India (123 million) and Mexico (103 million) (IEC, 2001).

Worldwide, some 70-80% of laying hens are housed in battery cages. The proportion of caged hens in the EU is about 90%, and likely to change rapidly following the passage of the 1999 Laying Hens Directive.

In the UK, the proportion of its 30.8 million hens in cages continues to decrease. About 74% are currently caged, with the rest in alternative non-cage systems; 23% kept free range; and 5% in perchery/barn systems (BEIC, 2001). France has about 63 million laying hens (FAO, 2002). Of these, 90% are caged and about 10% are in free range or barn systems (IEC, 2000). The Republic of Ireland has over 1.8 million laying hens. About 75% are in cages, 23% free range and 1.6% produced in perchery/barn units (DAFRD, in preparation).

# THE WELFARE CASE AGAINST ENRICHED CAGES

Laying hens show a complex array of natural behaviours. These include walking, wing flapping, nesting, and dustbathing, perching, pecking and scratching. Scientific evidence shows that hens are strongly motivated to carry out these behaviours. In recent decades, scientists have carried out much work to ascertain when frustration of these behaviours becomes suffering. Behavioural deprivation becomes suffering when animals are prevented from carrying out strongly motivated behaviours to the extent where they "experience intense or prolonged unpleasant subjective feelings" (Dawkins, 1988).

Battery cages for laying hens provide a barren environment for hens, depriving them of the ability to carry out most normal behaviours. The European Commission's Scientific Veterinary Committee has concluded, "It is clear that because of its small size and barrenness, the battery cage as used at present has inherent severe disadvantages for the welfare of hens" (SVC, 1996). The EU decision to ban battery cages from 2012 is an enormous step forward for the welfare of laying hens.

Regrettably, the 1999 Laying Hens Directive allows the continued use of modified or "enriched" cages. These must provide more space per bird than current battery cages, as well as a nest, litter area, perch space and a claw-shortening device. However, the space and facilities provided in "enriched" cages are so inadequate that this system deprives hens of the ability to meaningfully fulfil natural behaviours, leading to abnormal behaviours, frustration, suffering and body degeneration.

It is hard to overstate the lack of sophistication when discussing the "enriched" cage system. Generally, designs comprise a metallic battery cage containing an enclosed box-like area (for a nest), a tray (for litter), one or more wooden strips (for perches) and a metallic sandpaper-like strip as a "claw-shortening device". The small space for the hens, and lack of a complex and interesting environment, are indicative of a system that cannot fulfil the birds' welfare needs. The following scientific review shows the degree to which modified or so-called "enriched" cages fail to protect the welfare of laying hens.

## Space Needs

The provision of adequate space for hens is one of the most important determining factors for good welfare. Hens need to perform natural behaviours such as foraging, exercising, preening, dust-bathing and nest-building (Broom, 1992). Without sufficient space, the expression of these behaviours is restricted or inhibited, leading to poor welfare. The UK Government advisory body, the Farm Animal Welfare Council (FAWC) stated, "it is of great importance that adequate space is provided and where uncertainty exists the hen should be given the benefit of the doubt" (FAWC, 1991).

There have been a number of scientific studies aimed at finding the amount of space used by hens to perform certain basic behaviours such as ground-scratching and wing-flapping. The table below shows the results of a study looking at the area used by hens housed singly in litter-floored pens. To put these space requirements into perspective, an ordinary A4 sheet of typing paper covers an area of 620 $cm^2$.

## AREA USED BY MEDIUM HYBRID HENS HOUSED SINGLY IN SMALL LITTER-FLOORED PENS

| | Area (sq cm) | |
|---|---|---|
| **Behaviour** | **Mean** | **Range** |
| **Standing** | 475 | 428-592 |
| **Ground scratching** | 856 | 655-1217 |
| **Turning** | 1272 | 978-1626 |
| **Wing stretching** | 893 | 660-1476 |
| **Wing flapping** | 1876 | 1085-2606 |
| **Feather ruffling** | 873 | 609-1362 |
| **Preening** | 1151 | 800-1977 |

Source: *Dawkins & Hardie, 1989*

From these results we can see that the average space used by hens to perform these basic behaviours is shown to be between 475 $cm^2$ and 1,876 $cm^2$, although the top end of the range was up to 2,606 $cm^2$. All but standing require more usable space per bird than is provided for in "enriched" cages under the 1999 Laying Hens Directive, let alone barren battery cages; 450 $cm^2$ per bird in battery cages (until 2003); then 550 $cm^2$ per caged bird (until 2012), and for modified or "enriched" cages, 600 $cm^2$ of "usable area" per bird.

The UK Ministry of Agriculture's own Code of Recommendations for the Welfare of Livestock, Domestic Fowls (1987) states that all farm animals must have "freedom of movement" and the "opportunity to exercise most normal patterns of behaviour". By comparing the space used for different behaviours with those permitted in EU cages, we can see that even "enriched" cages fail to provide birds with adequate space to carry out normal behaviours.

It is important to emphasize that the measurements given in the table above are measurements of the space used by hens, not necessarily the space needed by them. The amount needed will be significantly higher than the values in the table, as pointed out by Dawkins & Hardie (1989). This stands to reason. For example, a caged hen may physically occupy 1,876 $cm^2$ of space when wing flapping, but the bird may actually need more than this to avoid hitting the sides of her cage (Baxter, 1994).

A study by Bradshaw & Bubier (1991) looked at the preferences of hens for different sized enclosures and their propensity to carry out wing-flapping behaviour. It found that an enclosure of 6,420 $cm^2$, which is three times greater than the area used to wing-flap, inhibited this behaviour in hens. Instead, the birds preferred an enclosure giving 13,550 $cm^2$ of space for wing flapping. The researchers concluded, "hens have a perception of the space required to wing-flap that is larger than the length of the outstretched wings" (Bradshaw & Bubier, 1991).

The behaviours studied in the above table do not include those involving meaningful exercise such as walking, running, fluttering, flying and escape behaviour from dominant hens, for which even more space is needed.

**Conclusion: The provision of adequate space is a highly important factor for good welfare. The average space used by hens to perform basic behaviours is between 475 cm² and 1,876 cm², although the top end of the range is up to 2,606 cm². Almost all normal behaviours require significantly more usable space per bird than is provided in "enriched" cages under the 1999 Laying Hens Directive.**

## *Lack of Exercise and Brittle Bones in Caged Hens*

Hens need to have sufficient exercise for high welfare (Broom, 1992). Without adequate space, birds cannot exercise meaningfully by walking, running, wing flapping, fluttering and flying. Battery cages are rightly condemned for completely thwarting the hens' ability to exercise, leading to the development of bone weakness - an important indicator of poor health and welfare.

Lack of exercise is widely recognised as being the primary cause of bone weakness (Turner & Lymbery, 1999). When a comparison is made with non-cage alternatives, hens kept in floor-housed colonies with freedom to move showed 41% greater leg strength compared with battery hens (Appleby, 1991). Gregory and Wilkins (1989) have found that up to 30% of battery hens suffer broken bones when being removed from their cages at end-of-lay and during transportation to the slaughterhouse. About 35% of all mortalities amongst caged hens in a commercial-scale study were attributable to bone fragility, or what the researchers described as cage layer osteoporosis (CLO), (McCoy et al, 1996).

Several studies have looked at the effect of perches on the bone strength of hens in cages. Work by Hughes *et al* (1989 & 1990) originally reported an increase in bone strength of up to 19% where perches were provided 7.5 cm off the floor. However, they subsequently doubted the meaning of these results; later experiments showed that although there was a positive correlation between the amount of time spent perching and the structural bone volume of the hens' legs, all the hens were considered osteoporotic (Wilson *et al*., 1993; Hughes & Wilson, 1993).

These studies conclude, "substantial bone loss occurs even in those birds provided with perches. It is unknown whether the relatively minor beneficial effects of perch provision are sufficient to lead to a subsequent reduction in fracture incidence" (Wilson *et al*, 1993). Clearly, hens need more than simply a perch to fulfil their welfare needs.

"Enriched" cages provide a restricted environment in which hens "do not have freedom to carry out large-scale locomotion. This affects bone strength" (Appleby, 1994). In short, "enriched" cages do not address the serious welfare problem of bone weakness.

*Enriched cages prevent hens from carrying out meaningful exercise to such an extent that bone weakness results – a clear indicator of poor welfare.*

## Feather Loss in Cages

Feather cover is generally worse in cages than in other systems. A substantial proportion of feather loss in caged hens is due to feather pecking, which is painful to hens. In addition, exposed skin is more prone to injury and abrasion that may lead to cannibalism (Freire *et al*., 1999). Feather loss can therefore be seen as a valid indicator of welfare.

The rate and degree of feather loss is significantly affected by the amount of floor space given to the hens. Caged birds retain better plumage condition

when given space allowances substantially higher than those used in EU battery cages. Plumage condition has been shown to improve where space allowance is increased from 575 to 766 $cm^2$ per bird, and from 460 to 920 $cm^2$ per bird. The two treatments also compared different colony sizes (3-6 birds per cage). It was concluded that space allowance significantly affected feather loss, but that colony size did not (Walker & Tucker, undated).

Battery cages must provide hens with a minimum floor space of 450 $cm^2$ per bird until 2003, when 550 $cm^2$ becomes the permitted EU minimum. From 2012, only "enriched" cages will be allowed which give each hen 750 $cm^2$. The evidence presented here supports the EU move to greater space allowances for laying hens by phasing out barren battery cages. However, it shows that feather loss would be improved further by abandoning cages altogether.

*Feather cover, a valid indicator of welfare, is generally worse in cages than in other systems. Plumage condition improves when caged hens are given substantially higher space allowances than those found in conventional battery cages. Further improvement is likely through abandoning cages altogether.*

**Conclusion: Hens in "enriched" cages are not provided with sufficient space allowances to carry out basic natural behaviours, let alone meaningful exercise. This leads to behavioural frustration, bone weakness and osteoporosis – clear indicators of poor welfare. Feather loss is also worse in cages than in alternative systems.**

## Cage Height

Cage height is important to hens. They strongly prefer cages that are higher than those currently in use in the EU (Dawkins, 1985).

EU battery cages must have a minimum cage height of 40 cm over at least 65% of the cage area and not less than 35 cm at any point. This takes into account the fact that cages have sloping floors to allow eggs to roll away. These cage heights will continue to be legal under the Laying Hens Directive until 2012. These cage heights are so low that they thwart a significant proportion of the birds' natural head movements. Scientific study of the way in which hens use vertical space in cages has shown that about 25% of all head movements take place above 40 cm high. This proportion increased to 30% of head movements at 38 cm high (Dawkins, 1985), which is the average minimum cage height used by the industry at present (Walker, pers com.). Hens will use up to 56 cm of cage height if given the opportunity.

*This research shows that current cage heights in Europe restrict 25-30% of the hens' natural head movements.*

Preference tests to measure scientifically the hens' responses to cage heights, have shown that caged hens have a strong preference for higher cages, and that "any cage lower than 46 cm at the front and 37 cm at the rear was shunned" (Dawkins, 1985). From 2012, all EU cages will have to provide at least 45 cm of headroom for hens.

*This research shows that the newly raised minimum headroom of 45 cm under the 1999 Laying Hens Directive will still be too low to satisfy the needs of the hen.*

Denying the hens' strong preference for higher cages and thwarting a significant proportion of their natural head movements will also have an adverse effect on their welfare. Increasing the cage height has been found to increase the rate at which hens perform certain 'comfort' behaviours such as head stretching, head scratching and body shaking. It also increases the time that hens spend sitting. Increasing cage height also reduces the rate of cage pecking, a pointless, stereotypic behaviour indicative of poor welfare. This was found using experimental cage heights of 30 cm, 42.5 cm and 55 cm (Nichol, 1987).

Lack of exercise and behavioural expression has been shown to lead to bone weakness and osteoporosis in hens. Restricting comfort behaviours leads to a build-up of unfulfilled motivation in the hens causing frustration. Both of these are clear signs of poor welfare. When hens are moved from small to large cages, the birds show marked increases in comfort behaviours (Nichol, 1986). Higher cages lead to stronger humerus (wing) bones as a result of more frequent comfort behaviours (Moinard *et al*., 1998). Similarly, in cages with low cage height, the increased cage pecking can be seen as "a sign of frustration" (Nichol, 1987).

*Research therefore shows that adequate cage height is necessary to prevent frustration of natural behaviours leading to poor welfare.*

EU legislation currently permits the use of modified or "enriched" cages that provide minimum headroom of 45 cm. These cages will also be equipped with furnishings such as perches. Minimum cage height will be measured from the floor of the cage to the ceiling. In order to protect welfare, this minimum cage height should more properly be measured from the upper surface of the perch to the ceiling. Perches in cages are normally set at least 7 cm above floor level to allow eggs to roll underneath them (ADAS, pers comm.). As we have already seen, scientific evidence suggests that a 45 cm cage height is too low to protect the birds' welfare. This problem will be exacerbated by hens spending a large proportion of their time on perches set 7 cm off the cage floor. Hens perching normally in a 45 cm high cage can be seen with their combs bent over and touching the ceiling (personal observation, 2001).

*To truly protect the welfare of laying hens, headroom in any system should be set at a minimum of 46 cm above the perching surface. If a perch is set 7 cm above floor level, then the minimum headroom from the floor should be set at no less than 53 cm high. Bearing in mind that hens will use up to 56 cm of cage height if given the opportunity, and that perches may be set at 7 cm above floor level, the minimum headroom from the floor to ensure welfare should be set at 63 cm.*

**Conclusion: Adequate cage height is necessary to prevent frustration of natural behaviours leading to poor welfare. Current cage heights in Europe restrict 25-30% of the hens' natural head movements. The newly raised minimum headroom of 45 cm under the 1999 Laying Hens Directive will still be too low to satisfy the welfare needs of the hen. The minimum headroom from the floor should be set at no less than 53 cm, and preferably, 63 cm high.**

## Nest Boxes

Hens have a strong preference for laying their eggs in a nest and are highly motivated to perform nesting behaviour (SVC, 1996).

Standard battery cages deprive hens of a nest, causing great suffering. If hens are deprived of a suitable nest site they will display abnormal behaviours, which indicate frustration, such as increased pacing and restlessness or abnormal behaviour in the form of vacuum nesting (Mills & Wood-Gush, 1985).

Appleby *et al* (1992) state, "It is widely accepted that frustration of nesting is the most severe behavioural problem of hens in battery cages". Broom (1992) comments "The evidence that welfare is poor at this time [before egg laying] if no nest site is available is clear".

The EU decision to prohibit barren battery cages from 2012 is highly welcome on welfare grounds. "Enriched" cages under the 1999 Laying Hens Directive must provide hens with a nest. This is defined as "a separate space for egg laying, the floor components of which may not include wire mesh that can come into contact with the birds, for an individual hen or for a group of hens".

All methods for keeping hens should provide suitable nests for egg-laying hens. The level to which a nest box placed within the restricted confines of an "enriched" cage satisfactorily fulfils the hens' behavioural needs is questionable. Natural behaviour in hens is to move away from the rest of the flock to find a secluded place to nest. However, in intensive or semi-intensive systems, birds often approach flock mates rather than avoid them. A number of theories have been advanced for this, including that hens kept under restricted conditions may well have difficulty finding shelter and suitable nesting places. They therefore try to hide and nest behind each other (Lundberg & Keeling, 1999).

"Enriched" cage designs tend to include one nest box in each cage. Hens are most likely to lay their egg around the start of the daylight period. As most hens are likely to want to use the nest box around daybreak, increased competition is inevitable. Competition for the nest site is likely to increase aggression during the pre-laying period. Under natural conditions, the hen stays at the nest site for about 1-2 hours during egg laying (Lundberg & Keeling, 1999). Disturbances and interactions within the impoverished confines of the "enriched" cage are likely to reduce this time considerably. So the natural nesting behaviour of hens could well be cut short or altered by competition from other cage mates.

Experimental designs of enriched cage were evaluated at three research establishments in the UK during the 1990's; Bristol and Edinburgh Universities, and ADAS Gleadthorpe Experimental Research Centre. The proportion of eggs laid in the nest box of enriched cages ranged from 31% to 71% (Alvey *et al*, 1995). ADAS Gleadthorpe now reports the level of eggs laid in the nest box of "enriched" cages as 85-90% (Walker, pers comm.).

In Sweden, commercial trials involving 8 flocks of hens in "enriched" cages found that on average, 9% of eggs were laid on the cage floor rather than in the nest. Three of the flocks recorded 15%, 21% and 35% floor-laid eggs consecutively (Oden, 2000).

**Conclusion: Hens have a strong preference for laying their eggs in a nest and are highly motivated to perform nesting behaviour. The exact level to which a nest box placed within the restricted confines of an "enriched" cage satisfactorily fulfils the hens' behavioural needs is questionable. Competition for nesting facilities, within a confined environment offering few other opportunities, is likely to alter or**

**curtail the hens' natural laying behaviour. Up to 35% of eggs from "enriched" cages in Swedish trials have been laid outside the nest box, with UK trials currently reporting 10-15%. Given the close proximity of the birds to the nest, these proportions suggest that nest boxes in "enriched" cages are not fully satisfying the welfare needs of the birds.**

## Dust Bathing

Hens are highly motivated to perform dustbathing behaviour (Lindberg & Nichol, 1997), and have a strong preference for a littered floor on which to carry out the behaviour (SVC, 1996).

Most modified cage designs have a loose litter area – or 'dustbath' - sited on top of the nest area, which is positioned width-ways at one end of the cage. Access can be controlled to prevent hens from entering at certain times of the day and laying eggs in the litter. Scientific research has found that only 26.7% of dustbathing bouts occur in the dustbath when access is unrestricted. This falls to 8.3% where access to the dustbath is restricted (Lindberg & Nichol, 1997). Most 'dustbathing' occurs as abnormal sham or vacuum dustbathing on the wire floor – activity that fails to satisfy the birds' behavioural needs (Nichol, pers comm.).

## *Vacuum Dustbathing*

Birds dustbathe to keep their plumage in good condition by removing old feather fat and parasites. However, the birds' need to perform dustbathing goes beyond the physical purpose of feather care. Hens that are genetically modified to be featherless, for example, will still dustbathe (Lindberg & Nichol, 1997).

Under normal circumstances, hens will dustbathe once every 2 days for about 20-30 minutes. This involves ruffling litter material into their feathers, letting it settle for a while, then shaking it out. Having performed the behaviour fully, their motivation to dustbathe is reduced to zero. Over the ensuing 2 days, the bird would normally work up a 'thirst' to perform the behaviour again.

In cages without dustbathing facilities, hens will go for a relatively long period without showing any dustbathing behaviour. During this time, the hen will build up a strong motivation, or 'thirst' to dustbathe. After a while, hens will make pointless, stereotypic attempts to dustbathe on the wire floor of their cage, a behaviour known as sham or vacuum dustbathing. The hens then make frequent and incomplete bouts of vacuum dustbathing. The fact that vacuum dustbathing is performed frequently suggests that the hens' motivation is not reduced substantially by this behaviour and therefore remains high. The hens' 'thirst' for the behaviour remains unsatisfied (Nichol, pers comm.).

To help illustrate this point, Nichol (pers comm.) likened this situation to someone in a desert having only stagnant water available to drink. That person is likely to shun the stagnant water for as long as possible in the hope that fresh water might appear. However, as thirst builds up, the person is likely to

**Free range hens seen dustbathing. However in "enriched" cages dustbathing is often abnormally short and incomplete and fails to satisfy the hens' strong behavioural need to dustbathe.**

drink some stagnant water out of desperation, little and often, again in the hope that fresh water might become available. If, after a prolonged period, water did become available, the person is likely to show compensatory behaviour by drinking more than their thirst would dictate.

Similarly, hens deprived of the ability to dustbathe properly will show compensatory behaviour if given access to adequate litter. This 'catch up' behaviour leads researchers to the conclusion that fully satisfying dustbathing behaviour is an important need for hens (SVC, 1996; van Niekerk & Reuvekamp, 2000).

*The occurrence of repetitive, stereotypic behaviour in the form of vacuum dustbathing shows that the hens' important ethological 'need' to dustbathe is being frustrated due to the lack of a suitable dustbathing facility.*

## Damage due to Trampling

One consequence of birds showing vacuum dust-bathing behaviour on the wire floor of "enriched" cages is that they are prone to being stepped on by cage mates, causing damage to their back feathers. The overgrown claws found in caged hens can exacerbate this damage (Freire *et al*., 1999). Vacuum dustbathing also leads to greater feather loss through abrasion with hard cage fittings (Lindberg & Nichol, 1997).

## *Dustbathing in Cages Will Never be Optimal*

Where hens do use dustbaths in modified cages, the behaviour tends to be abnormally short and incomplete. This leads scientists to conclude, "dust bathing in cages will never be optimal" (van Niekerk & Reuvekamp, 2000).

Dustbathing is very much a social activity for hens and the sight and sounds of other birds dustbathing can increase their motivation (Widowski & Duncan, 2000). The narrow confines of current designs do not allow all hens to use the dustbath at the same time. The size and shape of the dustbath can also restrict some of the birds' behavioural repertoire (Lindberg & Nichol, 1997; van Rooijen, 1998). Too little litter and too little physical space, together with disturbance from cage-mates confined in close proximity, leads to dustbathing behaviour being performed incompletely in "enriched" cages.

Researchers at the Centre for Applied Poultry Research at Spelderholt in the Netherlands studying dustbathing in modified cages report that "dust baths with a normal duration were hardly ever seen" (van Niekerk & Reuvekamp, 2000). Similarly, hens were observed to dustbathe several times a day, showing that the behaviour was "unsatisfying and the dustbath motivation remained high". These observations led to the conclusion that the hens were "frustrated" (van Rooijen, 1998).

Researchers conclude that due to practical reasons, "it is not possible to supply a thick layer of litter in cages" and therefore "dust bathing in cages will never be optimal" (van Niekerk & Reuvekamp, 2000).

*When deprived of dustbathing facilities, hens will vacuum-dustbathe. Where inadequate facilities are provided, the hens will either shun these or use them to carry out unsatisfactory and incomplete behaviours. In each case, bouts of 'dustbathing' will take place little and often, a pattern that indicates that the birds' behavioural needs are not satisfied, resulting in frustration.*

The 1999 Laying Hens Directive stipulates that "enriched" cages must have "litter such that pecking and scratching are possible". The Directive defines "litter" as "any friable material enabling the hens to

satisfy their ethological [behavioural] needs". There is strong evidence to show that litter areas provided in modified cages do not meet the behavioural needs of the hens, leading to deprivation and frustration.

**Conclusion: Hens are highly motivated to perform dustbathing behaviour. Deprivation of this behaviour leads to frustration and poor welfare. Scientific research has found that only 8.3-26.7% of dustbathing bouts occur in the dustbath due to the inadequate conditions presented. Where hens do use dustbaths in modified cages, the behaviour tends to be abnormally short and incomplete, leading scientists to conclude that, "dust bathing in cages will never be optimal." Clearly, the minimalist approach to dustbathing facilities in modified cages fails to satisfy the ethological needs of the hen as required under the EU Laying Hens Directive.**

## Perches

Hens are strongly motivated to seek a high perch on which to roost at night (Appleby *et al*, 1992; Baxter M.R., 1994). This instinct has developed as an anti-predator measure, enabling the hens' ancestors to escape the attentions of ground-dwelling predators. Although predators are usually no longer a problem on laying farms, the vigorous struggling of hens as they try to get on to perches at dusk shows that this behaviour is still instinctively strong.

Perches provided in enriched cages are unable to fulfil the hens' motivation for a raised perch for roosting. Under the 1999 Laying Hens Directive, enriched cages must be a minimum of 45 cm high - only marginally taller than the average laying hen. Within these confines, perches cannot be positioned physically more than just a few centimetres above the wire floor. The norm for current designs is 7-10 cm above floor level (ADAS, pers comm.). In terms of satisfying perching behaviour, the height of the perch is an important factor. A perch sited 5 cm above the floor, for example, is "not considered as a perch and has no attractive nor repulsive value" to the birds (SVC, 1996). Scientific evidence therefore suggests that low perches in cages are perceived as a different quality of floor but not as a perch (Tauson, 1984).

Hens strongly prefer litter floors to wire floors (SVC, 1996). Perches are well used in cages. Usage has been found to vary from 25% of the daytime to 90% or more at night (SVC, 1996; Alvey, *et al*, 1995). This suggests that the hens use low perches as a means to escape the discomfort of the sloping wire floor used in cage systems, rather than as a perceived safe roosting site.

**Conclusion: Hens are strongly motivated to seek a high perch on which to roost at night. Perches provided in enriched cages are unable to fulfil the hens' motivation for a raised perch for roosting. Although unsatisfactory in this respect, low perches do provide a means to escape the discomfort of the sloping wire floor used in cage systems.**

## Claw-Shortening Device

Under natural conditions, hens will spend nearly 50% of their day scratching and pecking (SVC, 1996). These foraging behaviours are important to hens and represent distinct 'needs' separate from the ingestion of food (Bubier, 1996).

In standard battery cages, hens' claws can grow too long and can become easily damaged by breaking (Appleby, 1991). This problem is due to lack of wear as ground scratching and foraging are completely thwarted.

Battery cages – both "enriched" and "unenriched" - are required by the 1999 Directive to incorporate a claw-shortening device. This device will be an abrasive strip attached to the cage. The exact location is critical as the strips are only effective at shortening claws when applied on a sloping egg baffle plate at the front of the cage. Similarly, badly designed strips have rapidly removed the skin from the underside of the hens' toes (Walker, 2001). The principle behind the claw-shortening device is that the hen will wear down her claws as she repeatedly scratches at the cage-front.

*Clearly, claw-shortening devices only tackle the symptoms rather than the cause of the welfare problem - the inability of caged hens to scratch and forage meaningfully.*

If opportunities to forage are not available, then hens can 'mis-direct' this behaviour into feather-pecking. A study by Blokhuis and Arkes (1984) looked at the behaviour of hens divided into four groups; two housed on litter, and two kept without litter. A higher frequency of feather-pecking (and a more damaging character of pecking) was found in the non-litter groups. Most of these birds had severely damaged plumage. On the other hand, the plumage of the birds kept on litter was in perfect condition.

The authors concluded that "food pecking behaviour can easily lead to feather-pecking and feather eating. The hypothesis that this development is more likely when ground scratching and pecking are frustrated by lack of an appropriate litter substrate seems obvious. In the latter situation, feather-pecking evolves as 'mis-directed' ground-pecking. The results from the present experiments strongly support this view".

Whilst the provision of an abrasive strip in cages may avoid claws becoming overgrown, it will not provide an opportunity to express foraging behaviour for which hens are strongly motivated. It has been suggested that in "enriched" cages, the dustbath/litter area could allow hens to express foraging behaviour. These litter areas have already been found inadequate at satisfying dustbathing behaviour in caged hens. It seems highly unlikely that such small facilities containing minimal amounts of substrate will be sufficient to satisfy foraging behaviour that would normally occupy almost half of each hen's day.

**Conclusion: Scratching and pecking are important behaviours to hens and represent distinct 'needs' separate from the ingestion of food. The impoverished environment of "enriched" cages will not satisfy this foraging behaviour, which would normally occupy almost half of the hens' daytime activity. Claw-shortening devices only tackle the symptoms – overgrown claws – rather than the cause of the welfare problem, which is the inability of caged hens to scratch and peck meaningfully.**

## Overall Conclusion

**Barren battery cages have inherent severe disadvantages for the welfare of hens. "Enriched" cages fail to overcome these severe welfare problems. The space and facilities provided in "enriched" cages are so inadequate that this system deprives hens of the ability to meaningfully fulfil natural behaviours, leading to abnormal behaviours, frustration, suffering and body degeneration.**

**Scientific and practical evidence strongly supports the European Union decision to prohibit barren battery cages from 2012 on welfare grounds. CIWF Trust believes that the EU should strengthen the 1999 Laying Hens Directive by also prohibiting the use of "enriched" cages. Only non-cage alternatives offer the potential for high standards of welfare.**

# THE ECONOMICS OF ENRICHED CAGES VS ALTERNATIVES

It has been suggested that "enriched" cages have an economic advantage over alternative systems. The industry argument goes that the Laying Hens Directive sets a maximum stocking density for alternative systems that is too stringent, thereby tipping the economic balance in favour of cages. This is based on a ***false*** assumption that alternative systems are limited to an absolute maximum stocking density of 9 birds/m$^2$ of *floor space*. The new Directive does ***not*** place an overall maximum on house stocking. Instead, it stipulates a maximum number of hens per square metre of "usable area".

The new Directive states that the stocking density in alternative systems "must not exceed 9 hens per m$^2$ usable area". The Directive allows for "usable area" to include up to 4 different levels or tiers. If one level is the house floor, then up to 3 tiers or platforms can be used to give an overall *floor space* stocking density that could be considerably higher than 9 birds/m$^2$.

## Economics

Economic analyses, presented in the Scientific Veterinary Committee's 1996 Report on laying hen welfare (pages 91-98), predicted that the production costs of "enriched" cages and alternative systems stocked at 9 birds/m$^2$ are likely to be broadly similar.

Latest figures produced by the British Egg Industry Council (see table below) suggest that capital costs for enriched cages are likely to be significantly higher than those for barn/perchery systems. They also show that the production cost of an "enriched" cage-produced egg is just 0.5 pence (sterling) less than that produced in a barn system stocked at 12 birds/m$^2$. This differential would be partly offset by the higher capital cost of the "enriched" cage system. If hens in alternative systems were stocked at slightly higher densities, then this differential would be eroded further.

Clearly, hens in alternatives should not be overstocked. However, it should be recognised that stocking densities of more than 9 birds per m$^2$ of floor

## EFFECTS OF STOCKING DENSITY ON EGG PRODUCTION COSTS

| ***Stocking Density*** (Indoors) | Capital Cost (£per bird) | Running (Production) Cost (pence per dozen) |
|---|---|---|
| Cage 450 cm$^2$/bird (EU current cage) | 14.00 | 41.3 |
| Enriched Cage 750 cm$^2$/bird (EU post 2012) | **20.30** | **46.1** |
| Perchery/Barn 12 birds/m$^2$ | **14.73** | **52.2** |
| Perchery/Barn 9 birds/m$^2$ | 19.14 | 57.5 |
| Free Range 12 birds/m$^2$ | 20.61 | 62.4 |
| Free Range 9 birds/m$^2$ | 25.00 | 69.3 |

Source: *British* Egg *Industry Council (Williams, 2002).*

space are achievable under the Directive. For example, an alternative system constructed with two tiers of raised platforms mounted above each other would only need to cover one sixth of the surface area of the hen house to achieve a maximum *floor space* stocking density of 12 birds/m². This is the stocking density currently used by much of the UK industry. Stocking to this level would help maintain the competitive position of higher-welfare alternatives over the "enriched" cage system.

These alternatives would also have a marketing advantage in the EU over their cage-produced competitors as, from 2004, cage eggs – "enriched" or not - must be labelled by law as "eggs from caged hens".

## Practical Examples of Multi-tiered Alternative Systems

In the Netherlands, an aviary system called the Tiered Wire Floor (TWF) system has been developed. Birds in this system have access to a littered floor and 3 tiers of wire platforms. Feed is available on the 2 lower platforms and water on all 3. Perches are mounted over the top tier. A stocking density of about 20 birds/m² has been achieved. Manure belts run under the wire platforms. This system is used on a commercial scale.

In Switzerland, aviaries with manure belts or scrapers are also used. These incorporate a rest area, a feeding and drinking area, a nesting area and a scratching area. The maximum stocking density in these systems is 21 birds/m².

A belted aviary system was developed in the UK in 1990. This resulted in the Naturel aviary. In this version feed, water, nest boxes and resting areas are provided at all 3 levels, and birds only have to come down to scratch or dustbathe in the litter on the ground floor. These have been stocked at densities of 15-25 birds/m².

A pure litter system in which all the hens are kept on a single level will no longer be possible under the new Directive. Those systems incorporating a part litter/part perforated floor set-up are more closely akin to a 'Barn/Perchery' house, as is reflected in the upper stocking densities used.

**Conclusion: Industry figures show that capital costs for enriched cages are likely to be significantly higher than those for barn/perchery systems. The production cost of an "enriched" cage-produced egg is just 0.5 pence (sterling) less than that produced in a barn system stocked at 12 birds/m². If hens in alternatives were stocked at slightly higher densities, then this differential would be eroded further.**

**Stocking densities of more than 9 birds per m² of floor space are achievable in alternative systems under the 1999 Directive. Raised platforms can be provided to increase the amount of "usable area" available to the hens. Two tiers of raised platforms covering one sixth of the surface area of the hen house, for example, would achieve a maximum floor space stocking density of 12 birds/m². This would help maintain the competitive position of this higher welfare alternative over the production costs of the "enriched" cage system. These non-cage alternatives would also have a marketing advantage in the EU over their cage-produced competitors as, from 2004, cage eggs – 'enriched' or not - must be labelled by law as "eggs from caged hens".**

**CIWF Trust believes that, as the ban on the conventional cage approaches, farmers should move over not to 'enriched' cages but to well-designed and well-managed perchery and free-range systems.**

# SUMMARY OF CONCLUSIONS

1. **The provision of adequate space is a highly important factor for good welfare. The average space used by hens to perform basic behaviours is between 475 cm² and 1,876 cm² per bird, although the top end of the range is up to 2,606 cm². Almost all normal behaviours require significantly more usable space per bird than the 600 cm²/bird provided in "enriched" cages under the 1999 Laying Hens Directive.**

2. **Hens in "enriched" cages are not provided with sufficient space allowances to carry out basic natural behaviours, let alone meaningful exercise. This leads to behavioural frustration, bone weakness and osteoporosis – clear indicators of poor welfare. Feather loss is also worse in cages than in alternative systems.**

3. **Adequate cage height is necessary to prevent frustration of natural behaviours leading to poor welfare. Current cage heights in Europe restrict 25-30% of the hens' natural head movements. The newly raised minimum headroom of 45 cm under the 1999 Laying Hens Directive will still be too low to satisfy the welfare needs of the hen. The minimum headroom from the floor should be set at no less than 53 cm, and preferably, 63 cm high.**

4. **Hens have a strong preference for laying their eggs in a nest and are highly motivated to perform nesting behaviour. The exact level to which a nest box placed within the restricted confines of an "enriched" cage satisfactorily fulfils the hens' behavioural needs is questionable. Competition for nesting facilities, within a confined environment offering few other opportunities, is likely to alter or curtail the hens' natural laying behaviour. Up to 35% of eggs from "enriched" cages in Swedish trials have been laid outside the nest box, with UK trials currently reporting 10-15%. Given the close proximity of the birds to the nest, these proportions suggest that nest boxes in "enriched" cages are not fully satisfying the welfare needs of the birds.**

5. **Hens are highly motivated to perform dustbathing behaviour. Deprivation of this behaviour leads to frustration and poor welfare. Scientific research has found that in enriched cages only 8.3-26.7% of dustbathing bouts occur in the dustbath due to the inadequate conditions presented. Where hens do use dustbaths in modified cages, the behaviour tends to be abnormally short and incomplete, leading scientists to conclude that, "dust bathing in cages will never be optimal." Clearly, the minimalist approach to dustbathing facilities in modified cages fails to satisfy the ethological needs of the hen as required under the EU Laying Hens Directive.**

6. **Hens are strongly motivated to seek a high perch on which to roost at night. Perches provided in "enriched" cages are unable to fulfil the hens' motivation for a raised perch for roosting. Although unsatisfactory in this respect, low perches do provide a means to escape the discomfort of the sloping wire floor used in cage systems.**

7. **Scratching and pecking are important behaviours to hens and represent distinct 'needs' separate from the ingestion of food. The impoverished environment of "enriched" cages will not satisfy this foraging behaviour, which would normally occupy almost half of the hens' daytime activity. Claw-shortening devices only tackle the symptoms – overgrown claws – rather than the cause of the welfare problem, which is the inability of caged hens to scratch and peck meaningfully.**

8. **Industry figures suggest that capital costs for enriched cages are likely to be significantly higher than those for barn/perchery systems. They also suggest that the production cost of an "enriched" cage-produced egg is just 0.5 pence (sterling) less than that produced in a barn system stocked at 12 birds/m$^2$. This differential would be partly offset by the higher capital cost of the "enriched" cage system. If hens in alternatives were stocked at slightly higher densities, then this differential would be eroded further.**

9. **Stocking densities of more than 9 birds per m$^2$ of floor space are achievable in alternative systems under the 1999 Directive. Raised platforms can be provided to increase the amount of "usable area" available to the hens. Two tiers of raised platforms covering one sixth of the surface area of the hen house, for example, would achieve a maximum floor space stocking density of 12 birds/m$^2$. This would help maintain the competitive position of this higher welfare alternative over the production costs of the "enriched" cage system. These non-cage alternatives would also have a marketing advantage in the EU over their cage-produced competitors as, from 2004, cage eggs – "enriched" or not - must be labelled by law as "eggs from caged hens".**

10. **Barren battery cages have inherent severe disadvantages for the welfare of hens. "Enriched" cages fail to overcome these severe welfare problems. The space and facilities provided in "enriched" cages are so inadequate that this system deprives hens of the ability to meaningfully fulfil natural behaviours, leading to abnormal behaviours, frustration, suffering and body degeneration.**

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# LAID BARE....

## THE CASE AGAINST ENRICHED CAGES IN EUROPE

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