Scottish Beekeepers' Association
Survey 2011 Report

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November, 2012

1 Introduction

1.1 Background

In 2011 the Scottish Beekeepers' Association (SBA) once again supported the carrying out of a survey of its members in late spring and early summer in order to continue monitoring the state of beekeeping in Scotland. As in 2010, the data from the survey provided the basis of a return from Scotland to the COLOSS organisation which monitors honey-bee colony losses internationally.

1.2 Design of the survey

As in the last two surveys, the survey was a postal one where the sample was selected from the SBA's membership list, using stratified random sampling, the stratification being on a geographical basis.

The details of the sample selection process were as follows:–

In this survey, a Neyman allocation scheme (using the winter 2009–2010 loss rate per beekeeper) was used to divide the chosen sample size of 200 between the main SBA administrative areas, namely Aberdeen and the North combined, the East and the West. These samples were then subdivided in proportion to the SBA membership in the smaller geographical sub-areas that were also used in the previous survey. Orkney, Shetland and the Outer Hebrides were included in the North Far-North sub-area, and the Inner Hebrides were included in the North North-West. The details are summarised below:

Area	No. of members	No. sampled	Sub-region	Size	No. sampled	Responses	Response rate (%)
Aberdeen	73	14		73	14	7	50
East	511	112					
			East-Central	280	61	33	54
			North-East	181	40	18	45
			South-East	50	11	3	27
North	201	40					
			Far-North	75	15	7	47
			Inverness & surrounding area	74	15	8	53
			North-West	52	10	3	30
West	206	34					
			South-West	120	20	10	50
			West-Central	86	14	5	36
Total	991	250			200	94	47

Table 1: Details of survey design

Unlike what was done in the survey carried out in 2010, this time we did not include bee farmers, as they were sampled separately as part of the England and Wales survey.

The response rate to this survey was rather disappointing, despite offering a prize to be competed for by those responding (once more kindly provided by Thorne's of Wragby and Newburgh), and also the sending out of reminders to those who had failed to respond by the initial deadline. By the time the last responses had been processed, 94 responses had been received to the total of 200 questionnaires sent out, representing a response rate of just 47%. This is a reasonably high response rate for a postal survey, but does not give great confidence that we have avoided all the hazards associated with non-response bias. Also the fact that the final data set is a small one inevitably means that apart from the possibility of bias involved, the statistical precision in estimation that can be achieved is limited.

2 The Questionnaire used

This followed fairly closely the lines of the earlier surveys in this series. Some simplification of the questionaire was attempted, but also, because this was the first occasion on which the initial planning of the survey was done with the deliberate intention of using the responses to make a return to COLOSS, all the "essential questions" required by COLOSS were directly addressed by the questionnaire with appropriate local wording changes to meet the situation in Scotland. The COLOSS "optional questions" were also included where this was felt to be feasible.

The full final questionnaire used is included as an appendix to this report.

The questions are grouped according to the sections in the questionnaire as

1. Preliminary questions
2. Location, scale and details of beekeeping activities (including losses)
3. Races of bees being kept
4. Queens and their replacement
5. *Varroa* and its management
6. Provision of pollination services, migratory beekeeping, and sources of forage
7. Management issues

The main body of the report will be arranged in sections following this arrangement for the most part, though after that certain points using returns from several questionnaire sections will be addressed.

3 Going through the questionnaire

3.1 Preliminary Questions

3.1.1 Anonymous response

Respondents were asked to disclose their contact details, but could choose to remain anonymous. Of the 94 respondents returning their questionnaires, only 18 (19%) chose to remain anonymous.

3.1.2 Beekeepers and non-beekeepers

Of the 94 respondents, 30 (about 32%) of them were not beekeepers in September 2010. Although membership of the SBA is not limited to beekeepers, this is a remarkably high percentage of our respondents. It worsens the problem of the limited precision of estimation that can be achieved, in all the questions relating to beekeeping — the majority of questions in the survey.

The other 64 respondents were beekeepers and they were asked further questions about their recent beekeeping experience.

Interest in becoming a beekeeper

In recent years in Scotland and elsewhere there has been an increase of interest in beekeeping, with many beginners classes in Scotland being over-subscribed. For this reason it was decided to ask those SBA members who were not beekeepers in September 2010 if they were interested in becoming beekeepers in the future. The result is shown in Figure 1.

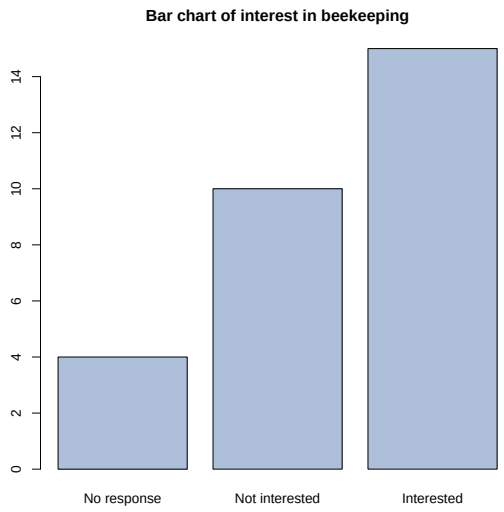

Figure 1: Distribution of interest in beekeeping among non-beekeeping respondents

Of the 30 non-beekeepers, 4 didn't answer the question and 10 said that they were not interested in becoming beekeepers, while the other 16 showed interest in becoming beekeepers (more than a half (53%) of all the non-beekeepers).

Former beekeepers

The non-beekeepers were also asked if they had previously been beekeepers. The result is shown in Figure 2.

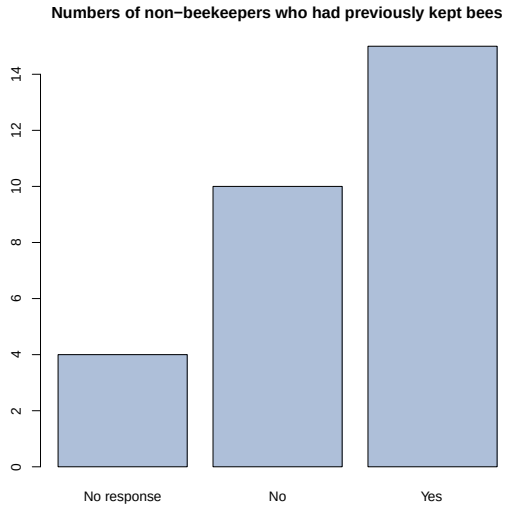

Figure 2: Distribution of non-beekeeping respondents who had previously been beekeepers

As shown above, 16 (53%) of the 30 non-beekeepers had formerly been beekeepers. Another question of interest is whether any of the former beekeepers are interested in keeping bees again. From responses to other questions it is clear that these are mainly beekeepers who had lost all their stocks but failed in re-stocking. The distribution of the numbers of those wanting to start beekeeping again is listed in Table 2.

Among the 16 respondents showing interest in keeping bees, 6 were previously beekeepers. In the survey for

		Interested in beekeeping?			Totals
		NA	No	Yes	
Previous beekeeper?	NA	3	0	1	4
	No	0	1	9	10
	Yes	1	9	6	16
Totals		4	10	16	30

Table 2: Cross-tabulation of non-beekeepers who are interested in becoming beekeepers against those who have previously been beekeepers

2010, 5 respondents out of 14 previous beekeepers also showed interest in keeping bees again; this is quite similar to the situation in 2011.

Length of time as a beekeeper

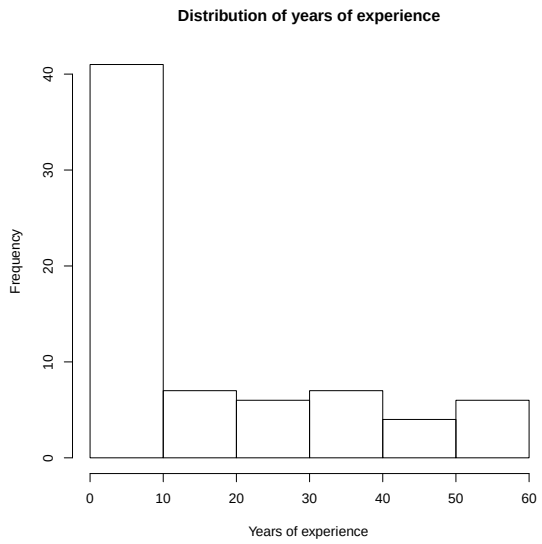

Figure 3: Distribution of years of experience among respondents who were or had been beekeepers

Those respondents who were keeping bees were asked for how many years they had done so. Some former beekeepers also answered this question. A histogram of the distribution of length of experience in years quoted by those who answered this question is given in Figure 3. The mean number of years of keeping bees is 16.44, but the median is just 7.5 years. Though there are a few experienced beekeepers who had been keeping bees for more than 50 years, the upsurge in interest in beekeeping has resulted in many new beekeepers in recent years, so that the distribution of years of experience is markedly skew.

3.2 Location, scale and details of beekeeping activities

The main part of the questionnaire was aimed at respondents who were actively keeping bees, and sought information about various aspects of their beekeeping activities and experience during 2010 and 2011. As noted above, of the 94 respondents only 64 declared they were keeping bees in 2011. The analyses in the following section all relate to the responses made by these 64 people.

3.2.1 The location of beekeeping activities

Respondents were asked whether they kept bees in their home area. The responses are summarized in Table 3.

Most beekeepers kept their bees in their home area, and most of those who answered "No" to this question said that their bee hives were within 5 miles of their home.

Yes	No	No Response
56 (87.5%)	7 (11%)	1 (1.5%)

Table 3: Do you keep all your bees in your home area?

3.2.2 Scale of beekeeping enterprises

Respondents were asked how many apiaries they managed. The distribution of these numbers is shown in Figure 4.

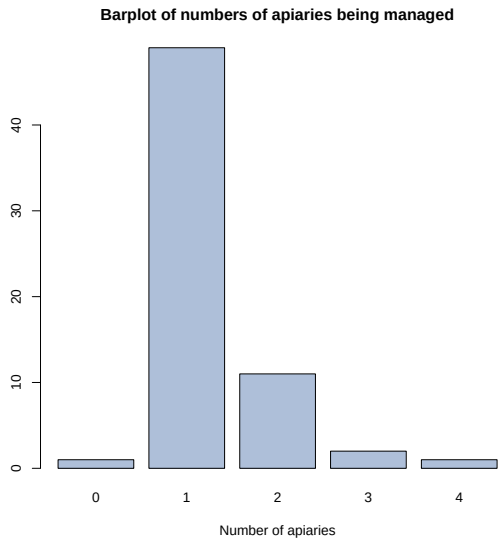

Figure 4: Numbers of apiaries being managed by respondents

As found in earlier reports, most SBA members manage only one apiary. The current result is quite similar in that the number is 49 out of 64 (about 76%). The number of respondents managing 2 apiaries is 11 (about 17%), while the number keeping bees in 3 or 4 apiaries is only 3 altogether. In one case a beekeeper claimed to have no apiary himself. This may because he or she was keeping bees in one or more apiaries managed by other people. The respondent offered no further explanation.

Respondents were also asked how many production colonies they had at three distinct dates: April 1st 2010, October 1st 2010 and April 1st 2011. The distribution of the October numbers is shown in Figure 5, since at the two April dates beekeepers may have reduced numbers due to winter losses, whereas in October they would presumably mostly have the number of colonies they aim to keep in the long term.

The result is quite similar to that in the 2010 survey: the mean number is about 4 colonies and the median is just 3 colonies. The largest number kept by any respondent is 12. Evidently SBA members mostly manage bees on a fairly small scale. The relationship between the number of apiaries and the number of colonies is shown in Figure 6. Those managing more than 2 apiaries were keeping no fewer than 7 colonies, but some respondents who had only one apiary were still managing quite a few colonies, in one case as many as 12.

3.2.3 Planned changes in colony numbers

Respondents were also asked if they had done any buying, selling or uniting of their production colonies in 2010. The original purpose of these questions, which were included to conform with COLOSS requirements, was to use them to confirm loss rates by calculating what colony numbers should have been once planned changes were allowed for. However the calculations by this method showed many inconsistencies with the direct responses on numbers of colony losses, so that use of these data was abandoned.

However the data can be used to examine how management of colony numbers relates to the size of beekeeping operation. Table 4 shows a summary of changes in numbers of colonies in both summer and winter of 2010. To keep this simple, we divided the beekeepers into three classes: the small-scale beekeepers (owning 0–3 production

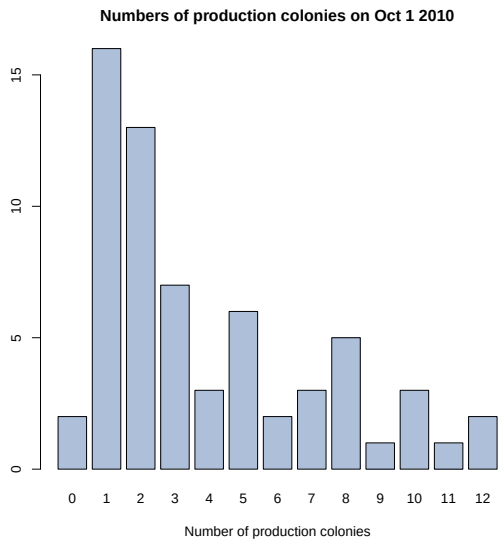

Figure 5: Distribution of numbers of production colonies at 2010 Oct. 1

colonies in Oct 2010), the middle-scale ones (owning 4–7 colonies), and the large-scale beekeepers (owning 8 or more colonies in Oct 2010). It appears that the more colonies a beekeeper owns, the more likely it is that there will be planned changes in colony numbers. To verify this, Fisher's Exact Test was carried out on the frequencies in this table. The p-value for the summer data is 0.0089. The chance that there will be at least one planned change is significantly greater among the larger-scale operations. This is not surprising, since with more colonies there is more scope for carrying out at least one such change. The p-value from Fishers Exact Test for winter is just less than 0.07, which fails to be significant at the 5% level. In fact over-all, very few planned changes were made. Most colonies in Scotland are simply left undisturbed over the winter months, so as not to stress them at a time when any such stress is likely to put them at risk. Even the larger-scale beekeepers mostly made no or very few changes of colony numbers during winter.

	Scale of operation		
	0–3 colonies	**4–7 colonies**	**8 or more colonies**
Number of beekeepers	31	14	12
Number making changes in summer	20	13	10
Percentage making changes in summer	53%	93%	83%
Number making changes in winter	3	2	4
Percentage making changes in winter	8%	14%	33%

Table 4: Numbers of beekeepers making planned changes in colony numbers

3.3 Colony Losses

3.3.1 Summer Losses

Respondents were asked how many colonies they lost during the summer of 2010. These summer losses were at a low level as usual compared to the winter losses — about 7.3% for our respondents (15 colonies out of a total of 205 colonies). The main reported reason for summer losses was queen problems, which contributed to more than half of the losses (8 out of the 15 colonies lost). Of the other specific causes suggested in the questionnaire, only two had been cited as causes of summer loss, 1 colony having starved, and one other having succumbed to *Varroa* infestation. Other explanations for some of the other losses were given, but no particular pattern emerged. Difficult weather for queen mating may well have been responsible for some of the losses due to queen problems

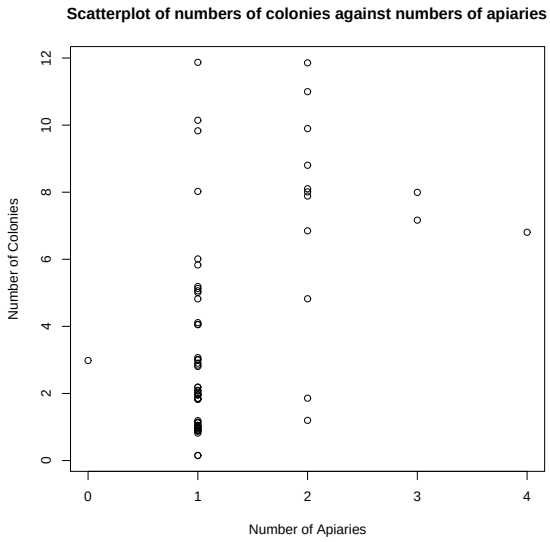

Figure 6: Scatterplot of numbers of colonies against number of apiaries

in some parts of Scotland. As expected, gains in colony numbers due to deliberate breeding far outweighed the losses.

3.3.2 Winter Losses

Loss rate and size of enterprise

Winter loss rates experienced by small-scale beekeepers are of course very variable. However with one exception, the larger scale beekeepers keeping 5 or more colonies all had loss rates of no more than 50%. The variation is shown in the plot in Figure 7, where the number of colonies in October 2010 are used as a measure of the size of operation.

Over-all, 55 out of 252 colonies were lost during winter, giving an over-all reported winter loss rate of 21.8%.

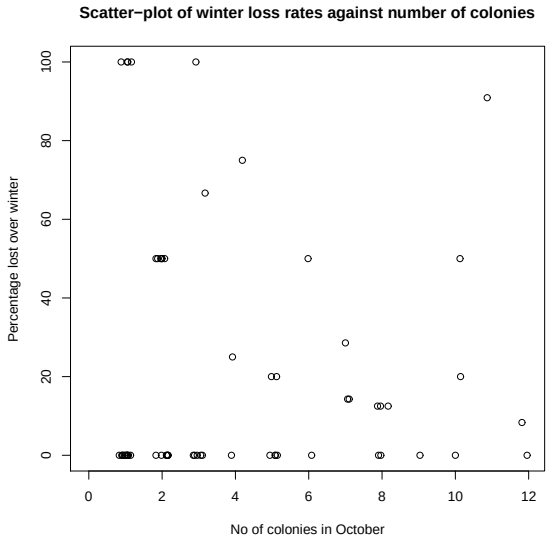

Figure 7: Scatter-plot of Winter Loss Rate for 2010–11 vs. Colony numbers in October 2010

3.3.3 Causes of winter losses

Causes reported by respondents

Respondents were also asked how many of their winter losses could be attributed to different causes. The result is displayed in Table 5, using the cause headings suggested in the questionnaire.

Cause	Loss Nos	Loss Percentage
Starvation	15	27%
CDS*	3	5%
Queen problems	11	20%
Varroa	5	9%
Other	13	24%
Unknown	8	15%
Total	55	100%

Table 5: Numbers (and percentages) of winter losses attributed to different causes
*CDS: Colony Depopulation Syndrome — a term used by COLOSS where a hive is found virtually depleted of all bees, with no dead bees in the hive or apiary, but ample stores left.

Table 4 shows that the most frequently cited cause of colony loss in winter was starvation, with queen problems (queenlessness or drone-laying queens) a close second. Other causes offered by the respondents were "oxalic acid treatment" (1 case, 4 colonies), "*Nosema* infection" (2 cases, 8 colonies and 3 colonies) and "hive knocked over by a cow" (1 case, 1 colony).

Other factors associated with raised winter loss rates found from the data

Rates of winter loss are a principal focus of the COLOSS surveys. In the light of this we carried out further analysis of the data, and found some factors which were definitely positively associated with differing winter loss rates and others which were not.

- **Geographical position in Scotland**

  Some differences in geographical position were associated with significantly different loss rates.

  Firstly, we split the country into East and West, then into North, the Centre and the South. As in the analysis of the 2010 survey, for the East-West split we used the SBA's own administrative division for the part of the country south of Inverness (taking the Aberdeen and East areas as east, and West as west) and for the north of the country we divided respondents straightforwardly according to whether they were nearer to the east or west coast. Any respondents from Orkney or Shetland were excluded from this division as not being clearly in either the east or the west. For the North-Central-South division, those north of Perth were regarded as being in the North, and those south of the Forth and Clyde as in the South, the remainder being in the Centre.

  The results shown in Table 6 indicate a difference in loss rates between the east and west parts of Scotland, the loss rate in the east being much higher than that in the west. Since the p-value for Fishers Exact Test applied to this table is only 0.00016 (which is far less than 0.05, the usual cut-off and is even less than (say) 0.001), the difference between these loss rates is highly statistically significant. This was also the case in the 2010 survey.

Area	**Colonies**	**Lost**	**Loss Rate**
East	179*	50	28%
West	73*	5	7%

Table 6: Different winter loss rates experienced in the East and the West of Scotland
*Respondents in Orkney and Shetland were omitted here, as not being clearly either in the East or the West of the country.

Table 7 shows the loss rates for the North, Centre and South. The p-value for Fishers Exact Test is now more than 0.6, so there is no strong evidence of a significant difference between the rates of colony losses between these three regions. (This differs from the result found in the 2010 survey, when there were signficant differences between these regions).

Area	Colonies	Lost	Loss Rate
North	124	29	23%
Centre	68	5	18%
South	60	14	23%

Table 7: Different winter loss rates experienced in the North, Centre and South of Scotland

Until recently, there were still large areas in the North region where *Varroa* had not arrived, or had only been found a few years earlier. By 2011 however, only the most remote areas of the North were still free of this pest (see the map available at [1]). In fact from the results of our first survey in 2006 we found a significant association between the length of time that *Varroa* had been reported as being present in bee colonies and winter loss rates (see [2]). Clearly however there is no such effect any longer apparent from the analysis above.

- **Foraging on Oil Seed Rape**

  We also considered whether foraging on Oil Seed Rape (OSR) or not might be a significant risk factor for winter loss rate, which we were able to do as sources of forage were asked about in this survey. The result is given in Table 8.

Forage	Colonies	Lost	Loss Rate
Includes OSR	80	24	30%
Does not include OSR	172	25	15%

Table 8: Difference in loss rates for colonies foraging on Oil Seed Rape or not

The p-value for Fishers Exact Test of these results is less than 0.006, so there is strong evidence of a significant difference between the rates of colony losses between these two foraging situations.

Comment on factors significantly associated with varying winter loss rates

The reason why there is such a large difference between the reported loss rates in the east and west of Scotland must remain a matter of speculation. However one possibility is that, as there is more intensive agriculture in the east of Scotland, the suspected harmful effects of neonicotinoid pesticides used more widely in the east may be leading to higher winter losses of honey-bee colonies there. This was why we chose to investigate as a possible risk factor the availability of Oil Seed Rape as a forage crop, since OSR is known to be almost universally grown in Scotland now from seed treated with one of the neonicotinoid seed dressings. The fact that a strong positive association was found with this factor may be seen as being consistent with OSR being a causative risk factor for colony loss, but of course we cannot claim to have *proved* a causative link (which would require much more careful investigation), particularly as our sample is small and may be subject to non-response and other biases.

3.3.4 The races of bees being kept

Before 1900 most bees in Britain belonged to the race *A. m. mellifera,* the Northern European dark bee. After the heavy loss of bees due to "Isle of Wight Disease" in the early part of the twentieth century, bees of other races were imported, notably *A. m. ligustica* (the Italian race) and *A. m. carnica* (the Carniolan race). Nowadays, bees in Scotland are mostly of mixed race. However, beekeepers were asked which race they kept, with the results shown in Figure 8 and Table 9.

Of the 51 beekeepers who claimed to know what race or races of bees they were keeping, 42 (82%) declared that they kept only one race of bees.

Race claimed						
Don't know	Local strain of no name	Mellifera	Carnica	Ligustica	Buckfast	Other
13	30	21	2	2	3	1

Table 9: Numbers of respondents claiming to keep the different races of bees

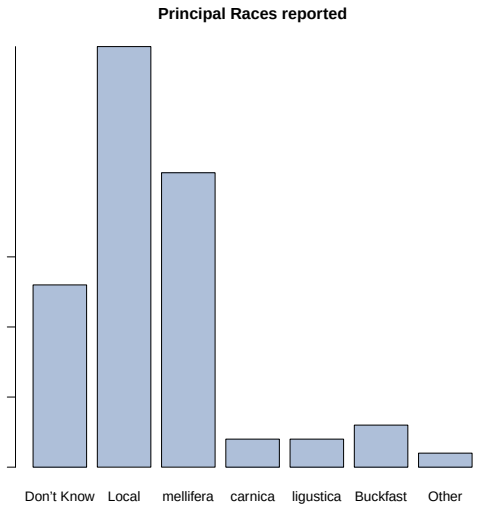

Figure 8: Distribution of number of distinct races of bees being kept

However more respondents claimed to be keeping an unnamed (presumably cross-bred) local strain than any other race, and *mellifera* is, as last year, the main named race claimed by the beekeepers. One respondent claimed to keep another special race of bee: $A.m.m. \times A.m.l.$ cross and three claimed to be keeping the Buckfast strain.

3.4 *Varroa* and its management

The *Varroa* mite is a source of continuing difficulty for beekeepers world-wide, and most beekeepers in Scotland now have to control levels of this parasite to prevent the loss of their colonies. We asked a range of questions on this topic, with the results below.

3.4.1 Incidence of *Varroa* infestation

We asked "Do you believe some at least of your colonies are infested with the *Varroa* mite", in the hope of determining which areas of Scotland represented in our sample might still be free of this pest. Unfortunately quite a number of our respondents answered "No" although they were keeping bees in areas where *Varroa* is well-known to be widespread, so little reliance can be placed on these responses in identifying *Varroa*-free areas.

Those who declared that they did believe *Varroa* infestation was present in their colonies were asked when they first found infestation present, with the options:–

- Before 2010
- In 2010
- In 2011
- Not yet detected.

The responses are summarised in Table 10. A large majority (84%) of those believing *Varroa* is present had known about it for at least two years. This is a far greater percentage than we have found in earlier years, and indicates the relentless spread of *Varroa* across Scotland. In earlier years there were still many respondents in the North of Scotland who had only recently found *Varroa*. The earlier columns of Table 10 show that this situation has now changed.

When *Varroa* first found	Region			Total No.	Total %
	North	Central	South		
Before 2010	17 (85%)	17 (77%)	7 (100%)	41	84%
In 2010	2 (10%)	5 (23%)	0 (0%)	7	14%
in 2011	0 (0%)	0 (0%)	0 (0%)	0	0%
Not yet found	1 (5%)	0 (0%)	0 (0%)	1	2%
Total believing infestation present	20 (100%)	22 (100%)	7 (100%)	49	100%

Table 10: When *Varroa* infestation was first found, with beekeepers split by regions

3.4.2 Detecting and monitoring *Varroa* infestation

Detecting the presence of *Varroa* for the first time

As a follow-up to the last question, we also asked those who responded "No" about their belief that *Varroa* is present, to say what steps they took to detect any possible infestation, with the following options:–

- Send floor scrapings to Science and Advice for Scottish Agriculture (SASA)
- Another method (to be specified)
- None.

The results are summarized in Table 11. It is surprising that as many as 38% of those claiming that they did not believe *Varroa* infestation was present were still not trying to detect it in any way.

Procedure	Number using	% using
Scrapings to SASA only	2	15
Other method(s)	5	38
Scrapings to SASA and other method(s)	1	8
None	5	38
Total claiming no *Varroa* present	13	100

Table 11: Procedures used to detect any *Varroa* infestation

Other methods of detection mentioned by respondents were:–

- Uncapping drone brood
- Treatment with oxalic acid
- Treatment with oxalic acid and with Apiguard
- Inspection by the beekeeper of floor scrapings, one respondent using a microscope for this, and another combining it with uncapping drone brood.

Monitoring the level of established *Varroa* infestation

Those who believed they had *Varroa* infestation were asked whether or not they monitored the level of infestation. If they did monitor, they were asked which method they used, with the following options offered:–

- Counting daily natural mite drop
- Uncapping of drone brood
- Other methods.

Tables 12 and 13 show the details of the responses. Most (47 (73%)) of the beekeepers said that they did monitor, but 12 (19%) did not.

	No answer	Did not monitor	Monitored	Totals
No. of beekeeping respondents	5	12	47	64

Table 12: Monitoring levels of *Varroa* infestation

Method		**Used**	**Did not use**	**Total**
Count mite drop	Number	39	8	47
	%	83%	17%	100%
Uncap drone brood	Number	25	22	47
	%	53%	47%	100%
Other method(s)	Number	4	43	47
	%	9%	91%	100%
Total	Number	68	73	-

Table 13: Methods used to monitor levels of *Varroa* infestation

In Table 13 the total number of uses of the methods (68) far exceeds the total number of respondents saying that they monitor (47), because many of the respondents who monitor use more than one method. The numbers using 1, 2, 3 or more methods are shown in the barplot in Figure 9. While using more than one method is the most common (60%), 36% used two methods, but use of more than two methods was rare.

The "other" methods of monitoring infestation levels stated by respondents were:–

- "Visual check";
- "Dust with icing sugar"
- "Floor scrapings to SASA"
- "Drone comb removal".

Whether or not any of these is a satisfactory method of monitoring infestation levels is perhaps doubtful, unless some numerical counting procedure is used to back up each one.

3.4.3 Treatment of *Varroa* infestation

Classes of treatment for *Varroa*

In the management of *Varroa* infestation the various treatments used can be divided into several different classes.

First there are general management practices, used all year, of which the main one is the use of open mesh floors to hives (which are believed to reduce mite populations by the loss of mites which fall through the mesh when in their phoretic stage they lose their grip of the host bee to which they are clinging).

Secondly, there are biotechnical methods such as the creating of sacrificial drone comb for cutting out, or the trapping of the queen on sacrificial brood combs, which aim to reduce the mite burden in the colony by sacrificing some bee brood. These can only be used in the appropriate seasons when bees are actively breeding.

Thirdly, there is the application of non-toxic "soft" substances, such as dusting with icing sugar, to remove a proportion of mites. Again these can only be applied at appropriate seasons.

Finally, there is treatment with chemicals which are toxic to the mites — "hard" substances — and are aimed deliberately to kill them. Many different substances are being used by beekeepers for this purpose, and the timing of their applications is crucial.

Some attempt was made to cover all these different types of treatment in the survey, and the responses received are summarised below.

Use of open mesh floors

These are now being widely used in Scotland. Of our 64 beekeeping respondents, 43 reported that they were using open mesh floors, 14 were not using them, and the remaining 7 beekeepers did not answer the question. Thus 75% of those who answered the question were using open mesh floors.

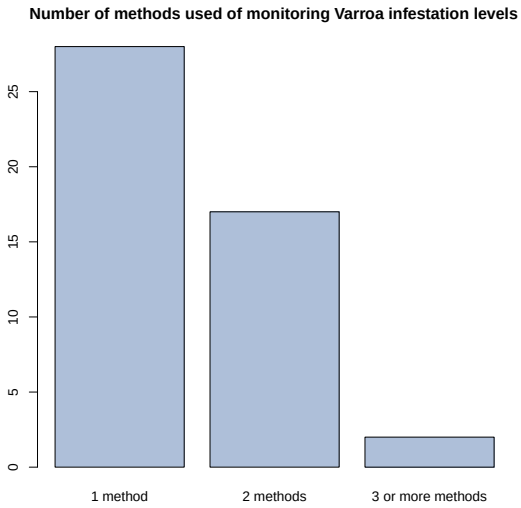

Figure 9: Number of methods used by those monitoring *Varroa* infestation levels

Frequency of use of other types of treatment

The barplot in Figure 10 and Table 14 show the varying frequencies with which different respondents applied various other treatments for *Varroa* during the 17 months from November 2009 to March 2011 inclusive.

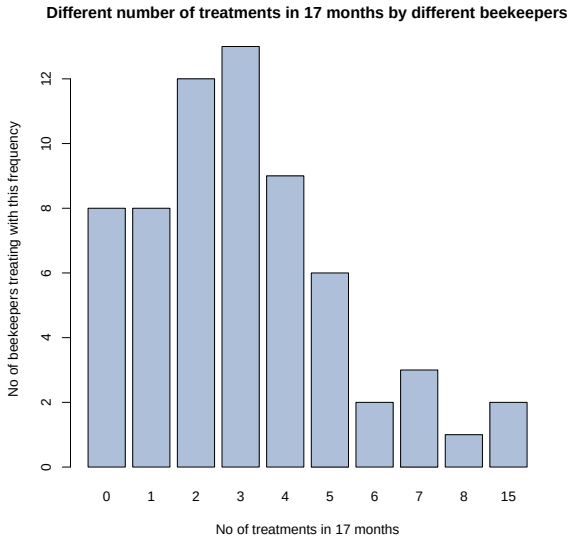

Figure 10: Frequencies with which different numbers of treatments were carried out by different respondents

The mean number of treatments undertaken during this period was 3.25, and the median number was 3, although 2 respondents claimed to have carried out as many as 15 treatments. However several respondents were using more than one type of treatment simultaneously — e.g., a biotechnical method in combination with a "soft" or "hard" chemical treatment in the same month.

Perhaps the most surprising feature of these results is that of the 64 beekeeping respondents, 8, or 12.5% did not use any treatment at all during this period of 17 months.

No. of treatments	0	1	2	3	4	5	6	7	8	15
Numbers doing this	8	8	12	13	9	6	2	3	1	2
Percentages	12.5%	12.5%	18.8%	20.3%	14.1%	9.4%	3.1%	4.7%	1.6%	3.1%

Table 14: Numbers and percentages of beekeeper respondents treating with different frequencies

Frequencies of use of different classes of other treatments month by month

These frequencies are displayed month by month in Table 15.

	Class of treatment			
Month	BT	Soft	Hard	**Totals**
Nov 09	0	1	11	12
Dec 09	0	0	14	14
Jan 10	0	0	10	10
Feb 10	0	0	3	3
Mar 10	0	0	3	3
Apr 10	1	4	7	12
May 10	5	6	6	17
Jun 10	5	9	5	19
Jul 10	3	9	4	16
Aug 10	1	9	7	17
Sep 10	0	2	22	24
Oct 10	0	2	14	16
Nov 10	0	1	8	9
Dec 10	0	1	12	13
Jan 11	0	1	10	11
Feb 11	0	1	6	7
Mar 11	0	1	4	5
Total	15	47	146	208
%	7%	23%	70%	100%

Table 15: Month by month break-down of frequency of use of different classes of treatment of *Varroa*

Use of biotechnical methods

The only biotechnical method reported by any of the survey respondents was the cutting out of drone comb (used for 7% of treatments), apart from one respondent who in July 2010 offered "Hive clean" as a *Varroa* treatment. How frequently and when cutting out drone comb was used is therefore already shown in Table 15.

Use of "soft" substances

Once again the only "soft" treatment reported was dusting with icing sugar (22% of treatnents), apart from a single respondent who fed "Lavender infused syrup" in August 2010. Table 15 already summarises that information. It is interesting to note that one respondent claimed to be continuing to dust with icing sugar throughout the winter of 2010–11, a season when most beekeepers are leaving their bees undisturbed.

Use of "hard" substances

There was a far greater variety of treatments reported in the "hard" substances class, which accounted for 146 (70%) of the 208 uses of treatment. Choices offered in the questionnaire were (1) Pyrethroid strips (Apistan/Bayvarol) (licensed veterinary medicines); (2) Apiguard (licensed veterinary medicine); (3) Thymol-soaked pad; (4) Oxalic acid trickle method; (5) Oxalic acid sublimation method; (6) Formic acid. Additional treatments of this class mentioned by one or more respondents were *Apilife Var*, *Varroa Gard* and *Thymol in feed*. Table 16 shows how the use of these treatments was distributed in frequency over the different months.

The most frequently used "hard" substance is still the synthetic pyrethroid strip (Apistan or Bayvarol; usually in September), accounting for 26% of the uses of treatment, but a close second is oxalic acid by the trickle method

	None	A/B	AG	ThP	OA(T)	OA(S)	FA	AlV	VG	ThF	Totals
Nov09	53	5	0	0	4	2	0	0	0	0	11
Dec09	50	0	0	0	9	5	0	0	0	0	14
Jan10	54	0	0	0	6	4	0	0	0	0	10
Feb10	61	1	0	0	2	0	0	0	0	0	3
Mar10	61	3	0	0	0	0	0	0	0	0	3
Apr10	57	5	1	0	1	0	0	0	0	0	7
May10	58	2	0	0	1	0	3	0	0	0	6
Jun10	59	1	1	0	1	1	1	0	0	0	5
Jul10	60	3	0	0	1	0	0	0	0	0	4
Aug10	57	5	2	0	0	0	0	0	0	0	7
Sep10	42	15	6	1	0	0	0	0	0	0	22
Oct10	50	8	3	1	0	1	0	1	0	0	14
Nov10	56	4	0	0	2	2	0	0	0	0	8
Dec10	52	0	0	0	5	6	0	0	1	0	12
Jan11	54	0	0	0	10	0	0	0	0	0	10
Feb11	58	0	0	0	6	0	0	0	0	0	6
Mar11	60	3	0	0	0	0	0	0	0	1	4
Totals	—	55	13	2	48	21	4	1	1	1	146
% of "hard" treatments		38	9	1	33	14	3	0.7	0.7	0.6	100
% of all treatments		26	6	1	23	10	2	0.5	0.5	0.5	-

Table 16: Month by month break-down of frequency of use "hard" substances to treat *Varroa*

Key to Table 16:

A/B	Apistan/Bayvarol
AG	Apiguard
ThP	Thymol-soaked pad
OA(T)	Oxalic acid – trickle method
OS(S)	Oxalic acid – sublimation method
FA	Formic acid
AlV	Apilife Var
VG	VarroaGard
ThF	Thymol in feed

(in December/January), accounting for 23% of the treatments. If both methods of applying oxalic acid are combined, then this is now the most frequently used "hard" substance to treat *Varroa* (33% of treatments). No doubt this reflects a continuing reduction of confidence in the efficacy of the synthetic pyrethroids, with reports of the development of *Varroa* mites resistant to the pyrethroids in various parts of the UK.

3.5 Some beekeeping management issues

3.5.1 Queens and their replacement

Respondents were asked what was the principal source they used for replacement of queens in management of their colonies, the options being

- A queen reared by the colony being re-queened
- A queen reared by another selected colony
- A queen from a Scottish queen breeder
- A queen from a queen breeder elsewhere in the UK
- A queen from a queen breeder outside the UK

Source	Colony being re-queened	Selected own colony	Scottish queen breeder	Other UK queen breeder	Queen breeder outside UK	Other source
Number	38	13	10	1	0	2
%	59%	20%	16%	2%	0%	3%

Table 17: Principal source of new queens

% of colonies with forced queen replacement	Minimum	Median	Mean	Maximum	Over-all
Summary statistics	0%	0%	10.3%	100%	10%

Table 18: Percentages reported of colonies needing forced queen replacements, per beekeeper and over-all

- Another source, to be specified in the answer.

A few respondents selected more than one of these options. In carrying out the analysis, we changed these responses to just one of the selected options, which appeared to us to be the most plausible as the main one.

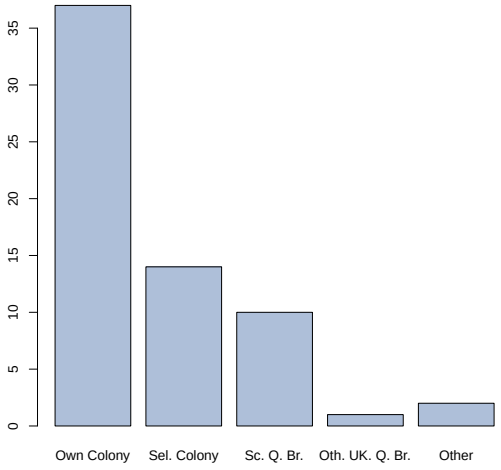

Figure 11: Principal sources of new queens

The responses are summarised in the barplot in Figure 11 and Table 17. Most (59%) used queens reared by the colony being re-queened. No respondent claimed to be sourcing queens from outside the UK, which perhaps is some comfort to those who fear that imported queens may be a source of disease or genetically undesirable characteristics, though the fact that none of our respondents claimed to import queens does not of course guarantee that no-one in Scotland does so.

Two of the three respondents who claimed an "other" source for their queens said they were from swarms taken, and one that they were "merged from another beekeeper". (Perhaps this last should be classified as sourcing queens from a Scottish Queen Breeder, which was one of the stated options).

Respondents were also asked for how many colonies they were forced to seek replacement queens because of queen problems. Clearly this number should be considered as a percentage of the number of colonies being kept, for the result to be comparable across all beekeeping enterprises.

The scatter-plot in Figure 12 shows how this percentage varies across enterprises of different sizes, where the size of enterprise is meaured by the number of production colonies being kept in October 2010.

Table 18 summarises this percentage replacement of queens per beekeeper and also shows the over-all proportion of such queen replacements. During the period of this survey 10% of colonies over-all required such forced

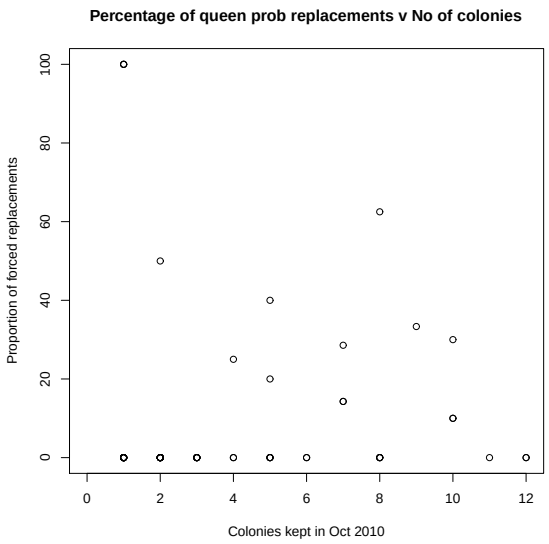

Figure 12: Number of colonies where queens had to be replaced because of queen problems as a percentage of colonies kept in Oct 2010

Percentage replaced	No response	0	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 or more
Number	4	10	15	11	9	3	8	4
%	6%	16%	23%	17%	14%	5%	12%	6%

Table 19: Frequency distribution of percentage of combs replaced annually

queen replacements.

3.5.2 Comb replacement

Respondents were asked to say what percentage of combs they replaced annually. The responses are summarised in Figure 13 and Table 19. The median was 20% and the mean was 23.13%. Of the 64 beekeeping respondents, 10 or about 16% of respondents stated that they replaced no combs at all. However as three beekeepers failed to answer this question, this means that over 16% of those answering the question stated they replaced no combs at all. Just one stated that they replaced all combs every year.

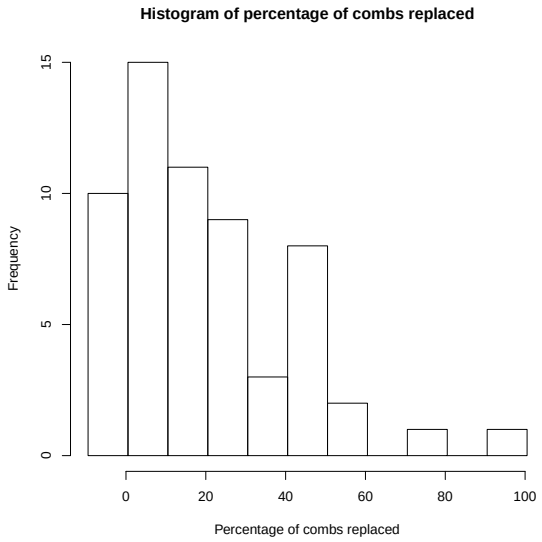

Figure 13: Percentage of combs replaced annually

3.5.3 Feeding colonies

Both the type and quantity of feed used by respondents was investigated, with the year divided into the 4 seasons of spring, summer, autumn and winter. The frequencies with which each specified type of feed was used in each season are shown in Table 20.

	Type of feed						
Season	Sugar syrup	Bee feeding syrup	Candy or fondant	Honey Honey	Pollen substitute	Other	Total no. of instances
Summer 2010	24	6	1	4	1	0	36
Autumn 2010	41	13	8	7	0	0	69
Winter 2010–11	7	3	33	5	0	0	48
Spring 2011	24	11	15	5	9	1	65
Total no. of uses	96	33	57	21	10	1	218

Table 20: Frequencies with which different types of feed were reported as used at different seasons

By far the most popular type of supplementary feeding was feeding with sugar syrup, most commonly in autumn, followed by feeding candy/fondant, most often in winter. Bee feeding syrup was next most popular, again most commonly in autumn.

It is also interesting to note how many of the beekeeping respondents did any feeding at all during each of the four seasons investigated. The results are shown in Table 21. At first sight, the fact that apparently about one-third of the beekeepers did not feed in the winter and likewise in the spring may suggest many very complacent beekeepers who deserve to lose stocks to starvation. However on combining the two seasons it appears that it is not the same one-third in each case and that only about 12% of the beekeepers reporting fed at neither season. Most of these may have been well satisfied that their stocks were already well provisioned, though the fact that starvation was reported as a fairly common cause of colony loss suggests that this is an area where some beekeepers in Scotland need to be more attentive to their stocks.

The quantities reported per colony of the different kinds of feed are also estimated using those responses which were given, but the response was patchy to these questions. The distribution of the approximate litres used per colony of sugar syrup, bee feeding syrup and the total of these combined is shown in Table 22 using the numbers of colonies being managed in October 2010 as the baseline for the four seasons covered, namely summer 2010,

Season	Feeding		Not feeding	
	No.	%	No.	%
Summer 2010	31	48%	33	52%
Autumn 2010	57	89%	7	11%
Winter 2010–11	42	66%	22	34%
Spring 2011	43	67%	21	33%
Winter OR spring	56	88%	8	12%

Table 21: Numbers and percentages of beekeepers feeding and not feeding at each season

autumn 2010, winter 2010–11 and spring 2011. Summary statistics of the relevant distributions are shown. The quantities used vary considerably, with some beekeepers feeding heavily.

For other types of feed, so little quantitative information was supplied that no meaningful summary can be provided.

Season	**Summer 2010**				**Autumn 2010**			
Type of syrup	Min	Median	Mean	Max	Min	Median	Mean	Max
Sugar syrup	0.20	1	1.4	5	0.36	1	3.19	20
Bee feeding syrup	1	1	2.10	20	2.5	2.25	3.79	21.25
Either	0.2	2	3.40	20	0.36	5	6.27	21.25
Season	**Winter 2010–11**				**Spring 2011**			
Type of syrup	Min	Median	Mean	Max	Min	Median	Mean	Max
Sugar syrup	0.71	1.75	1.87	4	0.40	1.86	2.17	5
Bee feeding syrup	2.0	2.00	2.00	2	0.2	2.25	3.79	15
Either	0.71	2.0	1.89	4	0.2	2	2.87	15

Table 22: Summaries of quantities of syrup (litres) per colony at different seasons by those feeding syrup

3.5.4 Forage plants being accessed by colonies

Respondents were asked to state which plants they believed their bees foraged on during the period covered by this survey. The following were the options suggested in the questionnaire:–

- Rape;
- Sweetcorn/maize;
- Sunflower;
- Bell heather;
- Ling heather;
- Lime;
- Dandelion;
- Willow;
- Bee Pastures;
- Honeydew.

Respondents were also invited to suggest up to two additional sources not on the list supplied. The sources listed above were in many cases listed to conform with what COLOSS required to be included. Two items in particular, namely “Bee Pastures” and “Honeydew”, appeared to be problematic for our respondents. (In

subsequent meetings of the COLOSS group it has emerged that there was considerable disagreement about the precise meaning of "Bee Pastures", and after 2011 the new category of "Wild Flowers" has replaced it.)

Honeydew is a crop gathered by bees from aphids which, when feeding often in coniferous forests on the trees, exude a sweet liquid which bees can harvest and convert into a kind of honey. It appears that this is rather a rare circumstance within the UK, and probably does not occur noticeably at all in Scotland. It is not surprising that our respondents appeared to be uncertain about it, and those who claimed to have it may not be giving reliable responses. What was claimed for both these is reported in Table 23 along with the frequencies cited for the other sources. Dandelion and Willow were the most commonly reported sources of forage.

The statistical association found between the risk of winter loss and the reported foraging of bees on Rape has already been reported above.

Plants	Rape	Maize	Sun-flower	Bell heather	Ling heather	Lime	Dandelion	Willow	Bees pastures	Honeydew
Frequencies	21	2	3	23	30	33	43	46	15	2

Table 23: Frequencies with which the different suggested forage plants were claimed

Table 24 gives the other forage sources claimed by respondents, and the frequency with which each was cited. Clover and plane tree/sycamore are the most commonly stated of these.

Source	**No of times cited**
Beans	1
Blackberry/bramble	2
Broom	1
Cherry	1
Clover	10
Fruit trees	1
Garden plants	3
Gorse	2
Hawthorn	1
Herbs	1
Himalayan balsam	2
Horse chestnut	1
Ivy	2
Marsh marigold	1
Plane tree/sycamore	9
Soft fruit (incl. raspberry)	3
Willow herb	7

Table 24: Frequencies with which other forage plants were cited

3.5.5 Disruption of colonies by various kinds of pests

The pests which may disrupt bee colonies were also investigated, with a question on which of the listed pests had disrupted one or more of each beekeeper's colonies. Of those pests listed, Small Hive Beetle is a notifiable pest, still believed to be absent from the UK, so it is not surprising that no instance of it occurred in this survey.

The results are in Table 25. The most frequently occurring pests are mice, with ants also causing fairly frequent disruption. Other sources of disruption mentioned are listed in Table 26, but none was mentioned more than three times.

Pest	Ants	Hornets	Badgers	Mice	Small Hive Beetle	Woodpeckers	Fire	Vandalism	Theft
Frequency	6	0	0	10	0	0	0	2	1

Table 25: Frequencies with which various named pests had disrupted colonies

Source	Flood	Wind/Storm	Wasps	Slugs	Lizards	Wax moth
Frequency	1	3	2	1	1	1

Table 26: Frequencies with which other pests were named as troublesome

3.6 Provision of pollination services and migratory beekeeping in general

Professional large-scale beekeeping businesses almost all undertake many moves of their bee colonies during the year to access different seasonal honey flows. Many of them also use their bees to provide pollination services for other agricultural businesses for specific crops that require pollination in order to optimise yields.

In this survey we found that both activities are at a very low level indeed among SBA members (who are nearly all hobbyist beekeepers with small numbers of stocks). None of our 64 beekeeping respondents claimed to be involved in pollination contracts. This is not surprising since a small number of colonies will not provide sufficient bees for efficient pollination of a large area of crop. It is more surprising to discover how few are taking advantage of seasonal honey flows such as heather. Perhaps this relates to the outbreaks of Foulbrood disease in Scotland since 2009, which may make beekeepers reluctant to move their colonies, owing to the risk of either spreading or acquiring such serious infections.

Number of colonies moved	0	1	2	3	4	5
Number of respondents reporting this	56	1	4	0	1	2

Table 27: Frequencies with which moves of different numbers of colonies were reported

Number of separate moves	0	1	2
Number of respondents reporting this	56	7	1

Table 28: Frequencies with which different numbers of moves were reported

Summary statistic	Minimum	Median	Mean	Maximum
Miles	8	12	20.4	60

Table 29: Summary statistics for total distances in miles respondents moved their bees

The responses to the questions on migratory beekeeping are summarised in Tables 27 and 28, in Figure 14 and in Table 29. Only 8 of the 64 beekeeping respondents (12.5%) moved any colonies at all. Those that did do so only moved a small number of colonies, the largest number moved being 5. Of the 8 reporting that they moved colonies, only 1 reported making as many as 2 moves during the summer of 2010. Figure 14 and Table 29 show the distribution of distances bees were moved.

3.7 Comments about other concerns

Many of the beekeeping respondents made comments about other concerns they had. These are reproduced below.

The nature of these comments is wide-ranging, however we have attempted to group them under general headings to identify any major areas of concern in 2011. One comment is listed under two headings. The results are given in Table 30, arranged by decreasing frequency of occurrence (and then alphabetically). The number

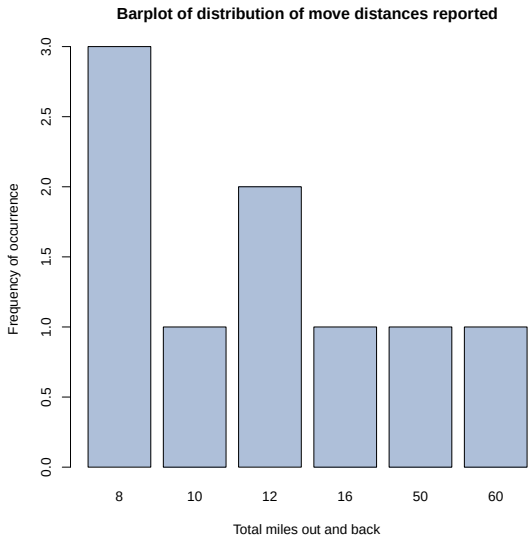

Figure 14: Distribution of distances of moves reported in migratory beekeeping

printed before each comment is the order number in which that questionnaire was processed, and has no other significance.

Topic	**How often mentioned**
Difficulties in obtaining bees, losses & finding sites	4
Winter preparations	4
Climate/weather	3
Pesticides and diseases	3
Queen Problems	3
Beekeeping education	2
"Natural" management	2
Incidence of *Varroa*	2
Problems with *Varroa* and treatment	2
Economics and forage	1

Table 30: Frequencies with which particular topics were raised in comments

Obtaining bees, losses and finding sites

20. When starting beekeeping in 2010 I found it difficult to obtain local bees. Any new beekeeper will find it difficult. The Forestry Commission own a lot of land in Scotland. They should be opening sites for beekeeping.

23. Lost all 6 stocks from 2 apiaries in winter 2009-10 (Apiary 1: 2 weak colonies, 2 starvation; Apiary 2: both weak or isolation starvation). Still awaiting replacements.

61. Lost all colonies over winter 2009-10.

77. Previously kept up to 11 colonies, reduced to 4 by 2008 - lost all to Varroa in 2009 when no treatment given, and not managed. Gained a swarm in 2010 and treated and fed. Trying to increase again now. Dept of Agriculture confirmed Varroa from samples in previous year.

Winter preparations

14. Autumn sugar syrup feeding: always after returning from heather feed sugar syrup till bees will take no more. I do not think sufficient importance is attached to heavy feeding in the autumn. I am happy to tell you that I have not lost a colony in the past 30 years.

15. This spring I have built walls to shelter hives and am considering putting polystyrene sides into sides of hives for the winter. How much does extra insulation help wintering bees?

26. Apart from 2 cases of drone laying queens we have not lost a colony in our 6 years of beekeeping. We attribute this to copious (even over) feeding with Ambrosia in the autumn with a min of 17 kg for each hive. Although not ideally sited our bees are not moved and enjoy as varied a diet as our countryside will permit. We are also isolated with no other beekeeper within worker bee range. Hopefully wider ranging drones are maintaining genetic diversity.

30. There are two of my hives that I am not treating for Varroa other than testing. I hope to develop resistance. The cost of sugar is a problem and in the north of Scotland you do not keep bees if you do not feed.

Climate/weather

5. Insulation/hive type, colder winters, impact on bee survival, interesting to see what hive design best for different sites - max/min temps, whether or not to insulate or build bee houses.

36. Weather and height above sea level have not been considered. (Anonymous - detailed location not pursued)

78. I had to dig my hives out of the snow this year.

Pesticides and disease

7. I have been keeping bees for about 50 years but have not seen so much chalk brood as this year. One hive in particular drops up to 30 per day on the Varroa board.

68. One colony found with dead bees at beginning of June. Most of the bees were outside the hive. Could this have been pesticides?

92. Diseases, pesticides, viruses spread by Varroa.

Queen problems

17. New queens (from artificial swarming) keep being superseded after they have produced apparently good brood patterns for 5 or 6 weeks.

76. Nearest feral colony about 5 miles away on other side of mountain at Amat - hence lack of genetic diversity. (Ardgay, Sutherland)

86. My belief at this time is that my losses were due to queen failure but I do not know why one queen failed and the other was failing (I killed her and united). Two queens born in 2010 have survived and their colonies are thriving. In about 40 years I have had very few losses when earlier in the questionnaire I indicated I sent floor scrapings to SASA that was from only one colony but all colonies were within 4 metres overall distance. The colony that is now strongest had a self-raised (born 2010) queen, but I was concerned for it because when the queen started laying at the end of summer, the eggs did not hatch. I was delighted therefore to find the eggs laid in the spring were good and did hatch. (etc)

Education/services for beekeepers

38. Beekeeping education

44. It might be worthwhile asking if the beekeeper has attained any qualifications in beekeeping, i.e., Basic Beemaster.

"Natural" management

29. 2 hives temporarily relocated to a friend's apiary, c 3.5 miles away, for approx 6 weeks in May/June 2010, in an attempt to introduce a measure of gene-pool diversity. Colonies are allowed to swarm (Qs not clipped) naturally with the swarms/casts being collected in bait hives located some 500 m to N of apiary.

30. There are two of my hives that I am not treating for Varroa other than testing. I hope to develop resistance. The cost of sugar is a problem and in the north of Scotland you do not keep bees if you do not feed.

Varroa incidence

2. Since Nov 2010 I found no natural mite drop, therefore decided on no treatment. This holds true today (1st June 2011). (Kinloch Rannoch)

33. Local beekeeping is at present varroa-free. As an island we feel we could keep it this way (by restricting imports of stock) with a recognition by higher authorities of this fact, and official status we could achieve this. The problem arises then of a limited gene pool for future development. (Orkney)

Varroa problems and treatment

16. I lost 9 hives in Jan. The bee inspector sent samples to SASA but nothing was found. As the hives were living before I applied oxalic acid max 50 ml per hive I can only assume that was the cause.

82. Mite resistance to pyrethroid. Getting beeekeepers to treat at the same time to stop/control re-infestation.

Economics and forage

24. Would it be interesting to find out how honey yields vary across the country and relate it to the crop foraged or is this already well known?

4 Principal Findings

4.1 Non-beekeeping respondents

Almost a third (30 out of 94) of the SBA members who responded to this survey were not beekeepers at the time the survey was carried out. However 16 of these 30 (53%) stated that they wished to become beekeepers. This includes both prospective new beekeepers and former beekeepers who were hoping to start again.

While one effect of this high proportion of non-beekeepers is that we had a smaller sample of beekeepers than we would have wished, we feel that this very fact reflects what has been reported quite widely lately, namely that it is not easy nowadays to acquire bees. One area where the SBA might do valuable work for beekeeping in Scotland would appear to be trying to facilitate the supply of local bees to those wishing to undertake beekeeping.

4.2 Races of bees being kept

Of the 64 beekeepers in our sample, 13 said that they did not know what race of bee they were keeping and 30 stated they were keeping bees of a local unnamed strain. Thus only 21 of the 64 (33%) claimed to be keeping only one or more particular named races. As in 2010 however, the most frequently claimed race was *Apis mellifera mellifera* (the Northern European dark bee), claimed also by 21 of the 64 or another 33% of our sample. It can of course be inferred from this that several respondents were keeping more than one race.

4.3 Colony Losses

As in 2010, summer losses of colonies were at a low level (15 out of 205 colonies, or 7.3%). The most usual cause cited for these losses was queen problems, nothing else featuring often enough to be worth mentioning.

Winter losses were at a much higher level. The over-all winter loss rate reported was 21.8% (55 out of 272 colonies), which is considerably lower than the rate of 27.3% cited in the 2010 survey report. This is interesting in that the winter of 2010–11 was a very harsh one in Scotland, but the spring, when it came, was quite good. This may have been an important factor.

Starvation (27% of winter losses) followed by queen problems (20% of losses) were the principal causes of winter loss reported. The concern of past years of "Colony Collapse Disorder" or our Scottish "Mary Celeste Syndrome" or what COLOSS refers to as "Colony Depopulation Syndrome", where a hive with plenty of stores is found abandoned and with no dead bees, played a very small role this winter, with only 3 cases reported — 5% of all winter losses reported.

Apart from causes of loss reported by those responding, we explored external factors which might be associated with differences in winter loss rate. The first was geographical position in Scotland. Although there were differences found when the data were split into a North, a Central and a South region, these differences were not sufficiently marked as to be significant. However when the country was split into the East versus the West, the difference found was highly significant with 50 out of 179 (28%) colonies lost in the East and only 5 out of 73 (7%) in the West.

Since much more Oil Seed Rape (OSR) is grown in the East than in the West, and as suspicions have been raised about the possible harmful effects of neonicotinoid seed dressings, which are now almost universally used on this crop in Scotland, we wondered whether foraging on OSR might also be associated with a higher winter loss rate of colonies. We found this was in fact the case, with 24 out of 80 colonies lost (30%) from those reported as foraging on OSR, whereas only 25 out of 172 of the colonies reported as not foraging on OSR were lost (15%). This difference is also statistically significant.

4.4 *Varroa*

A fairly high proportion of those responding claimed to believe that their stocks were not infested with *Varroa*. However since many of these reports were from areas where *Varroa* has long been present, we have rather discounted this. Much more interesting is that of 13 beekeepers who claimed to believe their bees did not have *Varroa*, as many as 5 (38%) were not taking any measures to detect the parasite.

Moreover, of the remaining 51 beekeepers, as many as 12 were not monitoring their level of infestation.

Finally 8 beekeepers (12.5% of our sample of 64) did not carry out any treatment for *Varroa* over the 17 months covered by the survey.

Even allowing for the possibility that some of the non-treating beekeepers may have good grounds for believing their bees are not infested, these are all worryingly high proportions.

The use of Open Mesh Floors as a control measure for *Varroa* was reported by 43 of the 57 beekeepers (75%) this year who answered the question. This is a higher proportion than in 2010 when only 42% reported using them.

4.5 Management issues

4.5.1 Migratory beekeeping

The finding of the 2010 survey that a very small proportion of SBA beekeepers were practising any form of migratory beekeeping was repeated in this survey. Only 8 of our 64 beekeeping respondents (12.5%) moved any colonies to take advantage of a particular honey flow. Perhaps the reluctance of beekeepers to do this may be a combination of the associated transport costs these days, and also a reasonable caution about exposing colonies to disease when they are moved, particularly when reports of outbreaks of both European and American Foulbrood continue to be received.

4.5.2 Comb Replacement

Beekeepers are being encouraged to replace old combs regularly as a hygiene measure, and to prevent the build-up of harmful pathogens such as those causing Chalk Brood and Nosema diseases.

Of our 64 beekeeping respondents, 10 (16%) stated that they had replaced no combs in the current year. Possibly these represent a shrinking minority, but it is still rather a high proportion failing to conform with modern recommended practice.

4.5.3 Supplementary feeding

As many as 11% of beekeepers responding had undertaken no autumn feeding in the autumn of 2010. This may mean that in some cases all colonies were well provisioned with their own stores.

Quantities of syrup fed per colony reported at each feeding season (whether sugar syrup, or special bee feeding syrup or a combination of both) were also highly variable, from a minimum of 0.36 litres per colony to a maximum of 21.25 litres per colony in the autummn of 2010 for example

In the light of the high incidence of starvation as a cause of winter loss, these facts suggest that this is an area where many Scottish beekeepers need to be more attentive and consistent in their practice.

References

[1] http://www.scottishbeekeepers.org.uk/PracticalBeekeeping/Research/VarroaMapping.aspx [last accessed November 2012].

[2] Gray, A., Mason, K., Peterson, M., and Teale, A. (2007). Scottish Beekeepers' Association Survey of Members 2006. Report on the Survey.

Appendix: questionnaire used

SBA Survey 2011
Questionnaire

Contact details or anonymous response

Unless you indicate you are willing to be contacted by the SBA for possible follow-up of your answers, your responses will remain anonymous. If you are willing to be contacted, **please give your contact details here:–**

Name .....

Address .....

.....

.....

Phone .....

email .....

OR

I wish my response to this questionnaire to remain anonymous.

☐

Tick box if anonymous return desired.

1. Preliminary questions

1. Were you keeping bees on April 1st 2010?

   Yes/No

   Please ring one.

2. If you answered 'No' to question 1:–

   (a) are you interested in becoming a beekeeper?

   Yes/No

   Please ring one.

   (b) Have you previously been a beekeeper?

   Yes/No

   Please ring one.

3. If you answered 'Yes' to question 1, for how many years (approximately) have you been keeping bees?

   Please insert number.

If you answered 'No' to Question 1, this is the end of your questionnaire. Thank you for your participation. Please return the Questionnaire as instructed.

If you answered 'Yes to Question 1, please continue with the questionnaire.

SECTIONS FOR PRACTISING BEEKEEPERS

2. Location, scale and details of your beekeeping activities and of colony losses

4. For how many separate permanent apiaries do you have primary responsibility?

Please insert number in the box above.

Please answer the questions below about all the stocks of bees kept in the apiaries you included in your calculation above.

5. Do you keep all your bees within 10 miles of where you live?

Yes/No

Please ring one.

If 'No', please describe the approximate location(s) of your apiaries
(e.g., "North-west of Glasgow — 1 apiary" if you live in Airdrie;
or "In west Aberdeenshire — 2 apiaries: south of Inverness — 1 apiary" etc.

. . . . . .
. . . . . .
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2.1 Changes in colony numbers (including colony losses)

Where numbers of colonies lost are asked for in the following questions, please consider a colony as lost if it is dead, or reduced to a few hundred bees, or alive but with unsolvable queen problems.

A Summer 2010

6. In total how many production colonies (i.e., queen-right colonies strong enough to yield a honey harvest or to provide a pollination service in season) did you have on April 1st 2010?

Please insert the number.

7. During the summer of 2010 (from April 1st till October 1st) what pattern of colony losses did you have? Please give the total number lost in each way described below, and the overall total of losses.

Pattern/cause of loss	**Number lost**
Starvation (including isolation starvation*)	
Death in a well-provisioned hive without dead bees in the hive or apiary	
Queen problems (queenlessness or drone-laying queen)	
Effects of *Varroa* infestation	
Other (specify):	
Unknown but different from any of the above	
Over-all total losses	

* isolation starvation, where bees are isolated from remaining stores and cannot reach them because of cold weather.

8. Did you buy, sell, unite or split colonies during the summer of 2010 (from April 1st to October 1st)?

Yes/No

Please ring one.

If 'Yes' what changes in numbers of production colonies did you have

by buying colonies or making splits?	+
by selling or giving colonies away?	−
by uniting or merging colonies?	−

B Winter 2010 – 11

9. In total how many production colonies (i.e., queen-right colonies strong enough to yield a honey harvest or to provide a pollination service in season) did you have on October 1st 2010?

Please insert the number.

10. During the winter of 2010–11 (from October 1st 2010 till April 1st 2011) what pattern of colony losses did you have? Please give the total number lost in each way described below, and the overall total of losses.

Pattern/cause of loss	**Number lost**
Starvation (including isolation starvation)	
Death in a well-provisioned hive without dead bees in the hive or apiary	
Queen problems (queenlessness or drone-laying queen)	
Effects of *Varroa* infestation	
Other (specify):	
Unknown but different from any of the above	
Over-all total losses	

11. Did you buy, sell, unite or split colonies during the winter of 2010–11 (from October 1st 2010 to April 1st 2011)?

Yes/No

Please ring one.

If 'Yes' what changes in numbers of production colonies did you have

by buying colonies or making splits?	+
by selling or giving colonies away?	−
by uniting or merging colonies?	−

12. How many production colonies did you have on April 1st 2011?

Please insert the number.

3. Questions on races of bees being kept

Various races of the Western Honeybee (Apis mellifera) are kept by beekeepers in Britain. Some beekeepers specialise in specific races, though many accept the local strains of bees prevalent in their own areas, without any particular effort to maintain a pure race. It is believed that some races may be more resistant than others to the threats to bees which are appearing nowadays.

13. Which specific race of bees do you know with some confidence is the principal race that you are keeping?

Please tick the relevant box.

Don't know	
Local strain of no named type	
A. mellifera mellifera (the Northern European dark bee)	
A. mellifera carnica (the Carniolan bee)	
A. mellifera ligustica (the Italian bee)	
The "Buckfast" strain	
Any other named race	Please specify:

4. Queens and their replacement

14. What is the origin of the majority of your queens?

Please tick one only or add required particulars.

Reared by the colony being re-queened	
Reared from one of your own selected queens	
Acquired from a queen breeder in Scotland	
Acquired from a queen breeder elsewhere in the UK	
Acquired from a source outside the UK	Specify country of origin:
Other	Specify:

15. For how many of your production colonies did you have to provide new queens because of queen problems between 1st April 2010 and 1st April 2011?

Please do not include normal re-queening (e.g., when the queen is old) in your answer.

Please insert number.

5. Varroa and its management

16. (a) Do you believe some at least of your colonies are infested with the *Varroa* mite?

Yes/No

Please ring one.

Only if you answered "No" to question (a) please answer question (b).

(b) What steps (if any) did you take during the past year to detect any infestation with *Varroa*?

Steps taken	**Please tick or leave blank**
Send floor scrapings to SASA	
Other (specify)	
None	

Only if you answered "Yes" to question (a) please answer questions (c)–(d).

(c) Do you monitor the levels of *Varroa* in your colonies?

Yes/No

Please ring one.

If 'Yes', please tick all the methods used:–

Count mite drop ☐

Uncapping fork ☐

Other (specify) ..... ☐

(d) In which year did you first find any of your colonies of bees infested with *Varroa*?

Please tick the relevant box.

Before 2010	
In 2010	
In 2011	
Varroa not yet detected	

17. Do you use open mesh floors on most of your hives as a measure against *Varroa*?

Yes/No

Please ring one.

18. Using which treatments and in which months have you treated your colonies for *Varroa* mites during the period detailed below?

Possible treatments which have been used include: (1) Pyrethroid strips (Apistan/Bayvarol) (licensed veterinary medicines); (2) Apiguard (licensed veterinary medicine); (3) Thymol-soaked pad; (4) Oxalic acid trickle method; (5) Oxalic acid sublimation method; (6) Formic acid; (7) Dusting with icing sugar; (8) Drone brood removal; (9) Queen trapping followed by brood destruction.

Year	**Month**	**Treatment(s) applied**
2009	November	
	December	
2010	January	
	February	
	March	
	April	
	May	
	June	
	July	
	August	
	September	
	October	
	November	
	December	
2011	January	
	February	
	March	

6. Provision of pollination services, migratory beekeeping and forage

19. How many of your colonies were contracted commercially for pollination services last year?

Please insert number.

20. How many times were your colonies contracted commercially for pollination services last year?

Please insert number of times.

21. How many of your colonies were moved for honey production last year?

Please insert number.

In the next question you are asked about the number of movements of your colonies. Please count travelling to the honey flow and returning as in total one movement.

22. How many times were any of your colonies moved for honey production last year?

Please insert number.

23. Approximately how many miles have your colonies been moved last year on each double journey?

Occasion	**Distance there and back — miles**
First move	
Second move	
Third move	

24. Have your colonies foraged last year on:–

Rape	
Sweetcorn/maize	
Sunflower	
Bell heather	
Ling heather	
Lime	
Dandelion	
Willow	
Bee Pastures	
Honeydew	
Other (first)	Specify
Other (second	Specify

25. Is it possible that honeydew honey remained in the hives during the winter?

Yes/No

Please ring one.

7. Management issues

26. Approximately what percentage of combs did you replace in the majority of your production colonies last year?

Please insert approximate percentage.

27. What feeding of your bees did you undertake in the past year?

Please indicate whether a particular feed was used or not, and, if you can, insert the total quantity used (approx. litres or kg) or leave blank if not used.

Type of feed	**Season**							
	Summer 2010		**Autumn 2010**		**Winter 2010–11**		**Spring 2011**	
	Used Y or N	Quantity l or kg	Used Y or N	Quantity l or kg	Used Y or N	Quantity l or kg	Used Y or N	Quantity l or kg
Sugar syrup								
Bee feeding syrup								
Candy/fondant								
Honey								
Pollen substitute								
Other: specify								

28. Have your colonies suffered any disturbance by:-

Pest	**"Y" or "N"**
Ants	
Asian Hornets	
Badgers	
Mice	
Small hive beetle	
Woodpeckers	
Fire	
Vandalism	
Theft	
Other (specify)	

8. In conclusion

Most of the questions in this survey have addressed the issues which are currently being investigated by the international COLOSS organisation, which is studying the beekeeping situation in 49 countries, mainly in Europe. This is the second year we are making a Scottish contribution to that programme.

If there are other beekeeping issues which you feel are important, but which have not been addressed above, then please fill in your thoughts below, and we shall use them to help to form the structure of any future investigations.

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Thank you for your help.

We hope to report the results of this survey in a future issue of The Scottish Beekeeper. Your data will also be contributed in an anonymous way to the international COLOSS survey.

Be assured that your identity will not be revealed in any report of this survey.