

Treatment-Free Beekeeping

By Clive and Shân Hudson, Lleyn and Eifionydd BKA

After eleven years of not treating honey bees for varroa, Clive and Shân Hudson are still keeping healthy colonies of honey bees. Here they share their experiences with treatment-free beekeeping.

It is nearly a decade ago since our surprising discovery that the majority of beekeepers in our area were successfully keeping bees without using any chemical treatments to control the varroa mite. Around that time, honey bees and beekeeping seemed to be facing a possible terminal decline. The catch-all acronym CCD (Colony Collapse Disorder) was in popular use accompanying doom and gloom stories in the media on the losses and problems besetting honey bees. There were substantial losses to varroa and, around that time, the UK had a run of poor, cool summers that contributed to losses, many related to poor queen matings. Honey bees, however, were not reading the press releases! They were busy working on their solution to the varroa problem and, indeed, the bees have solved the varroa problem.

As we complete our eleventh season of treatment-free beekeeping, we know bees have solved the varroa problem from our own experience, as we observe our bees season after season. We also know this from our long-term observations of wild-living honey bee colonies in trees and buildings. This fact is also confirmed by the 104 beekeepers known to us who are keeping their bees free of treatment and by other beekeepers throughout the UK who are doing the same. The evidence provided by our own experience and that of many other beekeepers is genuine and compelling. Beyond our own experience, there is now hard scientific evidence that honey bees can evolve to coexist with varroa. Professor Thomas Seeley, one of the world's most eminent scientists of honey bee research, has proved with his long-term studies that honey bees can solve the varroa problem. As he summarised in a statement at the Welsh Beekeepers' Association (WBKA) 75th Anniversary Conference held July 2018 at Aberystwyth University: "Colonies of European honey bees can survive without chemical treatments for varroa".

There is a lot of scientific research showing that honey bees can coexist with varroa, but it is mainly tucked away in academic papers that rarely have their findings explained in our beekeeping magazines. Professor Thomas Seeley has recently published a very readable and informative book: *The Lives of Bees* (2019). Drawing on a lifetime of study Seeley compares and contrasts the lives of honey bees living wild with bees in hives. From these studies, Seeley encourages the keeping of bees in ways that do not diverge too far from what bees naturally do. We are using this book, with a reference to 'Seeley' and a page number to support some of the information we present. With an eloquent narrative, the book documents many research studies and is packed with detailed information about honey bees and their lives. Seeley's book has copious notes to support his thesis and a reference bibliography of 426 academic works, and is a book we thoroughly enjoyed reading.

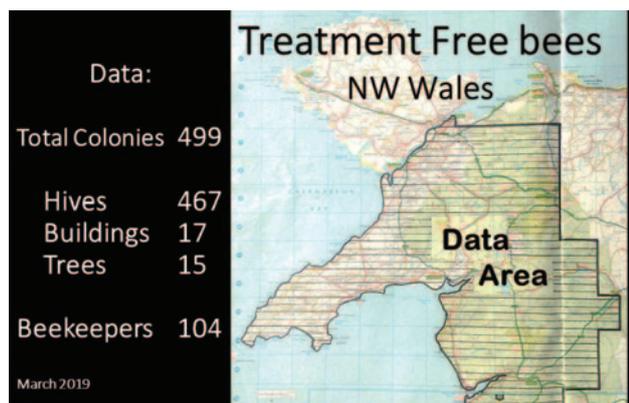
History

Back in 2010, we 'discovered' that there were already many treatment-free beekeepers in our area when we started our survey of winter losses. These were documented in *Welsh Beekeeper* (Nos. 179, 182, 185, and 189) and a summary of the information published in an article with the title, 'Varroa Has Lost its Sting' in 2016 in the *Welsh Beekeeper* 193 and 194, and in *BBKA News* 2016; 223: 429–431. At that time we stated that, 'Our surveys were a local attempt to collate information from fellow beekeepers to try and further our knowledge about our bees and beekeeping, especially relating to winter losses'. Over the survey years of 2010 to 2015, we collected data on 1,573 colony winters; of these 477 colonies had been treated with various miticides, and 1,096 had been treatment-free. The average colony loss for the treated colonies was 19%, while the average colony loss for the treatment-free colonies was 13%. In our last survey covering the winter of 2014 to 2015 we collected data from 77

beekeepers, all of whom we knew personally. Out of the 77, 17* were treating and 65* were treatment-free. [**some participants treated some colonies and not others*]. By 2015, we had been treatment-free for seven seasons and our bees were fine. We did not know of any beekeeper that had gone treatment-free who had reverted to treating, and our list of long-surviving wild-living colonies in trees or buildings was growing. During the surveys, varroa and its treatment or non-treatment developed as the focus of interest, and the results mirrored our own experience; treatment-free beekeeping was working.

The situation now

That was then; what is the situation in our area now? We reviewed our data for a presentation given at the 2019 WBKA Convention with the title, 'Varroa Has Lost its Sting – Our Experience of Treatment Free Beekeeping'. The data are summarised in the following map and the presentation is available at beemonitor.org.



Distribution map of treatment-free honey bee colonies in North-West Wales, March 2019. map image © AA Media Ltd 2009 All Rights reserved.

The map shows our area of north-west Wales where there are treatment-free beekeepers represented in all of the 10km squares in the area outlined. There are also beekeepers that are treating within the area. Very few beekeepers in Lley and Eifionydd BKA use any miticides or any other treatment to control varroa. In addition, there are also independent beekeepers that are not treating, plus colonies in trees and buildings. Mention of the WBKA Convention prompts the opportunity to say what a pleasure it was, after the presentation, to listen to the views of enthusiastic beekeepers that were keen to meet us and explain that they were also keeping bees treatment-free.

There are many areas in the UK where beekeepers are keeping bees treatment-free; for example, Ron Hoskins (24 years treatment-free) with his Swindon Honeybee Conservation Group, and Dr Dorian Pritchard (17 years treatment-free) in northeast England. A particular example we would like to highlight is in Northamptonshire where two very keen beekeeping brothers, Joe and Chris Ibbertson, are keeping bees treatment-free. Their area has a completely different landscape to our area; they are in central England, surrounded by arable farmland, and beekeepers who still feel the need to use miticides. Joe and Chris documented a lot of detailed information on their beekeeping in a very informative letter in *Welsh Beekeeper* 197. In discussion with Joe and Chris about this article, they were keen for us to include the following information about their beekeeping. They were treatment-free beekeepers from the day they started beekeeping nine years ago, because they researched the information on treatment-free beekeeping and did not see the necessity to treat. They simply did not like the idea of unnecessarily subjecting their bees to chemicals

if they were not needed. They believe local adaptation is important for sustainable beekeeping and this will not be achieved by importing bees. They understand that the genetic variation of locally adapted bees in the UK gives a deep gene pool that beekeepers can use.

What enables honey bees to develop natural resistance to the varroa mite?

Is it having the right hive? Definitely not. In our last survey, for the winter of 2014–2015, treatment-free beekeepers were keeping bees in thirteen different hive types or hive configurations. As long as bees have a reasonably weatherproof home of appropriate volume, it does not seem to affect their coexistence with varroa.

Is it the right beekeeper and the right management? We do not think so. There is a wide variety of management among the treatment-free beekeepers that we know. For example, many carry out regular inspections for signs of swarming and split colonies in various ways to minimise swarming. Others prefer minimal intervention and hope to retrieve swarms if they occur; some use queen excluders, others do not; most use foundation, but some do not; some mark queens, others do not; a few clip the wings of queens, most do not. Most provide their colonies with a supplementary autumn feed, while some do not and prefer to leave a super with honey. All, however, keep strong, healthy colonies that are completely treatment-free.

Is it having the right habitat? We do not think the evidence points to this being of critical importance for bees to be kept treatment-free. In our area bees are kept in a wide variety of habitats; adjacent to rich lowland on the Lley Peninsula, at a height of 250 metres on treeless moorland adjacent to the mountains, and in between there are apiaries in both coniferous and deciduous woodland. Joe and Chris Ibbertson are treatment-free beekeepers in a habitat of some contrast to our area; they state in their letter that they are: 'surrounded by arable farm land'. A habitat free of pollution and full of a rich and varied flora is obviously good for bees, but within reasonable limits; it does not appear essential for keeping bees treatment-free.

The right bee?

Is it having the right bee? This is an interesting question and giving a definitive answer is beyond our knowledge. We believe firmly in 'locally adapted bees' because we know of examples where brought-in alien subspecies that are initially 'gentle', turn into very aggressive bees after one or two years when they cross with local drones. We are, therefore, fully supportive of our national association, which recently stated on the front cover of the summer 2019 *Welsh Beekeeper* magazine, 'WBKA recommends sourcing locally adapted bees ...'.

If 'having the right bee' was interpreted as meaning keeping the native bee of Britain, pure *Apis mellifera mellifera*, that would not be easy because our native bees have hybridised with other brought-in subspecies over the last 200 years or more. We believe we are lucky in our area because beekeepers are rarely tempted to buy in alien queens, and recent genetic analysis is showing that honey bees throughout much of Wales have a high or very high *Apis mellifera mellifera* content to their genes (*pers. comm.* Dylan Elen, Bangor University). It is interesting to note that in the forests of the north-eastern United States where Seeley proved the evolution of bees and varroa had enabled them to coexist, the bees are a hybrid of *Apis mellifera*, *ligustica*, *carnica*, *mellifera*, and *caucasica* (Seeley p. 11). Seeley, however, recommends: 'Work with bees that are adapted to your location' (Seeley p. 286) and explains that the wild-living bees in his study area, '... have been exposed to strong natural selection to adapt to the climate throughout their nearly 400-year history of living in the north-eastern United States ...'.

None of the factors noted above seem to be critical to achieving success with treatment-free beekeeping. The only formula, we conclude, that is critical to achieving treatment-free beekeeping is to stop treating! This is the only route to finding out if your bees can survive without treatment. Providing they have the chemical-free opportunity, evidence is accumulating that *Apis mellifera* honey bees, regardless of their subspecies, can adapt to coexist with varroa. This conclusion is supported by Professor Stephen Martin of Salford University, who has studied and published many research papers on varroa and honey bees for over 25 years. Professor Martin informs us that he knows examples in many countries where different subspecies of *Apis mellifera* are showing the ability to develop natural resistance to the varroa mite (*pers. comm.*).

Perhaps we had better rewind a bit and

consider again the right bee? If we accept that locally adapted bees are, for many good reasons, the 'best bees', it may well be that some, many perhaps, will prove to be varroa-tolerant, but how do you know if that applies to your bees? You will not know the answer to that question until you stop treating! 'Refrain from treating colonies for varroa', is the recommendation from Professor Thomas Seeley, and he continues (Seeley p. 289): 'This will help your bees acquire, through natural selection, resistance to the mites. It is now clear that this will eventually happen, probably within five years, if you live where most of the colonies around you are either wild or are being managed by beekeepers who have agreed to refrain from treating for Varroa and from importing queens of mite-susceptible stock'. This scenario suggested by Seeley is a 'tall order' but possibly one that could be arranged by a beekeeping association. The good news is that in our area, beekeepers

just went treatment-free in their own way without any organisation or overriding plan and it has worked. Here we go back to Joe and Chris Ibbertson for inspiration because they have beekeepers with Buckfast and Carniolan bees in their area, and are '... surrounded by treating beekeepers ...'. So do not be put off being a treatment-free beekeeper if, by inclination and judgement, that way of beekeeping appeals to you.

Wally Shaw, WBKA Technical Officer, discusses the right bee for varroa tolerance in his article titled 'What did I mean by the right bee?', *Welsh Beekeeper* 197, and says: 'So where do the right bees come from? They come from feral colonies for which there is some evidence they have survived without any varroa control from a beekeeper'. Obtaining such bees may be an excellent way to source bees that will do well treatment-free. Beyond that scenario however, we think it is important to stress that we became treatment-free beekeepers by simply stopping any treatment. To our knowledge, all the other treatment-free beekeepers we know also went treatment-free by stopping treating. No special bees; no special management; no special environment.

We now keep our bees exactly as we did prior to varroa arriving; by traditional beekeeping in our National and Modified Commercial hives. Professor Seeley expresses two concerns when changing from treating to not treating. These are higher winter losses and, what he refers to as 'mite bombing', where bees from collapsing colonies migrate and spread varroa to neighbouring hives (Seeley p. 290). This was possibly the situation in our area in the early years of varroa, before the bees had the time to evolve and adjust their behaviour to this alien parasite. Over the years during which our association members and others have become successful treatment-free beekeepers, we have seen little evidence to justify either of these two concerns.

Differences in the make-up of different populations of *Apis mellifera* may also be a factor in its speed to adapt to varroa. For example, clear differences were found with deformed wing virus (DWV) variants between bees in the USA and in the UK. These differences, namely the dominance of DWV-B variant in Wales and England, and the dominance of DWV-A in the USA seem to be the reason for the high overwintering colony losses still being experienced in the USA. This information is from the REViVe Project research by Dr Jessica Kevill and Professor Stephen Martin and funded by beekeeping associations and Bee Diseases Insurance Ltd.

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To comprehensively address the question ‘what is the right bee?’, we really need to understand the biological mechanism, or probably mechanisms, that natural selection has bestowed on those bees. The list of mechanisms being proposed is growing as the years of research go by and includes: hygienic behaviour, varroa sensitive hygiene, allogrooming (social grooming), appropriate gut microbiome, superinfection exclusion, uncapping/recapping and varroa toxic protein. Until these biological mechanisms, and probably more to be proposed, are fully understood, going treatment-free will understandably remain a cautious path for many beekeepers. It is not a pleasant experience finding a hive with bees dying from varroosis. We have been asked what we do, if we find a colony suffering severely from varroa. On one occasion, after going treatment-free, we had two colonies that were clearly not thriving and obviously had bees with deformed wings; for a ‘few moments’ we wondered if we should treat them. It was April, still early in the season, and our other hives were all looking good. We did not treat those hives, and although they did not develop into big colonies, they survived, gave some honey and developed well the following season. Since that occasion, this issue has not arisen. On the other hand, some treatment-free beekeeping friends simply say, ‘good riddance’ to any weak colony; they dispose of it, clean the equipment and install a new colony made from a strong hive. If you are a beginner with few hives and being mentored by a treating beekeeper, it is probably better to make no changes until you gain in both experience and knowledge. If, however, you are experienced and have a number of hives why not try going treatment-free with some of them?

A wider view of treatment-free beekeeping

Adding to our knowledge of treatment-free beekeeping, a meeting of our beekeeping association took place at our home apiary last summer. Forty-five of us assembled, including fourteen beekeepers from Switzerland. The Swiss beekeepers included scientists, academics and research professionals from the Swiss Bee Research Centre, ‘Bees Switzerland’ (Swiss BKA), the Swiss Bee School, and the Swiss Bee Health Service. Why was this group of highly qualified and motivated beekeepers staying in Snowdonia for two days? It was part of their five-day journey to the UK to visit treatment-free beekeepers because after nearly 35 years of systematically treating for the varroa mite in Switzerland, its control by the use of chemicals is not solving their varroa problem. The visitors were very keen to meet treatment-free beekeepers and to see the bees for themselves. A report of the visit to the UK by the Swiss group was published in two parts in the October and November 2019 editions of *Schweizerische Bienen-Zeitung* – the Swiss beekeeping magazine.

For Thomas Gfeller, the Swiss beekeeper who inspired the visit, it has been a long journey to investigate the existence of honey bees that are surviving treatment-free. His exploration started in 2007, after losing his first colonies to varroosis, when he set out to search for wild-living colonies and treatment-free beekeepers that he only knew existed from rumours. Over a four-year adventurous period, Thomas undertook two muscle-powered cycle journeys across Europe including the UK and Ireland. In every country he visited, he discovered beekeepers that were keeping their bees without using any chemical treatment, and wild-living colonies. Thomas is convinced that the continued use of miticides throughout central Europe is simply breeding a more virulent mite, and that we should do all we can to reverse this process by learning from the bees that are surviving treatment-free.

We also think it is relevant to mention a number of papers under the heading of ‘Treatment-Free Beekeeping’ that have recently been presented at the biannual International Apicultural Congress, the 46th Apimondia, that took place in Montreal in September 2019. Seven papers were presented under this heading by



Examining our temperature-monitored hive at Lley and Eifionydd BKA Meeting in 2019 accompanied by a group of visiting beekeepers from Switzerland. Photo: Glyn Hudson.

representatives from France, Greece, United States, Canada, and the Netherlands. All the abstracts of these papers are positive with regard to treatment free-beekeeping; they are available at www.apimondia2019.com.

Concluding remarks

We took feeders off our hives in September and, as we write these notes, it is nearing the end of a glorious summer and another fascinating and productive bee-year. We hope sharing our experience of treatment-free beekeeping is of interest. As our understanding of treatment-free beekeeping beyond our own area has increased, it is becoming clear to us that the failure of chemical treatments to eliminate the varroa mite, and the parallel success of many examples of treatment-free *Apis mellifera* colonies around the world, is encouraging beekeeping organisations to re-evaluate their advice to beekeepers on how they manage varroa in their hives.

In the UK, we have had varroa with our bees for over 25 years and there is no known treatment that eradicates all the mites in beehives. The mites, as the bees, are evolving by natural selection; it only took a few years for the varroa mites to develop a resistance to flumethrin, the active chemical in Bayvarol. The experiential and scientific evidence makes it clear that treatment-free honey bees can evolve to deal with varroa.

As Thomas Seeley says: “*This is a fascinating report based on eleven years of beekeeping without treating colonies for varroa. I find especially intriguing the information that the authors, and others, have succeeded with treatment-free beekeeping in parts of Wales and England where a substantial fraction of the beekeepers continue to treat their bees for varroa. This begs the question: are there sizable populations of wild (unmanaged) colonies of honey bees living across the UK? Such colonies may be providing important grist for the mill of natural selection for resistance to Varroa destructor.*”

The evidence is there. It prompts a choice for every beekeeper.

Acknowledgements and notes:

We thank Joe and Chris Ibbertson, Dylan Elen, Professor Tom Seeley, Professor Stephen Martin, and Thomas Gfeller, who have given permission for their quotes and information to be used in this article.

Our temperature-monitored hive has real-time data that can be viewed at beemonitor.org where further information on our experience of treatment-free beekeeping can be found.