



Small Hive Beetle National Management Plan

31 October 2003

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INTRODUCTION

The previously exotic *small hive beetle* (*Aethina tumida* Murray) was detected at Richmond in western Sydney in October 2002. Subsequent investigation identified the beetle in 103 apiaries in NSW and 11 in Queensland. The level of infestation in the affected apiaries and historical reports subsequently indicated that the small hive beetle (SHB) might have been present in NSW for more than a year.

Following several meetings and a report by the Consultative Committee on Emergency Animal Diseases (CCEAD), the National Management Group (NMG) for the Small Hive Beetle noted that although the full extent of the spread was not known, it was clear that the outbreak could not be eradicated and that the likelihood of containment was also uncertain. Given this outcome, the relevant parties agreed that beekeeper controls should be implemented and a strong national approach implemented to provide effective management with Animal Health Australia requested to coordinate and broker funding for a National SHB Management Plan.

The small hive beetle is a native of Africa where it is considered to be a secondary apiary pest and little more than a nuisance. In 1998 it was recorded in Florida and has since spread to a number of other US States. It is now considered a major pest of European bee colonies in a number of American states and information from Florida and South Carolina indicates that it is more damaging to the apiary industry than in Africa.

Primary damage to apiaries and stored honey is through the feeding activity of the larvae that feed on brood, pollen and honey causing it to ferment and give off an odour like sour oranges. Stored supers of honey or extracted frames can also be ruined by infestation with adult beetles and larvae. The beetles have been reported to be capable of destroying strong honeybee colonies in a matter of weeks. Feral colonies of bees are also susceptible and provide a significant haven and reservoir.

The most severe initial impact of the presence of the SHB in Australia has been the restrictions placed on owners detected with the pest during the initial investigation and on the live bee export industry. The medium to long-term impact on the commercial apiary industry cannot be quantified due to a lack of information, especially the compounding impact of the current drought conditions. Because the beetle can complete its live cycle in certain fruits the potential for impacts on the fruit and vegetable industries cannot be excluded. Consultations have been undertaken with plant industry representatives through Plant Health Australia and they have indicated that they are maintaining a watching brief at this stage and monitoring market access.

A SHB Steering Committee formed by Animal Health Australia to address the request by the NMG met in December 2002 and endorsed development of a plan based on information acquisition, research, surveillance and control and communication to industry participants.

This national plan encompasses agreed activity components to ensure that Australia has a coordinated national approach and agreed priority research studies into this pest under Australian conditions.

SUMMARY OF THE MANAGEMENT STRATEGY

There is strong support by governments and the apiary industry for a national approach to the management of the SHB to reduce additional impacts on the productivity of the honeybee industry and to slow the spread of the beetle.

On previous occasions when the honeybee industry has had to adjust to a new pest or disease, there has been information available to enable the prompt development of control strategies. However, in the case of the SHB, there is little credible information and no knowledge of how it will behave under Australian conditions. Given the lack of robust information on which to base the national strategy, this plan recognises the knowledge deficiencies and identifies short-term immediate actions to acquire appropriate base information and initiates several projects to explore practical control options to provide some immediate advice to apiarists.

The plan also recognises the importance of acquiring information that will enable effective and efficient long-term management of the impact of the pest. Thus prompt implementation of an appropriate suite of research activities is a focus of the plan. This will provide much of the information required to enable control and advice to beekeepers. In the mean time, apiarists must be kept informed so they can take appropriate measures and the spread of the pest must be monitored to facilitate regulatory actions and advice of status where necessary.

The objectives of this plan are to:

1. Reduce the impact on productivity, slow the spread of the SHB in Australia and minimise the damage in infested apiaries by identifying and implementing measures (chemical, non-chemical and management) that minimise the risk of harmful chemical residues;
2. Implement cost effective surveillance to enable the spread of the pest to be monitored and reported;
3. Develop an on-going communications program to keep bee keepers and horticultural industries informed; and
4. Provide cost effective national coordination and review.

To provide a framework in which these objectives can be pursued, five operational projects are outlined in the next sections. The costs of implementing this strategy will be borne by both government and industry participants.

Animal Health Australia has completed a risk assessment in respect to managing this program, in line with Company project management approaches. The following risks in particular, impact on the success of this plan and will need to be managed through commitment by governments and industry to mitigate these risks:

- Insufficient funding to support priority studies and investigations in the short term that will assist in the development of a long term strategy to contain and control or possibly eradicate this pest
- Lack of technical information about the biology of SHB under Australian conditions
- Lack of technical information about chemical and non-chemical control methods
- Lack of specialist resources to deliver an effective monitoring and surveillance program that will define the geographic limits of infestation.

Costs incurred by Animal Health Australia in developing and managing the national strategy will be in-kind contribution. Ongoing costs associated with meetings of the SHB Steering Committee

to monitor progress and outcomes will be borne by individual affected Parties.

Program Objective – To slow the spread of the SHB in Australia and the impact in infested apiaries by identifying and implementing measures that minimise the risk of harmful chemical residues

1 RESEARCH AND DEVELOPMENT

The SHB Management Plan highlights a suite of identified priority research and development activities. It is important to note that funding estimates are only preliminary as the projects have yet to be fully developed and costed. There may be other research and development issues that have not yet been identified and that may require future investigation.

1.1 Information on biology and control

An immediate action designed to scope the gaps in information that will need to be addressed to provide effective and cost efficient control and to provide a basis for further information acquisition and research.

- A delegation to the US will be funded by the RIRDC (2 persons) and the horticulture industry (2 persons), to undertake a study tour of US affected areas to gain first hand information on biology, epidemiology, impacts and control practices.

USA Study Tour			
One Industry and one Government apiary expert to undertake a joint international study tour in March 2003 with funding of up to \$25,000 approved by the RIRDC . Industry sources will fund two other people to join the tour.			
Funding Source	2002/03	2003/04	Total
RIRDC	\$25,000		\$25,000
<i>NSW Ag (in kind 3weeks salary)</i>	<i>\$7,500</i>		<i>[\$7,500]</i>

1.2 Investigate biology under Australian conditions

The lack of information on the biology of the beetle under the full range of environmental conditions likely to be experienced in Australia is a significant constraint on implementing a rational control program. To acquire this basic information it will be essential to investigate:

- the local life cycle and survival of adult beetles outside hives
- food sources outside hives in the Australian situation (including native plants)
- survival of larvae *and* eggs under different soil/temperature/moisture conditions
- the ability to complete (multiple) life cycle/s outside hives (on fruit).
- investigation of why honey ferments after invasion by SHB larvae.

This work will be funded by RIRDC and included in a project by NSW Agriculture to be carried out at the Elizabeth Macarthur Agricultural Institute.

1.3 Investigate chemical treatments and attractants.

Chemical control of the SHB can be achieved but there are major concerns that existing treatments used in the US (Checkmite+ strips – Coumaphos), will result in unacceptable residues in honey and other products and potentially mask the introduction of varroa mites.

Coumaphos is not registered for use in Australia. Currently there are no approved treatments for use in Australia and there is significant concern that without appropriate advice, apiarists will experiment with chemical products and potentially contaminate Australian honey. The National Residue Survey will implement a targeted program to monitor honey for such chemicals.

This component involves the investigation of ways in which the Checkmite+ strips may be usable under Australian conditions without resulting in residues. Samples of Checkmite+ Strips have been obtained and will be tested under permit for both for efficacy and residues.

Other possible treatments for the beetle including cockroach or ant baits based on other chemicals such as chlorpyrifos, synthetic pyrethroids etc also need to be assessed.

The effectiveness under a wide range of Australian conditions of (and residues from) soil treatments for larvae including Permethrin needs to be defined and other chemicals such as powdered borax or potassium chloride assessed to provide a suite of products for various situations.

The immediate requirement is to develop a project proposal to identify and trial effective chemicals. In the longer term, the objective would be to only use non-chemical measures such as bacteria (*Bacillus thuringiensis*) and Insect Growth Regulators (IGR)s

Identify effective chemical treatments for use under Australian conditions				
Urgent medium length project. Funding approved by the RIRDC.				
Funding Source	2002/03	2003/04	2004/05	Total
RIRDC	\$29,000	\$58,000	\$8,000	\$95,000
<i>NSW Agriculture in-kind contribution</i>	<i>\$86,000</i>	<i>\$43,500</i>		<i>[\$129,500]</i>

Attractants and Repellents

The use of chemical attractants and pheromones in traps offers potentially easy ways to reduce the population of beetles and thus slow the spread to other sites. If suitable attractants can be identified they can be brought into use relatively quickly, as they do not require registration or permits for use. They could be incorporated into traps located in active apiaries to attract beetles surviving outside hives and potentially at sites following their vacation to capture any that may subsequently emerge from soil infested with larvae.

The use of specific repellents to keep beetles out of hives may also be fruitful.

Attractants and Repellents

A project is to be developed by RIRDC, who will deliver the project is still uncertain. It will not commence until the 2003/4 financial period and it is estimated at \$40,000.

2002/03

2003/04

(see section 1.2)

\$40,000

1.4 Investigate nonchemical controls

Non-chemical controls that interrupt the life cycle of the beetle or reduce the likelihood of entry into a hive appear to provide opportunities to develop practical control options suited to the Australian environment without the risks inherent in chemical use. Various ideas have been floated but without information on their effectiveness it is not possible to provide advice to beekeepers.

A series of projects is proposed as the effective way of initiating controlled tests to evaluate such options. In addition, beekeepers will be asked to trial some options and report any successful innovations for further evaluation.

Beetle and Larvae Traps

It is important to determine where the SHB stays within the hive to enable development of a suitable trapping system. USA has looked at traps that could incorporate a bait using the bee escape principles. They have also developed a trap that uses a small gap between cover slides. Attractants may enhance the effectiveness of traps.

Methods of larvae control such as impervious soil barriers under hives or larvae “catchers” at the front of hives have also been suggested. Undoubtedly some options have been tested in the USA. The outcomes of the proposed investigation may help to provide some information on effective means of minimising SHB in infested hives.

Trap Studies

This project relates to the study of various mechanisms to trap adult and larval beetles within the hive.

Trap studies			
Project proposal to investigate traps to be prepared for potential funding			
Funding Source	2002/03	2003/04	Total
RIRDC	\$2,000 [traps]		\$2,000
<i>ODPI in-kind contribution</i>	<i>\$3,000</i>	<i>\$9,500</i>	<i>[\$12,500]</i>
<i>NSW Agriculture in-kind contribution</i>	<i>\$8,000</i>		<i>[\$8,000]</i>

Hive and Super Protection

There is considerable interest in developing cost-effective options for hive and super protection. Information from the US indicates that cooling to –12 degrees for 24 hours will destroy all stages of the SHB but this is unlikely to be either practical or cost effective in Australia. More definitive work on the impact of cooling is required to identify the range of temperature that impacts on the beetle and its larvae and eggs. Of particular interest is the effect of temperature control via cooling rooms and refrigerated containers which are currently used by many apiarists for wax moth control.

Additional work on other methods of sterilisation may also prove useful including the use of phosphine gas. Information from the US study tour may help provide direction to such an investigation. If it does not, then knowledge about the application of phostoxin for wax moth control will be considered.

Chilling and freezing			
A project proposal on chilling and freezing to be developed for potential funding.			
Funding Source	2002/03	2003/04	Total
RIRDC	\$12,000	\$3,000	\$15,000
<i>NSW Agriculture in-kind contribution</i>	<i>[24,000]</i>	<i>[6,000]</i>	<i>[\$30,000]</i>

Cost benefit analysis

It is recognised that in the long term the investment in control of the SHB should be based on an appropriate analysis of the benefits to be gained from such investment. Given the lack of sound information on impacts under Australian conditions, such an analysis cannot be conducted at the time of preparation of this plan but will be undertaken once sufficient information is obtained and/or generated by the other activities described in the plan.

Cost benefit analysis

DEFERRED - A project proposal to be developed for potential funding once sufficient information becomes available

Funding Source	2002/03	2003/04	Total
<i>DEFERRED - NOT IDENTIFIED</i>	<i>0</i>	<i>[\$15,000]</i>	<i>[\$15,000]</i>

Other controls

There are other ways in which the impact of the beetle may be reduced. These include discouraging infestation with beetles by hive design, hive construction to reduce hiding places for beetles and sites for egg laying and biological controls such as ants, parasites and pathogens. The breeding of beetle-resisting bees that remove the larvae and eggs may also be important. Feral bee control may also be relevant.

In addition, there are several issues of primary interest to queen bee exporters including the identification of detection methods for ensuring bees are not carrying eggs and larvae (queens and package bees, especially queen cells and banked queens) and possible sterilising treatments for queens and package bees, for export treatment purposes.

Whilst within Australia, States have been prepared to accept queen bees from apiaries that have SHB in them on the condition that the queen bees are hand caught and hand escorted, this has not been the case with overseas countries. Opinions obtained at the time of the SHB detection and later by the USA Study Tour stated that hand caught hand escorted queen bees do not present a problem.

It has been agreed that a research project will be conducted by NSW Agriculture to study hand caught queens and hand caught escorts. The cost of this project will be included in the overall NSW Agriculture projects but will be written up separately.

2 CONTROL

Effective control of the SHB will primarily be achieved by ensuring a high level of understanding of the pest and its management by beekeepers. Encouraging beekeepers to report is important so restrictive regulatory requirements are to be discouraged.

The SHB should be declared a notifiable disease/pest under relevant legislation in each State and Territory to facilitate negotiations on export certification. The CCEAD Technical Working Group recommended that the legislative requirements for the SHB be reviewed on a six-monthly basis and this will be monitored.

Any movement controls imposed for the SHB should be the minimum required to control its spread. They should not be of a nature that would discourage reporting or encourage smuggling of bees or exaggerate to potential overseas markets the problems associated with SHB.

Implementation of Guidelines for Control

The prompt development of national guidelines on control of the SHB is essential to restrict the detrimental effects of SHB infestation on the apiary industry. This is difficult in the face of deficient information but initial plans should be accepted by governments and the honey bee industry as a dynamic set of proposals to be refined as new information from the above set of projects comes to hand.

Develop national control procedures for beekeepers

Develop national operating procedures on the basis of international information and ‘good practice’ procedures outlined in the AHBIC biosecurity plan

Funding Source	2002/03	2003/04	Total
<i>In-kind</i>	0	\$20,000	[\$20,000]

The AHBIC bee industry biosecurity plan is readily available from the AHBIC website <http://www.honeybee.org.au/biosecurityplan.pdf>. This plan provides general advice to beekeepers on controlling the presence of diseases and pests in their hives and should form the basis for improving the knowledge of industry participants on actions required to reduce the spread of diseases and pests of honeybees. The plan is currently incorporated into the Bee-Qual quality assurance program.

Program Objective - Implement cost effective surveillance to enable the spread of the pest to be monitored and reported

3 MONITORING AND SURVEILLANCE

Available information relies on that provided by the NSW and Queensland governments during their initial investigation into the distribution of the pest. Once the SHB was declared to be endemic, active tracing ceased and although still notifiable, it is unlikely that without proactive action additional quality information on the distribution and spread will be forthcoming.

Urgent action is required to encourage beekeepers to advise the state authorities of the presence of the SHB in their hives. To encourage this reporting, a package of nationally consistent information and advice is essential as discussed elsewhere.

In addition to surveillance via beekeeper reporting, a test that enables honey to be monitored for evidence of the beetle or larvae would provide a mechanism for effective industry wide monitoring of the spread of the beetle and allow targeting of information to affected producers. A sensitive test that indicates low levels of SHB infestation is not yet available. Currently, detection of SHB through honey relies on a crude examination for honey odour and consistency changes that are only seen in honey from heavily infested hives.

Both the QDPI and NSW Agriculture maintain maps of infested and inspected-negative sites within their jurisdictions and these should be standardised with location recorded via post codes and reported quarterly via the National Animal Health Information System (NAHIS) and publicised in honey bee industry journals etc.

The availability of quality information will assist to demonstrate internationally the conduct of effective monitoring and surveillance and a capability to identify infested areas with a reasonable degree of accuracy.

There are several levels of costs associated with surveillance. Detection at the apiary level should be a beekeeper responsibility and the affected states and apiary industry will take steps defined in the communications section to ensure apiarists understand the importance of reporting the presence of the beetle. Costs associated with collection and collation of surveillance information will fall primarily to the States and Territories and it is proposed they absorb this cost as part of surveillance responsibilities.

SHB Monitoring and surveillance

Jurisdictional surveillance and reporting activities for SHB to support control activities and international trade negotiations for market access.

Funding Source	2002/03	2003/04	Total
<i>QLD in-kind contribution</i>	<i>[\$93,000]</i>	<i>[\$33,000]</i>	<i>[\$126,000]</i>
<i>NSW in-kind contribution</i>	<i>[\$235,000]</i>	<i>[\$95,000]</i>	<i>[\$330,000]</i>
<i>ACT in-kind contribution</i>	<i>[\$1,000]</i>	<i>[\$1,000]</i>	<i>[\$2,000]</i>
<i>TAS in-kind contribution</i>	<i>[\$4,000]</i>	<i>[\$2,000]</i>	<i>[\$6,000]</i>
<i>SA in-kind contribution</i>	<i>[\$16,000]</i>	<i>[\$34,000]</i>	<i>[\$50,000]</i>
<i>NT in-kind contribution</i>	<i>[\$20,000]</i>	<i>[\$20,000]</i>	<i>[\$40,000]</i>
<i>WA in-kind contribution</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>VIC in-kind contribution</i>	<i>[\$30,000]</i>	<i>[\$25,000]</i>	<i>[\$55,000]</i>

Program Objective - Develop an on-going communications program to keep beekeepers informed

4 COMMUNICATION AND AWARENESS

Improved communication with beekeepers is critical to the success of any plan to control the SHB in Australia. This plan aims to engage stakeholders including apiarists and processors, honeybee organisations, governments, environment agencies, researchers and plant industries.

The plan will promote awareness and the application of honeybee industry Biosecurity Plans and the promotion of agreed risk management approaches to control. The objectives for the communications and awareness module have been refined in this draft as follows:

- To ensure all stakeholders in the Australian honey bee industry are aware and informed of the ongoing status of the SHB management plan.
- To ensure all stakeholders understand the role they can play in slowing the spread of SHB and productivity impacts of the pest in infested hives and the resources available to them.

Stakeholders are defined as all honey-bee industry chain participants - including industry organisations, government agencies, the research community and processors but excluding consumers.

There are 5 activities suggested for immediate commencement as follows:

- (i) **Writing & release of one feature article per month for the next 6 months**
These articles will focus on updating the progress of the plan, current status of activities, apiarist do's and don'ts etc. The focus will be predominately on apiarists with a distribution through to approx 485 rural and regional media outlets nationally (including radio). Industry journals will also be targeted. This will provide us with an opportunity to reach a wide range of apiarists and include those not previously captured on state government or industry organisation mailing lists. It will also serve to reinforce the message being pushed through other channels, particularly about the dangers of using unregistered chemicals because of honey residue concerns.
- (ii) **Creation of a monthly update**
Available as both an email and downloadable version for distribution through existing channels. This update will be available to any stakeholder interested in the progress of the national management plan and will include updates on the various aspects of the plan, international updates etc and in the case of the email version will be linked to the SHB website located within the AHBIC domain.
- (iii) **SHB website (AHBICdomain)**
This will be the principle means by which activities on SHB are communicated. The site is set to feature links to other sites and will house the monthly updates, media resources and related material.
- (iv) **Educational material**
The dissemination, development and assistance with educational material for SHB. There has already been some excellent material produced to date.
- (v) **National workshop series** a series of workshops will be conducted nationally in association with State/Territory Industry Conferences to present the key findings of the Australian delegation's study tour to the USA. This will provide an opportunity to disseminate further information and will be publicised via the AHBIC media network and promoted through monthly release of material.

In addition the activities in the Protect Australian Livestock Campaign affords considerable opportunity to communicate issues relating to SHB.

SHB Communication Plan			
The Communications Plan and activities will be developed using an editorial committee with NSW Agriculture, QDPI and AHBIC and the AHBIC website will be the key information portal.			
Funding Source	2002/03	2003/04	Total
<i>[In-Kind]</i>	<i>[\$5,000]</i>	<i>[\$15,000]</i>	<i>[\$20,000]</i>

Program Objective – To provide cost effective national coordination and review

5 MANAGEMENT AND EVALUATION

A Steering Committee with the following Membership has developed and is proposed to manage implementation of the national management plan.

Dr Rob Keogh, Director Programs, Animal Health Australia, (Chairman)
 Mr Greg Roberts, President, Australian Honey Bee Industry Council
 Mr Murray Spicer, New South Wales Agriculture
 Mr Keith McIlvride, Rural Industries Research and Development Corporation
 Dr Karen Skelton, Queensland Department of Primary Industries
 Dr Pat Boland, Biosecurity Australia, Agriculture, Fisheries and Forestry Australia
TBA, Animal Health Australia, Executive Officer

The implementation of the National SHB Management Plan will be monitored by Animal Health Australia through its Steering Committee and reviewed in January 2004 for effectiveness.

SHB Management and evaluation			
Animal Health Australia costs associated with management of the plan will be in-kind contribution. Ongoing costs associated with meetings of the SHB Steering Committee beyond June 2003 will be borne by individual Parties represented in the Steering Committee.			
Funding Source	2002/03	2003/04	Total
<i>Animal Health Australia [In-kind]</i>	<i>[\$30,000]</i>	<i>[\$10,000]</i>	<i>[\$40,000]</i>

BUDGET

Summary of 2002/03 to 2004/2005 SHB Operating Budget

		Funded by	2002/03 \$	2003/04 \$	2004/05 \$	In-Kind Contribution	TOTAL costed budget \$
1.	Research and development						
1.1	Information on biology and control [Overseas Study Tour]	RIRDC	25,000	0	0	0	\$25,000
		<i>NSW Ag in-kind contribution</i>	<i>[7,500]</i>	0	0	<i>[7,500]</i>	
1.2	Investigate biology under Australian conditions	<i>Will be included under 1.3</i>	0	0	0		0
1.3	Investigate chemical treatments	RIRDC	29,000	58,000	8,000	0	\$95,000
		<i>NSW Agriculture in-kind contribution</i>	<i>[86,000]</i>	<i>[43,500]</i>	0	<i>[129,500]</i>	
	Investigate attractants	RIRDC	0	40,000	0	0	\$40,000
1.4	Investigate non-chemical controls	RIRDC	2,000		0	0	\$2,000
	▪ trap studies	<i>QDPI in-kind contribution</i>	<i>[3,000]</i>	<i>[9,500]</i>	0	<i>[\$12,500]</i>	
		<i>NSW Agriculture in-kind contribution</i>	<i>[8,000]</i>	0	0	<i>[\$8,000]</i>	
	▪ chilling/freezing	RIRDC	12,000	3,000			\$15,000
		<i>NSW Agriculture in-kind contribution</i>	<i>[24,000]</i>	<i>[6,000]</i>	0	<i>[\$30,000]</i>	
	<i>Cost/benefit analysis</i>	<i>DEFERRED — until information available from studies</i>					
2.	Control	<i>In-kind</i>	<i>[0]</i>	<i>(\$20,000)</i>		<i>[\$20,000]</i>	

3.	Monitoring and surveillance	<i>In-kind</i>					
		<i>QLD in-kind contribution</i>	[93,000]	[33,000]		[\$126,000]	
		<i>NSW in-kind contribution</i>	[235,000] ¹	[95,000]		[\$330,000]	
		<i>ACT in-kind contribution</i>	[1,000]	[1,000]		[\$2,000]	
		<i>TAS in-kind contribution</i>	[\$4,000]	[\$2,000]		[\$6,000]	
		<i>SA in-kind contribution</i>	[16,000]	[34,000]		[\$50,000]	
		<i>NT in-kind contribution</i>	[20,000]	[20,000]		[\$40,000]	
		<i>WA in-kind contribution²</i>	N/A	N/A		N/A	
		<i>VIC in-kind contribution</i>	[\$30,000]	[\$25,000]		[\$55,000]	
4.	Communication and awareness		[5,000]	[15,000]	0	[\$20,000]	
5.	Management and evaluation		[30,000]	[10,000]		[\$40,000]	
TOTAL In-Kind						[\$876,500]	
TOTAL RIRDC Funded³			\$68,000	\$101,000	\$8,000		\$177,000

Note:

1. NSW in kind costs include \$105,000 incursion costs (calculated as cost share equivalent), \$100,000 direct salary costs during incident, \$45,000 regulatory costs and \$55,000 advisory activities.
2. No specific in-kind contribution for SHB surveillance in WA is needed, as it is part of normal surveillance for bee diseases.
3. RIRDC funding is on a project basis, therefore any RIRDC funds that are not used in any financial year will be rolled over into the following financial year.