Concerning Poultry- What is wrong with that egg?

You are keeping chickens and each time you enjoy the fresh, tasty eggs they provide you with. But only once in a thousand times it happens that there is something wrong with the egg. This could be something strange that puzzles you for a while, or even something disgusting that will make you shudder to think of having eaten that ‘unnoticed’! Some of these occurrences are very hard to explain and will certainly not happen each time your hen lays an egg. Others can be explained and will help to set your mind at ease after your bad experience. And in some cases - when your hens regularly lay ‘bad’ eggs, we hope you will find a reason – and solution – in this article.

Zie ook http://www.aviculture-europe.nl/nummers/07N03A06.pdf

Egg without yolk

One of our readers recently e-mailed us with a query: "Recently we had a party and were busy preparing all kinds of delicious snacks, for instance deviled eggs. We had bought 24 fresh eggs from the market. But to our astonishment there was one egg without yolk! It was a full, large egg, normal in size and completely filled with the egg white only. Details: We cut the egg in half lengthwise and everything was solid egg white, there was no yolk! No hole, it was really solid protein, beautiful and uniform in texture. Unfortunately I have no picture of it, of course, stupidly."

This is a very rare ‘fault’ and we only found the following (summary) scientific explanation.

The oviduct can be described as an assembly line with multiple eggs in progress at once. We all know, that if two yolks drop into the oviduct at the same time, they may end up encased in the same albumen and shell, which we call a double-yolk egg and which we don’t really see as weird or scary. However, if something interferes with yolk production, the hen may lay an egg containing
albumen only. 99 out of 100 times, this is a very small egg, usually formed when a bit of tissue is sloughed off the ovary or oviduct. This tissue stimulates the secreting glands of the different parts of the oviduct. It also occurs that a young, highly productive laying hen has abnormal high production of albumen and produces a yolkless egg between the normal eggs. This is very rare. Still we found several people on the internet who mentioned this, including Sean Wu from China, whose wife opened such a ‘surprise’ egg when baking a cake. See photo in the header.

**Bad smelling egg**

Hens that eat onions, garlic, typical flavoured fruit, or fish, may lay eggs with an undesirable flavour. Also chemicals for treating parasites can be a malefactor! Based on that off odour, the cause usually can be found. We once experienced the bad flavour was caused by moulded litter in one of the nest boxes, which was eaten by one hen who probably had a special liking for that.

If nothing like this appears to be appropriate to explain the off flavor, then it could be the feed (meal) containing a high amount of cholin, for instance rape seed. In some chickens the amount of trimethylanine (TMA) in egg yolk after feeding a cholin-rich diet causes a fishy taint. This is an interaction between genotype of the chicken and feeding - thus can also concern only one of your hens! - and can often be solved by feeding another brand with a different feed composition and/or providing extra charcoal.

Always beware how and where you store the eggs, because the porous shell easily allows odours to penetrate. If you store eggs in the vicinity of foods with strong odours such as onions or fruit, then in a short time the egg will adopt those smells. Also watch out for musty air, mould and petrol, in barn or garage.

**Egg with white-colourless yolk**

We all know that the yolk colour depends on nutrition of the laying hen and can vary from a very pale yellow to deep orange, depending on the amount of carotene in her diet. But what about a yolk which is almost as white as the egg white? Thus not just very pale, but really white or colourless? This is again something that we don’t know why. It really just appears to be a random thing where the chicken doesn’t pass on the pigment to the yolk in the egg. According to Poultry scientists it is thought to be due to certain infections, e.g. in the intestines. It is also said to be caused by infestation with capillaria (cropworms). However, since several people even mentioned a ‘double-yolker’ with one yellow yolk and one white yolk; this unsettles the worm or infection thing.

There is an exclusive website on the internet by John Conners, with comments on ‘white yolks’, see
http://johnsadventures.com/archives/2007/07/i_thought_egg_yolks_were_yellow/#comments
People who were confronted with this strange and rare phenomena said that it had the same texture and smell of normal egg yolks and when boiled, the texture is of a yellow yolk but the colour is just white. It is edible, although such a white egg yolk really does look un-appetising. By the way... the white yolks were found in supermarket eggs as well as organic / free range, and worldwide. In Ghana, Kenya and Tanzania (almost) all 'local' eggs seem to have white yolks!

**Right: A ‘normal’ yellow and a white yolk. Photo: Andy B., UK.**

**Egg-in-Egg**

Some of the comments on the above website mentioned: “The [white] yolk was enveloped in a thick, tough, white membrane-like a layer of opaque white skin.” Or: "... the [white] yolk had a tough wrinkled membrane instead of smooth like a normal yolk.” I think those people experienced an egg-within-an-egg. A fully formed and shelled egg encased within another eggshell is very rare, but it happens! We are speaking here of a fault in the reproductive process whereby the developing egg (for whatever reason) is reversed in direction by the wall of the oviduct and then when the following ovum/yolk is released from the follicles the problem of reversal is corrected and the shell is formed over them both (though often the "outer" egg will contain only the white). This can also happen to a so-called cock’s egg or fard egg – a very small egg without yolk. Being too small, it sometimes fails to stimulate peristalsis and to continue its journey; it stops before calcification of the shell occurred. Later it is covered with new layers of egg white and a shell. Unsuspectingly opening such an egg, you see what you think to be a ‘white’ yolk covered with strange membranes.

**Below: Complete egg-in-egg. Photo’s: Courtesy Elio Corti.**

[http://www.summagallicana.it/lessico/o/ovum%20in%20ovo.htm](http://www.summagallicana.it/lessico/o/ovum%20in%20ovo.htm)
**Watery egg white**
When you break a very fresh egg onto a plate or fry-pan, you will notice the white is thick and jelly-like and surrounds the yolk as a compact circle. A cloudy appearance is a sign of extra freshness, as this ‘cloudiness’ is in fact carbon dioxide, which is present when the egg is laid. Over time, the egg white will become more transparent, as the carbon dioxide dissipates.

When you break a somewhat older egg, you will see that the albumen has lost a great part of its consistency. The thinner white will spread quite far over the plate. Also the yolk will be flatter and break easily. As the egg ages and carbon dioxide is lost through the shell, the contents become more alkaline and this causes the albumen to become transparent and increasingly watery. The longer and warmer stored, the quicker the visible signs of ageing will occur. So always store the eggs in a cool room with sufficient humidity.

However, sometimes an egg has a unacceptably watery white even when freshly laid. When cooked, you will find these eggs are almost impossible to peel; when cooked, the white doesn't solidify in really white but grayish/opaque and hardly solid. This can have several reasons:
1. The most likely reason is the age of the hens: this happens more often with older hens.
2. Earlier Viral diseases such as infectious bronchitis, Infectious Laryngotracheitis (ILT) or Egg Drop Syndrome can result in poor eggs quality, both content and egg shell formation, in fact every portion of the reproductive tract can be affected.
3. High level of ammonia from droppings.
4. High vanadium levels in the feed.

However, the problem is not always related to nutrition or the health status of the hens, but could also be inherited, especially if the ones that are laying the eggs with watery whites are from the same breeder. It would appear that a genetic component is involved, so it is wise for breeders to select against this trait. Thin watery albumen, no matter if due to infectious bronchitis or prolonged egg storage, will also reduce hatchability.

**On the left thick egg white, on the right watery white. Photos: Dirk de Jong.**

**Mottled Yolk**
The egg yolk is separated from the white by the egg yolk (vitelline) membrane. As the yolk ages, it absorbs water from the albumen and increases in size. This weakens the vitelline membrane and gives the yolk a somewhat flattened shape on top and a general "out-of-round" shape. Ruptured yolks occasionally occur. But also fresh eggs may have a weakened vitelline membrane and cause the so
called ‘mottled yolk’. When an egg yolk is said to be "mottled", the yolk surface is covered with many pale spots or blotches. The spots can range from being somewhat transparent, to a brownish-orange.

Factors that affect the membrane quality in a negative manner are:
1. The anticoccidial drug, Nicarbazin.
2. Worming drugs, such as fenothiazine and dibutyltin dialaurate, probably also piperazine.
3. Certain antioxidant / tannins from grapes, tea, oak bark or eg the indigestible acids from millet and sorghum (phytic acid, oxalic acid, silicic acid).
5. Also storage time and temperature will affect the degree of egg yolk mottling. During storage, the vitelline membrane becomes weaker and eventually disintegrates. Finally albumen proteins enter the yolk and cause mottling.

Younger hens have been reported to produce a higher number of mottled eggs. After 2 to 3 months the incidence of mottled eggs will decline. Mottling has not been shown to affect the egg’s nutritional value or flavor, although a higher incidence of yolk mottling will probably contribute to your negative feeling of eating the egg.

**Photos: Aviculture Europe.**

**Blood spots**

Blood spots in the albumen or yolk are probably the most seen 'abnormality' in an egg. For the consumer this is no objection, but 9 out of 10 people will be carefully scoop the blood cube because they regard it as being a distasteful sight. These blood/meat inclusions have nothing to do with the egg being fertilized or a growing embryo. They arise due to an occasional rupturing of a tiny blood vessel in the ovary. It is more common in brown eggs - although there is no explanation for that - and in eggs from older hens. Even (temporary) stress can cause this.
Only very occasionally blood may be diffused through the white of the egg. This is caused by a bleeding in the oviduct, usually indicative of certain infections, such as IBV, or a lack of vit. K. (Of course it's not a good idea to eat those eggs.)

On very rare occasions, the white of a hard-boiled egg may become slightly caramel shaded due to a high amount of iron in the cooking water. Cooling them quickly after cooking helps to prevent this darkening.

Really weird things:
Every now and then people on poultry forums mention: a small beetle/ bug/ earwig that was in the egg white... or even a lizard! See http://www.abcaustralia.net/news/stories/2008/05/16/2246597.htm?site=darwin

Sources:
- Investigating Hatchery Practice, a Ross Tech publication published in October 2009, by Dr Steve Tullett, consultant for Aviagen.
- Abnormal eggs caused by diseases, by J.J. de Wit, DVM, PhD, dipl. ECPVS, GD Animal Health Service Deventer, the Netherlands, 2009.
- Various articles by e.g. Jacob et al., 2000, Coutts and Wilson, 1990, Berry et al., 1968, Cunningham and Sanford, 1974.