

## LAYING HEN FACTSHEET



Egg consumption in the UK has been steadily growing over several years and, in 2015 alone, according to egg industry data, around 10.2 billion eggs were produced (Egg Info website, 2016). Britain also imported 2.1 billion eggs during the same year (Egg Info website, 2016).

In 2015, 12.2 billion eggs were consumed in that year alone, or 33 million a day (Egg Info website, 2016), and it has been reported that there has been a high growth rate in egg purchasing by younger people since 2008 (Clarke, 2015).

In the wild, hens would only lay 20 eggs in a whole year, but on modern-day farms hens are subjected to near constant lighting and fed high protein feed to increase egg production so they produce over 300 eggs a year. Some egg companies are pushing hens to laying 500 eggs



(Hendrix Genetics website, 2015; World Poultry website, 2016).

Worldwide, more than 90 per cent of all eggs continue to be laid by hens in cages, and the vast majority of those (85 per cent) are conventional, aka, 'battery' cages (Windhorst, 2014; Farming UK, 2015).

#### Types of housing



#### **C**AGES

Around 51 per cent of the eggs sold in Britain come from hens kept in cages (Egg Info website, 2016). Since the beginning of 2012 these are now so-called 'enriched' or 'colony' cages.

Previously, the barren battery cages were used, in which each hen had just 550 cm<sup>2</sup> of space – about the area of a sheet of A4 paper (DEFRA, 2002). As a hen's wingspan is 76-80 cm – about the width of four pieces of A4 paper – they spent their entire lives unable to spread their wings.

In battery cages, without so much as a shred of straw for comfort, all of the hen's natural instincts – including nesting, perching, scratching and pecking – were denied. The bare wire mesh floor cut into the hens' feet and they were forced to balance on slopes of up to 12 degrees



(DEFRA, 2002). This was convenient for collecting the eggs as they all roll to one side, but incredibly uncomfortable for the hens.

In 1999, the Council of the European Union judged that battery cages are so cruel they should be banned across the EU – but not until 2012 (OJEC, 1999). However, the EU Directive still permitted the use of enriched cages after this date.

The enriched cage is very similar to the battery cage – only this time up to 80 hens can be incarcerated in it. To be exact, the cage affords each hen around a postcard sized extra space (Kerswell, 2011). This means hens on modern-day farms continue to be severely restricted and unable to stretch or flap their wings. As there tends to be only one nest box and very limited perching and dust bathing areas in each cage, the hens are forced to compete for access to these sites. Dominant hens may prevent others from ever accessing these facilities.

Enriched cages do not satisfy even the hen's most basic behavioural and physical needs such as ground scratching, wing stretching, and locomotor activities such as walking, running, jumping, fluttering and flying. There is no meaningful 'enrichment' in the enriched cage. It is an assault and battery, and these sentient, intelligent animals continue to suffer because of the *stack 'em high, sell 'em cheap* mentality. Hens are the only major group of farmed animal in Britain to remain caged for all of their productive lives. Unable to escape the close proximity of other hens or fulfil natural behaviours, life in enriched cages, is one of boredom, desperation, frustration and suffering.

Most birds in enriched cages will still spend a significant proportion of their time standing on sloping wire mesh floors with little room to move around, and they will all still be denied fresh air and sunshine. For these reasons, all of the major animal welfare organisations in the EU continue to push for a complete ban on cages – battery and enriched.

Hens kept in both types of cage system are routinely debeaked to prevent injury from aggressive cage-mates – a problem caused by the intensive conditions they are forced to live in (see more on debeaking below).

In late 2010, Viva! filmed undercover inside what is probably the largest enriched cage unit in



Britain (Viva! website, 2016). In 2016, Viva filmed in the ironically named 'Sunny Farm', in Bedfordshire, owned by the company Bird Bros which keep a staggering 450,000 birds in cages their whole lives (Viva! website, 2016a). Bird Bros supplies over 3 million eggs a week nationally (Twitter website, 2016) to independent shops, high street multiples, caterers and wholesalers.

Each visit by Viva! investigators at enriched cage units supplying millions of eggs to consumers each week has revealed similar welfare problems to those widely acknowledged to be present on battery cage units.

Bird Bros is accredited with the British Lion Scheme, like 85 per cent of all UK eggs (Lion Egg Farms website, 2016). The scheme was launched by the British Egg Industry Council (BEIC) and means only that eggs are produced to minimum legal food safety requirements. In other words, the baby chicks are vaccinated against salmonella.

Assurance schemes are, in practice, a consumer confidence trick. They rarely offer anything above and beyond minimum legal guidelines – and sometimes they fail to do even that. Egg consumers are duped by misleading labelling and packaging by the farming industry into believing that conditions for hens on free range and enriched cage farms live a decent life, yet each undercover investigation reveals hens living in the same dismal, hellish environment.

Despite the oft-heard assertion that the Britain leads the world in terms of animal welfare standards, we are lagging behind a number of other European countries when it comes to hen welfare. Austria banned the battery cage (doing so in 2009) and is set to ban the 'enriched' cage by 2020. Belgium has also banned the battery cage – and proposes to ban 'enriched' cages by 2024. Sweden, Germany, Luxembourg and the Netherlands banned the battery cage ahead of 2012. Germany has introduced a 'family cage', which has more space than the 'enriched' cage used in other countries. Outside the EU, Switzerland has already banned both the battery and 'enriched' cage systems (Kerswell, 2011).

Yet right up to January 2012, it was reported that 500,000 hens were still incarcerated in battery cages in Britain (BBC News, 2012). Currently, about 18 million birds are crammed in enrichment cages, where, under current UK legislation, 80 birds can be kept. Sadly, even on free



range farms, there may be nine hens per square metre (Statutory Instruments, 2002).

#### PERCHERIES ('BARN EGGS')

Around two per cent of the eggs sold in Britain are intensively produced 'barn eggs' (Egg Info website, 2016). While this term conjures up the image of a rustic hen house with a few dozen hens sitting peacefully on their own nests, the truth is somewhat different. Barn eggs actually come from hens kept in huge sheds called percheries. The number of birds in each perchery can be in the tens of thousands. However, the British Lion Scheme stipulates maximum flock size of 32,000 birds divided into colonies of 4,000 where flock size is over 6,000 birds in total (Egg Info website, 2016a). The EU Welfare of Laying Hens Directive stipulates a maximum stocking density of nine hens per square metre of useable floor space (DEFRA, 2002). Like enriched cages, percheries must provide perches, litter and nests, although there need only be one nest for every seven hens – leading to the same problem of competition for space as enriched cages (DEFRA, 2002).

Hens kept in this intensive system never go outdoors and many are still routinely debeaked.

#### 'FREE-RANGE' EGGS

Around 47 per cent of the eggs sold in Britain are 'free-range' eggs (including two per cent organic) (Egg Info website, 2016). Eggs sold as free-range must come from hens who have access to the outdoors. These hens are housed indoors in a perchery that must satisfy all the requirements listed above and, in addition, have popholes to access the outside. Hens must have continuous daytime access to runs with a maximum stocking density of 2,500 birds per hectare (DEFRA, 2002). This should, in theory, allow all to leave the shed. However, the reality is that many birds will never step outside. One 2005 study revealed that, on average less than 10 per cent of the hens went outside at any given time, and many never go outside at all (Hegelund, 2005).

There are several reasons why a hen will not venture outside, for example the unnaturally large number of birds coexisting, and inadequate conditions. Free-range farmers are encouraged, but



not required, to make the outdoor range as attractive as possible so that the hens spend more time outdoors. But there is no way to tell from the egg carton whether the farmers have actually taken these measures, or whether the quality of life for their hens is in fact just the same as for hens producing intensive barn eggs.

Many would have spent most of their lives in vast, stinking, overcrowded sheds, just as hens housed in barns would have.

These sheds have been investigated by Viva! and other organisations. In 2010, Viva! exposed dire conditions for laying hens at two farms owned by Noble Foods - one of the UK's largest free range egg companies supplying almost all of the major supermarket chains in Britain (Viva! website, 2016b). Investigators filmed dozens of birds who had lost feathers after being pecked by other hens, and a barn infested with red mite. In 2016, Noble Foods was again subject to an investigation and similar conditions were found on one of its Norfolk farms.

Other free range units visited by Viva! in 2015 have revealed birds inside dark, stinking, filthy sheds. The sheds bear a resemblance to those with enriched cages, and the hens, whilst uncaged, had comparable feather loss. Investigators documented hens who were extremely sick, and dead birds littered the filthy floor.

#### ORGANIC

All organic eggs are free-range, but not all free-range eggs are organic. To be sold as organic in the UK, eggs must come from a farm that has been approved by a certification body. However, not all of these organisations have the same standards for what makes a farm 'organic'. There is a national set of minimum standards that all certification bodies must use, but many employ their own stricter criteria.

The national standards (DEFRA, 2005) specify that organic farmers must allow laying hens access to the outdoors, and must allow them 1,666 cm<sup>2</sup> of indoor floor space each. Routine debeaking is forbidden in organic egg production, so feather pecking can be a problem. Despite evidence that hens suffer greatly due to feather pecking when housed in flocks of more than 500



(Bestman, 2003), organic egg farmers are permitted to keep hens in groups of up to 2,500 under EU rules.

The strictest standards for organic egg production are those of the Soil Association. They do not certify farms with flocks of more than 1,000 birds (but can certify flocks up to 2,000 if "extra conditions are met"). This is still not ideal, but it means that hens on Soil Association certified farms are considerably less likely to be injured or killed by other hens. Cartons of eggs from Soil Association certified farms will bear the Soil Association logo. However, the Soil Association's standards are difficult to apply on farms large enough to supply the major supermarkets, so you may have difficulty finding these eggs. Most Waitrose stores stock Soil Association certified eggs, as do many health food shops, farmers' markets, organic box schemes and some greengrocers.

Of course, day old male chicks and spent hens are still slaughtered in organic systems.



#### **SLAUGHTER**

Over 40 million laying hens are killed in the UK each year (Humane Slaughter Association, 2014).

The slaughter of healthy young animals is just as much a part of egg production as it is a part of meat production. All eggs on the market today come from hens destined to be sent to the slaughterhouse after just a fraction of their natural lifespan, and all laying hens had brothers whose lives cut short at just a day old.

To do otherwise would require increasing the price of eggs several fold, and would make egg production an even more resource-intense operation than it already is. After one to two years of laying, the number of eggs a hen can produce starts to decline. Male chickens, of course, lay no eggs at all. Allowing these animals to live out their natural lives (which can last up to 16 years (Plott, 2006) would require farmers to feed and house many times more birds than they currently do. This cost would be passed on to the consumer.

Chickens raised for meat are of a different breed from egg-laying chickens. Males of the egg laying breed do not gain weight fast enough to be raised profitably for meat. Very few of them are needed for breeding future generations of laying hens, so most are killed shortly after birth. It is estimated that between 30-40 million day old male chicks are killed in Britain each year.

Some male chicks are instead sold to laboratories, where they are used in vivisection experiments. The problem of unwanted male chicks exists in all methods of egg production, from battery cages to organic. In 2010, Viva! filmed undercover at two hatcheries that use maceration and gassing methods to dispose of male chicks and process females (Viva! website, 2016c). Following this investigation, in March 2015, the British Egg Information Service (BEIS) stated that the practice of maceration does not routinely take place inside hatcheries (Saul, 2015), however male day old chicks are still killed.

Female layers that are no longer productive are known as 'spent hens'. All worn-out hens, whether conventionally farmed or organic, are slaughtered when their egg production drops. Typically, this is around 72 weeks.



There are 69 poultry slaughterhouses in the UK (FSA, 2013), and here several thousand birds can be killed every hour in a factory-like, high speed operation. Around 71 per cent of birds in Britain are killed with gas, and 29 per cent continue to endure live shackling and electrical stunning followed by neck-cutting (FSA, 2013), despite it being well-acknowledged to be grossly inhumane (eg FAWC, 2009).

Shackling, particularly for birds with chronic leg disorders, is both a physiologically and psychologically painful experience. Once in the shackles, the upside-down birds are dragged through an electrified water bath which, by law, should render the birds unconscious and insensible to pain. In fact, many variables mean water baths may not render them insensible to pain at all.

Although the flesh of laying hens is not of the same 'quality' as that of chickens bred for their meat, it is still used in processed foods, such as soup, pies and baby food (Webster, 2004).

# **BROKEN BONES**

Weight-bearing exercise is one of the best things humans can do to keep their bones strong and prevent osteoporosis. The same is true for chickens, but hens kept in cages so crowded that they have barely enough space to move around don't have much of a chance to exercise. This lack of exercise combined with the loss of calcium to the hundreds of eggshells produced over a hen's lifetime works out to a high rate of osteoporosis and a lot of broken bones. In fact, more than 45 per cent of laying hens break a bone at some point during their lives (Webster, 2004).

#### FEATHER PECKING AND DEBEAKING

Hens subjected to the stresses of modern farming conditions tend to peck at one another. 'Aggressive pecking' is directed at the head of another bird and 'feather pecking' is directed at the plumage. Hens will often rip out the feathers of other hens, or even peck them to death and



engage in cannibalism. In one study of hens kept in enriched cages, more than one out of every 30 hens was killed and eaten by the other birds. Remarkably, this level of cannibalism was declared to be 'relatively low and within the production standard' (Weitzenburger, 2005). The same researchers found that although feather pecking is thought to be a redirection of hens' natural instinct to peck at the ground, providing them with a dust bath and straw chaff for foraging did not always help.

When hens injure and kill one another in this way, it hurts the farmer's bottom line. Dead hens obviously lay no eggs, and hens that have lost a lot of their feathers need to eat more in order to keep warm (Bestman, 2003), so it's in the interests of the egg industry to minimise these injuries. The most common solution is to cut off part of each hen's beak, a process which is performed without anaesthesia. Those in the egg industry refer to this process as 'beak trimming', which makes it sound like a manicure or a haircut – but unlike human nails and hair, the part of the beak that is cut is very sensitive to pain as it is highly innervated (Davis, 2004).

Hens whose beaks have been trimmed have difficulty eating properly later in life (Davis, 2004).

Beak trimming is already either prohibited, or does not generally take place in several European countries such as Norway, Finland, Sweden (Pickett H, 2008), Austria (The Ranger, 2014) and Denmark (Farming UK, 2015a).

Due to the substantial body of evidence against the humaneness of beak trimming, a ban in Britain was due to come into force in early 2011. On November 2010 however, the Coalition Government, following advice from the Farm Animal Welfare Committee (and its predecessor Council) (FAWC), announced that a beak trimming ban would be postponed until at least 2016 (Barclay, 2012) or when it can be 'demonstrated under commercial conditions that laying hens could be managed without beak trimming' (Ares, 2014).

The FAWC has stated that whatever the process, removing the tip of a beak is nothing short of a "mutilation" (FAWC, 2007). Despite being promoted as less painful and traumatic than hot blade trimming, studies have shown that this method still causes pain – and in some cases birds that have had their beaks trimmed with infrared eating less and being less active (which could be strongly indicative of lasting pain) (Marchant-Forde, 2008).



The number one reason for stereotypical and aggressive behaviour in laying hens is squarely down to the unnatural way they are kept, which – even in higher welfare cases – does not truly reflect their natural state nor allow them to express all natural behaviours.

Sanctuaries which offer hens a genuinely free-range life in small flocks find that birds do not feather pick and have healthy, shining feathers.



# **CONCLUSION**

Modern factory farms exist to produce meat, dairy, and egg products as quickly and cheaply as possible. To keep production costs down, animals are literally given the bare minimum they need to survive. Huge, dark, stinking sheds are crammed full of sick and miserable beings who will never breathe fresh air nor see natural daylight. Sadly, consumers are duped into believing the egg industry shaped up since the ban on battery cages, yet Viva! has exposed this to be a



farce. The enriched cage offers no protection or comfort for laying hens, and neither do free range or barn systems.

Even on organic systems, almost all male chicks are killed at birth. It is an unavoidable truth that modern egg production causes pain and suffering, which is why Viva! advocates a vegan diet.



## REFERENCES

- Ares E. 2014. Beak Trimming Ban. House of Commons Library. [online] Available from: http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN06931 [Accessed 10 February 2016]
- Barclay C. 2012. Battery Hens. House of Commons Library. [online] Available from: http://researchbriefings.files.parliament.uk/documents/SN06931/SN06931.pdf [Accessed 10 February 2016]
- BBC News. 2012. UK battery farms break EU rules. 13 January 2012. [online] Available from: www.bbc.co.uk/news/uk-16540769 [Accessed 16 March 2016]
- Bestman M W P and Wagenaar J P. 2003. Farm level factors associated with feather pecking in organic laying hens. Livestock Production Science. 80: 133-140
- Clarke P. 2015. Young consumers put eggs firmly back on the menu. 12 December 2012. [online] <a href="www.fwi.co.uk/poultry/young-consumers-put-eggs-firmly-back-on-the-menu.htm">www.fwi.co.uk/poultry/young-consumers-put-eggs-firmly-back-on-the-menu.htm</a> [Accessed 17 March 2016]
- Davis G S, Anderson K E and Jones D R. 2004. The Effects of Different Beak Trimming Techniques on Plasma Corticosterone and Performance Criteria in Single Comb White Leghorn Chickens. Poultry Science. 83: 1624-1628
- DEFRA. 2002. Code of Recommendations for the Welfare of Livestock: Laying Hens.
   [online] Available from:
   www.gov.uk/government/uploads/system/uploads/attachment\_data/file/435224/Laying\_hens\_code\_of\_recommendations.pdf [Accessed 16 March 2016]
- DEFRA. 2005. Compendium of UK organic standards. Department of Environment, Food and Rural Affairs
- Egg Info website. 2016. Industry data [online] Available at: www.egginfo.co.uk/egg-facts-and-figures/industry-information/data [Accessed 16 March 2016]
- Egg info website. 2016a. Barn Egg Production [online] Available at: www.egginfo.co.uk/egg-facts-and-figures/production/barn-egg [Accessed 16 March 2016]
- Farming UK. 2015. 9 out of 10 eggs outside the EU are still produced in cages. 27 April 2015. [online] Available from: www.farminguk.com/News/9-out-of-10-eggs-outside-the-EU-are-still-produced-in-cages\_35513.html [Accessed at 21 July 2015]



- Farming UK. 2015a. Beak trimming ban to cost German producers €1.57 per bird. 16 October 2015. [online] <a href="www.farminguk.com/News/Beak-trimming-ban-to-cost-German-producers-1-57-per-bird">www.farminguk.com/News/Beak-trimming-ban-to-cost-German-producers-1-57-per-bird</a> 37417.html [Accessed 17 March 2016]
- FAWC. 2007. Opinion of Beak Trimming on Laying Hens. Farm Animal Welfare Committee
- FAWC. 2009. Report on the Welfare of Farmed Animals at Slaughter or Killing Part
  Two: White Meat Animals. Farm Animal Welfare Council [online] Available from:
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA">www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA</a>
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA">www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA</a>
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA</a>
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA">www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA</a>
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA">www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA</a>
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA">www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA</a>
   <a href="https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/325045/FA">www.gov.uk/government/uploads/system/uploads/syste
- FSA. 2013. Results of the 2013 animal welfare survey in Great Britain. Food Standards Agency. [online] Available from: <a href="www.food.gov.uk/sites/default/files/2013-animal-welfare-survey.pdf">www.food.gov.uk/sites/default/files/2013-animal-welfare-survey.pdf</a> [Accessed 10 February 2016]
- Hegelund L, Sørensen J T and Kristensen I S. 2005. Use of the range area in organic egg production systems: effect of climatic factors, flock size, age and artificial cover. British Poultry Science. 46: 1-8
- Hendrix Genetics website. 2016. Hendrix Genetics shows strength of multi-species animal genetics at SPACE. [online] Available from: <a href="www.hendrix-genetics.com/pl-pl/news/hendrix-genetics-shows-strength-of-multi-species-animal-genetics-at-space">www.hendrix-genetics.com/pl-pl/news/hendrix-genetics-shows-strength-of-multi-species-animal-genetics-at-space</a> [Accessed 17 March 2016]
- Humane Slaughter Association. 2014. A Fowl End? July 2014. [online] Available from: www.hsa.org.uk/downloads/related-items/poultry-slaughter.pdf [Accessed at 16 March 2016]
- Kerswell J. 2011. Battery hens still face hell as 'enriched' cages phased in. [online]
   Available from:
   www.theecologist.org/blogs\_and\_comments/commentators/other\_comments/1046687
   /battery\_egg\_hens\_still\_face\_hell\_as\_enriched\_cages\_phased\_in.html [Accessed 16 March 2016]
- Lion Egg Farms website. 2016. What does the British Lion Quality mark symbolise? [online] Available from: www.lioneggfarms.co.uk/information/british-lion-quality [Accessed 16 March 2016]



- Marchant-Forde R M, Fahey, A G and Cheng H W. 2008. Comparative Effects of Infrared and One-Third Hot-Blade Trimming on Beak Topography, Behavior, and Growth. Poultry Science. 87 (8): 1474-1483
- OJEC. 1999. Council Directive 1999/74/EC, 53-57. Official Journal of the European Communities
- Pickett H. 2008 Controlling feather pecking & cannibalism in laying hens without beak trimming. Compassion in World Farming. [online] Available from: <a href="www.ciwf.org.uk/includes/documents/cm">www.ciwf.org.uk/includes/documents/cm</a> docs/2008/c/controlling feather pecking a nd\_cannibalism\_in\_laying\_hens.pdf [Accessed 17 March 2016]
- Plott B. 2006. Matilda world's oldest chicken dies at 16. 14 February 2006. Birmingham News
- Saul H. 2015. Hatched, discarded, gassed: What happens to male chicks in the UK. 5
  March 2015. [online] Available from: www.independent.co.uk/life-style/food-anddrink/hatched-discarded-gassed-what-happens-to-male-chicks-in-the-uk10088509.html [Accessed 10 February 2016]
- Statutory Instruments [SI]. 2002. No. 1646. The Welfare of Farmed Animals (England) (Amendment) Regulations 2002. [online] Available from:
   www.legislation.gov.uk/uksi/2002/1646/pdfs/uksi\_20021646\_en.pdf [Accessed 16 March 2016]
- The Ranger. 2014. Industry must take a 'stepwise approach' to managing untrimmed flocks. 17 March 2016. [online] Available from: <a href="www.theranger.co.uk/News/Industry-must-take-a-stepwise-approach-to-managing-untrimmed-flocks\_24021.html">www.theranger.co.uk/News/Industry-must-take-a-stepwise-approach-to-managing-untrimmed-flocks\_24021.html</a> [Accessed 17 March 2016]
- Twitter website, 2016. Bird Bros Eggs. [online] Available from: www.twitter.com/birdbroseggs [Accessed at 17 March 2016]
- Viva! website. 2016. New 'enriched' cages for hens a "sick joke" in terms of animal welfare, claims Viva!. [online] <a href="www.viva.org.uk/what-we-do/about-us/media-centre/media-releases/new-enriched-cages-hens-sick-joke-terms-animal">www.viva.org.uk/what-we-do/about-us/media-centre/media-releases/new-enriched-cages-hens-sick-joke-terms-animal</a> [Accessed 17 March 2016]
- Viva! website. 2016a. <<insert new Viva! Face Off website>>.
- Viva! website. 2016b. Happy Egg Company. [online] Available from: www.viva.org.uk/what-we-do/happy-egg-company [Accessed at 16 march 2016]



- Viva! website. 2016c. Mincing alive and gassing for baby chicks exposed by animal campaigners. [online] Available from: www.viva.org.uk/what-we-do/about-us/mediacentre/media-releases/mincing-alive-and-gassing-baby-chicks-exposed-animal [Accessed at 16 March 2016]
- Webster A B. 2004. Welfare Implications of Avian Osteoporosis. Poultry Science. 83: 184-192
- Weitzenburger D, Vits A, Hamann H and Distl O. 2005. Effect of furnished small group housing systems and furnished cages on mortality and causes of death in two layer strains. British Poultry Science. 46: 553-559
- Windhorst H. 2014. Patterns of European egg production and egg trade after the banning of conventional cages in the EU. Zootecnica International 36 (9) 24-31
- World Poultry. 2015. 500 eggs in 100 weeks. 9 March 2016. [online] Available at: <u>www.worldpoultry.net/Layers/Eggs/2015/11/500-eggs-in-100-weeks-2721812W</u>
   [Accessed at 4 January 2015]