

Vaccination of Turkeys with MSH and ts-11 vaccines

Vaccination of turkeys with live mycoplasma vaccines has not been very successful to date. F strain has significant pathogenicity in turkeys to the extent that it can not be used in chickens near turkey farms because of the risk of horizontal transmission. Apart from one report from Italy (Alessandri *et al* 2005) ts-11 has not been successful when used in turkeys and it is not currently used even in Italy. The usual experience is that turkeys are not colonized with the ts-11 vaccine. The live *M. synoviae* (MS) vaccine MSH has been shown to be safe and efficacious in turkeys (even by spray application) in the laboratory (Noormohammadi *et al* 2006) but no reports of field experience have been available until recently. This bulletin brings up to date our recent experience with MSH and ts-11 in Turkeys.

Table 1: Laboratory studies on MSH in Turkeys (adapted from Noormohammadi *et al* 2006)

	Vaccine Parameter	Result	Conclusion
Safety	Spray or eyedrop at the MRT of commercial vaccine	No clinical effects Weak serological response	SAFE No airsacculitis No joint disease No tracheitis
Efficacy	Colonization of the trachea	Colonization	Better results with aerosol than with eyedrop
	Serological response	Moderate serological response	Not a DIVA test and serology is probably not the mechanism of immunity
	Protection against tracheitis following aerosol challenge with virulent strain	Both eyedrop and spray vaccination significantly decreased clinical signs and pathology with virulent MS challenge	Better protection with aerosol vaccination

Whether aerosol vaccination as done in this laboratory experiment could be replicated in the field was not known. Gross lesions only occurred in half the birds challenged in the control group but this was without other aggravating factors (for chickens this experiment would usually have IB added to the challenge model).

MSH was developed in Australia but MS is not a recognised problem in turkey production in Australia so field trials could not be organized in the original registration jurisdiction. In Europe and some other intensive turkey growing areas MS can be a significant problem triggering respiratory disease (often nowadays in combination with ORT) and locomotory problems, primarily infectious synovitis. The losses here were thought to be due to the high medication costs and slaughterhouse condemnations.

MS is a big driver of the need to use medication in turkey production in some operations in Europe and there is currently a push to decrease antibiotic dependence of animal production here. In contrast to chicken broilers turkey broilers production life is long enough for vaccination of these broilers to be an option.

Recent Netherlands Trial

It has recently been reported that vaccination of turkey broilers with MSH vaccine by eyedrop or by spray allowed a reduction in antibiotic use during rearing of these flocks (Van Meirhaeghe *et al* 2015). The study looked at 6 cycles of production on a 5 shed multi-age farm in the Netherlands comparing three production cycles before vaccination with three cycles with MSH vaccination. During the 3 cycles before the introduction of vaccination locomotory problems occurred. Data was collected on mortality, clinical symptoms and all antibiotic usage throughout the study. Before vaccination at 4 weeks flocks were tested for MS infection by PCR of tracheal swabs (5 pools of 5 swabs). If MS positive at this stage an antibiotic treatment was undertaken before vaccination. The PCR tests for MS infection were DIVA and included sequencing of *v/hA* gene or sending the samples to Deventer laboratory for MSH DIVA PCRs.

In the first flock the males were vaccinated by eyedrop and the females by sprayed by a fogger (females were slaughtered earlier at 16 weeks of age). Later flocks males only were sprayed with a Birchmeyer and only males were vaccinated: coarse spray 1.3mm spray head, 100-50µm.

Field Trial Results

No vaccination reactions were seen and a complete absence of MS associated clinical disease in vaccinated turkey flocks and no antibiotic treatments for MS signs were needed in these flocks. Overall antibiotic use was decreased by more than 50%. No MS field strains were detected in vaccinated flocks by *v/hA* or GD field strain specific PCR. At 12 weeks of age MSH could be demonstrated in vaccinated groups. At 21 weeks the MSH strain could be detected in vaccinated males (slaughter age). Field strain was detected in the first unvaccinated females contemporaneous with vaccinated males but not in the final group.



Fig 1: Airsacculitis – main pathological problem with MS infection

Table 2: Comparison of results of first vaccinated batch with the previous batch

Placement date		01/10/2013	04/02/2014	Comment
Vaccination		No	Males by eyedrop Females by spray	MS negative at vaccination
Mortality	Females	4.43%	1.99%	To 16 weeks
	Males	11.93%	11.45%	To 21 weeks
				Condemnations in males associated with ORT airsacculitis
	Total	8.18%	6.17%	
Cost of vaccination and medication		€0.64 per bird	€0.47 per bird	Some medication was still used for gut health reasons.
Profit per bird		€3.64 per bird	€4.16 per bird	

Table 3: Overall results comparing vaccinated males (3 batches) with unvaccinated males (3 batches)

	Mortality	Slaughterhouse condemnations	Antimicrobial use *ADD
Non vaccinated cycles	8.93%	6.32%	49.1
MSH Vaccinated cycles	7.41%	4.82%	18.4
Reduction	17.1%	23.8%	62%

*ADD Animal Daily Dose – percentage of their life expectancy that animals receive one daily dose of antibiotics.

New developments in MG vaccines for turkeys

MG ts-11 has not been successfully used in turkeys to date but studies on the vaccine and in chickens have suggested that the initial colonization is the problem. Only a small fraction of the organisms in the vaccine express the GapA attachment protein and without this they can not attach (Shil *et al* 2011). We are currently re-engineering the GapA expression in ts-11 and initial studies are going well and this improved vaccine should emerge from our product pipeline soon for turkeys and chickens.

Conclusion

Field experience with MSH shows promising results at the turkey broiler level. Breeder vaccination may be possible. Whilst ts-11 in turkeys is currently not effective, an improved vaccine is in the pipeline.

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