Practical mycoplasma control for poultry production in Asia

In modern chicken production systems mycoplasma have to be controlled or the losses are too great. Practical control in Asia has been mainly by antibiotics in all sectors but this is changing. Freedom is not possible at the commercial level in many parts of Asia without antibiotics so vaccination has been tried. The lack of vertical integration in some markets means that commercial concerns are also a feature.

by Chris Morrow,
Global Technical Manager,
Bioproperties Australia.
www.bioproperties.com.au

Maternal antibody is interpreted by customers as evidence of contaminated parent stock (Fix – killed vaccine and argue that high uniform antibody equals quality).

Live vaccines are state-of-the-art where freedom is impractical but mucosal immunity is poorly understood and a combination with antibiotics and/or killed vaccines may be antagonistic. To maximise the health and economic benefits and minimise antibiotic dependence and antibiotic resistance problems mycoplasma control needs to be viewed in an integrated manner from GPs to final product.

Reliance on antibiotics

For a long time practical mycoplasma control in Asia has relied on antibiotics. This has been successful but is expensive and becoming more expensive (especially if newer antibiotics are having to be used) and non-sustainable in the long run due to acquired antibiotic resistance in target and non-target organisms. Also for integrations exporting poultry products or supplying certain food chains and supermarkets there is now customer resistance and barriers emerging to continued dependence of antibiotics.

Mycoplasma freedom (MG and MS) has been tried in Asia but often in combination with routine antibiotic treatments confusing what is actually providing the protection or only suppressing the infection and serological responses and impacts. Indeed, in my experience the mycoplasma status of many production flocks is unclear despite serological testing. This is even worse in flocks vaccinated with killed or live vaccines where serology is the only monitoring available.

Laboratory experiments predict that resistance to quinolones would develop the fastest and this is what has been observed in India and Thailand in MG with enrofloxacin but we are also seeing emergence of tylosin resistance in Asia corresponding to high usage patterns.

Antibiotic cross resistance

Antibiotic cross resistance makes these problems more significant. Resistance to one antibiotic means that resistance to other related antibiotics is likely. Unfortunately traditional antibiotic sensitivity testing requires mycoplasma culture and further sophisticated techniques not readily available in Asia.

Recently it has been suggested that antibiotic resistance can be assessed in the field by doing PCR before and two weeks after therapy – a failure to decrease PCR positivity would suggest the treatment is having no effect. This should be trialled more widely in the field and could be particularly useful in Asia.

Live and killed vaccines are mycoplasma species specific so MG and MS require separate vaccines, whereas antibiotics will potentially control both (except erythromycin which has no effect on any MS strain investigated to date) and may even more broadly control other bacterial infections like Brachyspira, Avibacterium, Pasteurella, Salmonella spp. including gallinarum and E. coli. This non-specific control further strengthens antibiotic dependence.

Vaccination with killed vaccines will make humoral antibodies but this is of little use stopping infection in vaccinated birds or their progeny and in preventing horizontal and vertical transmission. Killed vaccines can have suppressive effects on systemic clinical diseases and can be combined with antibiotic programmes (again in this situation one wonders if antibiotics alone would be just as effective). Worldwide the use of killed mycoplasma vaccines is contracting to Asia and commercial layers. Indeed in Western countries these vaccines are being phased out by large vaccine manufacturers as customers become more sophisticated. Less sophisticated European customers are being switched to multivalent vaccines with mycoplasma components which can be manufactured and sold with no proof of efficacy. It is common to make these autogenous vaccines multivalent to justify permitting and including other antigens such as Gallibacterium, and even Red mites (Dermanyssus).

Previously the dogma about MS is that 'our local strains are apathogenic' but this is often concluded for a variety of reasons including no synovitis is being seen (few MS strains cause synovitis), or the breeding company supplying the stock told them this (if they cannot control it then they need to talk it down) or effect on egg FCR is not evaluated, or antibiotics are masking the effects (antibiotics in-eggs out) or progeny effects are not evaluated.

The realisation that MS infection in broiler integrations may be underlying problems like 'cheesy' chicken in Germany (previously thought to be ORT), the need to decrease antibiotic medication, as well as glass top eggs and decreased FCR in commercial layers has created demand for MS control.

Live mycoplasma vaccines

Live mycoplasma vaccines all have different properties and are not interchangeable without consideration of these differences.

Live vaccination with MS vaccines is getting more widely adopted all around the world except North America where demand is strong (permitted use) but regulatory inertia is slowing down adoption.

This demand in Europe has been further augmented by recent pressure to decrease antibiotic usage by regulators. The current MS vaccine on the market is a temperature sensitive vaccine (MSH) but MSD has registered a strain MS1 in Europe, Philippines, Thailand, Japan and Mexico but product is yet to be available. From some

Continued on page 37

Continued from page 35
patents MS1 appears to be resistant to tetracyclines which would be a regulatory hurdle in some countries.

Live MG vaccines with a global presence include F strain, 6/85 and ts-11. F strain has two global suppliers (Ceva and MSD) and some local suppliers (F strains in China etc) but as they do not come from the same seedlot or passage levels they should be considered separate products with potential separate properties.

Some of the descriptions of F strain in the literature refer to properties at 200 passages in vitro and may not be applicable to commercial vaccines (but after bird to bird passage in the field many of the old report problems of F strain can re-emerge. My experience is that one integration in every country using F strain in breeders will have problems in the vaccinates and progeny, while most of the others will have no problems).

F strain and 6/85 have not been used in breeders in the USA in the last 30 years because they have been found to persist on sites or horizontal transfer to surrounding farms but F strain has been used in high challenge areas around the world but with little assessment of efficacy and often evidence of residual pathogenicity in vaccinated flocks and their progeny.

In many Asian markets F strain dominates layer sections, while ts-11 is used in breeders. All current live mycoplasma vaccines are sensitive to all anti-mycoplasmal antibiotics and antibiotics given at the time of vaccination or after vaccination will affect vaccine populations.

It is thought that the mucosal immunity generated by vaccines is short lived unless constantly boosted by the presence of the vaccine strain.

Antibiotic regimes

Antibiotic regimes that are effective against wild mycoplasma strains (for example one week of treatment every 4-8 weeks in lay) will certainly affect the vaccine population and if challenge is by a resistant strain and vaccinal immunity has been decreased then neither the antibiotic or the vaccine will prevent wild strain infection.

This was seen in Indonesia with F strain and tylosin not preventing MG infection (presumably with a tylosin resistant strain of MG).

A pox vectored MG vaccine has been marketed for nearly 20 years but there is little published information on its properties and in most markets it has a tendency to be used for one year and then dropped with no benefits being experienced. Certainly this was the history in layers in California in the last decade of the last century and every other market since then. The idea that this vaccine can be used to augment another vaccine is without supporting evidence.

In making decisions about which vaccine to use in Asia one needs to consider the following:

- What is the aim: to control MG and MS with no routine antibiotic administration?
- What vaccines are available: for example lack of MS vaccine in Taiwan and Southern China where infectious synovitis due to MS is a real problem in yellow chicken production means the current strategy for MG and MS control must be to use antibiotics where this is a problem.
- The status of the flock to be vaccinated (infected flocks may need to be medicated first).
- The total cost of the options. Cost of vaccines, cost of antibiotics, cost of testing and expected returns including subclinical benefits (FCR of egg production).
- Risk of challenge and properties of local challenging strains.
- Other vaccines or treatments being given to the flock. Combinations of live and killed vaccines may be antagonistic or a waste of money.
- The quality of the product being produced:
  - MG and MS free day old chicks mean broilers can be grown with less antibiotic dependence and stronger NDV vaccines can be used.
  - Better shell quality.
  - Less peritonitis in breeders and layers at the beginning of lay. ■