Pacific Horticultural and Agricultural Market Access Program (PHAMA)

Technical Report 35: Disease Survey of Honey Bees in Samoa

5 NOVEMBER 2012

Prepared for

AusAID

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Abbreviations

Abbreviation	Description
AFB	American foulbrood
AusAID	Australian Agency for International Development
BASI	Beekeepers' Association of Samoa Inc
CCD	Colony collapse Disorder
EFB	European foulbrood
EU	European Union
HMD	Halfmoon disorder or syndrome
IHS	Import Health Standard
MAF	Ministry of Agriculture and Fisheries (Samoa)
MPI	Ministry for Primary Industries (NZ, formerly MAF)
OAP	Official assurance program
OMAR	Overseas market access requirement
PCR	Polymerase chain reaction
PHAMA	Pacific Horticultural and Agricultural Market Access Program (AusAID)
PICs	Pacific Island Countries
PMS	Parasitic mite syndrome (usually associated with varroa mite)
PMS	Pest management strategy for AFB in NZ
SHB	Small hive beetle
SROS	Scientific Research Organisation of Samoa

Acknowledgements

The author wishes to thank AusAID's PHAMA program for funding the survey and Harry van Enckevort of AsureQuality Ltd for developing the contract. A special vote of thanks goes to Asuao Kirifi Pouono of PHAMA (Samoa) for providing transport and other local arrangements and assisting with the survey.

Leicester Dean of the Beekeepers' Association of Samoa Incorporated (BASI) and Saleimoa Apiaries selected the apiaries to be inspected after being given the required apiary risk profiles and provided equipment. Leicester and Fa'alele from Saleimoa Apiaries and Manase Faaofo Sopoaga, apiary manager from CCK, Savai'i, did all the heavy work of opening the hives for inspection and sampling and destroying the hive found with American foulbrood disease. I also wish to acknowledge the support of Raymond Voigt of the Samoa Umbrella for Non-Governmental Organisations Incorporated (SUNGO) and BASI who helped with local suppliers for sampling equipment.

I also acknowledge the expert laboratory work provided by MPI's Investigation and Diagnostic Centre labs in Wallaceville and Tamaki.

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Executive Summary

An Australian AusAID initiative is to increase exports of high value primary products from Pacific Island Countries (PICs) the Pacific Horticultural & Market Access program (PHAMA) is designed to address constraints to market access from primary production products including honey and other bee products. PHAMA funded the current bee disease survey to help maintain existing market access into New Zealand in particular.

The bee disease survey was carried out by Murray Reid, AsureQuality Limited, New Zealand, from 9–14 July 2012. Reid was ably assisted by Asuao Kirifi Pouono of PHAMA, Leicester Dean and Fa'alele of Saleimoa Apiaries and Manase of K Newton (CCK). Previous bee disease surveys of Samoa were undertaken by Reid (AsureQuality Ltd) and Van Eaton in 2009, Reid and Cory (Niue Honey Company) in 2005, Reid and Driscoll of NZ Ministry of Agriculture & Forestry (MAF) in 1996 and Reid and Bettesworth of MAF in 1987.

Samoa has an estimated 21 beekeepers operating 403 hives on 47 apiaries[1]. The annual honey crop is approximately 8 tonne per year most of which is consumed within Samoa (Dean, 2009 and pers. comm.). Samoa exports small quantities of honey to Australia and New Zealand each year but has the potential to increase this.

Currently honey and other bee products entering New Zealand from Samoa, and several other select Pacific Islands Countries (PICs), must be accompanied by a zoosanitary certificate issued by the veterinary authority of the exporting country which certifies that:

- The honey originates from that country;
- The country is free from European foulbrood caused by *Melissococcus pluton*[2].

European foulbrood (EFB) is a bacterial disease that affects the developing brood and is controlled in many countries by feeding antibiotics to beehives. EFB-causing bacteria can be transmitted in bee products, especially honey and pollen.

European foulbrood disease has never been detected in Samoa or New Zealand but regular surveys by competent personnel and reporting to international authorities are required to confirm this status. EFB is present in Australia. In addition honey exported to the EU must come from apiaries of known disease history, which usually means an apiary database is being maintained, annual bee disease surveys are being carried out and beekeepers are reporting on the presence of listed bee diseases.

The New Zealand Ministry for Primary Industries (MPI), formerly the Ministry of Agriculture and Forestry, revised the Import Health Standard (IHS) for Specified Processed Bee Products in June 2009. However, this standard is on hold while issues with a similar Import Health Standard (IHS) for bee products from Australia are resolved. The IHS from 2006 remains in force in the meantime and allows imports of honey from Samoa.

The current survey team inspected 159 beehives for bee diseases and pests, in particular European foulbrood (EFB) and its associated secondary bacterium *Paenibacillus alvei*, and sampled 68 hives for testing for Deformed Wing Virus (DWV) and Israeli Acute Paralysis Virus (IAPV), the microsporidian *Nosema ceranae*, the internal or tracheal mite *Acarapis woodi* and the external mites *Varroa* sp and

[1] CCK maintains a number of fales for their hives and these are counted as separate apiaries. The apiary register is maintained by Leicester Dean of the Beekeepers' Association of Samoa Inc. (BASI).
[2] Now renamed *Melissococcus plutonius*

Tropilaelaps. All these diseases, except DWV, *A. woodi* and the external mites, were raised as pathogens of concern by the beekeeping industry in New Zealand following the risk analysis done by MPI to allow heat treated honey from Australia into New Zealand. DWV had been found in New Zealand in 2007 and *A. woodi* and the external mites *Varroa* sp and *Tropilaelaps*, are not transmitted in honey. Varroa destructor is endemic in New Zealand. Since the IHS was reviewed MPI has confirmed the presence of *P. alvei* and *Nosema ceranae* in New Zealand. A nation-wide survey, plus ongoing annual sampling and testing, has not detected the presence of IAPV in New Zealand, and this remains a bee disease of issue with the New Zealand beekeepers (McFadden, AMJ, Tham, K., et. al., 2012)

Bees were tested for DWV, *Nosema ceranae*, the tracheal mite and *Varroa* sp and *Tropilaelaps* in case Samoa is in a position to export live bees, queen cells or drone semen, in the future.

No cases of EFB were found but one case of American foulbrood (AFB) was detected. AFB is one of the most widespread and serious honey bee diseases in the world. This disease is endemic in New Zealand and is controlled by inspection and total destruction of infected material. Some approved beekeepers can recover infected equipment by dipping in paraffin wax heated to 1600C for at least 10 minutes. AFB is subject to a Pest Management Strategy or PMS. This finding is the first case of AFB reported in Samoa since 1987 when the author carried out a bee disease survey. The author is not aware of any reports of AFB prior to 1987 either.

The infected hive was burnt the following day after discovery and the remaining two hives in the apiary will be inspected regularly (e.g. at least monthly) by experienced beekeepers for the next 12–18 months. Trace back did not reveal any obvious source of the infection.

The survey in Samoa achieved a hive inspection rate of 39%, from a population of approximately 403 hives. New Zealand has a target inspection rate of 1.4% of hives under its exotic honey bee disease surveillance program. However, all hives in New Zealand must be inspected for American foulbrood disease each year by an approved beekeeper which increases the possibility of beekeepers finding a notifiable exotic bee disease or pest.

Laboratory analysis of bee samples did not detect any cases of Deformed Wing Virus (DWV) and Israeli Acute Paralysis Virus (IAPV), the tracheal mite *Acarapis woodi*, or the external mites Varroa sp and *Tropilaelaps*. The external mite (*Acarapis externus*) was detected on many bees. This mite is common in New Zealand and is not parasitic on honey bees.

The microsporidian *Nosema ceranae* was detected by polymerase chain reaction (PCR) in 50% of the apiaries tested. Previous surveys did not test for the presence of *Nosema ceranae* so it is unclear how long it has been present in Samoa. *Nosema ceranae* has only recently been confirmed in New Zealand using polymerase chain reaction or PCR technology. It is not known what effect, if any, this species of nosema is having on Samoan honey bees.

The survey team inspected 22 apiaries out of 47 (47%) compared to New Zealand's target surveillance rate of 2.6%. European foulbrood disease has never been reported in Samoa and no evidence of this disease was found during this survey or during past surveys. Thus, Samoa should be able to claim country freedom from European foulbrood disease and continue to export bee products to New Zealand under the current import health standard.

No cases of notifiable external or tracheal mites or the Small Hive Beetle were found. There was no evidence of the African honey bee, the Cape honey bee or the Asian honey bee. These diseases or

pests are not transmitted through honey. Provided AFB can be eradicated Samoa will still have one of the highest bee health situations of any of the Pacific Island Countries (PICs).

Other minor diseases like chalkbrood, sacbrood and bee paralysis virus were re confirmed, as were both the greater and lesser wax moths, all of which exist in New Zealand. Various species of ants, cockroaches, centipedes and lizards living in or around hives were also found but these are not transmitted live in honey.

The risk pathways into Samoa for an exotic honey bee disease or pest are considerable with regular shipping and air flights from a number of countries, plus visiting yachts, which sometimes have honey on board. The number of tourists visiting Samoa is growing but hopefully most will come from countries with a high awareness of quarantine risks and will not bring in risk bee products. X-rays of all accompanied luggage is carried out at the airport on entry and this should detect undeclared biosecurity risk products.

(www.samoaquarantine.gov.ws).

Honey has been imported without a permit by merchants and cases of honey from the USA, New Zealand and India were found in retail shops by members of the Beekeepers' Association of Samoa Inc. (BASI) in 2008. This is despite the adoption of the Bee and Bee Products Prohibition Order 31999, which was enacted under the Customs Act 1977. The Prohibition Order prohibits the entry of packaged bees, and second hand or used bee supplies and bee equipment or clothing used for beekeeping. Honey and queen bees or queen cells can be imported into Samoa subject to an import permit being issued by the director of MAF. However, honey is listed by MAF Quarantine as a prohibited item.

The good news is no cases of honey imports have been detected since 2008 despite regular monitoring of retail outlets (Dean, 2012, pers. comm.). The Principal Quarantine Officer reported that very little honey has been taken from passengers or off yachts (Moors, 2012 pers. comm.).

Samoa has the Quarantine (Biosecurity) Act 2005 and the Bee and Bee Products Prohibition Order 1999 to control imports of risk bees and bee products and an active quarantine service operating at the border. Other legislation includes the Animals Ordinance 1960 and Animal Disease Prevention Regulation (1968).

Samoan MAF staff who received limited training on bee disease recognition and survey methods on the bee disease survey conducted in 2005, and subsequent training with Saleimoa Apiaries, are no longer available. The chief meat inspector received some training on the 2009 mission, as did Tulia Molimau, a scientist from the Scientific Research Organisation of Samoa (SROS). The latter organisation may be able to test suspect bee material using microscopy, culture or polymerase chain reaction (PCR) techniques following standard published methodologies or after training at a recognised laboratory in New Zealand or Australia. SROS could also carry out water tests as well as residue tests on honey if markets in the European Union (EU) were developed. Several staff from MAF and one Quarantine officer attended a week long beekeeping course in 2010.

Since the 2009 survey the number of beekeepers, apiaries and hives has reduced as beekeepers give up or leave the country. The majority of the hives in Samoa are owned by a few expert and experienced beekeepers who run larger apiaries. In addition, management and staff from Saleimoa Apiaries look after nearly all the remaining hives on behalf of the owners and also sell hives to new

[3] Came into effect 9 March 2000.

beekeepers. This increases the likelihood of an exotic bee pest or disease being discovered reasonably early after its introduction. BASI maintains an apiary register that was last updated in 2012 and is based on records kept by Leicester Dean and other members of BASI.

Honey is currently exported in small quantities to New Zealand and Australia. Exporters to New Zealand are meeting the Import Health Standard for Specified Processed Bee Products. However, if larger quantities of honey were sent to New Zealand or Australia for subsequent processing and re-export, it is likely the honey would have to meet relevant Overseas Market Access Requirements (OMARs) and New Zealand's or Australia's Official Assurance Programs (OAP). Samoa will have to show it has adequate legislation and a competent authority capable of reporting on and undertaking, regular bee disease surveys and issuing Export Certificates.

1 Background

A honey bee disease survey was carried out by Reid and Bettesworth in 1987, which found no major bee diseases present. Reid and Driscoll completed another full survey in 1996, plus further hive inspections as part of beekeeper training and queen bee production workshops under the auspices of the Food and Agriculture Organisation (FAO) in 1997 and 1998. Reid and Cory (Niue Honey Company) conducted a full bee disease survey in 2005 and Reid and Van Eaton repeated the exercise in 2009. Both surveys confirmed the very high bee health status of the Samoan bee population.

While there are potential markets for Samoan bee products, such as honey and propolis, in New Zealand, Australia and the EU, some of these countries require evidence of Samoa's bee health status before permitting importations of bee products. New Zealand's MPI reviewed its import health standard (IHS) for bee products in 2003 and again in 2005. A revised general standard was issued in November 2006.

http://www.biosecurity.govt.nz/imports/animals/standards/beeproic.all.htm

MPI had prepared a risk analysis for bee products entering New Zealand with a view to drafting an Import Health Standard for heat treated honey from Australia. The risk analysis was published in December 2004.

http://www.biosecurity.govt.nz/files/regs/imports/risk/ira-bee-products.pdf

An Import Health Standard for honey from Australia was subsequently issued in August 2006. http://www.biosecurity.govt.nz/imports/animals/standards/beeproic.aus.htm

However, this standard was successfully challenged in the courts by New Zealand's beekeeping industry but was subsequently overturned by the Court of Appeal. Legislation was then passed which reinstated the import health standard, but required a suspension on imports until an independent review panel had reported to MPI and the latter had made a determination on whether any amendments to the rules were required. The report was received from the panel in June 2009 and pointed to some areas in which the scientific evidence has evolved since the original risk analysis for the standard was undertaken. In particular the presence or absence and effects of some new pathogens were raised. These included *Paenibacillus alvei*, *Nosema ceranae* and Israeli Acute Paralysis Virus. *P. alvei* is a bacterium associated with European foulbrood, and may be used as the indicator for the presence of EFB, while *Nosema ceranae* is a microsporidian that has jumped species from the Asian honey bee *Apis cerana*. *N. ceranae* is believed by some researchers to be the cause of significant bee losses and even the cause of Colony Collapse Disorder (CCD), (Higes et.al. 2009). Israeli Acute Paralysis Virus has only recently been isolated from bees and is also associated with CCD.

The existing 2006 IHS standard was also reviewed in the meantime and some minor changes were proposed e.g. replacing the word honey with bee products where appropriate to allow products like propolis to be treated the same as honey. However, this revised standard was put on hold until the import standard for Australian honey is finalised. This means the 13 November 2006 Import Health Standard for Processed Bee Products remains the current operational standard and Samoan honey is currently entering New Zealand under this standard.

In order to continue to export bee products to New Zealand Samoa will need to demonstrate the following:

> 7.6 Honey from *Niue, Samoa, Solomon Islands, Tonga and Tuvalu* may be given a biosecurity clearance provided all of the following requirements are met:
>
> i. The product must be accompanied by zoosanitary certification issued by the veterinary authority of the exporting country which certifies that:
>
> - The honey originates from that country;
> - The country is free from European foulbrood caused by *Melissococcus pluton*[4].

http://www.biosecurity.govt.nz/imports/animals/standards/beeproic.all.htm

Pitcairn Island has negotiated its own IHS for honey into New Zealand and is required to certify freedom from American foulbrood (AFB) and European foulbrood (EFB). Currently Samoa cannot certify country freedom from AFB following discovery of a case of this disease during the current survey. Since the IHS for Australian honey imports was reviewed, MPI has asked Pitcairn authorities for new information regarding checks/tests on Pitcairn bees for *Paenibacillus alvei*, *Nosema ceranae* and Israeli Acute Paralysis Virus.

In recent years MPI has confirmed the presence in New Zealand of *Paenibacillus alvei* from soil and one bumble bee (2010) and *Nosema ceranae* (2010) so these pathogens are no longer of concern to MPI. Deformed Wing Virus was detected in 2007. Surveys in New Zealand in 2011 did not detect the presence of Israeli Acute Paralysis Virus (IAPV) (McFadden et. al. 2012).

Beekeeping in Samoa continues to change with some local beekeeping enterprises expanding to over 130 hives each, while village enterprises have not generally been very successful. Beekeeper numbers have reduced by 46% since 2009, apiaries by 33% and hives by 13%. Of the 47 apiaries reported in Samoa, Saleimoa Apiaries manages 29 or 62% and CCK owns and manages another 12. Together these two companies manage 87% of the apiaries in Samoa.

The annual honey crop is mostly consumed locally and is estimated at 8 tonnes per year (Dean 2009). This includes honey sold through various outlets as well as consumed at point of production. The local market may be close to matching demand with supply so any increase in production will need to be exported. Local markets sales could be increased but sustained promotion, product awareness and development of niche markets will be required. Some TV advertising for Samoan honey boosted sales in 2011 (Dean, 2012 pers. comm.)

Demonstrating a high bee health status and maintaining this status is critical if an expanding commercial beekeeping industry is to develop. Bee disease surveys not only help to facilitate the export of bee products from Samoa but also allow the maintenance of the Bee and Bee Products Prohibition Order 1999 (enacted on March 2000) which controls the entry of risk goods. Bee products and used beekeeping equipment could introduce exotic bee diseases which if established could threaten the well-being of the Samoan beekeeping industry. The case of AFB found could possibly have entered this way.

Eradicating AFB should be a priority to stop this very serious honey bee disease spreading and hindering the ongoing development of beekeeping in Samoa. AFB has the potential to spread rapidly given the large number of feral colonies that exist in the country. If left unchecked it could destroy beekeeping in Samoa.

[4] Now renamed *Melissococcus plutonius*

2 History of Beekeeping in Samoa

Black strains of the honey bee *Apis mellifera* were introduced by early settlers and missionaries in the 19th century. A Samoan American Bee Company (SABCO) began operating in 1978 and increased hive holdings to 900 hives. SABCO sold many tonnes of honey on the local market and exported large shipments of honey to Germany from 1981–83. The company was reformed as the Samoan Bee and Honey Company (SABHO) in 1985 with European partners.

This company increased to around 1800 hives and exported many tonnes of honey to Germany before suffering management and financial problems. The company was effectively abandoned in 1989. Severe cyclones in 1990 and 1991, as well as local villagers and wood rot and white ants (termites) destroyed most of the hives. The 22 remnants of these hives, plus the many hundreds of wild or feral hives that occupied houses and trees have been used to re-establish village-based and commercial beekeeping. The Women in Business Development Inc. (WIBDI) and also the Beekeepers' Association of Samoa Inc. (BASI) supports some of these beekeepers. Two private entrepreneurs own over 270 colonies between them and secure a significant income from beekeeping. One company also exports small quantities of honey to New Zealand and Australia.

3 Size of the Industry

During the bee disease survey in 1987 Reid and Bettesworth reported that SABHO operated 1500 hives, which they subsequently increased to 1800 (Rudnick, T. pers. comm). There were two other hobby beekeepers with 8 hives and no feral or wild bee colonies were found. However, the bee disease survey carried out in 1996 found the situation was completely reversed from 1987 i.e. only 14 managed beehives plus 8 rotten hives were found but there were many feral colonies in the walls of houses and in trees.

The survey in 2005 reported there were 37 beekeepers operating 467 hives on 54 apiaries, while the 2009 survey found there were 39 beekeepers, 465 hives and 70 apiaries recorded on a database maintained by BASI. Currently there are reported to be 21 beekeepers with 403 hives on 47 apiaries.

A few apiaries are shared by beekeepers but the current estimate of apiaries is based on beekeepers and recorded locations for their hives whether on a shared site or not. CCK has a number of fales with beehives on various properties and each fale is counted as an apiary.

The number of beekeepers and hives had decreased since the last survey in 2009 mainly due to several operators with reasonable sized hive holdings moving overseas or giving up beekeeping. Beekeeper numbers are down 46%, apiaries down 33% and hive numbers down 13%. A number of hives, formerly managed by villages under the auspices of WIBDI, have been returned to Saleimoa Apiaries or have been destroyed or abandoned.

4 Bee Disease Status in Samoa

Bee disease surveys of Samoa were carried out by Reid and Bettesworth (1987) and Reid and Driscoll in 1996 (FAO 1996). Reid and Driscoll also inspected many hives during training workshops carried out in 1997 and 1998, which were funded by FAO and NZ Foreign Affairs (NZAid). Driscoll reviewed the beekeeping industry and inspected some hives in 2000 and Reid and Cory (Niue Honey Company and owner of 85 hives in Samoa) inspected a large number of hives during a private visit in 2003 to evaluate the potential for the Niue Honey Company to invest in commercial beekeeping in Samoa. Reid and Cory carried out a further bee disease survey in 2005, funded by the Ministry of Finance and the Canada Fund, and inspected 294 out of 467 hives (63%) on 35 apiaries (65%). Reid and van Eaton were funded by the Government of Samoa's Ministry of Commerce, Industry and Labour to undertake another bee disease survey in 2009. Survey team members inspected 129 hives (28%) out of 465 hives in 22 apiaries (31%). The current survey funded by AusAID via PHAMA inspected 159 hives (39%) out of 403 hives in 22 apiaries (47%).

Table 1: Comparison of the status of honey bee pests and diseases in Samoa, New Zealand and Australia

Common name	Scientific name	Agent	Samoa	New Zealand	Australia
American foulbrood	*Paenibacillus larvae*	Bacteria	Present: 1 case found during the 2012 survey	Present	Present
European foulbrood	*Melissococcus plutonius*	Bacteria	Absent	Absent	Present
P. alvei	*Paenibacillus alvei*	Bacteria	Absent	Present –found in soil & one bumble bee	Present
Varroa Mite	*Varroa destructor*	Mite	Absent	Present	Absent
Asian Bee Mite	*Tropilaelaps clareae*	Mite	Absent	Absent	Absent
Tracheal Mite	*Acarapis woodi*	Mite	Absent	Absent	Absent
Small Hive Beetle	*Aethina tumida*	Insect	Absent	Absent	Present
Asian honey bee	*Apis cerana*	Undesirable genotype	Absent	Absent	Present: Queensland
Africanised honey bee	*Apis mellifera scutellata*	Undesirable genotype	Absent	Absent	Absent
Cape honey bee	*Apis mellifera capensis*	Undesirable genotype	Absent	Absent	Absent
Nosema	*Nosema apis*	Protozoan; microsporidia	Present	Present	Present
Nosema	*Nosema ceranae*	microsporidian	Present	Present	Present
Amoeba	*Malpighamoeba*	Amoeba	Present	Present	Present
Sacbrood		Virus	Present	Present	Present
Chronic bee paralysis		Virus	Present	Present	Present
Black queen cell virus		Virus	Unknown	Present	Present
Kashmir bee virus		Virus	Unknown	Present	Present

Common name	Scientific name	Agent	Samoa	New Zealand	Australia
Bee virus X		Virus	Unknown	Present	Present
Bee virus Y		Virus	Unknown	Present	Present
Israeli Acute Paralysis Virus (IAPV)			Absent	Absent	Absent
Colony Collapse Disorder (CCD)		Unknown but varroa and viruses implicated	Absent	Unknown	Absent

5 Methods

The survey concentrated on visual inspections for brood diseases likely to impede the entry of bee products into New Zealand and the EU. Many of the serious bee diseases and pests that affect adult bees are not of a quarantine concern for extracted honey packed in honey drums or retail packs. Raw bee products like propolis, pollen or beeswax can harbour pests such as wax moths and Small Hive Beetles but are usually treated by freezing or fumigation. The term 'bee disease' is used in this report to refer collectively to all bee diseases and exotic pests of the honey bee as well as undesirable genetic strains. See AsureQuality and MPI pamphlet on exotic honey bee pests and diseases.

5.1 Location of Colonies

The selection of apiaries for inspection and sampling was based on an assessment of risk of contacting an exotic bee disease or pest, and follows the method used in New Zealand. Apiaries deemed to be of high risk are those near ports, airports, garbage dumps and tourist and population centres.

5.1.1 Upolu

The survey team visited 14 apiaries belonging to 9 beekeeper owners on Upolu and inspected 107 hives and sampled 47 hives.

5.1.2 Savai'i

The survey team visited 8 apiaries belonging to two beekeepers on Savai'i and inspected 52 hives and sampled 21 hives.

5.2 Collection of Specimens

At least 30 bees were collected as a composite sample from three hives per apiary which were to be tested by PCR for viruses and *Nosema ceranae*. These bees were placed on ice in insulated containers and later frozen. In addition, approximately 200 adult bees were collected as a composite sample from at least three hives and stored in 70% ethyl alcohol. Sub-samples of these bees were dissected for the presence of the tracheal mite. The samples were also washed in alcohol and screened for varroa sp and the Asian mite *Tropilaelaps* sp.

5.3 Field Observations

A selection of hives were also inspected but not sampled. These hives were opened and brood frames and bees were examined for clinical (visual) symptoms of:

- American foulbrood (bacteria) AFB
- European foulbrood (bacteria) EFB
- Half-moon Syndrome or Disorder (nutritional / genetic disorder) HMD
- Colony Collapse Disorder (CCD)
- Parasitic Mite Syndrome (PMS)
- Chalkbrood (fungus)
- Sacbrood (virus)

- Chronic bee paralysis (virus)
- Varroa and *Tropilaelaps* (external mites)
- Small Hive Beetle (insect)
- Africanised honey bee, Cape honey bee and the Asian honey bee (undesirable genetic strains)
- Wax moths and other pests
- Observations were also made on colony temperament, and genetic diversity of bee stocks.

6 Results

6.1 American Foulbrood AFB (Bacterium)

One hive, henceforth called the 'parent hive', with obvious clinical symptoms of AFB was found in the Tula'ele area. AFB was confirmed by microscopy and ELISA in New Zealand.

Two other hives had been split in February 2010 from this parent hive but neither of the 'splits' showed any AFB symptoms. This suggest that the parent hive contracted AFB after the new hives were created as the time period from when the splits were made is sufficient for the disease to show in these new hives. The owner also had five other hives supplied by Saleimoa Apiaries on adjacent land but had previously shifted these many kilometres away to Aleisa. Saleimoa Apiaries had supplied these five nucleus hives on 20 July 2011 which were transferred into single storey hives owned by the beekeeper. Subsequent inspection of these five hives (four alive & one dead) at Aleisa did not find any sign of AFB.

The owner removed four feral colonies on or about the 17 August 2011 from the high school library, which is opposite Faleolo airport. He put pieces of brood and honey comb and bees in each of four new single storey hives and added four frames of foundation wax and brought these to his property in Tula'ele. He recalls bees 'going in and out' of these hives but did not check them until his return from overseas some 6 months later in March 2012. At this stage all these colonies were dead or had not established. It is possible that bees from the parent hive robbed the honey stores from these pieces of feral comb. If these feral colonies had AFB it would be transmitted to the parent hive and any other hives that robed out the honey stores in these pieces of comb.

AFB is caused by a spore forming bacterium that is very hardy and can survive on used equipment or in honey for 30+ years. It survives boiling in water and needs temperatures of 1600C for at least 10 minutes to kill the spores. The disease can exist in a colony as an in-apparent or 'not obvious' infection for 12–18 months. During this time beekeepers can unwittingly spread the disease by transferring frames of brood and bees or honey or honey supers to healthy hives.

In this case the time between possible infection from the feral swarms in August 2011 and discovery in July 2012 is within this normal range. Thus, the original source could be from the feral swarms but how the swarms got infected with AFB is not obvious. The close connection with the airport and arrival of risk goods cannot be dismissed but seems unlikely.

The owner says he has not added any new supers to the parent hive, fed it any suspect imported honey or taken any honey or hives parts from this hive, since he made the splits in 2010. AFB can also be introduced off an illegally imported queen bee, which would limit the infection to the hive with the queen bee(s) at least initially. Once AFB had killed sufficient brood and weakened the hive, its honey stores could be robbed out by other honey bees which would spread the infection.

Another possible source of the AFB is for bees from the parent hive to have robbed a diseased colony within 3–5 km of the apiary or an imported container of honey. Another apiary that is within 0.5 km of the infected hive has been on site for at least two years and is not showing any symptoms of AFB. However, it is possible for only one colony to find an infected source such as a weak hive or a jar of honey and remove all the infected material, without other hives discovering the source especially if it is of limited quantity such as an unwashed honey jar.

There are two other known apiaries within approximately two kilometres of the infected apiary at Pesenga and Sinamoga. No hives were found with AFB in these apiaries but not all hives were inspected.

AFB can also be introduced on used infected equipment such as frames or supers or on queen honey bees as well as honey. There is no evidence that these options apply in this case.

Hopefully the AFB can be eradicated by burning the diseased hive and inspecting the two adjacent colonies for AFB symptoms every month for the next 6 months at least. Ideally the supers that had the pieces of feral comb in them should be burnt as well although burning the frames and scraping off any adhering wax or propolis on the supers or floors and washing the insides with hypochlorite may be sufficient. Any supers that may have been on the parent hive in the past should also be burnt as a precaution.

6.2 European Foulbrood EFB (Bacterium)

No colonies with obvious field symptoms of EFB were found nor were any suspects seen that required sampling and further laboratory examination. Half-moon Disorder (HMD) and Parasitic Mite Syndrome (PMS) can be confused with EFB as clinical symptoms are similar. No hives exhibiting HMD symptoms were seen and PMS is usually associated with varroa. No evidence of varroa mites were seen.

6.3 Half-moon Disorder or Syndrome (HMD)

Half-moon Disorder is believed to be a nutritional effect caused when developing queen bees are under-nourished (Anderson, 1988). No cases of HMD were seen.

6.4 Colony Collapse Disorder (CCD)

Colony Collapse Disorder (CCD) is a phenomenon that was first described in the USA in late 2006. It describes a sudden population loss in a colony with few, if any associated dead bees in front of, or inside the hive. Brood combs contain brood of all ages and in some cases, plenty of food. Similar observations have been made in several countries throughout Europe.

Recently a team of researchers in the USA used whole genome microarrays to compare cells from the stomachs of bees as this is the primary site of pesticide detoxification and immune defence (Johnson et. al, 2009). Previous theories for CCD have included pesticide poisoning, miticides and mite infestation.

However, genetic analysis of the bees' stomachs failed to reveal elevated levels of pesticide response genes. In addition, genes involved in immune response showed no clear expression pattern despite the increased prevalence of viruses and other pathogens in CCD colonies. The guts of the CCD bees had an abundance of fragments from the ribosome which makes cell proteins. This finding suggests that protein production is likely to be compromised in bees from CCD hives.

Previous research showed that picorna-like viruses such as deformed wing virus and Israeli Acute Paralysis Virus (IAPV) attack the ribosome and instead of making honey bee protein they make virus proteins. None of these viruses were detected in bees taken for testing. Other research has shown a link between an iridovirus, *Nosema ceranae* and CCD (Bromenshenk et. al, 2010).

More recently the neonicitinoid group of insecticides has been implicated as one of the causes of CCD especially in maize crops in the USA and in several European countries. The insecticides are used to coat seeds that are sown using air or pneumatic drills. Talcum powder is commonly used to lubricate the seeds but during the sowing process the powder plus the insecticide is blown into the air which bees fly through. Sub lethal doses of neonicitinoids have been shown to affect bees' memory and ability to orientate and return to their hives. In addition neonicitinoids can persist in soils for some years and translocate through any flowering plants that are present where they affect the nectar and pollen. Neonicitinoids have recently been shown to affects bees ability to eat and recruit other foragers to a potential food source.

No evidence was seen of CCD in Samoa.

6.5 Parasitic Mite Syndrome (PMS)

PMS is caused by viruses associated with heavy infestations of varroa mites, but no evidence of this syndrome or varroa were seen.

6.6 Chalkbrood (Fungus)

Chalkbrood was found at low levels in some apiaries but many hives were apparently free of the disease. Chalkbrood was found on all previous surveys but at low levels.

6.7 External Mites

No *Varroa destructor* or *Tropilaelaps* mites were seen in the hives and these mites have not been detected in past surveys either during hive inspections or following subsequent laboratory screening.

6.8 Internal Mites

No evidence of tracheal mite, *Acarapis woodi,* were seen in the colonies during this survey or past surveys, either during hive inspections or following subsequent laboratory dissections of adult bees. Samples from 10 apiaries were dissected by MPI lab and no tracheal mites were detected.

6.9 Sacbrood Virus

Only a few hives were found with infected larvae but the number of cases per hive was very low and reconfirmed previous reports of this disease. The disease can be managed by requeening the colonies with strains of bees resistant to the virus.

6.10 Chronic Bee Paralysis (Virus)

This virus can be seen in adult bees and was reasonably common but at low levels of infection within the hives. The virus has also been detected on previous surveys. Requeening can reduce or eliminate the symptoms.

6.11 Nosema spp. (Microsporidian)

The nosema microsporidian is a fungus-related microbe that produces spores that bees consume when they clean out infected cells. The spores germinate in the bees' digestive tract and cause an infection that spreads to other tissues. Nosema is probably the most common honey bee disease in

the world and can be found in just about every hive. *Nosema apis* was the leading cause of microsporidia infections among domestic bee colonies until recently when *N. ceranae* jumped species from the Asian honey bee to the European honey bee.

N. ceranae appears to be more virulent than *N. apis* in European honey bees. Researchers in Spain have shown that it may be the cause of CCD in that country (Higes et al, 2009). Colonies were being wiped out or lost much of their strength within weeks of being infected.

N. apis has been found in Samoan bees on previous surveys. In 2005 spore levels ranged from 0 to 1,283,333 spores per bee but all apiaries tested were infected. The nosema spore levels from some of the hives were possibly high enough to have an adverse economic effect on the hives. Regular comb replacement, requeening and good protein nutrition is generally recommended to help reduce the effects of nosema.

No visual signs of either nosema species were seen although confirmation is usually by microscopic or PCR diagnosis. Samples taken during the survey were tested for *N. ceranae* with 50% of samples testing positive. As in the New Zealand situation, it is unclear how long *Nosema ceranae* has been present as this is the first survey to test for the disease. It is also not known what effect, if any, this species of nosema is having on Samoan honey bees.

6.12 Africanised Honey Bee, Cape Honey Bee and Asian Honey Bee (Undesirable Genotypes)

Most hives examined were hybrids of the Italian strain (*Apis mellifera ligustica)* and the black European strain of honey bee *(Apis mellifera mellifera).* There was no evidence of the African or Africanised honey bee (sometimes called the killer bee) or of the Cape honey bee.

There were no reports or sightings of the Asian honey bee which has spread in the Solomon Islands since first being reported in 2003. It has destroyed beekeeping there by out-competing the European honey bee and also introducing *Varroa jacobsoni* mite. The Asian honey bee is a prodigious swarmer and frequently robs European honey bee colonies and is very difficult to manage in hives.

The Asian bee has been reported in Australia on a number of occasions but became established in Cairns in 2007. Despite attempts to contain and eradicate the bee, it was found in May 2011 some 88 km south from Cairns in the Innisfail area.

The Asian honey bee was discovered in Vanuatu in 2011 (PHAMA pers. comm.).

6.13 Small Hive Beetle (Insect-beetle)

No Small hive beetles (SHB) or beetle larvae were seen. SHB larvae infest hives and consume pollen and honey stores. In the process they infect honey combs with a yeast, which creates a noxious slime all over the frames and makes the honey inedible. Small Hive Beetles are present in Australia and are now reported to be causing a major nuisance and wiping out hives and apiaries (Sommerville, D. 2012 pers. comm.).

6.14 Other Pests or Diseases

The lesser wax moth larvae (*Achroia grisella*) and the greater wax moth (*Galleria mellonella*) were found as were ants, lizards and cockroaches. These had all been recorded previously.

6.15 Genetic Base

The honey bees in Samoa are a reasonably homogeneous strain of the Italian bee *Apis mellifera ligustica*. However, the strain is showing signs of reverting to the black bee (*Apis mellifera mellifera*). The black bee is a very hardy strain, and capable of living without human assistance as feral colonies. Since black bees predominate as the background population in Samoa, drones of this stock are more likely to mate with virgin queens flying from managed colonies. Over time, this results in hybridisation of the strain of bees in managed colonies, and the eventual reversion to black bees.

Black bees are much more aggressive than the Italian strain, and run excessively on the comb, making finding queen bees very difficult. They are therefore not the preferred strain for commercial beekeeping.

During the survey, no conclusive signs of inbreeding (patchy brood pattern and mutant eye colour) were found. Patchy or irregular brood patterns were observed in some hives, but old queens, pollen deficiencies, nosema infections and chalkbrood and sacbrood disease could also cause this.

Queen bee cells from selected Italian breeding stock were imported from New Zealand in 1998 and 1999 to arrest a decline in temperament that was becoming evident 6 years after the demise of SABCO. This stock is still present but the trend towards a darker more aggressive strain will continue unless breeder selection and matings are better controlled. Alternatively importation of queen cells from varroa-free areas or artificial insemination using select drone semen could be considered. The latter option is the most expensive and involves a risk of introducing viruses, especially deformed wing virus. However, it may be preferable to letting the bee stock in Samoa degenerate into an aggressive strain that creates issues for landowners. A large number of the beehives examined showed regression to a darker and more aggressive bee that is not really suitable for village enterprises.

7 Summary and Conclusions

In Samoa, 159 beehives out of a total of 403 available were inspected for bee diseases and pests, and in particular European and American foulbrood (EFB). This is a hive inspection rate of 39% compared to the target surveillance rate of around 1.4% in New Zealand. MPI contracts AsureQuality Limited to inspect and sample 350 apiaries each year using AsureQuality staff or warranted beekeepers, and to collect samples from another 300 apiaries that supplied live bees for export. The latter are inspected for internal and external mites only.

In Samoa 22 apiaries were inspected out of 47 (47%) compared to New Zealand's target surveillance rate of 2.6%.

No cases of European foulbrood, Colony Collapse Disorder, Parasitic Mite Syndrome, Half-moon Disorder or *Paenibacillus alvei* were found. However, a case of the serious bee disease American foulbrood was found in one apiary. Trace back did not find any obvious source of the infection but MAF, in their notification alert to the World Organisation for Animal Health (OIE) of the discovery, identified a presumed link with imported honey from American Samoa. A special report was prepared for PHAMA to release to the competent authorities in Samoa (MAF and Quarantine services).

http://www.oie.int/index.php?id=198

No field evidence was found of the Small Hive Beetle or the very aggressive African strain of honey bee or the Cape bee or the Asian honey bee.

Some cases of chalkbrood disease, sacbrood and chronic bee paralysis virus were found but these have been reported during all previous bee disease surveys.

Wax moths, cockroaches and lizards were also reasonably common as were several species of ants. None of these appear to be causing a problem to the hives.

8 References

Anderson, D. 1988, Half-moon Disorder of the honey bee (Apis mellifera) in New Zealand. Proceedings 2nd Australian and International Bee Congress: 77–79

AsureQuality Ltd & Ministry for Primary Industries, 2012. Honey Bee Exotic Disease and Pests. (pamphlet).

Bromenshenk, J. 2010 Iridovirus and microsporidian linked to honey bee colony decline. PloS ONE 5(10) e13181.

Dean, L. 2009, Income Generating Project For Villages Involved In Conservation Area Management, Organic Farming And Other Interested Grass Root Farming Villages. Report to Samoan Ministry of Foreign Affairs and Trade.

FAO, 1996, Apiculture Development Strategy: Samoa. Technical Cooperation Programme

TCP/SAM/4551. (Reid and Driscoll AgriQuality Limited)

Higes et al. Honeybee colony collapse due to Nosema ceranae in professional apiaries. Environmental Microbiology Reports, 2009; 1 (2): 110–113 (http://www3.interscience.wiley.com/journal/122204880/abstract?CRETRY=1&SRETRY=0)

Johnson, Reed M, Evans, Jay D, Robinson, Gene, and Berenbaum, May R. 2009 Changes in transcript abundance relating to colony collapse disorder in honey bees (Apis mellifera) (www.pnas.org_cgi_doi_10.1073_pnas.0906970106)

McFadden, AMJ, Tham, K, Stevenson, M, Goodwin, M, Taylor, B, Munro, G, Owen, K, Peacock, L. 2012. In press.

Moore, W.F. 1984, Development of the honey and beekeeping industries in Western Samoa. Proceedings of the Expert Consultation on beekeeping with Apis mellifera in tropical and sub tropical Asia. FAO Rome 252 p.

Morse, R A & Nowogrodzki, R. 1990 Honey Bee Pests, Predators & Diseases. Cornell University, Ithica. 474 p.

Reid, M & Bettesworth, D. 1987. A survey of honey bee diseases and pests in Western Samoa. NZ Ministry of Agriculture 37 p plus Appendices.

Reid, M & Cory, A. 2006. Honey Bee Disease Survey of Samoa. Ministry of Finance and Canada Fund. 20 p.

Reid, M & Van Eaton. 2009. Survey of Honey Bee Diseases in Samoa. Ministry of Commerce, Industry and Labour. 18 p.

USDA Handbook AH 690, Diagnosis of honey bee diseases. United States Department of Agriculture, 61 p. Revised July 2000. (http://www.ars.usda.gov/is/np/honeybeediseases/honeybeediseasesintro.htm)

9 Limitations

URS Corporation Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of AusAID and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Contract dated 20 January 2011.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

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This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties

Appendix A

Appendix A Location of Hives Surveyed

Apiary location	Land owner	Beekeeper-owner	No hives present	No hives inspected	No hives sampled	Comments
UPOLU						
Letogo	Meti	Saleimoa Apiaries	14	9	6	
Vinifou	Vini	Saleimoa Apiaries	7	7	3	
Malifa	Bartley	Saleimoa Apiaries	6	6	3	collection of hives from bkprs giving up bkpg
Pesega	Voigt	Voigt	18	11	6	plus 10 nucleus hives split from other hives in apiary-2 inspected
Sinamoga	Lousa	Lousa-Saleimoa Apiaries	10	6	3	shared site-managed by Saleimoa Apiaries
Ululoloa	CCK-Newton	CCK-Newton-Factory staff	18	12	3	hives supplied by Saleimoa Apiaries
Ululoloa	CCK2-Newton	CCK-Newton-Factory staff	15	10	3	hives supplied by Saleimoa Apiaries
Falelauniu	W Voigt	Saleimoa Apiaries	15	10	3	<1km from town dump
Tanumalala	Peterson	Peterson-owner	4	4	3	hives supplied & managed by Saleimoa Apiaries
Tanumapua	Westerlund	Mauff-owner	5	5	3	managed by Saleimoa Apiaries
Tanumapua	Ah Liki	Ah Liki-owner	11	7	3	hives supplied & managed by Saleimoa Apiaries
Olomanu	Justice Dept; Juvenile Correction Centre	Students-Saleimoa Apiaries	7	7	3	hives supplied by Saleimoa Apiaries who are training the students
Tula'ele	Kiwi Plumbing	Saleimoa Apiaries	5	5	3	hives supplied & managed by Saleimoa Apiaries
Tula'ele	Joe Hansell	Joe Hansell	3	3	2	One American foulbrood
Aleisa	Church-Joe Hansell	Joe Hansell	5	5	0	risk apiary moved from above. Hives supplied by Saleimoa Apiaries
14		9	143	107	47	
SAVAII						
MAF	MAF	Salelologa	9	5	3	

Appendix A

Apiary location	Land owner	Beekeeper-owner	No hives present	No hives inspected	No hives sampled	Comments
Lalomalava	CCK-Newton	CCK-Newton-Farm staff	18	8	3	CCK3
Lalomalava	CCK-Newton	CCK-Newton-Farm staff	18	8	3	CCK4
Logoipulotu	Manase family	CCK-Newton-Farm staff	8	5	3	CCK5
Vaia'ata	CCK-Newton	CCK-Newton-Farm staff	14	8	3	Home farm 0.5 k from Savai'i main dump
Vaia'ata	CCK-Newton	CCK-Newton-Farm staff	14	9	3	CCK7
Vaia'ata	CCK-Newton	CCK-Newton-Farm staff	11	7	3	CCK8
Vaia'ata	CCK-Newton	CCK-Newton-Farm staff	2	2	0	CCK9
Vaia'ata	CCK-Newton	CCK-Newton-Farm staff	16	9	0	CCK10
8		**2**	**94**	**52**	**21**	
Total Samoa	**Beekeepers**	**Apiaries**	**Hives**	**Hives inspected**	**Hives sampled**	
	21	47	403			
Total inspected-sampled	11	22	237	159	68	
% inspected	52%	47%		39%		
% sampled					43%	

Appendix B

Appendix B Legislation and Quarantine Systems for Bees and Bee Products

Samoa continues to have one of the highest bee health situations of any Pacific Island Country (PIC) despite the finding of a case of AFB. The bee health situation can change at any time after accidental or deliberate introduction of risk goods such as bee products and live bees. The varroa mite was found in Tonga in 2006 and the Asian bee was recently reported in Vanuatu in 2011.

The industry needs continued government protection by way of import controls and border quarantine and inspection, ongoing field surveillance and an ability and willingness to respond to an outbreak of a serious honey bee disease.

B.1 Acts and Regulations

A degree of protection was given to the industry when the Bee and Bee Products Prohibition Order 1999 (enacted 9 March 2000) was issued under the Customs Act 1977.

B.2 Quarantine Systems

The Samoan quarantine service has been much improved over the past few years following an institutional strengthening program funded by AusAID. Samoa is reasonably high risk for bee diseases given its proximity to American Samoa and frequent aeroplane and ship services to New Zealand and Australia and other Pacific Islands. Honey was regularly imported from the USA, China, New Zealand and Australia until the prohibition order was enacted in March 2000. This imported honey could potentially introduce the serious bacterial diseases American and European foulbrood as well as a more malignant strain of the fungus disease called chalkbrood. Honey from New Zealand, Australia and the USA, at least, has been seized under the prohibition order (J Burton, Samoa Quarantine 2005 pers. comm.).

All accompanied luggage from airline passengers is X rayed at the airport so this should reduce the risk of prohibited bees and or bee products entering the country. However, risk items on yachts, cruise ships and containers represent an unknown risk. Small quantities of honey from the USA, India and New Zealand got through the border and were found in retail shops in 2008 by members of the Beekeepers' Association of Samoa. Leicester Dean has not found any imported honey in retail outlets since 2008 despite frequent monitoring (Dean, 2012, pers. comm.). Any honey found in shops was subsequently seized by Quarantine officers.

There is limited movement of beehives within each of the two main islands of Samoa so any outbreak of an exotic bee disease or pest could be contained and hopefully eradicated. Movement between Upolu and Savai'i is relatively easy to control so an outbreak on one island could be contained on that island.

B.3 Honey Bee Disease Survey and Response Systems

In the past bee disease surveys were carried out in Samoa approximately every 5 years. New Zealand's revised import health standards may require equivalence with New Zealand standards, which could mean an annual bee disease survey. Such surveys in New Zealand are the responsibility of MPI as the competent authority. MPI contracts AsureQuality Ltd, who in turn sub-contracts beekeepers warranted as Authorised Persons Level 2 by MPI, to carry out the field work.

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Currently all the beekeeping expertise in Samoa resides with six or so main beekeepers and their key staff. They should recognise an exotic bee disease if one should become established and alert Samoa MAF. International expertise could be brought in to help in the first instance if necessary.

An import permit for biological products of animal origin was obtained for the current bee disease survey but the bees had to be frozen or stored in alcohol. Suspect larval material was also permitted but this material had to be tested using PCR and could not be cultured. Material was to be released to an MPI containment facility and destroyed afterwards.

Fortunately in the absence of varroa mites, which can lead to Parasitic Mite Syndrome (PMS) and Colony Collapse Disorder (CCD), both American and European foulbrood have reasonably conclusive visual or clinical symptoms.

Information on bee diseases, including colour photographs, has been left with Samoan beekeepers and authorities on a number of occasions, including the current mission. Copies of the brochure Honey Bee Exotic Diseases and Pests produced by AsureQuality Ltd and funded by MPI, was revised in May 2012 and supplied to BASI along with illustrations of American foulbrood disease.

B.4 Industry Prospects and Export Considerations

Four beekeepers own most of the hives on Samoa (range 11–140) but expansion plans identified during the previous survey appear to be on hold for the time being. Plans for a mobile extracting unit are being promoted over a purpose-built honey processing factory. The issue of mobile extractors being acceptable to the EU has been resolved in New Zealand. MPI Food Safety Authority has determined that mobile field extraction is acceptable provided the plant and equipment are operated within a suitable enclosure. Some New Zealand beekeepers operate in the field with extracting units built within horse float type units while others have enclosed extracting machines on trailers with permanent walls and a permanent roof.

The potential for bee hives in Samoa is still estimated at 2000–3000. Export markets will be vital if any marked expansion occurs as the local market can probably only absorb around 7–8 tonnes per year (FAO, 1996 and Dean, L 2009). Exports to New Zealand are currently permitted with an export certificate from Samoa stating the honey is from Samoa and the country is free of European foulbrood (EFB). Once New Zealand's revised bee product import standards are in place this automatic right of entry could be replaced with a requirement to get an import permit.

The conditions on the permit are likely to demand demonstrated freedom from EFB, which will probably mean regular surveys of hives by a competent authority. How frequently the surveys need to be carried out and who has to do the surveys will need to be negotiated with the New Zealand authorities.

Qualifications of staff that should carry out the survey work will be subject to negotiation. Suitably trained local personnel, or accredited experts from overseas, could do this work or New Zealand authorities may accept qualified beekeepers inspecting their hives and making declarations as to disease freedom. A competent authority will also be required to issue Export Certificates and the level of competency required will be negotiated with New Zealand authorities. Further training in New Zealand or Australia may be needed for MAF Officers and or scientists/technicians from SROS.

If the Samoan honey is to be consumed within New Zealand then it should have been processed in premises approved for the purpose by local health authorities and the operator should ideally have a documented Food Safety Program (FSP) or a Risk Management Program (RMP). If the Samoan

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honey is likely to be re-exported from New Zealand as Samoan honey, or blended with other bee products from New Zealand or elsewhere, then the operator must have an RMP and meet all Overseas Market Access Requirements (OMARs). AsureQuality Ltd carries out the majority of the RMP audits for New Zealand honey processors. See web site below for more information;

http://www.foodsafety.govt.nz/index.htm

To enable subsequent export of the Samoan bee products, they must also be inspected at the New Zealand border by MPI Quarantine staff, who will attest to the integrity of the product and the country of origin and issue a relevant certificate (OMAR/01-172). This must be cited if a subsequent export certificate is to be issued by MPI.

http://www.foodsafety.govt.nz/industry/general/animal-products/omar-notifications/

If the bee products for human consumption or use are likely to be exported directly to the European Union (EU), or be re-exported from New Zealand, then Samoa must have an annual residue-testing program in place.

Pitcairn Island has an accredited New Zealand lab carryout its residue tests at an annual cost of approximately NZ$1200 Alternatively SROS may be able to carry out the testing. The EU also requires that supplier countries be listed with them as approved suppliers.

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