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A. Purpose

This resource document has been developed to provide general information for personnel in the planning and surveillance functions of a local control centre when considering trapping procedures for *Culicoides* species.

B. Vector identification

There is limited taxonomic expertise within Australia to identify emergency animal disease (EAD) insect vectors, especially where species differentiation is dependent upon minor anatomical details (e.g. *Culicoides*) and the examination of samples from one trap may take a number of hours.

The use of polymerase chain reaction (PCR) technology for vector identification may overcome this difficulty but will not identify vectors for which no molecular data exists. It is also possible that PCR technology will be widely available at the start of an EAD outbreak.

Certain insect species may be known to be competent vectors for the EAD under consideration. However, in an area where an EAD is being investigated for the first

time, it is feasible that an insect which has not been previously recognised as a vector could be wholly or partially responsible for disease spread.

Larval sampling is considerably more time consuming than adult sampling, and may not be as reliable an indicator of presence or prevalence as adult trapping. In addition, the breeding site of some vector species is unknown.

C. Disease agent identification

Recovering evidence of an EAD agent from a pool of suspected vectors can be carried out only by certain laboratories. The process is labour intensive and time consuming, and should only be used to establish:

- the presence of the agent; and
- the possible role of the vector.

The use of PCR technology for vector competency confirmation and virus identification will accelerate the process however it is also unlikely that testing will be widely available at the start of an outbreak.

D. Trap designs

A thorough knowledge of the ecology of known and potential vectors is essential in order to determine the most appropriate trapping technique. It is possible that a combination of different trapping techniques may need to be employed as vectors have different feeding habits. The following are potential sampling tools:

a. Light traps

Light traps are most commonly used to collect biting midges. These traps should be available from the respective National Arbovirus Monitoring Program (NAMP) Coordinator in each state and territory agriculture (or equivalent) department. The number of traps available nationally is limited and many are retained on properties as part of the NAMP. Sourcing of light traps from jurisdictions will take time. In the first instance traps already near the EAD could be examined for potential vectors.

b. Carbon dioxide traps

Many local government medical authorities use carbon dioxide-baited light traps to collect mosquitoes and these could be adapted for biting midges, if necessary. Trials undertaken by the Tropical Population Health Unit, Cairns, have indicated that the addition of octenol¹ and carbon dioxide are useful attractants for biting midges when used with light

¹ 1-Octen-3-ol.

traps², however experience in the Northern Territory suggests that the use of octenol is not particularly beneficial in the collection of *Culicoides* species.

c. Truck traps

The Northern Territory is believed to have the only truck trap in Australia. Construction of new truck traps could be achieved in a very short time. A truck trap is most effective where there is adequate insect activity before dark and where the temperature is not low enough to reduce insect activity.

d. Aspiration

The use of modified leaf blowers, adapted to aspirate feeding vectors from the skins of sentinel animals, and other vacuum devices can be useful in situations where vectors are unlikely to be attracted to carbon dioxide or light traps. These also have the advantage of providing data on what insects are actually feeding on hosts.

e. Sweep netting

Entomological sweep nets can be used to sample insect populations around host animals during periods of peak activity. While sweep nets are unlikely to collect more insects than aspiration they offer a simple and economical means of collecting insects that are attracted to hosts.

f. Sticky traps

Sticky traps (yellow and blue) are routinely used to collect flying insects. They are indiscriminate and may collect numerous non-target species, but have the benefits of being readily available, cheap, and can be rapidly deployed in large quantities.

E. Trap placement

Siting of traps should be done with epidemiological input and in consultation with members of the NAMP Technical Committee.

At the start of an investigation, there will be limited capacity to trap insects especially if the insects under survey are not attracted to light or carbon dioxide traps and it may take some time before the capacity is developed.

² Octenol appears to act as a synergist with carbon dioxide for certain species and may increase the number biting midges trapped thus improving the sensitivity of surveillance.

The placement of insect traps will need to take into consideration:

- The need for trapping (i.e. vector identification, vector distribution and density; distribution of disease agent, presence of potentially competent vectors);
- the location of the primary case in relation to other infected premises;
- known meteorological data (e.g. prevailing winds, temperature, rain and humidity) during the period prior to the first recorded disease outbreak;
- life cycles and feeding preferences of known competent vectors;
- the availability of traps; and
- the distribution of susceptible livestock species.

F. Sample Storage

Samples of potential vectors must be maintained in a quality state to enable either morphological or molecular identification. Storage solutions must also take into account the need to extract and identify the pathogen being vectored to confirm if the host insect is actually a vector. Consult with an expert or the taxonomists involved prior to storing samples but general methods include:

- Storage in alcohol – preference is 100% ethanol where molecular methods will be used. A lower percentage ethanol is suitable for morphological studies.
- Freezing – either through refrigeration or liquid nitrogen. The latter of which may not be readily available depending where the EAD occurs.