AVIAN MYCOPLASMA CONTROL – CENTRAL FOR ANTIBIOITIC INDEPENDENT PRODUCTION

C.J. Morrow

Bioproperties, 36 Charter St, Ringwood, Vic. 3134 Australia
Corresponding author: chris.morrow@bioproperties.com.au

SUMMARY

The effects of avian mycoplasma infections are overt disease (often chronic), subclinical losses and antibiotic dependence. Routine administration of antibiotics in broilers at 18-22 d was developed to prevent chronic respiratory disease in vertically mycoplasma infected broilers. The timing of this administration is after all the birds are infected but before overt disease occurs. The routine administration of antibiotics to layers (and in some parts of the world breeders) every four to eight wk during lay is to similarly knock back mycoplasma on a regular basis. Mycoplasma infection freedom (MIF) was developed as a strategy to prevent these problems. It has one big problem which is that the birds in uninfected flocks are totally unprotected against infection. Live vaccines that are safe (low transmission) and efficacious (protecting against wild strain disease) can provide the additional benefit of increasing the resistance of flocks to mycoplasma wild strain infection. This is particularly important where neighbouring operations may not have the same priority on controlling both *M. gallisepticum* (MG) and *M. synoviae* (MS) and challenge is continuous. Having vaccines to protect against both MG and MS infection means that no antibiotics are needed. Other infections that routine antibiotics have controlled include *Brachyspira*, *Avibacterium*, and *Pasteurella* but these can be attacked with biosecurity, other interventions and vaccines as well and are not the universal problems that mycoplasma infections are. MIF is at the core of being able to farm poultry and egg layers in modern production systems without dependence on routine therapeutic antibiotic administration and perhaps with vaccination should be considered state of the art in high risk areas.

INTRODUCTION

In chickens, MG and MS are chronic infections that have been causing big problems including disease, production inefficiencies and antibiotic dependence since the development of modern production systems. Although a lot of people have the opinion that MS infection has little impact in layer, or sometimes even breeder operations, this opinion has to be interpreted with an understanding of the antibiotic use in the organisation. Sometimes production people look at antibiotics in-production out whereas the veterinary view is antibiotics in- production out- therefore a bacterium is part of the problem.

Morrow (2014) described the rationale behind mycoplasma control being central to reducing antibiotic dependence in poultry industries. This paper will look at examples where antibiotic reduction has followed introduction of MS control by MSH vaccination and total mycoplasma control by MSH and ts-11 vaccination.

MATERIALS AND METHODS

Case studies of antibiotic reduction from introduction of live mycoplasma vaccination. Case studies on the impact of the introduction of live mycoplasma vaccination on antibiotic usage were collected from individual supervising veterinarians (Table 1) in various parts of the world. Most were where MS associated disease was confirmed and antibiotics had been used for a long time with varying degrees of success in controlling clinical signs. The US study was where MSH vaccine was used under permit.

One study in Indonesia looked at a straight substitution from F strain vaccine and antibiotic to MG ts-11 and MS MSH vaccine with no antibiotic in a large poultry company with broiler breeders and layer breeders. The data presented concerns the broiler breeder side of the company and does not include benefits past DO broiler chicks or layer information. The DOC price here was chosen as 30 cents per chick while the feed price was $700/ton.

Estimate of the total antibiotic usage in Europe combating MS infection. Using previous data on the prevalence of MS infection in the Netherlands (1), a dose rate of 25 mg/kg and treatment regimens typical of European production systems, an estimate of the total amount of antibiotic used against MS in the EU was made. No estimate was made for antibiotic use benefits in broiler progeny production.

RESULTS AND DISCUSSION

Indonesian case study. A Cobb PS programme with 800K PS was having problems with respiratory disease despite using extensive

antibiotics and F strain vaccination. No diagnostics were undertaken. The results were dramatic with a cure of clinical signs (perhaps they were having problem with tylosin resistant mycoplasma) (4).

An estimate of the amount of antibiotic used to combat MS infection in Europe. The accuracy of this estimate is hard to assess but it is a starting point. Over the years of use of these vaccines in Australia the dependence of the poultry industries on routine antibiotics given at therapeutic levels has markedly dropped.

Anecdotally the introduction of MSH in Iran with extensive use in broiler breeders was associated with one million dollars, wholesale price, of tylosin (generic) expiring in storage.

CONCLUSION

The economic benefits of mycoplasma control, especially mycoplasma control in layers needs to be revisited. The effects reported on FCR in the conversion of feed to eggs (5) or saleable chicks need to be confirmed. Indeed studies on this effect from MG infection also are warranted. The reduction in feed costs pays for the vaccination in real time – each feed bill – independent of the market prices realized for products.

With the push for a reduction in antibiotic dependence in poultry production systems, live mycoplasma vaccines need to be considered as a tool. These examples show that live mycoplasma vaccination of breeders and layers (in areas of significant challenge) can be expected to reduce the dependence of these industries and perhaps broiler production as well on the dependence of routine antibiotic treatments. The secret is to stop/review use of antibiotics after the introduction of vaccination (and not to combine the vaccination with killed mycoplasma vaccines). MIF needs to be updated to include considering vaccinated breeder flocks as being mycoplasma free for regulatory purposes or a new category (vaccinated).

REFERENCES

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Table 1. Case studies with MSH.

Country (when)	Segment/size	Problem	Antibiotic reduction
Germany 2008-9	Broiler breeder 250K breeders	MS infection post transfer to rearing site	Reduction of 34 to 73% of antibiotic usage in breeders and 13.5% in broilers post MSH introduction
South Africa 2008-9	Layer rearing 1 M layers	Infectious synovitis with vertical infection of layers	100% reduction in antibiotic (aivolsin/doxy/tiamulin) use post MSH introduction
Mexico	Broiler breeders and broilers	Airsacculitis in broiler breeders and broilers	Elimination of enrofloxacin treatment of broilers and tylosin treatment of breeders after MSH introduction into broiler breeders.
USA 2009-2010	Broiler breeders 82K breeders	MS infection and airsacculitis and vertical transmission to broilers	Elimination of CTC and tylosin use and better control of field challenge by MS after MSH introduction.

These studies were compiled for submission to the EMA to support the registration of MSH in 2011.

Table 2.

Parameter	**Before: on F-Strain Upto 2012**	**After: on TS-11/MS-H From 2012**	**Cost savings on new programme (USD)**
Respiratory health	Clinical respiratory disease	No respiratory signs in vaccinated birds	
Antibiotic usage	Routine – every six wk in feed Tylosin Placement Medication with Tilmicosin and Enrofloxacin	None Placement Medication with Tilmicosin to flush before vaccination	+ $85, 000/year
Saleable chicks to 68 wk	140 chicks	162 chicks	+$3.50 Avg chick price: $0.30
Feed required to produce one chick (from production onwards)	325g/chick	285g/chick	+$0.30/ chick
Hatchability	89% peak with average 84.2%	92% peak with average 89%	
Airsacculitis in pipped embryos.	>35%	Up to 20% but good hatchability	
Chick quality		Improved	
Cumulative Mortality	10.2% (Female) 19.1% (Male)	8.3% (Female) 16.5% (Male)	Less peritonitis in breeders observed in PMs.

Table 3. Antibiotic usage against MS in Europe- 2011 estimate.

Sector	**Number**	**MS incidence***	**Antibiotics**
Broiler parent stock (and GP)	14 M	35%	5.3 tons
Rearing from infected GP stock	4.4 M	100%	1.2 tons
Broilers			No estimate
Layer	264.8 M	73%	59.6 tons
Layer rearing from infected parent stock	99.5 M	100%	12.4 tons
		From Feberwee	
Total antibiotic			78.5 tons