

## Veterinary

# Panacea or problem?

Dr Mark Elliott BVSc VetMFBom MRCVS MLIHM PCH DSH RSHom provides an update on pheasant vaccination, and the latest study of *Mycoplasma*.

WITH THE GLOBAL INITIATIVES TO REDUCE antibiotic use, attention is increasingly looking at how vaccines might aid farmers. But, as we understand more about vaccination, we also understand the risks involved in relying on these as a solution.

Seven years ago, I raised concerns about using vaccines designed and developed for other species and the problems that might subsequently arise in gamebirds if use was not properly thought through and fully evidence-based (see *KtB* Summer 2011). Just as antibiotics breed resistance in bacteria, vaccines can incite changes that enable diseases to escape their control. It is a constant battle that researchers work to head off, often now through genetic engineering of the microbes – work no one is doing, or is seemingly interested in doing, for game. Sadly, I believe we are now seeing some of the concerns realised, especially for *Mycoplasma* (also known as ‘bulgy eye’), and these concerns could

actually increase the use of antibiotics long term in the game industry if not already doing so. So I make no apology for repeating some of the previous article’s key points.

To be effective, a good vaccination programme must produce long-term disease protection by inducing a ‘memory bank’ of cells ready to respond to exposure of an individual to a particular disease by preventing the disease taking hold and resolving it quickly. The vaccine should be effective in the entire population and should have no unwanted side effects.

In commercial contained and biosecure poultry flocks, vaccination is arguably logical, mostly successful, and farmed poultry would not be possible without it. Despite all the precautions, breakdowns do still occur and it is not a perfect solution. Initial vaccines are live but attenuated (reduced pathogenicity) organisms, given to young birds to produce a short-term response, boosted

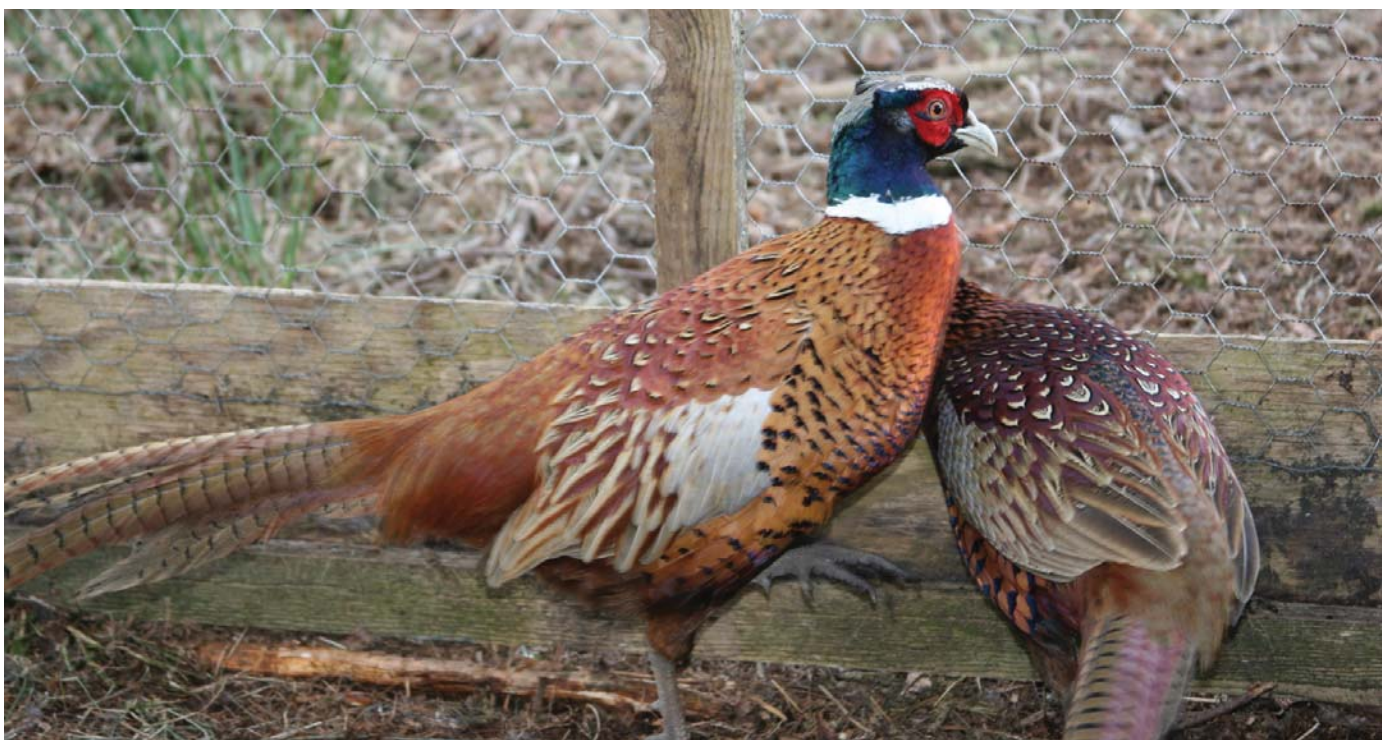
later in life by injectable vaccines containing inactivated (effectively dead) organisms to achieve longer-term protection, and re-boostered as required. This is highly controlled, in confined, secure environments, and the problems of live vaccine virus escaping as active disease are mostly containable. That changes when poultry are kept in an outdoor environment.

With a short season for rearing game, and questionable biosecurity – and by the time they might need a long-term booster, the birds are running wild – we potentially get a problem.

Live vaccines can overwhelm the immune system, revert back to virulence and lead to disease. They can also, if different strains are used, or wild strains are encountered, re-combine their genetic codes and create mutants far worse than the original disease problem. If this Frankenstein-like scenario seems a

**CONTINUED ON PAGE 42**

Source only *Mycoplasma*-free birds from breeding establishments prepared to cull their stock if a problem occurs.



**CONTINUED FROM PAGE 41**

little far-fetched, do not be fooled: it is happening and is causing major economic losses in the poultry world already. It may well lead to failure of some vaccine programmes in the near future.

If a live disease organism escapes, we have no practical way of containing it, and perhaps no way of knowing it's out until too late. And if we use live vaccines designed for other species, we risk creating mutated diseases in the 'wrong' species to which they have been given.

Killed vaccines, otherwise described as 'dead' or 'inactivated', are less risky but less effective, require more doses and boosters, and are not 100% secure if only inactivated. They don't answer concerns that immunisation generally is making once-rare or non-existent genetic variants of pathogens more prevalent, presumably as vaccine-primed antibodies cannot as easily recognise and attack shape-shifters that look different from vaccine strains.

Put simply, disease-causing organisms can outwit the vaccines in some circumstances with some diseases and we shouldn't be surprised that this is happening – it's called 'evolution'.

Advances in genetic sequencing have made it easier to see how microbes change over time and many such findings are reinforcing just how quickly pathogens mutate and evolve in response to environmental cues.

Vaccine science is ever-more brow-furrowingly complicated, yet if this all seems somewhat irrelevant to the modern gamekeeper you couldn't be more wrong!

Specialist vets and research scientists have come together working on a project looking at Mycoplasma in gamebirds. This has been in part sponsored by the NGO. Mycoplasma has quite possibly the greatest potential to destroy shooting in the UK as the implications of not tackling infection are legion. In recent years, some very severe strains have occurred, which transmit through the egg, are seemingly untreatable, and yet chicks are still being sent around the country from infected laying flocks to devastate rearing fields and shoots when outbreaks consequently occur.

At one point the use of live chicken vaccines was blamed as the cause, but gene sequencing failed to prove that the current problems directly relate to that.

Absence of evidence is not evidence of absence and use of live vaccines may still have contributed to new mutant strains unrecognisable from before, whereas killed vaccines can still alter the evolutionary path of pathogens. As Mycoplasma is a form of bacteria, it is also possible that the outdated practice of prophylactic antibiotic use could have been involved in predisposing to the strains now being found. And as we now also know, there are complex related infections that can make matters worse or more likely to occur.

The results of this work were presented to the BVPA in March this year, and were also considered before that by specialist gamebird vets. All present agreed that live vaccines created for other poultry species had no place in control

## *The only solution is to cull and clean the breeding stock.*

of this problem; although there was data suggesting they can create a false impression of improvement by reducing clinical signs, they do not prevent infection or potential for carrying the disease. Additionally, releasing infected birds – as that is what they are (with live organisms that we have given them) – into the wild is irresponsible as we no longer have control over that population.

It is evident that inactivated chicken strain vaccines are not better in preventing disease. Autogenous vaccines (those made from the organisms cultured from an outbreak on a specific site and for use legally only on that site in a closed environment) may reduce clinical signs, but do not prevent transmission or ability to carry the disease. There is no evidence that they result in offspring free of infection. Also, they don't necessarily result in reduced the need for antibiotics, which further defeats arguments for using them.

Clearly, vaccination to justify maintaining a flock already infected with severe strains of Mycoplasma is pointless and will likely spread disease around the country with all the devastation that results. Similarly, techniques such as heating eggs and trying to get antibiotics into eggs before setting, etc, are – in my view – equally irresponsible. The only solution is to cull and clean; and the

economic point at which to do this is in the breeding flocks – tough as that may be.

The conclusion of the study was that the aim must be to source Mycoplasma-free birds with eradication of the disease from breeding companies supplying others.

There are other examples where non-species specific vaccines can cause problems for game. One such is for marble-spleen disease. I've heard it advised recently that turkey vaccines can help in pheasants, when in fact the vaccines intended for use in turkeys should not be used in pheasants, and vice versa – because the avirulent isolates used for vaccinating one species are typically virulent in the other!

Until we have species-specific, safe and effective vaccines, which do not add risk to the gamebird industry and associated wildlife, we should focus on the irreplaceable benefits of good management in the field and sourcing as clean and as healthy stock as possible for our breeding

flocks. It will need a co-ordinated approach, with a culture of openness and a willingness to face up to the problems within if we are to win the war against disease.

### **NOTE IT!**

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