NEWCASTLE DISEASE SURVEILLANCE PLAN FOR UNVACCINATED BROILERS

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PURPOSE OF THIS SURVEILLANCE PLAN

To provide the National Newcastle Disease Management Plan (NDMP) Steering Committee with an epidemiologically defensible, risk-based surveillance plan for broilers in any State where vaccination of broilers for Newcastle Disease (ND) is not compulsory, as permitted under the NDMP.

ELEMENTS OF THIS SURVEILLANCE PLAN

A. Surveillance strategy for non-vaccinated broilers

Background

ND vaccination of broilers is no longer compulsory in Queensland, South Australia, Western Australia and Tasmania; however, if producers wish to voluntarily vaccinate their broilers, they are able to do so.

To support the low risk ND virus status (apparent from previous surveys and risk assessments carried out by the ND Steering Committee and its Surveillance Working Group and Risk Assessment Working Group), it is encouraged that regular surveillance must be carried out in all non-vaccinated broiler operations to ensure continuance of low risk status. This active surveillance component is introduced to allow industry in low risk jurisdictions that do not require broiler vaccination to monitor if there is precursor/progenitor strains in the unvaccinated broiler, and to guide biosecurity and vaccination practices.

This requirement has arisen due to the great expansion of the chicken meat industry since the inception of the NDMP. The risks of ND infection are likely to have increased due to the large populations of broilers in proximity to each other, greater movements of these broilers, and the development of large free-range chicken farms. These large populations of unvaccinated broilers are essentially acting as sentinels for the occurrence of the introduction and/or development of ND and therefore must be monitored on a regular basis to ensure that infections are detected and controlled quickly.

Purpose of this surveillance

The purpose of this active surveillance is to identify the presence of precursor/progenitor strain or exotic low pathogenicity NDV.

Explanation: Virulent NDV will be picked up by investigation of disease outbreaks meeting the clinical definition for investigation as outlined in AUSVETPLAN. However unvaccinated broilers are the perfect sentinel birds to identify early incursions of precursor/progenitor strain or exotic low pathogenicity NDV.

Note: As in all jurisdictions, mortality or morbidity fitting the case definition in commercial poultry flocks will need to be investigated in addition to this surveillance plan.

Risk areas/prioritisation

Each jurisdiction needs to determine an effective surveillance plan for the state and requires a detailed knowledge of the populations and locations of commercial poultry.

This needs to be targeted to be most effective in finding the highest risk areas of circulating virus.

The following are risk factors which will help to identify these regions:

- Clusters of chicken farms where differing ages of birds are kept within 2 km of one another (enabling ND virus to continually circulate between farms). This may be a mixture of broilers (differing broiler companies even where some are vaccinated), broilers and layers, or broilers and backyard flocks (with mixed or unknown vaccination status) or broilers and turkeys.
- Clusters of multi-age broilers where some of the farms are in close proximity (<2 km) to major poultry transport routes
- Clusters of multi-age broilers, which are in close proximity (<2 km) to large populations of wild birds or waterbodies
- Clusters of multi-age broilers which are in close proximity (<2 km) to areas where chicken manure is placed (stockpiled, composted or applied to land)
- Clusters of multi-age broilers that have frequent crossover or sharing of equipment, personnel, vehicles and catching operations with other farms, companies or operations

Sampling of a deemed high risk farm, representative of a high risk area, is recommended to occur every 6 months Sampling is to consist of tracheal and cloacal swabs from at least 10 birds from each farm, to be taken 14 – 28 days before blood samples at end of batch.

Positive serology by HI testing is to then proceed to virus isolation and PCR/sequencing testing to determine if there is any presence of progenitor/precursor or exotic low path NDV.

Response to findings of these viruses to be return to vaccination for at least 6 batches of chickens through the farms of all companies involved in the epidemiological unit[1].

After cessation of vaccination, testing is recommended to recommence within six months to ensure that these viruses have been 'swamped out'.

It is important to enhance mortality investigations during this time period. If chickens show signs that meet the following definition, indicative of infection with ND, then appropriate surveillance and sampling must be carried out as required by the State jurisdiction.

MORTALITIES	CLINICAL SIGNS	DECLINES
Unexplained disease-related **mortalities of 1% or more** in 24 hours, after the first week of placement	**Unusual symptoms** in the flock, such as: • Severe respiratory diseases symptoms • Nervous signs • Severe flock depression	Any decline of **5% per day** for 2 consecutive days in one or more of the following: • Feed consumption • Water consumption

[1] An epidemiological unit is defined as - farms where there is a crossover or sharing of equipment, personnel, vehicles and catching operations with other farms, companies or operations.

B. Samples to be taken

The sampling will consist of the following to be taken of healthy chickens[2], from each distinct epidemiological unit[3], without any signs suggestive of infection with ND:

1. Collection of tracheal (or oropharyngeal) and cloacal swabs from 10 birds (10 tracheal and 10 cloacal swabs separately, pooled into 4 vials containing 5 swabs each) for PCR/ virus isolation,

    a. Between 14 days and 28 days prior to slaughter if slaughtering at 50-54 days, or

    b. 14 days before slaughter if slaughtering at 40-49 days of age, and

    c. Can be taken from farm or at the processing plant as long as the sampling ensures a gap of at least 14 days prior to blood sample collection from the same epidemiological unit.

    d. The swabs may be taken from live birds or freshly dead birds on farm or when slaughtered at the processing plant.

2. Collection of 15 blood samples for serology on the farm just prior to dispatch for slaughter or at the processing plant with an approximate 14 days gap from swab collection. Preferably the bloods should come from the same shed as the swab samples, but any shed on the farm will suffice as they are the same epidemiological unit.

The time period of 14 days between the two samples means that if a chicken/broiler showed a positive antibody titre at final slaughter, the swabs from approximately 14 days to 28 days earlier can be examined for presence of genetic material. If the time period between the two sampling were longer (over 28 days), genetic material may not be detectable on those early swabs and for less than 14 days the birds may not have developed sufficient antibody response with a late infection to be detected on the blood samples.

Storage and transport considerations for samples

Swabs that will be used for virus detection (isolation or PCR) should be pooled into 5 swabs per vial for tracheal swabs and cloacal swabs (separately) using viral transport medium that has been kept frozen and then thawed within a day of collection. Samples should be stored and transported chilled (4°C) after sampling (within 48 hours) to a facility where it can be stored at -80°C pending results of serology. For serum, -20°C is also often used without too much long-term effect on antibody levels. For -20°C storage, it is also better to use non-frost-free freezers to avoid temperature fluctuations and freeze-thawing effects.

[2] If broilers/chickens show signs indicative of infection with ND as above, meeting the case definition, surveillance and sampling must be undertaken as required by the state jurisdiction

[3] Described as a group of chickens/poultry under the same management and biosecurity conditions such that disease, should it occur, could easily be spread within the group

C. Diagnostic approach and interpretation of results including follow-up on positive samples from healthy chickens

Note: All laboratory testing associated with this surveillance must be performed in a NATA-accredited and ANQAP/LEADDR PT participating state laboratory or at AAHL. NATA accreditation means accreditation to ISO/IEC 17025 Animal Health. The scope of accreditation must include the applicable services.

State authority operational plans will include the details of the specific laboratories that will be used.

Step 1: Test blood samples by haemagglutination inhibition (HI) or ELISA.

If negative, finish here. There is no evidence that the chickens/broilers have seroconverted to either ND vaccine virus or any other ND virus.

If positive, this could be because:

a) **broilers** have been infected with cycling ND vaccine virus, or

b) parent stock have been vaccinated with live vaccine virus that has been carried over (e.g. on shells, in litter) to the broiler flock (this occurs very rarely), or

c) the broilers have been infected with an Australian strain ND virus of low virulence, or

d) the broilers have been infected with an exotic ND virus of low virulence.

Go to Step 2.

Step 2: Undertake epidemiological investigation on the farm as a priority to check for absence of clinical signs (informed through morbidity/mortality records) and respiratory signs in particular. This is usually done by the farm manager as part of daily inspection of birds. Case definition as follows:

- any broiler shed suffering mortality (not including culling) of 1% or more in 24 hours, after the first week of placement
- any shed with birds with evidence of respiratory signs lasting more than 2 consecutive days
- any shed with birds with nervous signs regardless of the duration

If records suggest that there have been chickens with clinical signs indicative of infection with ND virus, surveillance and sampling must be carried out as required by the State authority.

If there is no evidence of clinical signs, go to Step 3.

Step 3: Because of the positive serology result, examine the swab samples by PCR (and virus isolation if the laboratory is capable). Send any positive swab samples to AAHL. This follow-up is required to determine whether there is evidence of ND genetic material or viable virus, and if so, the virulence potential of the ND virus.

If negative:

a) monitor farm for any clinical signs of disease in the next batch of poultry

b) carry out swabbing on the next batch at 14 days of age, repeating every 7 days until 14 days before final slaughter out and test bloods at final slaughter, and if positive test swab samples. (The previous negative result may have occurred because the virus had been cleared before swabs were taken).

If positive:

- all PCR samples need to be further tested by PCR and/or virus isolation (and ultimately sequencing) to differentiate between virulent ND virus, avirulent precursor or progenitor strains and avirulent non-precursor or progenitor strains; all of which can be determined by AAHL[4].

Virulent virus detection

If the virus is determined to be virulent as defined by the OIE; detection of virulent ND MUST be reported immediately to the state department of Agriculture.

An emergency animal disease (EAD) response will be guided by the AUSVETPLAN Disease Strategy Newcastle Disease.

Decisions will be made by the Control Centre for the Emergency Animal Disease (CCEAD) and National Management Group (NMG) (on advice from the CCEAD).

Avirulent virus detection

Where an avirulent virus is detected the following options are available (as a guide only) and will be determined based on consultation between industry, the relevant department of agriculture and any private veterinarians involved.

If precursor or progenitor strains:

a) Reinstate vaccination
b) Upgrade biosecurity (no litter reuse, upgraded cleanouts, extended turnarounds, enhanced wild bird control, etc),
c) Closely monitor health of birds and investigate all disease manifestations.

If non-precursor or progenitor strains:

a) Conduct epidemiological investigation to determine likely pathways for virus introduction. Review all biosecurity measures associated with the farm and upgrade where required
b) Monitor the health of the birds closely and carry out further laboratory investigations if there's any respiratory disease.
c) Consider vaccination of either farm or all company stock (particularly if other farms are positive). Inform neighbouring farms/companies of vaccination status.

[4] Information regarding AAHL classification of ND virus is provided in the Glossary.

The four scenarios are listed in anticipated order of likelihood from right to left: most likely, there will be no positive reactions (especially if there is a reasonable lag time before first sampling); a positive reaction due to an exotic ND virus incursion would be least likely in healthy chickens. A flowchart for actions is provided in Figure 1 on the following page.

D. Communications strategy

Uncertainty about whether quarantine and movement restrictions as well as other regulatory controls such as stamping out will be implemented following positive results during active surveillance of healthy broiler flocks is a disincentive for producers to cooperate in this surveillance in the first place.

This active surveillance program is voluntary for producers. To gain producer and processor support and buy-in for the surveillance plan, the following key messages should be used:

- Management of ND is a shared responsibility; governments and the industry (including processors and contract farmer representatives) need to work together to maintain our ND-free status.

- The purpose of this active surveillance is not to investigate disease; it is to demonstrate that the non-vaccinated chicken populations (practical sentinels) remain free of non-vaccine ND virus. This surveillance may be undertaken if flocks are not vaccinated.

- Vaccinated broilers would produce positive results because of vaccination with the vaccine virus. For a period after cessation of vaccination, many non-vaccinated broilers will also test positive because there is still live vaccine virus on the premises (e.g. carried over from vaccinated parent stock, on shells, or in the litter). To rule out infection with field virus, samples from those chickens will undergo follow-up testing.

- There will only be regulatory controls in those cases where there is evidence of virulence. This would be investigated as agreed under AUSVETPLAN.

- Final results of any follow-up investigation would only become available when ND testing results are complete and have been made available to the producers and companies providing the samples. Summary reports must be compiled by the non-vaccinating producer/ processor and made available to the State Authority.

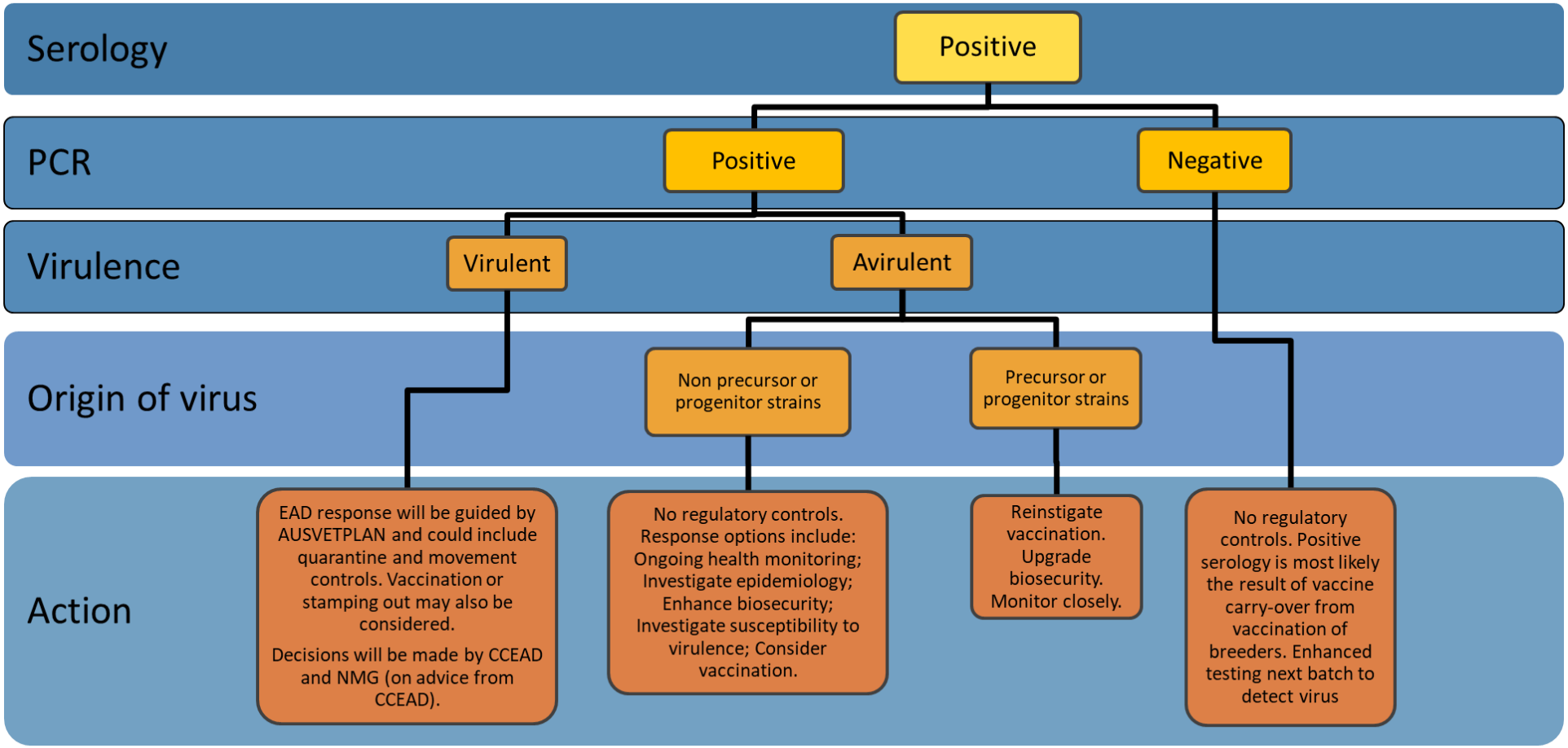

Figure 1. Management/ regulatory approach to positive laboratory findings

E. Governance

The oversight and implementation of this surveillance plan is a responsibility shared between industry and government. At the national level, this partnership approach is overseen by a ND Steering Committee, if and when required. Within states not requiring compulsory vaccination, the plan is implemented jointly by industry and the State Authority through agreed operational surveillance plans that describe the sampling plan, sample collection and dispatch, and how the results of testing will be communicated.

F. Responsibilities and reporting arrangements

Industry needs to ensure that chickens are sampled within the appropriate time frame as agreed between industry and government officers and detailed in the State Authority operational plans. Summary results are forwarded to the relevant Chief Veterinary Officer (CVO) within an agreed time frame.

There is still a legal requirement to report the presence or suspicion of virulent Newcastle Disease to the state department of agriculture.

Where required, state governments will change their legislation to allow for non-vaccination of broilers; industry will be expected to comply with legislation in regards to the surveillance which will be incorporated into the national Standard Operations Procedures for Newcastle Disease and therefore automatically taken up by state legislation. Governments will continue to advise on policy and interpretation of positive results.

After completion of each round of testing, the State Authorities will make the results available to the Animal Health Committee.

G. Funding

The implementation of this surveillance plan (administration, sampling, sample transport, laboratory testing) will be funded by industry as the beneficiary of reduced compulsory vaccination. Industry and government will jointly monitor the results of testing.

LONGER TERM OUTLOOK

The ND Steering Committee may be reconvened to review results after a suitable time interval and decide on the appropriateness and approach to further surveillance. This may require adjustment to the frequency of the surveillance programmes.

Industry may decide to voluntarily undertake a more comprehensive testing program for unvaccinated broilers as ‘insurance’ if a greater risk is perceived. Subject to industry agreement, summary results of such testing must be made available to the CVOs, as this provides evidence of due diligence by industry.

APPENDIX - GLOSSARY

Virulence of ND viruses

This surveillance plan uses the definition of ND from the OIE *Terrestrial Animal Health Code*[5]:

> *"... Newcastle disease (ND) is defined as an infection of poultry caused by a virus (NDV) of avian paramyxovirus serotype 1 (APMV-1) that meets one of the following criteria for virulence:*
>
> - *the virus has an intracerebral pathogenicity index (ICPI) in day-old chicks (Gallus gallus) of 0.7 or greater; or*
> - *multiple basic amino acids have been demonstrated in the virus (either directly or by deduction) at the C-terminus of the F2 protein and phenylalanine at residue 117, which is the N-terminus of the F1 protein. The term 'multiple basic amino acids' refers to at least three arginine or lysine residues between residues 113 and 116. Failure to demonstrate the characteristic pattern of amino acid residues as described above would require characterisation of the isolated virus by an ICPI test.*
>
> *In this definition, amino acid residues are numbered from the N-terminus of the amino acid sequence deduced from the nucleotide sequence of the F0 gene, 113–116 corresponds to residues –4 to –1 from the cleavage site."*

It should be noted that the ICPI is rarely used anymore and that sequencing is the preferred method of identifying virulent viruses.

Precursor or progenitor virus strains

Precursor or progenitor virus strains refer to avirulent virus strains that have the capacity to evolve into the virulent ND virus as the amino acid sequences in these viruses are very similar to that of virulent ND virus. Non precursor or progenitor virus strains therefore refer to avirulent virus strains that have amino acid sequences that have very different amino acid sequences to that of virulent ND virus.

[5] https://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_nd.htm

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