Mycoplasma control world wide

Chris Morrow

Dr. Chris Morrow reflects on Mycoplasma control world-wide. A veterinarian, he completed a PhD in 1991 on *M. synoviae* in Australia during which he invented MSH vaccine. After working for a decade in Ross Breeders in Scotland as a poultry vet servicing customers in Asia and Eastern Europe he went back to Australia to head Global Technical Services for Bioproperties (2006-2024) - the manufacturers of MSH - the only currently available live MS vaccine in the world.

He is the recipient of the Australian Poultry Award from the WPSA Australian branch, (2017), The Kesteven Medal from the Australia Veterinary Association (2024) and the Peter C. T. Hannan award for Clinical Mycoplasmology of the International Organization of Mycoplasmology (2024). He has just retired from Bioproperties but still holds an honorary position with the School of Veterinary Science in the University of Melbourne. His interests have been using mycoplasma control by vaccination to eliminate antibiotic prophylaxis in layers and breeders especially in Low- and middle-income countries to prevent this antibiotic use contributing to AMR (Human disease).

Current status of Mycoplasma control in the world

MG has been controlled effectively in most parts of the world with a strategy of MG free replacement stock from breeding programs producing MG free broilers. Alternatively, MG impact has been minimized by routine antibiotics during lay (which is also controlling MS impact) and/or vaccination with live mycoplasma vaccines. Although MG free stock is available for layers this has not been implemented as effectively as MG freedom at the commercial level because of a number of reasons including multiage sites and ease of use of antibiotics having zero withdrawal times (residues apparently are not a domestic issue). Factors contributing to this include lack of coordinated action and reluctance to invest in MS control by all poultry industries. Vaccination with live, killed, both, and/or antibiotics have also been used.

MS control has largely been by MS free stock being available (although MS control has been largely in response to customer demand rather than government control programmes). MS killed vaccines (including autogenous vaccines) are available in some areas and certainly can make antibody but little more in terms of impact. Antibiotics have also hidden the impact of MS.

The impact of live vaccines on the prevalence of field strains is now being assessed. It seems in the Netherlands that it takes about 4 flock cycles to push the field strains off a site. Presumably if the birds are vaccinated with live vaccines before challenge, they are seeing benefits immediately in terms of disease control and production benefits. Some places like France usually drop vaccination after problems are controlled – the cost of insurance being seen as too high (and the problems with getting staff to eyedrop vaccine).

Assessment of vaccine success in the field is difficult due to interaction with other control measures and inconsistency of challenge. Currently in many areas new turnkey operations have been built with inbuilt biosecurity that is vastly improved over existing "chicken sick" sites. These sites are without neighbours- remote. Without challenge MG killed vaccines and pox vectored vaccines seem to be performing well – at least initially (perhaps the live vaccines have done the work and there is an absence of challenge- always makes a vaccine look good!). Antibiotic resistance as a problem is seemingly moving up a notch in countries where antibiotics are used without prescription, or in polypharmacy application. Multiple resistance (to 8 different antibiotic groups in one isolate being the record at the moment) have been found. There are a few more groups but they are running out so vaccination has to be attempted.

This massive use of antibiotics in prophylaxis in lay is presumably also driving antibiotic resistance in the microbiota of poultry. It is possible that this is things like macrolide resistance in human Campylobacter and Salmonella. But resistance in ESKAPE organisms is a problem now in India that could have some of its origin in animal production use of antibiotics – we hear reports of people in India with a cancer diagnosis choosing not to have chemotherapy because if they develop bacteria during treatment then no antibiotics will save them.

Once of product is registered then often research on that product dries up except for ambulance chasing labs wanting research projects. Questions I have in my mind are

1. Does F strain use rely on antibiotics from 20-40 weeks (the antibiotics effective as the birds are infected with antibiotic sensitive F strain rather than local (resistant) field strains?)
2. Do killed MG vaccines take the edge off F strain residual pathogenicity and decrease vertical transmission. Will K strain need the same for use in breeders?

3. Is the belief of the need to use antibiotics from 40 weeks in ts-11 flocks because of confusion from seroconversion often seen in ts-11 flocks around the beginning of lay (not having any demonstrable field challenge and good health and production).
4. Do killed vaccines interfere with live vaccines. The only published study of Live and killed combination I could find suggested antagonism)

If you can stop vertical transmission of field strain mycoplasma then you can stop using routine antibiotics in the broiler progeny for "post vaccinal reactions." Horizontal infection of broiler flocks is not a big problem compared to vertical infection.

Of interest is what to do in live vaccinated flocks when they get a respiratory virus infection (LPAI, TRT, ND, IBV). The natural reaction is to give these flocks antibiotics but if we go to the doctors now days and they tell us that we have viral respiratory syndrome we don't automatically get antibiotics. I suspect that we should not bother to treat these flocks. (test it yourself – treat half the flocks and see if it gets better faster than the untreated half).

As the pressure to reduce antibiotic reliance increases in food animal production we need to capitalise on our investments. One big problem I see is there are improvements in mycoplasma control with better quarantine and bio secure facilities and the supply of mycoplasma free replacement stock, but people still keep using antibiotics. (the use of live vaccines here can be looked at as insurance). We have to be brave enough to stop using antibiotics when we have a solid alternative strategy in place.

So perhaps the measure of successful mycoplasma control is bird health and performance without the use of antibiotics (not serology or DIVA PCR monitoring in birds vaccinated against mycoplasma).