

A Whiter shade of Pale

Although we may have seen little in the way of sunshine so far this year, for some producers what we have had has already cost them dear. The problem of pale shelled eggs in free range layers is one that seems to rear its ugly head during the summer months. There may well be no scientific data to back up his theory, but Ranger Editor John Widdowson is certain in his own mind the set of circumstances that results in the expensive down-grading of an otherwise saleable egg. "A bird with a bare back and some strong sunshine is all it takes," feels John, who has suffered such a flock recently.

"We are usually pretty successful in keeping the feathers on the birds, which is mostly influenced by management, but also an element of luck. However, the flock in question, which has now been depleted, had lost rather more plumage than I like to see, and that early sunshine last month was enough to immediately trigger the white egg syndrome." John didn't choose the option of keeping the birds in although he knows this would have restored the eggs to full colour within a few days. "This is always the dilemma facing producers, who know that a confinement to barracks would stem the financial loss but means breaking the law both in spirit and letter. I've done it in the past but I am not comfortable with it," said John. "And besides, I still like throwing the

odd stone so cannot afford to live in a glass house!"

The fact that the hens are feather pecked would suggest a degree of stress is involved, but John is not convinced this is solely the problem. "If it is due to stress, why does it only happen in sunny weather?" questions John. "Even restricting the hens to the veranda litter area, where the temperatures and lighting levels are still relatively high, can be enough to eliminate the problem. The main factor being the birds are protected from the direct sun."

This theory would suggest that perhaps the ultra-violet rays are in some way affecting the bare back of the chicken, but Professor Sally Solomon, Head of Poultry Research at Glasgow University Veterinary School, was doubtful of such interaction. "Without thorough research nothing can be ruled out, but knowing that the oviduct lies deep within the abdomen, it is difficult to imagine a physiological reason why this process would be affected by sunlight," Professor Solomon told the Ranger. "A possibility is the sunlight acting as a minor stress causing the expulsion of the egg prematurely before pigmentation, which occurs around four hours before lay.

The absence of shell cuticle would reinforce this theory as this occurs after pigmentation." So is the cuticle present? Lou Marsden, now retired after a long career in poultry research with a particular interest in egg quality, has looked at some eggs produced by John's guilty birds. "A visual assessment would suggest that the cuticle was present, and considering the age of the birds, the eggs were of good quality apart from the shell colour," said Lou.

Whatever ones view, it would seem this phenomenon is crying out for some proper research. It is likely funding would have to come from the industry as any MAFF money is understandably reserved for welfare problems, but considering the cost to the industry, this may be money well spent. Meantime, the number one priority for producers, as always, is to strive to keep the hens at the peak of health, including good plumage. "This is down to overall management and creating a stress-free environment," said John Widdowson. Aside from this, the most influential factor is controlling lighting levels, believes John. "Houses need to be well lit initially to encourage good activity amongst the young pullets and to minimise floor eggs, but inevitably this needs to be decreased if feather pulling is to be avoided. In practise, the 10 lux quoted in the various codes of



practise is often too high." Despite John's best efforts, the occasional flock still seems to develop the habit, and until someone comes up with an answer, his only hope is for cloudy weather.

WHITE EGGS ON FREE RANGE (An additional contribution from Jason_Gittins@adas.co.uk.)

The problem of white eggs in free range systems during the summer months continues to cause comment and concern. Whether the problem is generally getting worse or not is difficult to say although in some cases, retail buyers appear to be less tolerant of 'marginal' cases. Because of this, the financial penalties are very high.

A number of factors are known to influence egg shell colour, including flock health and flock age. Published experiments have shown that the use of the coccidiostat nicarbazin for instance can bleach brown egg shells, the colour returning some 7 days after withdrawal. A number of studies have concentrated on the effects of stress upon aspects of shell quality, including shell colour. It is known that a hen may retain the egg in the shell gland during times of stress or disturbance and this can cause a superficial layer of white calcium to cover the shell. In such cases, the shell is often described as being 'coated' or 'splashed'. In the typical white egg problem associated with free range systems, the shell appears not to show these characteristics. Instead it is either completely white or there may be a little brown pigmentation deposited on all or part of the shell.

A major problem at present is that the information available is largely limited to anecdotes. No doubt other readers will have their own experiences and theories. One apparent link is between poor feather cover on the backs of birds and the production of white shelled eggs. However, this does not necessarily mean that poor feather cover causes white eggs - it could simply be a

parallel effect rather than the direct cause of the problem. Another point which appears to be borne out in a number of trials is that if affected birds are kept indoors for a few days (effectively switching to barn egg production) then shell colour returns. Furthermore, it seems that this effect can reliably be repeated. This appears to rule out longer term health issues which could not be induced or overcome so quickly or in such a repeatable way. However shorter term stresses and the effects of sunlight itself could at least be contributing factors.

If we take a closer look at egg shell formation and pigmentation, we see that an egg spends around 20 hours in the shell gland. During this time the shell is built up from the membranes outwards. Towards the end of this time, the pigment is added. The majority (but not all) of the pigment is in the cuticle, the shiny outermost layer which is composed mainly of protein. The absence of cuticle would therefore have an effect upon shell colour. Assessments undertaken by ADAS in which white shelled eggs from brown birds were submerged in a protein dye solution revealed that some of the eggs had a good, even cuticle cover, whilst others had an uneven or virtually no cuticle. We have therefore concluded that the cuticle is not the key issue - the problem can be seen irrespective of the cuticular cover.

Perhaps we need to look closer at the nature and synthesis of the shell colour pigment itself. Egg shell pigment consists of porphyrins, in particular protoporphyrin. This is formed by the oxidation of a colourless intermediate product called protoporphyrinogen. Researchers in France have suggested that white shells may be caused by the shell pigmentation synthesis and the timing of egg laying being out of phase. In other words, the pigment is not available to the egg at the right time. Alternatively, the processes which lead to the production of protoporphyrin in the shell gland may fail. As well as the influence of stress, the possibility of a link with nutrition -

either in the compound feed or perhaps more likely through the consumption of grass and other vegetation on the range - should not be excluded. There could be an additional link between nutrition and high environmental temperature. The latter is known to reduce feed intakes and could mean marginal deficiencies of essential nutrients. It could be argued that birds with bare backs would be more vulnerable to the effects of hot weather since they lack the insulating effect of feathers.

There is a clear need to formalise the anecdotal information and to test these theories in further trial and analytical work.