
AMERICAN FOULBROOD DISEASE

AMERIKAANSE JONGBYSIEKTE

AFB

Guidelines for managing beekeeping with this disease

Riglyne vir die bestuur van byeboerdery met hierdie siekte

AFB has been diagnosed in the Western Cape during the first quarter of 2009. Based on what is known of this disease, the following guidelines are published to assist beekeepers in managing their hives to live and work WITH this disease. This disease is normally considered as untreatable. As a result it is only the symptoms, the management of bees, the spread and the effects that are discussed here.

AFB (hierdie afkorting sal deurgans gebruik word) is vir die eerste keer tydens die eerste kwartaal van 2009 in die Wes-Kaap gediagnoseer. Gebasseers op wat oor hierdie siekte bekend is, word die volgende riglyne gepubliseer ten einde byeboere by te staan om hulle korwe te bestuur ten einde SAAM MET AFB te werk en te lewe. Hierdie siekte word beskou as onbehandelbaar. As gevolg hiervan is dit slegs die simptome, die bestuur van bye, die verspreiding en die gevolge wat hier bespreek word.

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CONTENT

This document consists mainly out of sets of tables that should assist beekeepers in making decisions.

The first set of tables will describe what is known about this disease.

The next sets of tables will assist beekeepers in evaluating each step regarding risks related to this disease and to assess, those recommended management adaptations for implementation.

INHOUD

Hierdie dokument bestaan hoofsaaklik uit tabelle wat byboere sal kan aanwend ten einde besluite te neem.

Die eerste stel tabelle sal wat alles bekend is oor hierdie siekte beskryf.

Die volgende tabelle sal byboere help om met elke stap van hulle operasies elke risiko verbind met hierdie siekte te kan identifiseer en om die aanbevole bestuursaanpassings na te gaan vir implementering

DIE VOLGENDE
TABELLE
VERSKYN IN
ENGELS EN IN
AFRIKAANS

THE FOLLOWING
TABLES APPEAR
IN ENGLISH AND
IN AFRIKAANS

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TERM	DEFINITIONS
ROBBING *	BEES WILL COLLECT IN VARIOUS WAYS ANYTHING CONTAINING SUGARS. WHEN THEY STEAL HONEY OR NECTAR OUT OF OTHER COLONIES IT IS CALLED ROBBING. ROBBING WILL RAPIDLY SPREAD AFB.
DRIFTING *	BEES ARE NOT ALWAYS LOYAL TO THEIR OWN COLONIES OR MAY LOSE THEIR WAY WHEN HIVES ARE TRANSPORTED OR MOVED OR PLACED INCORRECTLY. THIS COULD RESULT IN BEES ENDING UP IN COLONIES FROM WHERE THEY DID NOT ORIGINATE.
CROSS CONTAMINATION *	DISEASES MAY BE SPREAD BETWEEN TARGET ORGANISMS AS A RESULT OF MAN'S INTERFERENCE (CONTAMINATED ITEMS CAN SPREAD DISEASES). PATHOGENS CAN CONTAMINATE NEW TARGET ORGNISMS AS A RESULT.
SHOOK SWARM	ALL THE BEES OUT OF A COLONY ARE SHAKEN OFF THE COMB AND OUT OF THE HIVE AND MADE TO ENTER A NEW OR RECONDITIONED AND STERILISED HIVE WITH NEW WAX FOUNDATION, TO RE-ESTABLISH ON THIS NEW EQUIPMENT.
STERILISED	EQUIPMENT IS STERILISED WHEN IT HAS UNDERGONE ONE OR MORE OF THE FOLLOWING AFTER BEING SCRAPED CLEAN <ul style="list-style-type: none"> - TREATED IN SOME WAY AT MORE THAN 160 DEGREES C FOR MORE THAN 10 MINUTES SUCH AS WITH WAX DIPPING - RADIATION AT A RADIATION FACILITY - STEEPING IN SODIUM HYPOCHLORITE FOR INERT AND NON-ABSORBENT MATERIALS FOR NO LESS THAN 30 MINUTES - STEEPING IN CAUSTIC SODA (LYE)

* The three most serious methods of spreading of the disease between colonies

TERM	DEFINISIES
ROWERY *	BYE SAL OP VERSKILLEND MANIERE ENIGIETS WAT SUIKERS BEVAT VERSAMEL. WANNEER BYE HEUNING OF NEKTAR UIT DIE KORWE VAN ANDER BYE STEEL WORD DIT ROWERY GENOEM. ROWERY SAL AFB VINNIG LAAT VERSPREI.
DRYF *	BYE IS NIE ALTYD LOJAAL AAN HULLE EIE KOLONIES NIE OF KAN HULLE WEG VERLOOR WANNEER KORWE VERVOER OF VERSKUIF WORD OF VERKEERDELIK UITGEPLAAS WORD. DIT KAN BETEKEN DAT BYE IN KORWE BELAND WAARVANDAAN HULLE NIE GEKOM HET NIE.
KRUIS-BESMETTING *	SIEKTES KAN TUSSEN TEIKENORGANISMES VERSPREI AS GEVOLG VAN DIE MENSE SE INVLOED (BESMETTE ITEMS KAN SIEKTES VERSPREI). SIEKTEVERSPREIDENDE ORGANISMES KAN AS GEVOLG HIERVAN ANDER TEIKEN ORGANISMES BESMET.
AFSKUD SWERM	AL DIE BYE WORD UIT 'N KORF EN VAN DIE RAME AFGESKUD EN TOEGELAAT OM 'N NUWE OF BEHANDELDE EN GESTERILISEERDE KORF MET NUWE WASVELLE TE BETREE TEN EINDE TE HERVESTIG.
STERILISEER	TOERUSTING IS GESTERILISEER WANNEER DIT – NADAT DIT SKOON GESKRAAP IS - EEN OF MEER VAN DIE VOLGENDE BEHANDELINGS ONDERGAAN HET <ul style="list-style-type: none"> - OP EEN OF ANDER MANIER TEEN MEER AS 160 GRADE C VIR MEER AS 10 MINUTE BEHANDEL IS, SOOS MET WARM KERSWAS DOOP - BESTRAAL BY 'N BESTRALINGSAAANLEG - GEWEEK IN 3% NATRIUM HIPOKLORIET VIR NIE MINDER AS 30 MINUTE – SLEGS GESKIK VIR NIE-ABSORBERENDE MATERIAAL. - GEWEEK IN BYTSODA

* Die drie ernstigste maniere waarop die siekte tussen kolonies versprei

Name	American Foulbrood Disease
Organism	Paenibacillus larvae larvae
Lifestyle	Rod shaped, anaerobic, spore forming gram-positive bacteria.
Lifetime potential of spores	> 65 years dormancy
Resistance of spores against temperature	Temperature to time ratio 100 degrees for 35 minutes 160 degrees for 10 minutes (as examples)
Target organism	Affects all juveniles of Apis. Specifically larvae are fed the spores, which germinate and affect the pupal stage of bees.
Medication	Antibiotics are able to eliminate only the live active bacteria. Spores remain unaffected. Antibiotic application is counter-productive and illegal in SA.

Naam	Amerikaanse Jongbysiekte
Organisme	Paenibacillus larvae larvae
Lewensstyl	Staaf vormige, anaerobiese spoor vormende gram positiewe bakterium
Leeftydspotensiaal van die spore	> 65 jaar dormant
Weerstand van spore teen temperatuur	Temperatuur tot tyd verhouding 100 grade vir 35 minute 160 grade vir 10 minute (as voorbeelde)
Teiken organisme	Affekteer alle Apis jongby. Spesifiek word die spore aan larwes gevoer waar hulle ontkiem en die papiestadium van bye affekteer.
Medikasie	Antibiotika vernietig slegs die lewende aktiewe bakterië. Spore bly bestand. Antibiotika aanwending is teen-produktief en onwettig in SA.

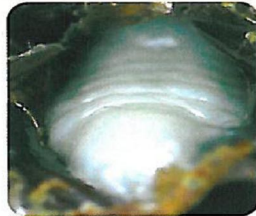
AFB DETECTABLE SYMPTOMS	<u>VISUAL</u>	OLFACTORY
HOW to inspect	<ul style="list-style-type: none"> - After opening a hive, using appropriate smoke and the correct tools and procedures, carefully remove a frame out of the hive, close to the centre of the brood nest of the colony. - Carefully remove most of the bees off the comb in the frame by shaking the frame, by bumping or using a bee brush or feather over the open beehive. - Do not move the frame away from over the open hive. - Place yourself with the most light falling from behind you and shining onto the face of the comb and look at the comb to examine it. - On completion, place the frame back into the open hive. - Evaluate as many frames as you need to – every comb containing brood. - Return the hive to its original status. - Take care not to destroy or damage bees. 	
In the brood comb, detect:	<ul style="list-style-type: none"> Sunken cell cappings Dark cell cappings Cell cappings with irregular openings that look chewed away Moist “oily” looking brood cell cappings 	<p>The aroma of “sour beer” or “old socks” or “old boots” or “stale sweat” or “mustiness”</p>
In uncapped brood cells, detect any of the following:	<ul style="list-style-type: none"> Bee pupa has its tongue sticking up to the cell roof The pupa is chocolate brown in colour The pupa has dried to a hard – difficult to remove scale in the bottom of the cell. The pupa, if stirred with a small stick - such as a match – pulls out into an elastic rubber-like thread of between 3 mm and 30 mm 	

AFB WAARNEEMBARE SIMPTOME	<u>SIGBAAR</u>	RUIKBAAR				
HOE om te inspekteer	<ul style="list-style-type: none"> - Na die korf oopgemaak is deur die toepaslike rook en prosedures en gereedskap aan te wend, haal versigtig 'n raam na aan die middel van die broeines van die kolonie uit die korf. - Verwyder die meeste bye van die koek in die raam versigtig deur die raam oor die oop korf te skud of te stamp of deur 'n byeborsel of veer te gebruik. - Moenie die raam van oor die oop korf wegbeweeg nie. - Plaas jouself met die meeste lig wat oor jou skouer kom en wat op die aansig van die koek skyn en kyk na die koek om dit te inspekteer. - Sodra jy klaar is, plaas die raam terug in die oop korf. - Evalueer so veel rame as wat nodig is – elke koek waarin daar jongby is. - Herstel die status van die korf na die oorspronklike. - Wees versigtig om nie bye te vernietig of te beskadig nie. 					
In die koek met jongby vind:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Versonke sel doppies</td> </tr> <tr> <td style="padding: 2px;">Donker kleurige sel doppies</td> </tr> <tr> <td style="padding: 2px;">Sel doppies wat weggekou is met onreëlmatige gate</td> </tr> <tr> <td style="padding: 2px;">Nat, "olie-agtige" sel doppies</td> </tr> </table>	Versonke sel doppies	Donker kleurige sel doppies	Sel doppies wat weggekou is met onreëlmatige gate	Nat, "olie-agtige" sel doppies	Die geur van "suur bier" of "ou sokkies" of "ou stewels" of "ou sweet" of "muwwerigheid".
Versonke sel doppies						
Donker kleurige sel doppies						
Sel doppies wat weggekou is met onreëlmatige gate						
Nat, "olie-agtige" sel doppies						
In ontseelde jonby selletjies vind enige van die volgende:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Bye papies met hulle tongetjies teen die bokant van die sel</td> </tr> <tr> <td style="padding: 2px;">Sjokolade-kleurige papies</td> </tr> <tr> <td style="padding: 2px;">Papies wat hard en taai geraak het en wat moeilik uit die selletjie kom</td> </tr> <tr> <td style="padding: 2px;">Papies wat, indien geroer met 'n stokkie - soos 'n vuurhoutjie – soos 'n rubber rekkie uittrek in 'n 3 mm to 30 mm draadjie</td> </tr> </table>	Bye papies met hulle tongetjies teen die bokant van die sel	Sjokolade-kleurige papies	Papies wat hard en taai geraak het en wat moeilik uit die selletjie kom	Papies wat, indien geroer met 'n stokkie - soos 'n vuurhoutjie – soos 'n rubber rekkie uittrek in 'n 3 mm to 30 mm draadjie	
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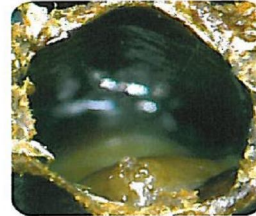
American Foulbrood Disease (AFB)

AFB is a bacterial disease of honey bee brood:

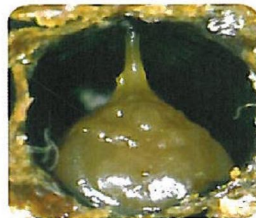
- The first signs of AFB are usually chewed cell cappings, sometimes sunken and darkened.
- When the cell is uncapped, coffee (with milk) coloured larva/pupa can be seen slumped on the lower wall.
- Bees will sometimes uncap infected cells.
- Pupae may have their tongues stretched across the cell.
- Older larvae/pupae dry out and turn into black scales that are difficult to remove from the cell wall.



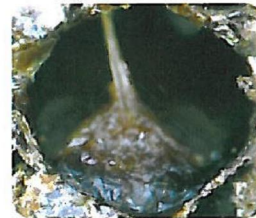
Very early infection



Diseased larva

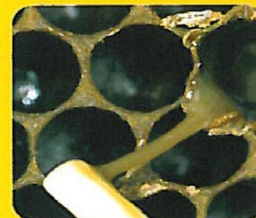


Diseased pupa with tongue



Older, darker diseased pupa

To diagnose AFB, mix up the larva/pupa with a matchstick and withdraw it from the cell. If the material ropes out then it is AFB. The presence of the pupal tongue stretched across a cell also means it is AFB. Dry scales do not "rope out".



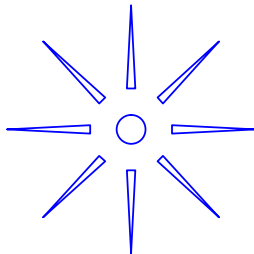

AFB "Ropiness" test



WHAT TO DO IF YOU DETECT SYMPTOMS OF AFB IN A HIVE



	HIVE	EQUIPMENT	SITE	WORKSHOP	LEGAL
IMMEDIATE	Put the frame back in and the lid back on the hive, reduce all entrances and mark the hive with an unmistakable mark, noting the date	Sterilise your tools.	Mark and identify the site as a potential AFB spore source	Consider methods of hive body sterilisation Gather information and advice from reputable sources	Contact the Department of Agriculture and the Plant Protection Research Institute to notify this disease
URGENT	Evaluate the potential of implementing the shook swarm method	Plan an own or contract sterilisation technique such as hot paraffin wax dipping for the beehive equipment	Inspect all further hives in the site for physical symptoms	Develop methods and procedures for containing the spread in all bees, specifically regarding DRIFTING ROBBING EQUIPMENT SWAPPING	
High PRIORITY	Consider taking such a swarm – sealed well into the hive and at night – to a central and isolated yard to continue with management	Sterilise all the equipment that was in contact with the colony	Inspect all hives in your operation	Determine the potential source (IN) of the contamination Determine the potential spread (OUT) of the contamination	
REGULAR	Culling of comb – replace with new foundation - and immediate efficient rendering of old – contaminated – comb to produce wax	Repeated sterilisation of hive parts each time a colony is lost or removed from a hive	Random placing of NON-LEAKNG hives Regular inspections	Management of containment and sterilisation techniques at all levels. Keep everything bee tight. Manage bees using the “Barrier method”	

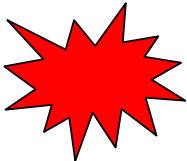
WAT OM TE DOEN INDIEN AFB SIMPTOME IN 'N KORF ONTDEK WORD.





	KORF	TOE- RUSTING	STAAN- PLEK	WERKSWINKEL	REGS- PLIG
ONMIDDELIK	Pak die raam terug en sit die deksel op, vernou alle openinge en merk die korf onmiskenbaar – merk ook die datum	Steriliseer die korfgereedskap	Merk en identifiseer die staanplek as 'n moontlike bron van AFB spore	Besin oor korftoerusting sterilisasie metodes Versamel inligting van betroubare bronne	Skakel die Departement Landbou en die Navorsings-instituut Plantbeskerming ten einde die siekte aan te meld
DRINGEND	Ontleed die moontlikheid van die afskud swerm metode	Beplan 'n eie of kontrak sterilisasie tegniek soos warm parafien was doop vir die korftoerusting	Inspekteer al die ander korwe in die staanplek vir simptome	Ontwikkel metodes en prosedures om die verspreiding in alle bye te keer. Spesifiek oor DRYF ROWERY TOERUSTING UITRUILING	
Hoë PRIORITEIT	Besin daaroor om die korf – goed verseël en in die aand - na 'n sentrale en geïsoleerde staanplek te vervoer vir verdere bestuur	Steriliseer alle toerusting wat met daardie swerm in aanraking was	Inspekteer alle korwe in die operasie	Bepaal die moontlike bron van die besmetting (IN) Bepaal die moontlike verspreiding (UIT) van die besmetting	
GEREELD	Uitsny van koeke – vervang met nuwe wasvelle - en onmiddellike en doeltreffende uitsmelt van ou besmette koeke ten einde was te produseer	Herhaalde sterilisering van korftoerusting elke keer as bye uit 'n korf verlore raak of uitgeskud word.	Rond en bont plaas van HEEL korwe Gereelde inspeksies	Bestuur van beperking en steriliserings tegnieke op alle vlakke. Hou alles bye dig. Bestuur korwe op die "Barrier metode"	



•ITEM	•ISSUE	•SOLUTION
•SITE / APIARY	•DRIFTING 	<ul style="list-style-type: none"> •MARK HIVE FACES UNIQUELY BY PAINTING OR MARKING WITH RADIAL MULTI-COLOURED PATTERNS •ELIMINATE WEAK HIVES (SMALL POPULATIONS OF BEES) I.E. EQUALISE HIVE STRENGTHS PER SITE •ELIMINATE LEAKY HIVES (WEAK WOODWARE) EVEN IF BY TEMPORARILY CLOSING ALL EXCESS LEAKS •AVOID PLACING BEEHIVES IN UNIFORM GEOMETRIC PATTERNS IN A SITE (SUCH AS IN STRAIGHT LINES OR SQUARES OF HIVES) •PLACE BARRIERS AMONGST BEEHIVES OR ENSURE THE SITE CONTAINS UNIQUE NATURAL OR ARTIFICIAL OBSTRUCTIONS TO THE BEES, SUCH AS BUSHES, ROCKS OR TREES
	•ROBBING 	<ul style="list-style-type: none"> •ELIMINATE ALL LEAKY & WEAK EQUIPMENT •AVOID MESSING ANYTHING THAT MIGHT LEAD TO ROBBING SUCH AS SUGAR SYRUP OR HONEY OR FEED (DRY OR PATTIES) OR OPEN DRUM FEEDING



<ul style="list-style-type: none"> •HIVE 	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •UNIQUELY NUMBER EACH HIVE COMPONENT PER HIVE, INCLUDING THE FRAMES (HIVE NUMBER 1 IS STACKED WITH SUPERS MARKED NUMBER 1 AND CONTAINS ALL FRAMES MARKED NUMBER 1.) •QUEEN EXCLUDERS ARE REPORTED TO ASSIST IN CONTROLLING THE SPREAD IN MOST BEE RACES, AS BROOD IS RESTRICTED TO THE BROOD CHAMBER(S) – A.M. CAPENSIS LAYING WORKERS CAN STILL BREED IN THE SUPERS. •EACH HIVE BECOMES AN ISOLATED UNIT AND HIVE PARTS ARE NOT SWAPPED BETWEEN HIVES •RINSE TOOLS WITH “HYPO” (sodium hypochlorite - AKA Jik) AT EACH HIVE
<ul style="list-style-type: none"> •CROPPING 	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •IMMEDIATELY ISOLATE AND BEEPROOF EACH SUPER CROPPED •DO NOT USE THE “STAND-OFF” OR “BLOW-OUT” METHOD FOR VACATING BEES FROM THE SUPERS •REPLACE ONLY WITH THAT HIVE’S OWN NUMBERED SUPER(S) / FRAME(S) •CONSIDER USING CLOSED “CARRY BOXES” FOR SEALED HONEY FRAME TRANSPORT •ENSURE THAT “CARRY BOXES” ARE CLEAN AND CLEAR OF ANY HONEY RESIDUE BEFORE LOADING FRAMES •CROP HONEY ONLY WHEN ROBBING CAN BE CONTAINED, EVEN IF THIS MEANS WORKING IN ADVERSE CLIMATE OR NIGHTTIME CONDITIONS.




<ul style="list-style-type: none"> •TRANSPORT 	<ul style="list-style-type: none"> •ROBBING 	<ul style="list-style-type: none"> •ENSURE MINIMUM BEES ARE LEFT IN HONEY SUPERS THAT ARE CROPPED •PLACE A LID OF SORTS ON TOP OF EACH STACK OF SUPERS •SEAL ALL LEAKY SUPERS •USE TRANSPORTATION NET (ADAPTED SHADE-CLOTH) •AVOID STOPPING BETWEEN THE ORIGIN OF THE CROP AND DESTINATION OF THE LOAD AS THIS MIGHT GIVE ROBBER BEES A CHANCE TO START ROBBERING •IMMEDIATELY WASH ANY SPILLS OFF THE LOAD-BED BEFORE THE BEES CAN GET ACCESS •CONSIDER TRANSPORTING HONEY IN SUPERS IN CLOSED VEHICLES, SUCH AS PANEL VANS
	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •WASH ALL HONEY, WAX AND PROPOLIS OFF THE VEHICLE, BEFORE BEES CAN GAIN ACCESS

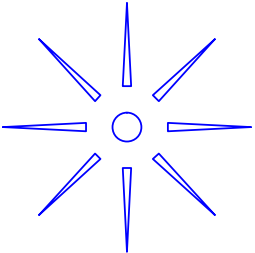

<ul style="list-style-type: none"> •HONEY ROOM 	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •APPLY ALL THE PRINCIPLES OF THE HEALTH ACT REGULATION R918 AT ALL TIMES WITHIN REASON AND EXPERIENCE (SUCH AS INSTALLING A NEGATIVE PRESSURE RATHER THAN A POSITIVE PRESSURE AIR CONTROL SYSTEMS) •OFF-LOAD AND THEN CHANGE CLOTHING (INCLUDING FOOTWEAR) BEFORE EXTRACTION STARTS •CLEAN ALL BURR AND BRACE COMB OFF EACH FRAME AND SUPERS BEFORE EXTRACTION •EXTRACT AS DRY AS POSSIBLE (REMOVE AS MUCH HONEY OUT OF THE COMB AS POSSIBLE) •RETURN EACH NUMBERED FRAME INTO ITS OWN NUMBERED SUPER AFTER EXTRACTION •PLACE A BARRIER – SUCH AS A SHEET OF PLASTIC - BETWEEN SUPERS •STERILISE ALL THE TOOLS AFTER EACH SESSION •DEVELOP A POLICY REGARDING ALL SPILT, DAMAGED, WASTE OR UNMARKETABLE HONEY THAT WILL NOT ALLOW THE BEES TO ACCESS SUCH HONEY
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	<p>•ROBBING</p> 	<ul style="list-style-type: none"> •MINIMISE OR ELIMINATE ROBBING DURING OFF-LOADING AND ON-LOADING AND OPERATION OF THE HONEY ROOM •ELIMINATE ROBBING OF STICKEYS • ENSURE THAT HONEY IN THE WASHING WATER IS NEVER ACCESSIBLE TO BEES •ENSURE THAT ALL HONEY PROCESSING FACILITIES ARE BEE TIGHT.
<p>•HONEY STORE</p>	<p>•ROBBING</p> 	<ul style="list-style-type: none"> •STORE ALL HONEY IN BEE PROOF AND MOISTURE PROOF FACILITIES
<p>•BOTTLING</p>	<p>•ROBBING</p> 	<ul style="list-style-type: none"> •DO NOT ALLOW THE BEES (OR ANY POTENTIAL VERMIN) ACCESS TO THE BOTTLING AREA • STICKEY DRUMS, HONEY BAGS AND STICKY TOOLS ARE TO BE CLEANED OUT IN A BEE-PROOF AREA AND WASHED WHERE BEES CANNOT GET TO ANY HONEY. •HONEY CONTAMINATED WATER IS TO BE PIPED AWAY OR USED
<p>•STICKEYS</p>	<p>•ROBBING</p> 	<ul style="list-style-type: none"> •DO NOT ALLOW ANY BEES TO ROB STICKEYS – STORE ALL SUPERS BEE-PROOF



	<p>•CROSS CONTAMINATION</p> 	<p>•RETURN EACH STICKEY SUPER ONLY TO ITS OWN HIVE</p>
<p>•CLEANING OF WOOD WARE</p>	<p>•ROBBING</p> 	<p>•PERFORM FRAME AND HIVE CLEANING IN A PLACE WHERE BEE ACCESS IS RESTRICTED</p> <p>•STORE OLD PROPOLIS, COMB AND WAX IN A BEE PROOF FACILITY OR CONTAINERS</p> <p>•DO NOT FEED ANY OLD HONEY IN FRAMES OR COMBS TO BEES OR ALLOW THESE TO BE ROBBED</p>

<ul style="list-style-type: none"> •MELTING WAX 	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •DO NOT FEED BEES HONEY OUT OF THE WAX PROCESSING SYSTEM •DO NOT ALLOW BEES TO LICK CLEAN, ANY WAX OUT OF ANY KIND OF WAX MELTER (SOLAR OR ELECTRIC)
	<ul style="list-style-type: none"> •ROBBING 	<ul style="list-style-type: none"> •DO NOT ALLOW BEES ACCESS TO THE WAX MELTING AREA •DO NOT ALLOW BEES TO LICK CLEAN, WAX OUT OF THE MELTER •USE BEE PROOF SMELTING FACILITIES OR EQUIPMENT •LOAD AND UNLOAD SMELTERS WITHOUT BEES HAVING ACCESS TO ROBBING


<ul style="list-style-type: none"> •SPLITTING / MAKING NUKES 	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •DO NOT USE UN-STERILISED OR UN-RECONDITIONED EQUIPMENT OR ABANDONED HIVES AND COMBS WHEN MANAGING BEES •NUMBER THE NEW COLONY OR NUKE WITH A REFERENCE TO THE COLONY FROM WHICH IT WAS MADE TO ENSURE TRACE-BACK (SUCH AS HIVE NUMBER 1 AND HIVE NUMBER "1A" OR "1001" OR "2009-1")
	<ul style="list-style-type: none"> •ROBBING 	<ul style="list-style-type: none"> •MANAGE BEES ONLY WHEN ROBBING IS NOT NORMALLY A PROBLEM •DEVELOP SPLITTING TECHNIQUES THAT MINIMISE ROBBING AND THAT ARE LESS INTRUSIVE
	<ul style="list-style-type: none"> •IMPROVEMENT 	<ul style="list-style-type: none"> •SELECT ONLY COLONIES THAT SEEM AFB RESISTANT FOR INCREASING


<p>•POLLINATION</p>	<p>•DRIFTING</p> 	<ul style="list-style-type: none"> •IN ORCHARDS PLACE HIVES WHERE DRIFTING CAN BE MINIMISED •USE TRANSIT AND BULK HIVE DELIVERY CAMPS SENSIBLY TO MINIMISE DRIFTING •ONLY TRANSPORT BEEHIVES WHEN NONE OR THE MINIMUM BEES ARE FLYING •TRANSPORT BEEHIVES CLOSED BEE-TIGHT AS MUCH AS POSSIBLE AT ALL TIMES. •IF CLOSED TRANSPORT IS IMPOSSIBLE, COVER THE LOAD WITH A NET AND ISOLATE ALL COLONIES IN THAT LOAD, TREATING THEM AS A SINGLE – POTENTIALLY CROSS CONTAMINATED - APIARY
	<p>•CROSS CONTAMINATION</p> 	<ul style="list-style-type: none"> •ENSURE THAT BEES ARE NOT CROSS CONTAMINATED OR THAT ROBBING IS NOT INDUCED DURING INSPECTION FOR MINIMUM STANDARDS •USE ONE CLOSURE PER EACH HIVE OR USE A CLOSURE ONLY ONCE BEFORE STERILISATION IN HYPO OR CAUSTIC SODA OR EVEN BY MACHINE WASHING


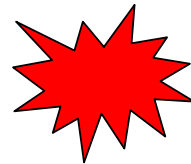
<ul style="list-style-type: none"> •BEE REMOVALS 	<ul style="list-style-type: none"> •ROBBING 	<ul style="list-style-type: none"> •ONLY PERFORM REMOVALS IF ROBBING CAN BE CONTAINED •DO NOT LEAVE "CAVITY" OR CULLED COMBS TO BE ROBBED OUT BY OTHER BEES: SEAL IT UP •KEEP ALL COMB IN SEALED CONTAINERS OR IN THE HIVE
	<ul style="list-style-type: none"> •CROSS CONTAMINATION 	<ul style="list-style-type: none"> •SEAL UP THE CAVITY: ALTERNATIVELY OR IN ADDITION, RINSE, OUT AND STERILISE THE CAVITY •DECONTAMINATE ALL TOOLS & CLOTHING •DO NOT USE REMOVED COMB IN OTHER HIVES UNLES IT IS TRACEABLE •DO NOT USE COMB FROM OTHER HIVES TO BOOST THE REMOVED COLONY UNLESS IT IS TRACEABLE •KEEP THE COLONY IN A QUARANTINE SITE FOR A TIME PERIOD (A YEAR?). •ONLY MOVE BEES AWAY FROM A REMOVAL SITE WHEN ALL THE BEES ARE IN THE HIVE

<p>•FEEDING</p>	<p>•ROBBING</p> 	<ul style="list-style-type: none"> •DO NOT FEED IN ANY WAY THAT WILL INDUCE ROBBING, SUCH AS WITH EXTERNAL OR DRUM FEEDERS •DO NOT ALLOW ANY OF THE FEED TO MESS OR SPILL WHEN FEEDING •DO NOT FEED AT A TIME THAT BEES WILL NORMALLY BECOME EXCITABLE AND ROB •DO NOT FEED WARM SYRUP SOLUTIONS •DO NOT ADD ANY HONEY OR AROMATIC EQUIVALENTS TO THE FEED
	<p>•CROSS CONTAMINATION</p> 	<ul style="list-style-type: none"> •NO OPEN DRUM OR FEEDING STATION TYPE FEEDING UNLESS IT CONTAINS ONE WAY ACCESS TO THE FEED (SUCH AS GRAVITY FEEDERS) •ENSURE THAT ALL IN-HIVE OR ON-HIVE FEEDING MECHANISMS ARE LINKED TO NUMBERED COLONY OR STERILIZED BETWEEN USES •DO NOT FEED BEES ANYTHING CONTAINING HONEY OR POLLEN OUT OF BEEHIVES UNLESS SUCH HONEY OR POLLEN CAN BE PROVEN TO BE STERILE.

•ITEM	•ASPEK	•OPLOSSING
<p>•STAANPLEK</p>	<p>•DRYF</p> 	<ul style="list-style-type: none"> •MERK KORWE SE VOORKANTE UNIEK DEUR VERF OF MERK MET STRAALVORMIGE VEELKLEURIGE PATRONE •RAAK ONTSLAE VAN SWAK SWERMS M.A.W. VERSEKER GELYKE STERKTES VAN SWERMS PER STAANPLEK •RAAK ONTSLAE VAN LEK KORWE (SWAK HOUTWERK) AL IS DIT NET TYDELIK DEUR GATE TOE TE STOP •VOORKOM DIE PLASING VAN BYE IN DIE STAANPLEK, IN EENVORMIGE GEOMETRIESE PATRONE (SOOS REGUIT LYNE OF BLOKKE KORWE) •PLAAS OBSTRUKSIES TUSSEN KORWE OF VERSEKER DAT STAANPLEKKE UNIEKE NATUURLIKE OF KUNSMATIGE OBSTRUKSIES VIR DIE BYE BEVAT SOOS BOSSE, ROTSE OF BOME.
	<p>•ROWERY</p> 	<ul style="list-style-type: none"> •RAAK ONTSLAE VAN ALLE LEK EN SWAK TOERUSTING •MOET NIKS MORS WAT TOT ROWERY KAN AANLEIDING GEE NIE, SOOS SUIKERTROOP OF HEUNING (DROOG OF AS 'N DEEG) OF OOP DROM VOER.

<p>•KORF</p>	<p>•KRUISBESMETTING</p> 	<ul style="list-style-type: none"> •UNIEKE NOMMERING VAN ALLE KORFONDERDELE VAN ELKE KORF INSLUITENDE DIE RAME (KORF NOMMER 1 WORD MET SUPERS NOMMER 1 GEPAK EN BEVAT NET RAME WAT NOMMER 1 GEMERK IS) •DAAR WORD BEWEER DAT KONINGINUITSLUITER HELP MET DIE BEHEER VAN DIE VERSPREIDING VAN DIE SIEKTE IN DIE MEESTE BYE RASSE OMDAT JONGBY TOT DIE BROEIKAS(TE) BEPERK WORD – A.M. CAPENSIS LÊENDE WERKERS KAN STEEDS IN SUPERS BROEI. •ELKE KORF WORD 'N GEISOLEERDE EENHEID EN KORFONDERDELE WORD NIE TUSSEN KORWE UITGERUIL NIE. •WAS GEREEDSKAP (MET NATRIUM HIPOKLORIET – Jik OF DOMESTOS) BY ELKE KORF.
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<ul style="list-style-type: none"> •OES 	<ul style="list-style-type: none"> •KRUISEBESMETTING 	<ul style="list-style-type: none"> •ONMIDDELIKE ISOLERING EN VERDIGTING TEEN BYE VAN ELKE SUPER WAT GEOES WORD. •MOENIE DIE SUPERS OOP LOS OM DIE BYE TE LAAT UITVLIEG NIE •VERVANG SLEGS DAARDIE KORF SE EIE GENOMMERDE SUPER(S) / RAME •GEBRUIK DALK GESEËLDE DRAKISTE VIR HEUNINGRAAM VERVOER •VERSEKER DAT DRAKISTE SKOON IS EN GEEN HEUNINGRESIDU BEVAT NIE VOORDAT RAME GELAAI WORD. •OES HEUNING SLEGS WANNEER ROWERY BEPERK KAN WORD AL BETEKEN DIT DAT IN MOEILIKE KLIMAAT OF SNAGS GEWERK MOET WORD.
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<p>•VERVOER</p>	<p>•ROWERY</p> 	<ul style="list-style-type: none"> •VERSEKER DAT GEEN BYE IN HEUNING SUPERS WAT GEOES WORD AGTERBLY NIE •PLAAS 'N DEKSEL OF IETS SOORTGELYK BO-OP ELKE STAPEL SUPERS •VERSEEL ALLE LEKKENDE SUPERS •GEBRUIK 'N VERVOER-NET (AANGEPASTE SKADUNET) •MOENIE TUSSEN DIE OORSPRONG VAN DIE OES EN DIE EINDBESTEMMING STILSTAAN EN SODOENDE DIE BYE KANS GEE OM TE ROOF NIE. •WAS ONMIDDELIK ENIGE MORSERY VAN DIE VRAGBED AF VOORDAT DIE BYE TOEGANG KRY. •DINK OOR DIE GEBRUIK VAN 'N TOE VOERTUIG SOOS 'N PANEELWA NA, VIR DIE VERVOER VAN HEUNINGSUPERS.
	<p>•KRUISEBESMETTING</p> 	<ul style="list-style-type: none"> •WAS VOERTUIG VAN ALLE HEUNING EN WAS EN BYWERK MET WATER VOORDAT DIE BYE TOEGANG KRY.

•HEUNING-
KAMER

•KRUISEBESMETTING








- IMPLEMENTEER TE ALLE TYE ALLE BEGINSELS VAN DIE GESONDHEIDSWET SE REGULASIE R918 BINNE PERKE EN ONDERVINDING (SOOS DIE INSTALLERING VAN 'N NEGATIEWE LUGDRUK EERDER AS POSITIEWE LUGDRUK BEHEERSTELSEL)
- LAAI DIE VRAG AF EN VERWISSEL VAN KLERASIE (INSLUITENDE SKOEISEL) VOORDAT UITSWAAI 'N AANVANG NEEM
- KRAP ALLE KOEKE BO EN ONDER DIE RAME EN IN DIE SUPERS SELF, AF VOORDAT UITGESWAAI WORD.
- SWAAI SO DROOG MOONTLIK UIT (SO VEEL HEUNING UIT DIE KOEK AS MOONTLIK)
- ELKE GENOMMERDE RAAM GAAN TERUG IN SY EIE GENOMMERDE SUPER NA UITSWAAI
- PLAAS 'N BEPERKENDE ITEM – SOOS 'N PLASTIESE VEL - TUSSEN SUPERS
- STERILISEER ALLE GEREEDSKAP NA ELKE BESENDING
- ONTWIKKEL 'N BELEID OOR VERMORSDE, BESKADIGDE OF ONBRUIKBARE HEUNING WAT GEEN TOEGANG TOT DIE HEUNING DEUR BYE SAL DULD NIE



•ROWERY

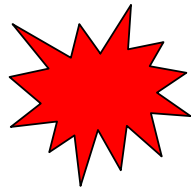




- MINIMISEER OF VERHOED ROWERY TYDENS DIE AFLAAI- EN OPLAAISTADIUMS EN TYDENS UITSWAAI
- VERSEKER DAT HEUNING IN DIE WASWATER ALTYD ONTOEGANKLIK IS VIR BYE
- VERSEKER DAT ALLE HEUING UITSWAAIFASILITETE BYE-DIG IS.


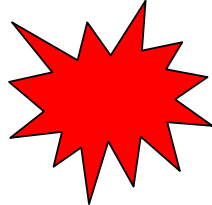
<ul style="list-style-type: none"> •HEUNING BERGPLEK 	<ul style="list-style-type: none"> •ROWERY 	<ul style="list-style-type: none"> •BERG ALLE HEUNING BYE-DIG EN WEG VAN VOG
<ul style="list-style-type: none"> •BOTTELERING 	<ul style="list-style-type: none"> •ROWERY 	<ul style="list-style-type: none"> •MOENIE BYE (OF ENIGE MOONTLIKE PESTE) TOEGANG GEE TOT VERPAKKINGSAANLEGTE NIE •TAAI DROMME EN SAKKE EN GEREEDSKAP MOET IN 'N BYE-DIGTE PLEK SKOONGEMAAK EN AFGESPOEL WORD WAAR BYE NIE KAN TOEGANG KRY TOT DIE HEUNING NIE • HEUNING IN WATER MOET MET PYPE WEGGELEI WORD OF GEBRUIK WORD
<ul style="list-style-type: none"> •TAAI SUPERS 	<ul style="list-style-type: none"> •ROWERY  <ul style="list-style-type: none"> •KRUISBESMETTING 	<ul style="list-style-type: none"> •MOENIE DAT BYE TAAI SUPERS UITROOF NIE – STOOR ALLE SUPERS BYE-DIG • SIT ELKE TAAI SUPER TRUG SLEGS OP SY EIE KORF.


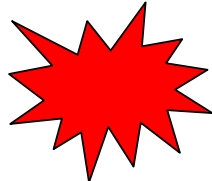
<ul style="list-style-type: none"> •SKOON MAAK VAN HOUT WERK 	<ul style="list-style-type: none"> •ROWERY 	<ul style="list-style-type: none"> •MAAK SLEGS RAME EN KORWE SKOON WAAR TOEGANG DEUR BYE BEPERK IS •BERG OU KOEKE, WAS EN BYWERK OP IN 'N BYEDIGTE FASILITEIT OF HOUER. •MOENIE OU HEUNING IN KOEKE OF RAME AAN BYE VOER NIE OF TOELAAT DAT DIT DEUR BYE UITGEROOF WORD NIE.
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<ul style="list-style-type: none"> •WAS SMELT 	<ul style="list-style-type: none"> •KRUISEBESMETTING 	<ul style="list-style-type: none"> •MOENIE HEUNING WAT UIT DIE WASVERWERKINGSTELSEL KOM AAN BYE VOER NIE •MOENIE TOELAAT DAT BYE WAS UIT ENIGE WASSMELTSTELSEL (SON OF ELEKTRIES) KAN SKOONLEK NIE
	<ul style="list-style-type: none"> •ROWERY 	<ul style="list-style-type: none"> •VERHOED DAT BYE IN DIE WASVERWERKINGS-AANLEG KOM •MOENIE DAT BYE WAS UIT DIE WASSMELTAAANLEG SKOONLEK NIE •GEBRUIK WASSMELTERS WAT BYEDIG IS •LAAI EN ONTLAAI WASSMELTERS SLEGS WANNEER BYE GEEN TOEGANG HET TEN EINDE ROWERY TE VERHOED.

<ul style="list-style-type: none"> •VERDELING / KERNKORFIES MAAK 	<ul style="list-style-type: none"> •KRUISEBESMETTING 	<ul style="list-style-type: none"> •MOENIE ONGESTERILISEERDE TOERUSTING OF KORWE EN KOEKE GEBRUIK WAARUIT DIE BYE WEGGETREK OF GEVREK HET WANNEER BYE BESTUUR WORD NIE •NOMMER ELKE NUWE KOLONIE BYE OF KERNSWERMPIE MET 'N VERWYSING NA DIE OUER KOLONIE TEN EINDE TERUG TE SPEUR (SOOS KORF NOMMER 1 EN KORF NOMMER "1A" OF "1001" OF "2009-1")
	<ul style="list-style-type: none"> •ROWERY 	<ul style="list-style-type: none"> •BESTUUR BYE SLEGS WANNEER ROWERY NIE NORMAALWEG 'N PROBLEEM IS NIE •ONTWIKKEL STELSELS VIR DIE MAAK VAN NUWE SWERMS WAT ROWERY VERMINDER EN WAT MINDER STEUREND VIR DIE BYE IS.
	<ul style="list-style-type: none"> •VERBETERING 	<ul style="list-style-type: none"> •SELEKTEER SLEGS BYE WAT MOONTLIK WEERSTANDBIEDEND TEEN AFB IS VIR VERMEERDERING.

<p>•BESTUIWING</p>	<p>•DRYF</p> 	<ul style="list-style-type: none"> •IN BOORDE EN LANDERYE MOET KORWE SO UITGESIT WORD DAT DRYWERY VERMINDER WORD. •GEBRUIK TRANSITO EN GROOTMAAT KORF AFLEWERINGSKAMPE SINVOL TEN EINDE DRYWERY TE VOORKOM. •VERVOER SLEGS BYE WANNER DIE MINIMUM OF GEEN BYE Vlieg •VERVOER KORWE BYE-DIG TE ALLE TYE •INDIEN DIT ONMOONTLIK IS OM BYE TOE TE VERVOER OORDEK DIE VRAG MET 'N NET EN ISOLEER DAARDIE VRAG SE KORWE: HANTEER HULLE AS 'N ENKELE – MOONTLIK BESMETTE – KORFSTAANPLEK.
	<p>•KRUISEBESMETTING</p> 	<ul style="list-style-type: none"> •VERSEKER DAT BYE NIE KRUISBESMET WORD OF DAT ROWERY AANGEWAKKER WORD TYDENS INSPEKSIE VIR MINIMUM STANDAARDE NIE •GEBRUIK SLEGS EEN SLUITMEGANISME VIR DIE INGANG PER KORF OF GEBRUIK ELKE SLUITMEGANSIME SLEGS EENMALIG VOORDAT DIE GESTERILISEER WORD IN HYPO OF BYTSODA OF IN 'N MASJEN GEWAS WORD

<p>•BYE UITHAAL</p>	<p>•ROWERY</p> 	<ul style="list-style-type: none"> •HAAL SLEGS BYE UIT INDIEN ROWERY BEHEER KAN WORD. •MOENIE DIE HOLTE OF UITGESNYDE KOEKE LOS OM UITGEROOF TE WORD DEUR ANDER BYE NIE: SEEL DIE HOLTE.
	<p>•KRUISEBESMETTING</p> 	<ul style="list-style-type: none"> •SEEL DIE HOLTE OF SPOEL EN STERILISER DIE HOLTE •STERILISEER ALLE KLERASIE EN GEREEDSKAP •HOU DIE KOLONIE IN 'N KWARRANTYNGEBIED VIR 'N TYD ('N JAAR?) •SKUIF BYE SLEGS VANAF DIE VERWYDERINGSPLEK WANNEER ALLE BYE IN DIE KORF IS •MOENIE KOEKE WAT UITGEHAAL IS <u>IN</u> ANDER KOLONIES GEBRUIK NIE TENSY DIT NASPEURBAAR IS. •MOENIE KOEKE <u>UIT</u> ANDER KORWE GEBRUIK OM DIE UITHAAL KOLONIE TE STIMULEER NIE, TENSY DIT NASPEURBAAR IS

<p>•VOER VAN BYE</p>	<p>•ROWERY</p> 	<ul style="list-style-type: none"> •MOENIE BYE VOER OP ENIGE MANIER WAT ROWERY SAL AANWAKKER NIE SOOS MET 'N BUIITE- VOERDER OF 'N OOP DROM VOERDER. •MOENIE TOELAAT DAT DIE VOER MORS WANNER GEVOER WORD NIE •MOENIE VOER OP 'N TYD DAT BYE NORMAALWEG OPGEWONDE WORD EN KAN BEGIN ROOF NIE •MOENIE WARM STROOPOPLOSSINGS VOER NIE •MOENIE HEUNING OF ANDER AROMATIESE MIDDELS IN DIE VOER AANMAAK NIE
	<p>•KRUISEBESMETTING</p> 	<ul style="list-style-type: none"> •GEEN OOP DROM OF VOERSTASIE TIPE VOERDERY NIE, BEHALWE INDIEN 'N EENRIGTING TOEGANG TOT DIE VOER BESTAAN (SOOS 'N SWAARTEKRAG-VOERDER) •VERSEKER DAT ALLE VOERDERS WAT BINNE IN OF BO-OP KORWE WERK MET DIE KORFNOMMER GEMERK IS OF GESTERILISEER WORD TUSSEN GEBRUIKE. •MOENIE DIE BYE ENIGIETS VOER MET HEUNING OF STUIFMEEL UIT DIE KORWE IN NIE TENSY SULKE KORFPRODUKT BEWYSBAAR STERIEL IS NIE.