

THE HONEY BEE HEALTH STRATEGY



FOR A SUSTAINABLE AND HEALTHY
POPULATION OF HONEY BEES

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POPULATION OF HONEY BEES

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MINISTERIAL FOREWORD: CABINET SECRETARY FOR RURAL AFFAIRS AND THE ENVIRONMENT:

I am delighted to announce the publication of Scotland's Honey Bee Health Strategy, the aim of which is to achieve a sustainable and healthy population of honey bees for pollination and honey production in Scotland over the next ten years.

As I am sure you are aware, the outbreak of disease which affected honey bees across Scotland during 2009 has proved to be a challenging time for beekeepers and has heightened our awareness of the emerging threats in relation to protection of the honey bee.

I am encouraged that in order to enhance the range of activities and services that the Scottish Government already provides to beekeepers in Scotland, representatives from the Scottish Beekeeping Association (SBA) and the Bee Farmers Association (BFA) have made a commitment to support the strategy's intentions.

The SBA and BFA have been closely involved in the preparation of this document and I am particularly encouraged by this positive development and look forward to seeing its progress through strengthened partnership working between all stakeholders who have an interest in honey bees.



**RICHARD LOCHHEAD
CABINET SECRETARY FOR RURAL AFFAIRS AND THE ENVIRONMENT**



EXECUTIVE SUMMARY

Managed honey bees contribute directly to food production and make an important contribution through pollination to crop production and environmental services. Honey bees are susceptible to a variety of threats, including pests and diseases, the likelihood and consequences of which have increased significantly over the last few years. Some diseases affect adult bees, others (known as brood diseases) affect immature stages of the bees' development (larvae and pupae). There are several brood diseases that affect honey bee colonies in Scotland including two extremely serious and infectious foulbrood diseases, European foulbrood (EFB) and American foulbrood (AFB), which are subject to statutory control.

The outbreak of EFB and AFB in honey bees across Scotland in 2009 has brought the need for this Strategy into stark focus. These outbreaks have resulted in movement restrictions and the destruction of hundreds of hives with substantial costs for those beekeepers involved.

This Strategy seeks to address the challenges facing beekeepers and publication of this document marks the beginning of work on its implementation and identification of further priorities and actions. It provides a plan of action aimed at sustaining the health of honey bees and beekeeping in Scotland for the next decade.

The Strategy describes the **four** main outcomes which provide the focus for future action and development by all those with an interest in honey bees including the Scottish Government, its agencies and delivery bodies, stakeholder associations and most importantly, individual beekeepers. **The main underlying principle of these outcomes is that prevention is better than cure.** The outcomes also encapsulate the objectives that stakeholders are looking to achieve and comprise:

- 1. Education, Training and Knowledge Transfer: good standards of beekeeping and husbandry will minimise pest and disease risks and contribute to sustaining healthy honey bee populations.**
- 2. Communication: effective communication and relationships operating at all levels.**
- 3. Surveillance, Diagnosis and Biosecurity: positive surveillance based on vigilance, reporting and diagnosis.**
- 4. Research and Development: sound science and evidence underpinning bee health policy, disease prevention and control, and good husbandry.**

Overview of the strategy

AIM: To achieve a sustainable and healthy population of honey bees for pollination and honey production in Scotland through strengthened partnership working between stakeholders with interests in honey bees

OUTCOMES	PROPOSED INITIATIVES AND ACTIVITIES
<p>1. Education, Training and Knowledge Transfer</p> <p>– good standards of beekeeping and husbandry will minimise pest and disease risks and contribute to sustaining healthy honey bee populations</p>	<ul style="list-style-type: none"> (i) Continue to promote and access the education and training available through the Scottish Agriculture College (SAC), the Scottish Beekeepers Association (SBA) and also through local associations, e.g. to raise awareness of disease threats (such as EFB, AFB and Varroa) and how to identify them; best management practices; disease control methods and home-based queen rearing activities (ii) Develop and publish a common set of good husbandry principles, including regular monitoring of colonies and apiary health planning (iii) Improve the education of beekeepers and standards of bee husbandry by co-ordinating and streamlining training programmes, outreach initiatives and examinations (iv) Explore the scope for home-based queen rearing through co-ordinated education and training initiatives (v) Encourage the exchange of good breeding stock within Scotland (vi) Maintain contingency planning for the possible arrival of exotic pests, diseases and undesirable species
<p>2. Communication</p> <p>– effective communication and relationships operating at all levels</p>	<ul style="list-style-type: none"> (i) Review and strengthen communications and liaison arrangements between representative bodies and the Scottish Government – e.g. through annual meetings and regular dialogue with Bee Inspectors (ii) Issue of routine updates and alerts to beekeepers through the Scottish branch of the BFA and the SBA (iii) Develop and implement a co-ordinated strategic communication plan between all stakeholders with an interest in honey bees

OUTCOMES (cont.)	PROPOSED INITIATIVES AND ACTIVITIES (cont.)
<p>3. Surveillance, Diagnosis and Biosecurity</p> <p>– positive surveillance based on vigilance, reporting and diagnosis</p>	<ul style="list-style-type: none"> (i) Continue to monitor high risk areas and provide early warning of evidence of new exotic pests and diseases (ii) Establish a database of Scottish beekeepers (iii) Raise awareness about exotic pests, undesirable alien species and import risks with relevant agencies, beekeepers and with honey importers and packers (iv) Strengthen enforcement of existing regulations, develop and publish clear guidance on best practice for disease control, including the importation of honey bees (v) Strengthen and raise awareness of existing voluntary arrangements on domestic sale of honey bees (vi) Raise awareness of the impact and interaction of honey bees and bumble bees (vii) Review and improve current arrangements and practices in relation to other hazards such as Small Hive Beetle (SHB) (viii) Ensure suitable diagnostic systems are available to beekeepers, associations and Government and that arrangements are in place for sample submission and reporting of results (ix) Develop strategies for controlling foulbrood diseases to reduce incidences to the lowest achievable level
<p>4. Research and Development</p> <p>– sound science and evidence underpinning bee health policy, disease prevention and control, and good husbandry</p>	<ul style="list-style-type: none"> (i) Ensure the contingency plan for exotic bee pests and diseases is regularly maintained (ii) Improve co-ordination and collaboration of research with other research funding bodies (iii) Commission science and evidence appropriately to support policy development (iv) Ensure that research priorities, scientific developments and evidence are shared widely with the science community and beekeepers

Section 1: Introduction

1. The overall **Aim** of the Strategy is:

To achieve a sustainable and healthy population of honey bees for pollination and honey production in Scotland through strengthened partnership working between stakeholders with interests in honey bees

2. Development of this Strategy, in partnership with those involved in beekeeping, signals the Scottish Government's ongoing commitment to:

- **protect and improve the health of honey bees and support those who manage them**
- **a sustainable natural environment as a result of a thriving and healthy population of honey bees**

3. It will contribute to two of the Scottish Government's Strategic Objectives:

- **Wealthier & Fairer – enable businesses and people to increase their wealth and more people to share fairly in that wealth**
- **Greener – improve Scotland's natural and built environment and the sustainable use and enjoyment of it**

4. The overriding aim of the Strategy could not be achieved by one sector acting in isolation of other interested parties. A strengthened partnership, involving all interested parties, is essential if current and evolving threats to bee health are to be successfully identified and addressed.
5. The Strategy identifies the various outcomes, activities, priorities and importantly describes the distinct roles and responsibilities of the Scottish Government and its agencies/delivery bodies (e.g. SASA, SAC, Scottish Enterprise (SE), Scottish Natural Heritage (SNH) etc.), beekeepers, their Associations and other stakeholders (such as the agriculture and horticulture sector) in achieving these aims. Following publication of this Strategy detailed actions will be developed and implemented in consultation with interested parties.
6. It is not the intention of the Strategy to change existing basic policy on bee health as there is a well established framework of domestic and international legislation and other agreements already in place (*further details of which can be found on the Scottish Government website*¹).

1 Scottish Government – <http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/animal-welfare>

Beekeeping

7. Beekeeping plays an indispensable role in the survival of honey bees in Scotland where there are very few feral or wild colonies remaining. In Scotland there are around 25 commercial bee farmers whose businesses depend on the management of healthy honey bees, around 1,400 bee hobbyists who are members of the Scottish Beekeepers Association (SBA) and an estimated further 1,000 hobbyists who are not. Bee farming businesses in Scotland are generally small to medium sized enterprises, the value of their honey production varies from year to year but collectively it averages several million pounds per annum, in addition these businesses are important locally as employers.
8. Healthy thriving bee colonies are also important to soft fruit and arable farmers as crop pollinators, and although it is difficult to put a definitive economic value on this, using the methodology of the National Audit Office (NAO) it was estimated to be worth around £12m in 2009². Other estimates, including a wider range of crops, put this figure at £17m. The contribution of honey bees to pollination of Scotland's flora should also be recognised but its value is difficult to estimate.
9. The high number of non-commercial beekeepers presents particular challenges for safeguarding bee health. Without specialist support, their efforts to manage bee health or to collaborate effectively with other beekeepers to address common problems may be limited. These difficulties are compounded because many beekeepers are difficult to reach as they are not members of any beekeeping associations and there is no compulsory registration of beekeepers. Although beekeeping associations and individual bee farmers have limited resources and capacity it is encouraging that so much has been achieved through voluntary efforts and co-ordinated action.

Challenges and Opportunities

10. Honey bees contribute directly to sustainable local food production and more broadly, through pollination, to crop production.
11. However, honey bees are susceptible to pests and diseases. Current risks include diseases such as American Foulbrood (AFB), European Foulbrood (EFB), the Varroa mite and associated viruses, pests such as the Small Hive Beetle (SHB), parasitic brood mites (*Tropilaelaps* species) and invasive non-native species such as the Asian Hornet (which preys on colonies), (*additional information on pests and diseases can also be found on the Scottish Government website*).
12. In 2009, widespread outbreaks of foulbrood were identified in Scotland. Several hundred hives were affected and the beekeeping sector and Government were not well prepared. Resources and systems were severely stretched and the outbreaks served as a wake up call to all concerned to be better prepared against threats to the bee population.

2 National Audit Office – <http://www.nao.org.uk//idoc.ashx?docId=04373F6B-3B1A-4474-85AC-F628E1F50618&version=1>

13. In the preceding 10-15 years the mite *Varroa destructor* has been the major concern for Scottish beekeepers. Infestation and the consequent debilitating effect on colonies, if not managed and treated correctly, remains a concern to Government and stakeholders as *Varroa* continues to be the major threat to the sustainability of the honey bee population. A particular concern is the development of resistance to the available pyrethroid varroacides and the limited number of alternative treatments (*additional information on veterinary medicines for honey bees is available on the Veterinary Medicines Directorate (VMD) website*³).
14. Beekeeping in Scotland is carried out by a community of individuals and small businesses whose interests, objectives and priorities may seem diverse, for example in terms of the strains of bee that they prefer to use, the level of trade or relocation they undertake and their emphasis on pleasure or business. However, among these differences there are common interests such as the bees themselves, the craft of beekeeping and in using best practices that suit individual circumstances to achieve their objectives.
15. To protect the honey bee as an important pollinator and honey producer in Scotland, pests and diseases must be managed using good husbandry practices and preferably using Integrated Pest Management (IPM). To achieve this, information about pests, diseases and good husbandry practices must be easily accessible to all beekeepers.
16. Markets for honey and honey based products are strong and growing, and within this, the positioning of health based products and those of known provenance provide an opportunity for the sector.
17. The Scottish Government, its agencies and delivery bodies, and national associations will keep under review other hazards, such as pesticide poisoning⁴, loss of habitat and other environmental changes, and their impacts on the sustainability of honey bees. In the event of significant impacts the Scottish Government will work with relevant agencies to review and improve, as necessary, current arrangements and practices.
18. The availability of forage for honey bees is a particular issue that requires co-ordination between beekeepers and landowners, and discussion with policy makers. Farmers, landowners and seed houses will have better knowledge and motivation to encourage a greater availability of higher value nectar and pollen crops.

³ Veterinary Medicines Directorate (VMD) website: <http://www.vmd.gov.uk/VetSQP/Bee/bee.htm>

⁴ While pesticides is a devolved issue, the day to day administration of the pesticides approval system is undertaken by the Chemicals Regulation Directorate (CRD), a Directorate of the Health and Safety Executive. Further information can be found at <http://www.pesticides.gov.uk>

Scope

19. This strategy is concerned with protecting and improving the health of honey bees which are managed for honey production and/or for pollination of food and non-food crops. Equivalent plans for *England & Wales*⁵ and *Northern Ireland*⁶ have been prepared, and co-ordinated implementation of these plans is vital to achieving successful outcomes.
20. The health of honey bees, in the context of this strategy, is concerned with anything associated with hive management that affects their health, including bacteria, viruses, arachnids (i.e. mites), insects, fungi and other pathogens which cause disease or feed on bees, as well as adverse effects caused by other threats such as invasive non-native species and the misuse of pesticides.
21. We do not fully understand the extent to which the environment around a hive affects the health of bee colonies. It would seem reasonable to expect that poor foraging habitat, misuse of insecticides and a range of other factors could increase stress on managed bee colonies, thereby increasing their susceptibility to disease. However, this strategy covers the direct management of bee colonies and although it does not cover wider Scottish Government policies on habitat management for biodiversity (e.g. the *Scottish Biodiversity Strategy*⁷) their success is inter-linked.
22. Scotland's national food and drink policy, *Recipe for Success*⁸, is based on quality food production in a sustainable environment. A sustainable and healthy population of honey bees for pollination and honey production in Scotland will help deliver this.
23. Other policy areas relevant to managing the health of the honey bee include food safety controls (*regulations on residues in honey from pesticides and medications*⁹ and *veterinary medicines controls*¹⁰). While these areas are outside the scope of the strategy itself, liaison and close co-operation with the relevant lead agencies is necessary to achieve the outcomes.

5 England and Wales – <http://www.fera.defra.gov.uk/plants/beeHealth/>

6 Northern Ireland – <http://www.dardni.gov.uk/index/animal-health/bees.htm>

7 Scottish Biodiversity Strategy – www.biodiversityscotland.gov.uk/

8 Recipe for Success – <http://www.scotland.gov.uk/Resource/Doc/277346/0083283.pdf>

9 Food Standards Agency – <http://www.food.gov.uk/>

10 Veterinary Medicines Directorate – <http://www.vmd.gov.uk/VetSQP/Bee/bee.htm>

Section 2: Roles and Responsibilities of Stakeholders

This strategy requires all stakeholders to work together and recognise the common purpose of improving honey bee health and sustainability

Beekeepers

24. Beekeepers are responsible for the health and welfare of their bees and for the management of pests and diseases. This responsibility of care should include, where appropriate:
- (i) maintaining good husbandry and health practices to prevent and control the spread of pests and diseases and a thorough understanding that pests and diseases in their bees could spread to other apiaries nearby and/or further afield;
 - (ii) being vigilant, recognising pests and diseases, knowing which of these are notifiable; and in line with their legal obligations, reporting any suspicion of notifiable pests or diseases to their Bee Inspector/Government;
 - (iii) complying with legislation on controlling pests and diseases, including standstill notices and import requirements;
 - (iv) using medications and treatments appropriately, including responsible storage, safe administration and recording, with due regard for residue limits and withdrawal periods;
 - (v) ensuring that their knowledge skills and competence levels are maintained through training and education;
 - (vi) maintaining records on the movement and location of their colonies and making records available to their Bee Inspector on request;
 - (vii) seeking advice from their local beekeeping association to help discharge these responsibilities; and,
 - (viii) maintaining up-to-date information on BeeBase.

Beekeeping Associations

25. Beekeeping associations represent their members in discussion with other stakeholders, they provide services to their members and encourage co-operative actions between them. In the context of this strategy they will:
- (i) support beekeepers through education, information and advice;
 - (ii) promote good beekeeping husbandry and practice;
 - (iii) encourage beekeepers to achieve higher standards of beekeeping, including disease recognition and management skills;
 - (iv) raise beekeepers' awareness of their legal obligations, including those relating to bee imports and requirements on responsible storage, safe administration and recording of bee medications and other treatments;
 - (v) encourage their members to sign up to BeeBase;
 - (vi) work with the Scottish Government and other stakeholders to achieve common objectives; and,
 - (vii) encourage new members of the public to undertake appropriate training if they wish to become beekeepers.

Scottish Government, its Agencies and Delivery Bodies

26. The Scottish Government, its agencies and delivery bodies will work with Scottish beekeepers to achieve common objectives by:
- (i) supporting beekeeping in recognition of the public and economic benefit of pollination by honey bees;
 - (ii) protecting and promoting the health of honey bees by setting strategic objectives on managing and protecting their health in consultation with other stakeholders;
 - (iii) working with stakeholders to achieve common aims, including effective communications with beekeepers;
 - (iv) working in liaison with other UK administrations and the EU to ensure that the development and implementation of policy frameworks, including regulations are being implemented in the most appropriate way to deliver strategic objectives and minimise the regulatory burden on beekeepers;
 - (v) using sound up-to-date science to underpin bee health policy, and influencing the prioritisation of research and development requirements;
 - (vi) supporting inspectors to carry out inspections where notifiable diseases are suspected;
 - (vii) contributing to the management of BeeBase and seeking to increase the numbers of beekeepers registered;
 - (viii) delivering policies that have due regard for the long-term genetic health of honey bees in Scotland and the economic and biodiversity benefits of a healthy bee population;
 - (ix) providing quality-assured diagnoses of pests and diseases;
 - (x) providing and maintaining contingency plans for outbreaks of exotic pests, diseases and undesirable species; and,
 - (xi) supporting good practice through training, education and knowledge transfer programmes co-ordinated with national and local associations aimed at helping beekeepers to become more self-reliant in controlling pests and disease and to aspire to higher standards of beekeeping.

Other Contributors

27. The science and research community, based at UK universities and institutes, helps improve the science and evidence base through research and analysis.
28. Honey importers and packers should recognise the potential risks of spreading infection from their packing plants to local apiaries and be responsible for taking appropriate steps to prevent honey bees from accessing equipment at packing plants.
29. Individual companies and representative bodies of medicine manufacturers, hive and appliance manufacturers and other suppliers will recognise the importance of keeping up-to-date with developments in bee health and ensure that beekeepers are given advice on using their products safely and effectively.
30. Responsible sourcing, selling and movement of bees and equipment, particularly second hand equipment is key; safeguarding against pests and diseases is the responsibility of all stakeholders.

Section 3: Outcomes

This section describes the four strategic outcomes which will contribute to secure a healthy and sustainable population of honey bees

31. The main purpose of these outcomes is to provide a focus for our work over the next 10 years. They are intended to be delivered through a series of work-plans to be developed and implemented by stakeholders working together.
32. The work-plans will build on what is already working well and will focus on particular aspects that need to be reviewed, strengthened and/or improved.

Outcome 1: Education, Training and Knowledge Transfer – good standards of beekeeping and husbandry will minimise pest and disease risks and contribute to sustaining healthy honey bee populations

- (i) Beekeepers take pride in their craft and are competent in honey bee husbandry, health, best management practices and home based queen rearing activities. As a result, they benefit from healthier bees, earlier detection and better control of pests and diseases in co-operation, as necessary, with the Scottish Government Bee Inspectors.
- (ii) Beekeepers have the skills and knowledge to identify disease in their colonies and know where to seek help in identifying them if required. They know the symptoms of notifiable diseases and understand how to report such diseases.
- (iii) Beekeepers continue to have access to education and training programmes through their national associations and Scottish Government supported programmes. This allows them to receive practical evidence-based advice to help establish their competence in husbandry and health management and to further develop these skills.
- (iv) As members of national or local beekeeping associations or other informal networks, beekeepers recognise the benefits gained from access to further support, training and practical advice from other beekeepers to help them maintain good standards of honey bee husbandry and health.
- (v) Honey and other hive products are produced safely. Veterinary medicines and other treatments are used correctly and are recorded to ensure that honey is as far as possible free from residues and that consumer safety and consumer expectations that honey is a pure product are not compromised¹¹.
- (vi) Appropriate and effective veterinary medicines, diagnostics and other treatments are available as a result of engagement with treatment manufacturers and regulatory agencies, and are used sustainably.

¹¹ Honey Regulations available at: http://www.oqps.gov.uk/legislation/ssi/ssi2005/ssi_20050307_en_1

Outcome 2: Communication – effective communications and relationships operating at all levels

- (i) All parties to this strategy agree to work openly and communicate with each other proactively.
- (ii) BeeBase will form a central component of communications between stakeholders. Regular dialogue using the most appropriate means is encouraged.
- (iii) The Scottish Government, its agencies/delivery bodies, beekeepers and their Associations will review and share information, best practice, risk assessments and ideas. They will agree and review priorities and responsibilities in partnership.
- (iv) The Scottish Government will continue to strengthen current liaison arrangements with beekeeping associations and other stakeholders, Government Departments and Agencies such as FERA/NBU and VMD on honey bee health matters.
- (v) All partners to this strategy will use their available resources to engage effectively with beekeepers including those who are hard-to-reach and new to beekeeping to ensure that they are aware of available sources of advice and training on good practice, disease recognition etc.

BeeBase¹² – a voluntary national database of beekeepers

- (vi) Lessons learned in the tackling of exotic diseases in animals show that knowing where animals are and where they have come from is critical to disease control and eradication. In the foulbrood outbreaks of 2009 a lack of information on hive locations and movements made the tasks of establishing the extent of the disease and preventing its spread more difficult. Reliable and up-to-date information on the movements also allows the earliest possible lifting of movement restrictions.
- (vii) In order to resolve this issue the Scottish Government will support the development of BeeBase to serve the needs of Scottish beekeepers and to enhance our ability to deal effectively with exotic pests and diseases.
- (viii) Stakeholders will ensure that the benefits of signing up to BeeBase for pest and disease control purposes are highlighted in education and training programmes for beekeepers.
- (ix) The Scottish Government, its agencies and delivery bodies, beekeeping associations and suppliers will work together to increase the numbers of beekeepers who register on BeeBase in order to enhance communication and disease control.

¹² BeeBase available at: <https://secure.fera.defra.gov.uk/beebase/index.cfm>

Outcome 3: Surveillance, Diagnosis and Biosecurity – positive surveillance based on vigilance, reporting and diagnosis

- (i) Beekeepers will be proficient in monitoring the health and welfare of their own hives, they will know the procedures for reporting notifiable diseases and what action to take to control other diseases or conditions.
- (ii) Inspectors supported by the Scottish Government will carry out inspections where notifiable diseases are suspected.
- (iii) Stakeholders and Scottish Government will strengthen compliance with and enforcement of existing regulations on disease control (including the importation of honey bees and bumblebees) by developing clear guidance and best practice procedures to minimise disease risk.
- (iv) Stakeholders will ensure that the domestic sale and trade of honey bees, honey and other bee products present a minimal risk spreading pests and diseases.
- (v) Honey importers and packers will ensure that their packing plants present a minimal risk of spreading pests and diseases to local honey bee apiaries.
- (vi) BeeBase will provide essential information about the location and numbers of colonies for the purposes of risk assessment, and for prevention and control of serious endemic and exotic pests and diseases. As a result, beekeepers, particularly those who are not members of an association, are encouraged to register on the database.

Outcome 4: Research and Development – sound science and evidence underpins bee health policy, disease prevention and control, and good husbandry

- (i) Stakeholders will have a well developed awareness and knowledge of the science and evidence base relating to bee health and husbandry, disease risks and control strategies.
- (ii) Research results relevant to proactive honey bee health management and husbandry as well as pest and disease risks, prevention and control methods are shared routinely between beekeepers and the science community.
- (iii) Appropriate science and evidence will be used fully in the formulation of policy, in training programmes and in development of best practices.
- (iv) Stakeholders participate in multi-funder programmes such as the Insect Pollinators Initiative and further research will be commissioned as appropriate, drawing on all potential sources of funding.
- (v) Stakeholders have the opportunity to influence priorities and new developments in bee health such as development of new diagnostics and management tools for bee health threats.

Section 4: Implementation

The Scottish Government and other stakeholders will agree actions and develop specific work plans and will put in place arrangements to implement the plan

Managing the Plan

33. Arrangements to manage implementation of the plan will be established and the overall programme will be overseen by a **Stakeholder Implementation Group**. Sub-groups will identify and agree initiatives, activities, agree the relative priorities and who is best placed to lead them. The groups will develop work plans, specify goals and milestones for delivery and establish indicators upon which the plan's success will be measured.
34. The implementation group will review the progress of the strategy and agree any necessary further actions. It will also review the work plans and priorities in response to new information, changing circumstances or unexpected events.

Towards Implementation

35. Initiatives and activities were identified and prioritised during the strategy's consultation phase, including the need to identify the currently 'unknown' beekeepers and assess the health of their apiaries. These initiatives and activities will be finalised with other Stakeholders and developed into work plans in order to realise the plan's aim and outcomes.

Examples of key priorities for implementation are:

Outcome 1: Education, Training and Knowledge Transfer

36. Education and training activities aimed at improving the standards of beekeeping and husbandry are essential to delivering the strategy's aim and outcomes. Minimising disease through good husbandry should help maximise honey production and income, particularly if the marketing of honey and other hive products can demonstrate characteristics such as provenance, high quality, purity and health standards at point of sale. High standards of biosecurity and husbandry may also help reduce the need for treatments and hence reduce costs. Proposed activities to improve education and standards could include:
 - (i) Develop and publish a common set of all good husbandry principles;
 - (ii) Improve the education of beekeepers and the standards of bee husbandry through co-ordinating and streamlining training programmes and outreach initiatives; and
 - (iii) Improve communication between farmers, landowners and beekeepers to enhance the availability of forage for bees.

Outcome 2: Communication

37. Effective communication at all levels is key to successful delivery of the Strategy. Scottish Government and stakeholders will:
- (i) Develop and adhere to an agreed set of principles and means of communication;
 - (ii) Develop and strengthen existing liaison arrangements between all stakeholders through regular dialogue and discussion; and
 - (iii) Ensure that all stakeholders work together to ensure that BeeBase is used efficiently as a key tool for communication and enable a joined-up approach throughout the UK.

Outcome 3: Surveillance, Diagnosis and Biosecurity

38. Prevention of disease incursions and minimising disease spread and impact is more cost effective than treating disease. The following actions will assist in disease prevention:
- (i) Strengthen the use of statutory requirements which seek to control the health risks associated with imported honey bees. The Scottish Government will ensure that, whilst continuing to apply the principles of good regulatory practice, sanctions are applied as necessary to those who import honey bees illegally and/or who fail to comply with other statutory requirements;
 - (ii) Raise awareness of the health risks, legal requirements and strengthen existing voluntary arrangements to reduce the risk of spreading pest and diseases associated with the importation, sale and movement of honey bees; unrefined beeswax, other hive products and used hives and equipment;
 - (iii) Highlight the benefits of biosecurity in the routine management of colonies;
 - (iv) Develop strategies for controlling foulbrood diseases with the aim of reducing incidences to the lowest levels achievable;
 - (v) Develop, strengthen and expand options for the management of the Varroa destructor mite;
 - (vi) The Scottish Government will enhance the diagnostics available to Scottish beekeepers;
 - (vii) Scottish Government and stakeholders will maintain contingency plans for the possible arrival of exotic pests, diseases and invasive non-native species; and
 - (viii) The Scottish Government will keep under review the evidence for any risks of spreading pests and diseases from species of bumble bee used for commercial pollination to honey bee colonies or to other species of bees.

Outcome 4: Research and Development

39. A key component of the strategy is to ensure that science and evidence in relation to honey bee health is well developed and provides support for the following desired outcomes:
- (i) Effective biosecurity to minimise pest and disease risks;
 - (ii) Good standards of beekeeping and husbandry to minimise pest and disease risks;
 - (iii) Impacts from pests, diseases and other hazards are kept to the lowest levels practicable;
 - (iv) Improve research co-ordination and collaboration ensuring that research priorities, scientific developments and evidence are shared widely between scientists, farmers, land-managers, communities and beekeepers;
 - (v) Prioritise and commission further research as appropriate to support policy development and operations; and
 - (vi) Use sound scientific advice and best available evidence as key inputs to inform policy development, decision making and operations.

