

FEATURE ARTICLES

CONTROL OF POULTRY DISEASES: THE U.K. EXPERIENCE*

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Irrespective of the causal agent, the control of any disease requires a number of basic elements. There are:-

1. A knowledge of the epidemiology of the disease.
2. Provision of adequate diagnostic facilities.
3. A high standard of hygiene and husbandry.
4. Effective vaccines.
5. Results of research must be publicized, preferably through an extension officer who provides the link between the farmer and the diagnostic laboratory and state veterinary service.
6. Voluntary/State Control Scheme/legislation.

It may not be possible to satisfy all these criteria and the disease control program e.g. eradication may make some of them unnecessary.

Introduction of infection

Disease may be introduced into a flock by the following routes:-

1. Purchase of infected birds, these may be birds incubating the disease or carriers, as occurs with *Salmonella gallinarum*. A number of diseases can be transmitted through the egg.
2. Visitors, workers, owners and veterinarians may all spread disease on their clothing and footwear. Similarly crates and equipment must be thoroughly cleaned and disinfected.
3. Food and water can become contaminated during outbreaks of disease, as may the litter or soil in which some organisms survive for many months.
4. Improper disposal of carcasses, eggs and litter may perpetuate infection, as may inadequate disinfection.
5. Mechanical ventilation may give rise to wind-borne infection which may spread to adjacent houses and other units.
6. Other species of domestic birds and wild birds may also spread the disease.

Disease Control Strategies

A number of courses of action are possible, these include:-

1. Eradication by slaughter. A policy of this type may be necessary where the disease is acute or the disease is newly introduced into a country.

*This paper was delivered in a Seminar when the Author visited SUA, Morogoro, Tanzania, January, 1988.

2. Vaccination programs.
3. Prophylactic use of antibiotics.
4. A combination of the above.
5. Control may also be imposed by trade requirements.

It should always be borne in mind that whatever strategy is adopted it must always be accompanied by good hygiene and husbandry.

Two important poultry disease namely, Newcastle Disease and Fowl typhoid, provide good models for illustration of disease control programs.

Newcastle Disease

Nine avian paramyxovirus serotypes are recognized of which the viruses responsible for Newcastle form serotype PMV-1. The strains of Newcastle Disease virus vary in their pathogenicity and a number of disease syndromes are seen.

- a) Viscerotropic velogenic (Doyle's form) - highly pathogenic in which haemorrhagic lesions are common.
- b) Neurotropic, velogenic (or Beach's form) - high mortality with respiratory and nervous signs.
- c) Mesogenic (or Beaudette's form) - respiratory signs, occasional nervous signs with low mortality.
- d) Lentogenic respiratory (or Hitchner's form) - mild or inapparent respiratory infections.
- e) Asymptomatic enteric; usually inapparent enteric infections.

It would appear that carriers do not develop in poultry, although it is possible that other species of birds, e.g. psittacines, may become carriers and infect poultry.

It must be stressed that pathotype groupings are rarely clear-cut and considerable overlapping may occur. In addition, the milder strains may show heightened virulence when other organisms or adverse environmental conditions are present.

Control

Control in the United Kingdom is by prophylactic vaccination. Affected flocks are isolated in the event of an outbreak with legislation for slaughter for exceptionally virulent (peracute) outbreaks.

A number of vaccines are available, these include:-

1. Live vaccines
 - a) Hitchner B2 strain, the least virulent vaccine and the only live Newcastle Disease vaccine permitted in the United Kingdom.
 - b) La Sota strain, this is a more "virulent" vaccine which should only be used when the birds have been primarily vaccinated with Hitchner B1.
 - c) AG68L a lentogenic strain which has been used in Iraq.
 - d) V4 - an Australian lentogenic strain which has been used successfully in Malawi.

- e) In addition there are a number of live mesogenic vaccine strains, but since they are pathogenic in susceptible chickens under 8 weeks of age, their use should be discouraged.

2. Dead vaccines

Dead vaccines are usually prepared from infectious allantoic fluid inactivated with formalin or beta-propiolactone and incorporated into an emulsion with mineral oil. Many commercial vaccines are polyvalent vaccines containing antigens against a number of poultry diseases.

Administration

Live vaccines may be administered to individual birds by intra-nasal and intra-ocular inoculation but the easiest technique is probably beak dipping. Mass medication can be achieved by use of a spray or aerosol or adding the vaccine to the drinking water although this may not be advisable in countries with high ambient temperatures unless carefully controlled procedures are followed. Killed vaccines have to be administered by injection to individual birds which makes their use costly.

Vaccine Program

Vaccination at over 3 weeks of age is normally only practiced in egg-laying birds and should be at sufficiently frequent intervals to maintain a good immune response. In countries where the disease is endemic the following programs are suggested:

1. Mild sporadic disease

1 day old - Hitchner B₁ -
intra-ocular or spray

18-21 days old - Hitchner B1
or La Sota - Drinking water

10 week old - La Sota -
Drinking water

Point of lay - In activated oil
emulsion

Thereafter Hitchner B1 at 3
month intervals in the drinking
water.

2. Severe - prevalent disease

As above to 21 days

35-42 days - La Sota -
Drinking water/aerosol

10 weeks and point of lay -
inactivated oil emulsion.

Fowl Typhoid - *Salmonella gallinarum* infection

Fowl typhoid is an acute infectious disease of adult birds, especially those at the point of lay; some survivors may become carriers and in 18% of cases transovarian transmission may occur. Consequently self limiting disease may occur in some chickens but in others passive immunity may mask disease symptoms and lead to the development of carriers. The disease may be spread by a number of routes but by far the most important is the carrier bird.

A number of control strategies are available; these are:

1. Culling

- a) Purchase hatching eggs
and day-old chicks from

a n a c c r e d i t e d
S.gallinarum/pullorum free
source.

- b) Kill ailing birds during an outbreak.
- c) During an outbreak blood testing should not take place until all ailing birds have been removed, or until antibiotic therapy has been completed. It should be repeated 2 - 3 weeks later, to detect birds which may have been incubating the disease when the first test was carried out. Repeated blood testing at intervals of not longer than 14 days are often required to eradicate infection and should continue until two clear tests have been obtained.

2. Antibiotic prophylaxis

Antibiotics, usually furazolidone may be administered prophylactically or during disease outbreaks. Treatment should continue for ten days and after treatment the birds should be moved to fresh ground, and placed in clean and disinfected houses in order to prevent recrudescence of infection.

Sometimes, through loss of appetite, ailing birds may not obtain a full dose of the drug; if losses recur after treatment, the antibiotic may be fed for a further 10 days. Even with treatment it is not always possible to eliminate infection and carriers may occur; consequently surviving fowls in

a treated flock should be sold for consumption as soon as this is economically possible. Breeding birds on farms which have been treated during an outbreak should always be blood-tested after treatment, before eggs are collected for hatching. Prolonged antibiotic therapy may give rise to resistant organisms and strains of *S.gallinarum* which are furazolidone resistant are not uncommon in some countries.

3. Vaccination

A live rough mutant of *S.gallinarum* (9R) is available for use as a vaccine. It has given good results in the United Kingdom even when used during field outbreaks. Vaccination is usually carried out at nine weeks of age and will give immunity against heavy challenge for at least 5 months, under field conditions. Carriers may still develop after the use of vaccines and some birds will lay infected eggs. Since the vaccine in a rough strain it does not induce antibodies which interfere with the slide agglutination test and after an outbreak flocks should be checked serologically for the presence of carriers.

4. Hygiene

Carcasses should be cremated or buried in lime. On no account should they be left lying about where other birds and farm animals can have contact with them. The floors of infected houses should be scraped, swept out and the scrapings burnt. Deep litter should be removed, stacked and allowed to ferment.

The walls, floors, nest boxes, utensils etc should be scrubbed with either hot soda solution or a suitable detergent. When dry, the whole should be sprayed with a solution of an approved disinfectant. Infected runs should be dug and dressed with quicklime. Battery cages and incubators should also be adequately disinfected or fumigated, on breeding farms eggs should be fumigated before or during the first 6 - 10 hours of incubation.

Vaccination Programs

Any vaccination program needs to take into consideration:

1. The size of the flock.
2. The life of the flock.
3. The available labour.
4. The economics of vaccination.
5. The presence of maternal immunity which may suppress the immuneresponse, especially that to live vaccines.
6. Other diseases present and vaccines used.
7. The availability of the vaccine.
8. Previous performance of the vaccine.
9. The overall disease control policy.

Having embarked on a program it must always be remembered that various factors may adversely affect the performance of the vaccine. These include:

1. **Incorrect storage:** most vaccines may be stored for up to a year at 4 C. Live vaccines should never be held at temperatures greater than 8 C for more than an hour.
2. The presence of maternal immunity.

3. The coexistence of other diseases e.g. Gumboro Disease or Aflatoxicosis may suppress the immune response.
4. If the vaccine is administered in the drinking water inhibitory substances may be present. Viral inactivation may be prevented by the addition of one teaspoonful dry skin milk powder per 5 liters of water.
5. The vaccine may not contain the protective antigens against the prevalent strain.
6. Antibiotics may interfere with the use of live bacterial vaccines.

Conclusions

There are many poultry diseases against which vaccines are available. However, vaccines alone will not given protection if used incorrectly, stored wrongly or without consideration of the epidemiology of the disease. All control programs must always be accompanied by improved standards of husbandry and hygiene.

Acknowledgements

I should like to thank Dr. D. Alexander, Mr. J.F. Harbourne and Mr. W.J. Sojka for their help in a variety of ways.