Australian Government
Department of Agriculture and Water Resources

20 June 2016

BIOSECURITY ADVICE 2016/23

IMPORTATION OF HONEY BEE SEMEN–FINAL REVIEW OF IMPORT CONDITIONS

This Biosecurity Advice informs stakeholders that the Department of Agriculture and Water Resources has finalised a biosecurity risk review for the importation of honey bee semen. Importation of honey bee semen may be permitted subject to biosecurity legislation, and the application of sanitary measures as specified in the Review of the importation of honey bee semen. The biosecurity risk review will be taken into account by decision makers when considering import permit applications for honey bee semen from approved countries effective from 20 June 2016.

The Department of Agriculture and Water Resources has completed a review of the biosecurity risks of importation of honey bee semen. A draft review was issued on 29 September 2015 for a 60 day consultation period, which closed on 1 December 2015 (BA 2015/16).

The department received twenty-three submissions from across the beekeeping community in response to the release of the draft review. A number were supportive of the findings of the review and the suggested conditions for importation and a number raised concerns that agents not present in Australia may be introduced through honey bee semen.

The largest number of submissions raising concern about importation were concerned that viruses harmful to honey bees could be introduced. It is well established that a number of viruses associated with honey bees can be transmitted through honey bee semen. Most of these submissions referred to the Rural Industries Research and Development Corporation (RIRDC) nationwide survey of honey bee pathogens—*Upgrading knowledge on pathogens (particularly viruses) of Australian honey bees* (available at http://www.rirdc.gov.au) which was published in October 2015, after the release of the draft review.

This comprehensive and authoritative survey determined the presence and distribution of honey bee viruses as well as looking at the prevalence of other fungal and bacterial diseases in Australian honey bees. The survey found that deformed wing virus (DWV) and slow paralysis virus (SPV), two viruses that have been associated with disease and colony losses in honey bees, were not present in Australia. The *Importation of queen honey bees, Final policy review 2012* (queen honey bee review), on which the review of honey bee semen is based, assumed this status and this has been confirmed by the RIRDC study. Several submissions suggested that as a result of these findings conditions should be imposed on the import of honey bee semen in order to keep these agents out.

The United States Department of Agriculture prohibited the import of live honey bees from Australia in 2010, citing the presence of SPV in Australia as the major sanitary risk. It was the department's view at that time that there was that there was a lack of evidence to support the conclusion that SPV is a pathogen in itself, and little evidence of pathogenicity when associated with *Varroa destructor* mites (varroa). There has been no evidence presented to change this view so the department's assessment remains as it was in the queen honey bee review—that

the biosecurity risk associated with this virus is not sufficient to warrant risk management measures.

The case for risk management of DWV is stronger—it is the virus most associated with varroa initiated disease and colony loss. DWV has spread widely and multiplied in association with the spread of varroa and a large number of studies have confirmed the link between DWV transmitted by varroa and the appearance of the clinical signs of deformed and stunted wings. The queen honey bee review found that DWV did not require risk management mainly due to the lack of consequences of its entry in the absence of varroa in this country. There has been no change it that status since. As part of its response to stakeholder comments on the import of honey bee semen the department reviewed the literature on this agent, including studies suggested by stakeholders.

Disease attributed to DWV in the absence of varroa is not well documented, some colony mortality was attributed to DWV in the UK before the arrival of varroa but none of the characteristic pathology of wing deformities associated with DWV were recorded. Researchers have observed colonies with high DWV titres and clinical signs where varroa numbers are low but this appears to have been after acaricide treatment and may be due to the suppressive effect of the acaricide itself on the honey bees.

After review, the relevant literature maintains the view that, in the absence of varroa, DWV remains a virus of low virulence, existing in honey bee colonies at a low level and asymptomatic. Where it is present, it likely persists by vertical transmission via drones and queens and/or horizontally by oral transmission. Titres of virus in individual bees in this situation appear to remain low. Titres only increase where the virus is transmitted by varroa. In that case deformities of emerging bees start to appear along with increased honey bee mortality and the likelihood of colony loss. The effect of varroa transmission has been mimicked experimentally by injecting DWV into honey bee pupae, increasing dosage leads to an increasing proportion of honey bees with deformities. When injected into adults, the virus can cause overt infection but only with very high doses. The same series of trials fed susceptible adult bees DWV orally but were unable to elicit any overt infection even at the highest dose.

Some stakeholders expressed concern that more virulent strains of DWV are starting to predominate, changes in the DWV population in Hawaii following the appearance of varroa there would support this. This mechanism appears to be varroa-mediated—virulent virus is amplified in the pupae despite a mix of virus strains within the infesting varroa transmitting it. The virulent strain is advantaged by the method of transmission—this has been experimentally replicated by injection into the pupal haemolymph. Transmission by other methods would not necessarily show this predilection for more virulent strains.

The ability of this transmission by varroa to cause high titres in infected honey bees can have a number of other effects—one submission referred to work showing that sub-clinical effects such as learning difficulties that can affect foraging bees can be associated with the presence of DWV. These are associated with the detection of the virus in the bee's head and the virus is detected there only with the increased titres seen with transmission by varroa. Although DWV is a honey bee virus it has now been identified in other species, including other species of bees (for example, *Bombus* ssp.) and other insect species such as Argentine ants. This appears to be due to a spill over from infected honey bees with high tires of the virus.

Other comments on factors such as poor nutrition or concurrent infection possibly increasing the virulence of otherwise low virulence viruses are true for any infection or infestation and are not specific for DWV.

Australia's appropriate level of protection (ALOP) is 'very low' but not zero. On the evidence examined, it remains the department's position that, in itself, the consequences of the entry of DWV are very low. The biosecurity risk associated with this virus, assessed as being very low in the queen honey bee review, is not sufficient to warrant risk management measures.

Besides honey bee viruses, the *Upgrading knowledge on pathogens (particularly viruses) of Australian honey bees* survey also looked at other pathogens including the two closely related fungal pathogens, *Nosema apis* and *Nosema ceranae*. Both species are widely distributed across the country but the study confirmed previous work that *N. ceranae* is not present in the major beekeeping areas of Western Australia (although it was detected in the far north of that state). One stakeholder pointed out that as *Nosema* can be present in honey bee semen, direct importation into Western Australia may lead to the introduction of *N. ceranae* into the major honey bee population there. Accordingly a risk assessment of *N. ceranae* was undertaken. This agent was assessed as being a significant local biosecurity risk and the final conditions require that for semen to be imported directly into Western Australia it be sourced from a country or zone recognised by the department to be free from *N. ceranae*.

Minor editorial changes have been made in response to other stakeholders' comments. Following completion of this biosecurity risk review, imports of honey bee semen from approved countries can commence effective from 20 June 2016.

The final biosecurity risk review is available on the department's website: agriculture.gov.au/biosecurity/risk-analysis.

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