

TRT IN THE FIELD: FIELD SITUATION AND CONTROL

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Introduction

TRT was first observed in the UK during June 1985, in the eastern part of the country spreading slowly north and then arriving in the west of England during November 1985. The disease caused respiratory symptoms often with high mortality and appeared identical to the disease that had been seen in France since 1981.

Early Days

The Sun Valley Company situated in the West was affected during November 1985 and within a few days the disease was present in all types of turkey stock, commercials, parents and grandparents. The mortality was often very high in this completely susceptible population, varying between 3% and 15%. My records show that at that time we had to adjust mortality budgets up to 25% losses in stags [toms] to 20 weeks, and 20% in hens to 16 weeks. Clearly this situation could not be allowed to continue.

At that time the infectious agent was assumed to be a virus, but it had not been isolated, despite considerable effort, especially in France.

Methods of Control

In February 1986, we started moving infected birds to farms with young birds of 2-3 weeks of age and to try to encourage early infection and immunity. Also nasal washings from infected birds were made up and used to artificially infect young birds. The disease could still be severe in young birds, but at least financial losses at this age were not as drastic as those caused by late mortality.

However, this procedure proved to be too hit and miss and obviously entailed all sorts of other risks to farm biosecurity.

By June 1986, a virus, which grew on tracheal organ culture, had been isolated and became available through Dr. P. Wilding of B.U.T. It was found that birds infected with this material experienced a relatively mild form of disease and hence immunity.

Desperate measures were needed to resolve a situation that was fast becoming an industry crisis, so a small number of veterinarians started growing this virus and using it to immunise poults. We inoculated 5 birds per 1,000 on farm at 14 days of age. These birds then transferred infection to others resulting in a mild disease with much lower mortality than from natural infection. In general, using this procedure our mortality from TRT was reduced to 3% for males and 1% for females.

By February 1987, an organ culture vaccine which had undergone 50 passages was available and this reduced our mortality from TRT to 1% in males and 0.5% in females. This gave total losses of 8% in males to 20 weeks and 6% in females to 16 weeks. This restored the situation to commercial acceptability. The procedure was illegal in terms of the Medicines Act, but MAFF reluctantly allowed it as a short-term measure until a licensed vaccine became available.

This type of controlled exposure produced a serological response that began to fall at around 60 days of age and was then followed by a sharp rise, suggesting a field challenge at about 70-80 days of age. This was often associated with coughing but no mortality (see Table 1).

Table 1. Results of longitudinal serological survey for TRT		
Flock	Age (days)	Titre
A	56	6.9
A	80	4.3
A	99	16.5
A	111	0.0
A	141	12.6
B	39	7.0
B	63	8.1
B	84	16.9
B	140	13.5
C	39	8.9
C	63	8.8
C	83	7.2
C	107	16.3
C	142	13.1

The pattern of clinical signs and immunological response has remained essentially unchanged for the past 10 years. The licensed live vaccines all tend to cause a mild respiratory reaction, sometimes with mortality.

Management Factors

A number of factors have a definite influence on the severity of the disease. Stocking levels per brooder are especially important. No more than 300 poult per standard brooder is ideal. In general reduced stocking density in a shed helps to minimise the reaction. However it is still perplexing that in a shed divided into two pens, mortality can be high in one pen and low in the other, when all the birds occupy the same air space!

There is no question that ventilation is critical in minimising the reaction to vaccine or field infection. The reaction of the turkeys to infection is to huddle together, perhaps looking for warmth, but this tends to create an area of stale air around them, which must be removed by adequate ventilation. Thus there is a delicate balance between the birds' requirement for heat on the one hand and fresh air on the other. I can only assume that there are subtle differences in the microclimate within a house that can result in different mortality in pens within the house.

The ideal stocking density to minimise effects of TRT will vary according to house design and must be determined by each individual company or grower. It is important not to overstock young birds in the brooding facilities up to 6 weeks of age. The number of bodies in a given space is more important than the weight of birds per unit area.

Other management factors, which help to control TRT also, apply to most other diseases. For example, sufficient turn-round time and satisfactory terminal hygiene have been found to be essential in the control of turkey poult enteritis and stunting syndromes. Effort on these aspects of hygiene has helped considerably with TRT control.

Reservoirs In Broilers And Broiler Breeders

As has now been well described in the literature, the TRT virus can infect broilers and broiler breeders causing Swollen Head Syndrome. These birds can act as a reservoir of infection for turkeys where the two species are kept close together. This was particularly significant for companies that farmed both species.

Soon after TRT infection was diagnosed in turkeys, a disease was observed in broiler breeders, characterised by peritonitis and pronounced nervous symptoms, typically with torticollis. Usually there was a drop in egg production. The head was swollen due to subcutaneous oedema and the infection spread into the cranial spaces and middle ear. In broilers, head swelling was due to subcutaneous oedema with no middle ear infection. Middle ear infection was the cause of nervous symptoms and loss of balance in breeders. This is also a feature of pneumovirus infections in other species.

Vaccination

The first vaccine for TRT was licensed in September 1989. This meant that the industry had had to wait 4 years from the first appearance of the disease to the time a licensed vaccine was approved. This was despite isolation of candidate viruses at Houghton and elsewhere as early as February 1986. During those 4 years we had to make do with controlled exposure and then latterly, extensive vaccine trials.

When experimental vaccine was first available, it was given either by spray at 5 days or by eye

drop at day old. Birds were released from brooding rings at 5 days, so it was convenient to vaccinate them while they were enclosed in that space.

Gradually vaccination regimes have been revised so that after many trials we have found it best to give vaccine at day old in the hatchery in a spray cabinet. Some producers combine the 'A' and 'B' type vaccines together. Although both manufacturers of the 'A' type vaccine have demonstrated that their vaccines protect against both strains, there is perceived to be a benefit in using both strains. If required, Newcastle disease vaccine (mild Ulster strain) can be given combined with TRT at day old. The size of the orifice plate on the sprayer is 10 microns delivering 25ml per box of 100 poults.

No further doses of TRT vaccine are given to commercial birds. Breeding birds are usually given two doses of killed vaccine at about 18 and 26 weeks of age to prepare them for lay.

It is now standard practice to vaccinate broiler breeders with live vaccine at about 10 weeks and killed vaccine at 16-18 weeks. This gives good protection.

Broilers may receive vaccine depending on the field challenge, which will vary in different parts of the country. My experience has shown that there are certain broiler farms that will benefit from vaccination but generally the cost does not justify continued use.

Vaccine Reaction

All the live vaccines produce a noticeable vaccine reaction at approximately 2 weeks after administration. Usually the birds start to 'snick' and cough and have swollen sinuses and a frothy discharge from the eyes. With luck the birds recover, but in a significant number of flocks, septicaemia with *E. coli* infection develops. Mortality can be as high as 8% in the worst cases but this would be unusual. If birds are given feed medication with, for example potentiated sulphonamides over the period when the vaccine reaction is expected, this helps to reduce the mortality. Otherwise cases must be treated on an individual basis with antibiotics in the drinking water.

The unpredictable nature of this vaccine reaction is a disadvantage with all TRT vaccines and this problem may not be resolved until a genetically engineered vaccine becomes available.

Field Study

For several years now the turkey industry has funded work carried out by Dr. David Cavanagh and his colleagues at the Institute for Animal Health at Compton. Several longitudinal studies have been carried out using the RT-PCR (reverse-transcriptase polymerase chain reaction) test in commercial flocks and relating the results to mortality from respiratory disease. All of these flocks received TRT vaccine at day old and it was found in all that after an early period of detection of vaccine virus, all flocks were challenged with 'B' type field virus after about 35 days (Table 2). In flock 3, there was a rise in mortality associated with the challenge with 'B' type virus as shown in Figure 1.

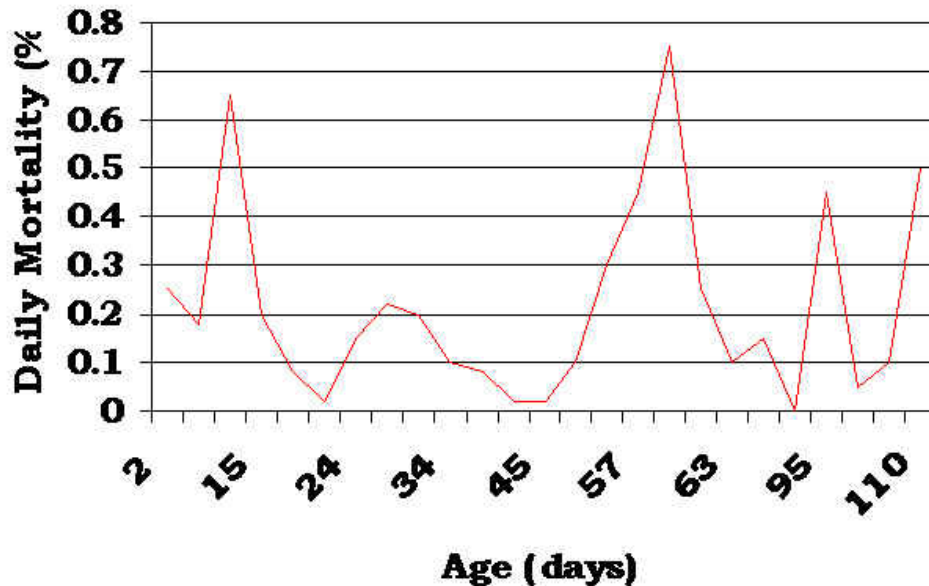
Table 2. RT-PCR detection of type A and B ARTV in several growing units

Unit	Vaccine	Season (year)	PCR period*(days)	Age virus Detected (days)	Type of virus detected	Mortality after virus
1	Intervet (A)	Autumn (1994)	81	7-21 35-42	A B	+ -
2	Solvay (A)	Spring (1995)	99	16-23 37	A B	? ?
3	Solvay (A)	Spring (1995)	120	22-35 50 105	A B B	+ + +
4	None	Spring (1995)	67	67	B	?
5	Intervet (A)	Spring (1995)	72	21-35 32-35	A B	+ +
6	Rhone Merieux (B)	Summer (1995)	49	14-17	B no field B up to day 49	+ ?

*PCR period means the maximum period (days) over which swabs were analysed by the RT-PCR.

This is a pattern that has been reported consistently in the field. Characteristic lesions in dead birds are air sacculitis, pericarditis, peritonitis and pneumonia. E. coli is usually the bacterial infection involved and prompt administration of the appropriate antibiotic results in a good recovery. After this episode, it is rare to see any further respiratory disease through to slaughter age.

Figure 1. Mortality (%) and detection of avian pneumovirus (type A and B) in unit #3 where type A vaccine had been given at one day of age



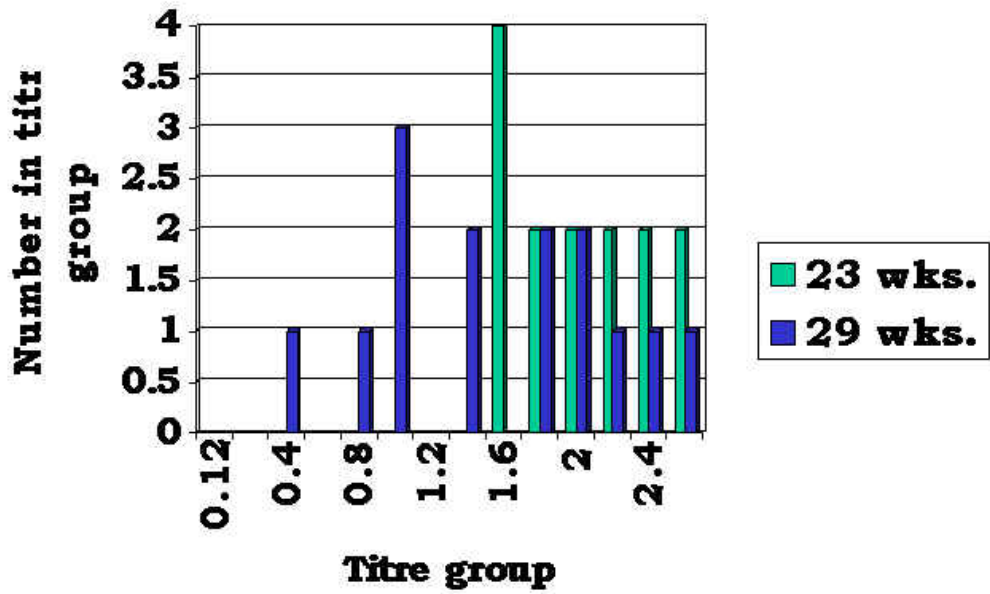
Use of Serology

There are several kits available commercially, which make ELISA a test straightforward to carry out and testing has become part of routine serological monitoring. Some kits are more sensitive to 'A' type virus, some to 'B' type and some detect antibodies to both virus types. Serological testing can be useful for detecting infection with field virus and also the response to the inactivated vaccine given to broiler and turkey breeders. It is not, however, a reliable measure of antibody response to live vaccine. Thus it would not necessarily be appropriate to make decisions on flock immunity based on ELISA tests in birds which have only received live vaccine.

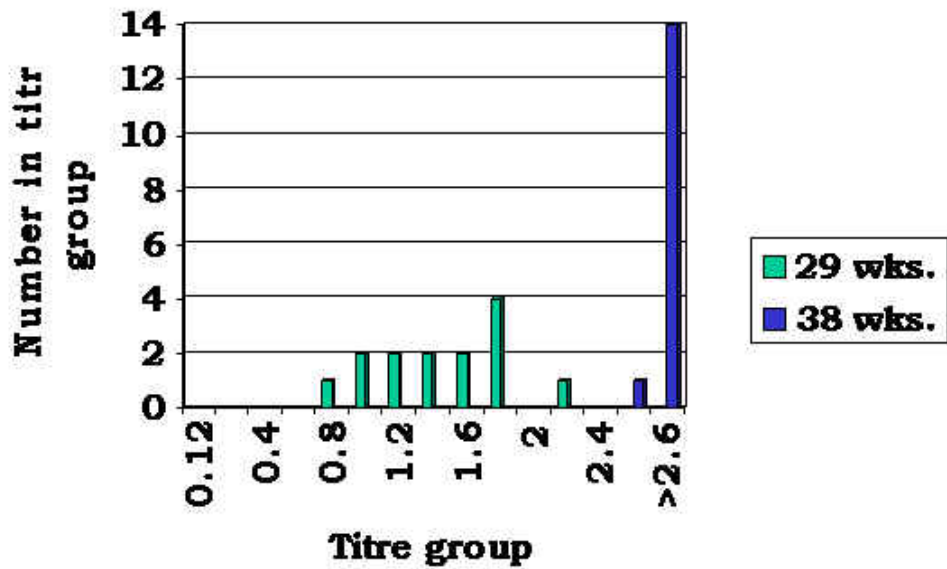
Some typical ELISA profiles for TRT are shown below. Figure 2 illustrates a typical serology profile of a broiler breeder flock at 23 and 29 weeks. There is no rise in TRT titre. A field challenge occurred in a turkey breeding flock causing a rise in titre between 29 and 38 weeks (Figure 3).

Figures 2. A typical TRT serology profile at 23 and 29 weeks of age from an

unchallenged broiler breeder flock



Figures 3. TRT serology profile at 29 and 38 weeks of age from a field challenged turkey breeding flock



Conclusion

There is sufficient information about the epidemiology of avian pneumoviruses to allow reasonably good control of infections in the field. However, the problem of vaccine reaction in turkeys and field challenge at about 6 - 10 weeks of age means that the effectiveness of these control measures can be rather unpredictable.