



Honeybee Husbandry Survey Winter 08/09

An AFBI research report

About the Agri-food and Biosciences Institute (www.afbini.gov.uk)

The Agri-Food & Biosciences Institute (AFBI) was created on 1st April 2006 as an amalgamation of the Department of Agriculture and Rural Development (DARD) Science Service (including the former Queen's University Belfast's School of Agriculture and Food Science) and the Agricultural Research Institute of Northern Ireland (ARINI). Based at seven sites around Northern Ireland and employing approximately 700 staff, AFBI carries out research and development, statutory, analytical, and diagnostic testing functions for DARD and other Government departments, public bodies and commercial companies.

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Declaration: We declare that this work was done under our supervision according to the procedures outlined and that the findings of this report are a true interpretation of the results obtained.

Acknowledgements: We gratefully acknowledge the assistance of Mr Paul J. Moore, Mr Thomas Williamson, Dr Mike Brown (National Bee Unit FERA), DARD bee inspectorate, the Ulster Beekeepers' Association, the Institute of Northern Ireland Beekeepers and the many beekeepers who gave up their time to fill in our questionnaire.

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Summary

A questionnaire-based survey of beekeeping husbandry issues was conducted in spring 2009. Ninety-four responses were received from beekeepers. The average experience of beekeepers was almost 15 years but the mode (or most typical response) was 2 years. The majority of beekeepers (77%) kept their colonies in one locality and did not move them. Most beekeepers are in Down and Antrim (66% of responses) and typically, the beekeepers surveyed had 3-5 hives.

The overall average colony loss during the winter of 2008/2009 for Northern Ireland was 23%, although 43% of beekeepers reported no losses. The main perceived cause of colony loss was queen problems. Twenty percent of beekeepers imported bees, mainly from GB and RoI. Eighty-two percent of beekeepers monitored for *Varroa* and 97% treated for this parasitic mite. The commonest treatment for *Varroa* was Bayvarol applied in the autumn, with the use of open mesh floors throughout the year. There is no evidence, to date, of *Varroa* pyrethroid resistance. Nineteen percent of beekeepers treat for *Nosema*, mainly by using Fumidil-B in the autumn. Eighty percent practice comb replacement with a new foundation in the spring. The prevalence of *Nosema* was estimated at 22% from beekeepers' perceptions. Laboratory diagnosis confirmed that 3% of beekeepers had *Nosema*. For acarine disease, laboratory diagnosis confirmed that 6% of beekeepers had problems with this mite. The figures for laboratory-diagnosed disease prevalence are likely underestimates, as most beekeepers did not laboratory confirm colony losses. The majority of beekeepers can recognise the main pests and diseases of honeybees.

Method

The honeybee husbandry survey (Appendix) was sent out by paper copy including stamp-addressed envelopes and was also available electronically and online on the AFBI website (www.afbini.gov.uk). A total of 450 paper copies were sent to the two Northern Ireland beekeeping organisations, namely the Ulster Beekeepers' Association and the Institute of Northern Ireland Beekeepers. Paper copies were sent out in March, with a closing date of May, although copies continued to be received and processed into June.

Results

There were 94 responses with 74 paper returns and the rest online. A number of duplicate entries were received (paper and online returns from the same beekeeper). Where these differed, precedence was given to the paper copy. Two returns were not used in the analysis as they were from former beekeepers who did not currently maintain colonies (although this information is valued and will be kept on file).

Q. 1. How many years have you kept bees?

Beekeeping experience ranged from 0 to 65 years. The average experience was 14.8 years with the mode = 2 years (12% of beekeepers) (Figure 1). The majority of beekeepers who responded to the survey (52%) had less than 10 years' experience.



Figure 1. Frequency distribution of the amount of beekeeper experience found in the survey.

Q. 2. Do you move your honeybee colonies e.g. migration to heather or apple pollination?

Yes = 22 (23%), No = 72 (77%)

Q. 3. Where do you keep your bees for the majority of the season? (e.g. North Down, West Tyrone)

Most responses were from beekeepers who kept their bees in counties Down, Antrim and Londonderry (Table 1). This is probably a partial reflection of the distribution of beekeepers in Northern Ireland but there were some problems with disseminating the survey. For example, the Fermanagh Beekeepers' Association did contact the survey to say that there been problems obtaining paper copies and internet access to the online questionnaire was not available to all.

Table 1. The responses received from beekeepers in different regions

County	Responses
Antrim	29
Armagh	5
Donegal	1
Down	33
Down and Antrim	2
Dublin	1
Fermanagh	1
Londonderry	12
Monaghan	1
Tyrone	9

Q. 4. Please indicate the number of live colonies you had in: October 2008, April 2009

The overall average colony loss for Northern Ireland was 23% (Table 2). This varied between regions. If we consider the two main regions, Antrim had losses of 28% whereas Down had losses of 18%. However, 40 beekeepers (43%) had no colony losses.

Table 2. Colony losses during the winter of 2008/2009 per region

Region	Live October 08	Live April 09	% loss	Average colonies (Oct 08)
All respondents	732	572	22	7.8
Ulster (excl. Dublin)	683	526	23	7.3
Antrim	184	133	28	6.3
Down	281	230	18	8.5
Londonderry	73	61	16	6.1
Tyrone	52	31	40	5.8

The number of colonies ranged from 1 to 49. Overall mean was 7.8 colonies per beekeeper in October, dropping to 6.1 in April. The mode in October was 3 colonies (representing 16% of beekeepers), dropping to one colony (17% of beekeepers) in April. In general though, most beekeepers maintained 3-5 colonies (Table 3).

Table 3. The numbers of colonies, divided into categories, maintained by individual beekeepers

No. of beekeepers	No. of colonies maintained					
	0	1 - 2	3 - 5	6 - 10	11 - 20	20+
October	0	18	32	23	16	5
April	4	24	28	23	13	2

Q. 5. If applicable, what do you consider was the cause of your losses? (Disease, Starvation, Weather, Queen problems, Other)

Forty beekeepers (representing 43% of the total) reported no losses (Table 4). Of those who did report losses (Table 5), the main problem was related to the Queen (53%) with diseases and starvation of equal standing thereafter (18%).

Table 4. Main perceived reason for losses

Perceived reason for losses	Count of beekeepers	%
Disease	8	9
Not Applicable	40	43
Other	6	7
Queen Problems	27	29
Starvation	9	10
Weather	2	2

Table 5. Reason for losses amongst beekeepers directly affected

Perceived reason for losses	Count of beekeepers	%
Disease	11	18
Queen Problems	32	53
Starvation	11	18
Weather	5	8
Beekeeper's health	1	2

Q. 6. Were any of the remaining bees from failed colonies submitted to AFBI (Newforge Lane) for diagnosis, before or after failure?

Yes = 25 (27%), No = 69 (73%)

The answer above may reflect a general submission of bees to AFBI, as in the database there is not a substantial link-up between loss of colonies and submission of samples. Twelve samples were submitted from beekeepers who had no losses.

Q. 7. Do any of your colonies contain imported queens?

Yes = 19 (20%), No = 75 (80%)

Twenty percent of beekeepers imported bees, mainly from GB and RoI (Table 6).

Table 6. Source and numbers of bees imported into Northern Ireland

Source of bees	Count of beekeepers	Total colonies	EU countries
RoI	7	9	
GB	8	13	
EU	5	10	Greece, Slovenia, Denmark
Non EU	0	0	

*One beekeeper imported from both RoI and EU

Q. 8. Do you monitor the levels of *Varroa* in your colonies?

Yes = 77 (82%), No = 17 (18%)

Overall, the most common method of assessing *Varroa* was by counting mite drop on a floor insert (49%), followed by visual inspection (33%) and uncapping (18%). Most beekeepers (67%) used more than one method to assess *Varroa*.

There was a clear seasonal pattern to *Varroa* monitoring, with activity peaking in the summer months (Figure 2).

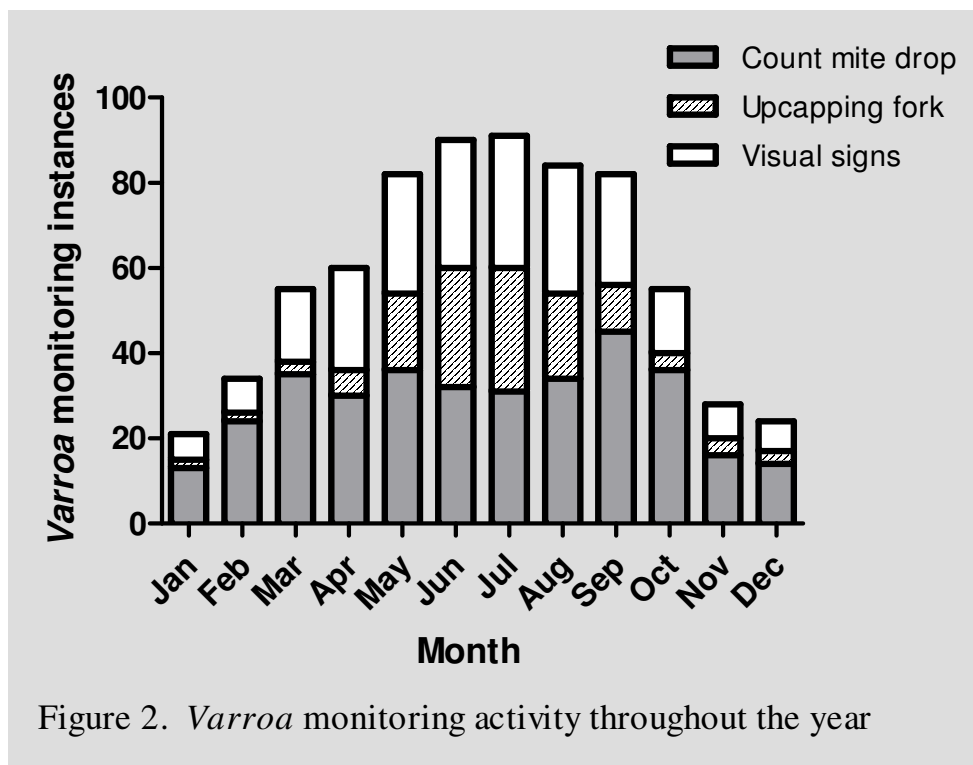


Figure 2. *Varroa* monitoring activity throughout the year

Q. 9. Do you treat for *Varroa*?

Yes = 91 (97%), No = 3 (3%)

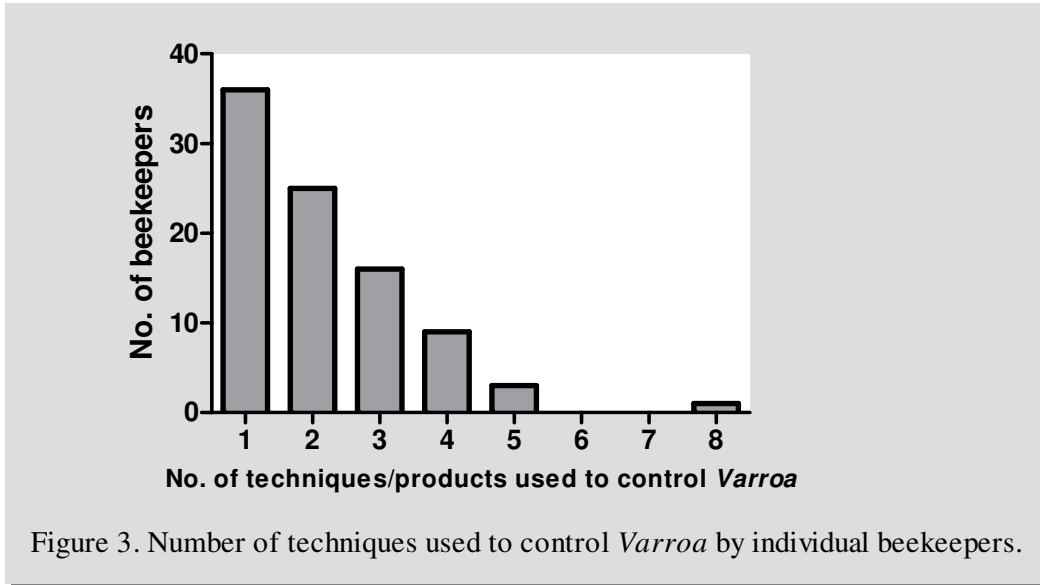
Ninety respondents provided details of *Varroa* treatment. The commonest treatment for *Varroa* was the use Bayvarol (used by 44% of beekeepers), followed by open mesh floors (42%), Apistan (34%), oxalic acid (22%), icing sugar/ground rice (19%) and drone comb removal (19%). For the oxalic acid treatments, 9% of beekeepers used pre-mixed and 13% self mixed.

Table 7. Treatments used against *Varroa*, expressed as the number of beekeepers using each treatment, as well as the percentage of total usage throughout the year

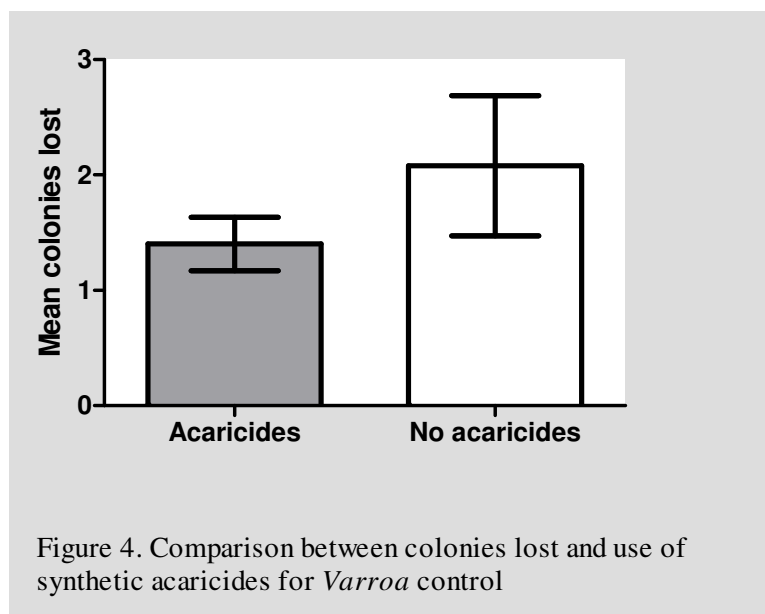
Treatments against <i>Varroa</i>	Count of beekeepers (<i>n</i> = 90)	% of beekeepers	Total usage (%)
Apiguard	13	14	3
Apistan	31	34	7
Apivar	2	2	<1%
Bayvarol	40	44	9
Bee vital hive clean	1	<1%	<1%
Checkmite	1	<1%	1
Drone comb removal	17	19	5
Dusting icing sugar /ground rice	17	19	6
Formic acid	5	6	1
Lactic acid	1	<1%	<1%
Open mesh floors	38	42	59
Other*	2	2	2
Oxalic acid	20	22	4
Thymol crystals	5	6	2

*Other treatments were herb thyme (*Thymus vulgaris*) and unspecified

The majority of beekeepers (60%) used more than one method to control *Varroa* (Figure 3). Those who used just one method (40%) mainly used the synthetic pyrethroid treatments (e.g. Bayvarol or Apistan), those who used two techniques tended to combine the pyrethroids with open mesh floors. Generally, for three treatments, beekeepers added drone brood removal. Beekeepers using four or more techniques tended to reduce their usage of synthetic pyrethroids.



A preliminary comparison was made between colonies lost and use of synthetic acaricides for *Varroa* control. There was no significant difference in the number of colonies lost and the use or not of synthetic acaricides (Figure 4). However, this was not a rigorous test due to the considerable variability in the data (e.g. different sample sizes, different numbers of colonies maintained by beekeepers etc.). The influence of *Varroa* management on colony loss does remain an area of possible further investigation.



Seasonality of *Varroa* treatments

Open mesh floors were a permanent feature of the hive and therefore used in every month. The synthetic acaricide and thymol treatments were mainly used at the end of summer/autumn with peak usage in September, particularly of Bayvarol and Apistan (Figure 4). Dusting of icing sugar/ground rice was used almost year-round with the exception of November. Drone comb removal took place in the summer months, particularly June and July. The use of acids (oxalic, lactic and formic) was mainly in the late autumn or winter months.

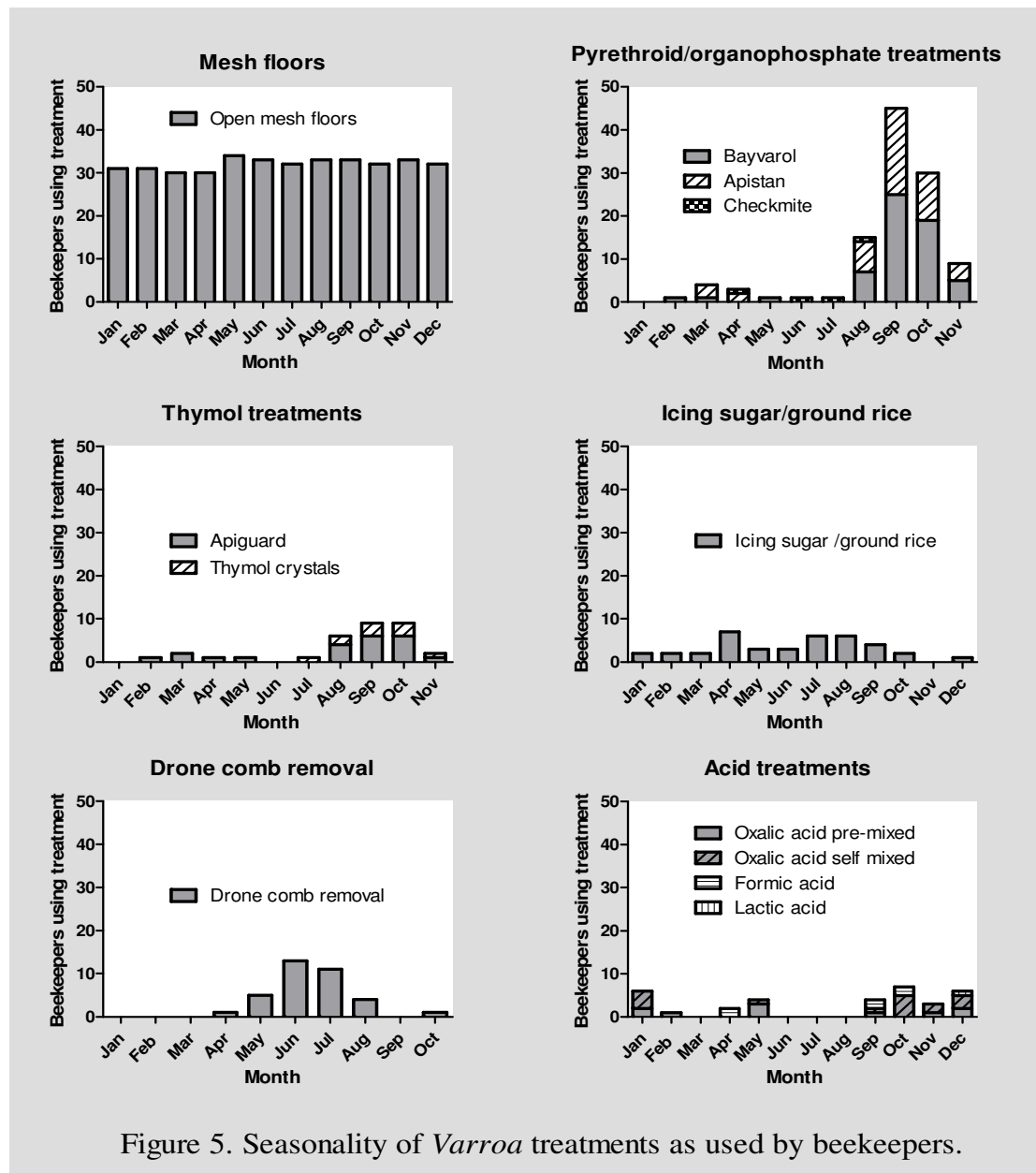


Figure 5. Seasonality of *Varroa* treatments as used by beekeepers.

Q. 10. Have you ever submitted bees to a laboratory for *Varroa* pyrethroid resistance testing or conducted such a test yourself?

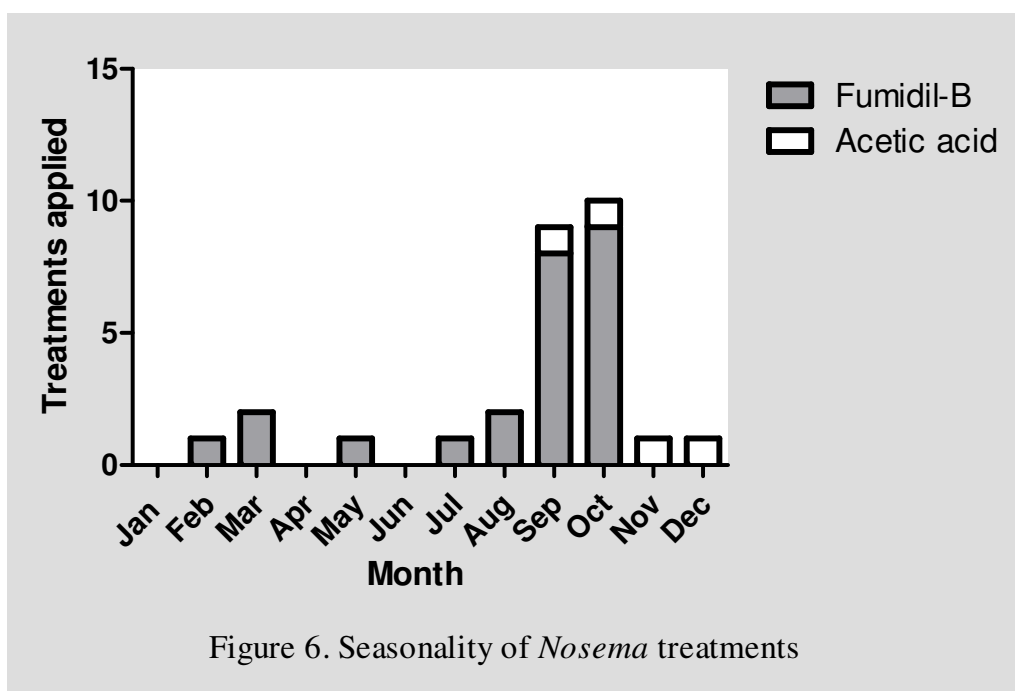
Yes = 11 (12%), No = 81 (88%) ($n = 92$, 2 blanks)

No resistance has been detected in Northern Ireland as yet.

Q. 11. Do you treat for *Nosema*?

Yes = 18 (19%), No = 75 (81%) ($n = 93$, 1 blank)

Two treatments were used against *Nosema*. Sixteen beekeepers used Fumidil-B, one used acetic acid and one used an unspecified 'other'. *Nosema* treatments were mainly applied in September and October (Figure 5).



Q. 12. Do you practice comb replacement with new foundation during the spring?

Yes = 74 (80%), No = 19 (20%) ($n = 93$, 1 blank)

Q.13. In your opinion, did your bees suffer with *Nosema* between May 2008 and April 2009?

Yes = 20 (22%), No = 72 (78%) ($n = 92$, 2 blanks)

Of the 20 beekeepers who felt that their bees suffered with *Nosema*, two treated for *Nosema* (10%). For the 72 who considered that they did not have *Nosema*, 15 (21%) had treated for the disease. However, these figures were not statistically different.

Q.14. Were any of your honeybee colonies diagnosed with either *Nosema* or acarine (tracheal mite) between May 2008 and April 2009 (i.e. microscopy/molecular diagnosis)?

Nosema affected 3% of beekeepers and acarine 6%. However, the majority of beekeepers did not have samples tested for these diseases (Table 8)

Table 8. Prevalence of *Nosema* and acarine disease amongst Northern Irish beekeepers

Disease	Positive	Negative	Not tested
<u><i>Nosema</i></u>	3 (3%)	15 (16%)	76 (81%)
<u>Acarine</u>	6 (6%)	12 (13%)	76 (81%)

Q. 15. Did you feed your colonies between May 2008 and April 2009?

Yes = 89 (96%), No = 4 (4%) (n = 93, 1 blank)

The most common feed for bees was sugar syrup used by 94% of beekeepers and candy/fondant (used by 72%) (Table 9). Most beekeepers used two methods of feeding (Figure 6). This consisted of sugar/syrup in September/October and again in March/April, with candy/fondant through the winter into spring (December, January, February and March) (Figure 7). Of the beekeepers who used one method of feeding, sugar syrup was mainly used (22 out of 25).

Table 9. Feeding methods used by beekeepers in Northern Ireland

Feed for bees	Count of beekeepers (n = 88, 1 blank)	% of beekeepers	Total usage (%)
Ambrosia	2	2	1
Pollen/Patty feed product	6	7	2
Candy/Fondant	63	72	38
Feed supplement	1*	1	<1%
Honey	6	7	3
Sugar Syrup	83	94	54

*Omnivite in syrup

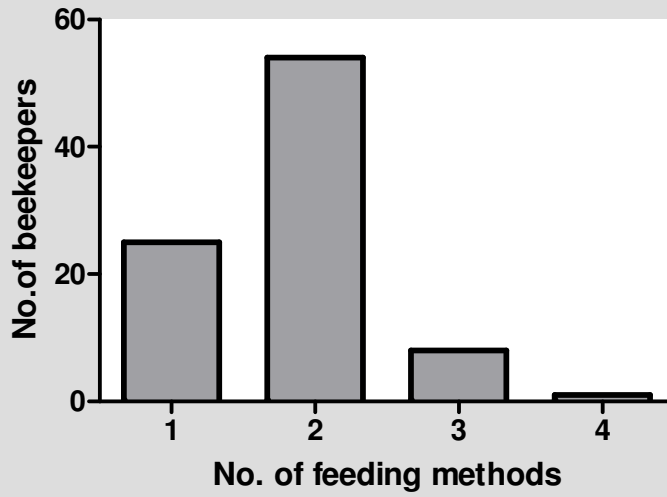


Figure 7. The number of different feeding methods used by beekeepers

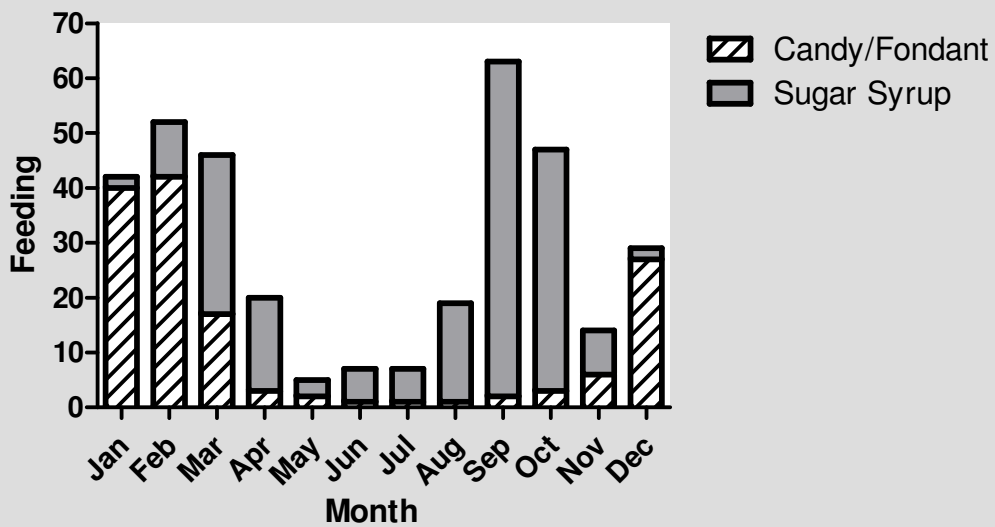


Figure 8. Seasonality of honeybee feeding

Q. 16. Can you diagnose or access help on the following bee pests and diseases?

The majority of beekeepers can recognise or access help on the main pests and diseases of honeybees (Table 10). *Varroa* was the most readily identifiable pest. Sac brood, acarine disease and European foul brood were the least recognised diseases.

Table 10. The ability of beekeepers to recognise or access help on the main bee diseases

Disease	Can you diagnose or access help on the following bee pests and diseases?					
	Yes			No		
	Count	%		Count	%	
Acarine	74	79		20	21	
<i>Nosema</i>	77	82		17	18	
<i>Varroa</i>	89	95		5	5	
Chalk brood	86	91		8	9	
Sac brood	65	69		29	31	
European foul brood	74	79		20	21	
American foul brood	77	82		17	18	

APPENDIX. Original survey questionnaire



Please return the completed form to:
Honeybee Husbandry Survey
Laboratory F25,
Applied Plant Science & Biometrics Division,
Agri-Food & Biosciences Institute,
Newforge Lane,
Belfast
BT9 5PX

Honey bee husbandry survey 2009

This is a survey to obtain information on current honey bee husbandry practices in Northern Ireland and to provide baseline data on bee health. The survey is based-on and in conjunction-with a national survey being conducted by the National Bee Unit at the Central Science Laboratory, York. The survey takes approximately 5 minutes to complete. All your answers are strictly confidential and will **only** be used for the purposes of this study.

Please return the form using the attached envelope by 1 May 2009

Provision of your name and address is voluntary. There is no need to write your name anywhere on this questionnaire, if you so wish.

VOLUNTARY	Name		
	Address		
	Postcode		
	Telephone		
	E-mail		

Q. 1. How many years have you kept bees?

_____years

Q. 2. Do you move your honeybee colonies e.g. migration to heather or apple pollination?

Tick your response

___ Yes ___ No

Q. 3. Where do you keep your bees for the majority of the season? (e.g. North Down, West Tyrone)

Q. 4. Please indicate the number of **live** colonies you had in:

Oct 2008 _____ April 2009 _____

Q. 5. **If applicable**, what do you consider was the cause of your losses?

Tick your response

___ Disease ___ Starvation ___ Weather ___ Queen problems

_____ Other

Q. 6. Were any of the remaining bees from failed colonies submitted to AFBI (Newforge Lane) for diagnosis, before or after failure?

Tick your response

___ Yes ___ No

Q. 7. Do any of your colonies contain imported queens?

Tick your response

___ Yes ___ No

If YES please state how many colonies and from which countries:

Republic of Ireland		*Please specify
GB		
EU countries*		
Non-EU countries*		

Q. 8. Do you monitor the levels of *Varroa* in your colonies?

Tick your response

___ Yes ___ No

If YES, please tick below to indicate monitoring method/timing

Monitoring Method	2008								2009			
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Count mite drop on floor insert												
Uncapping fork												
Visual signs on comb/bees												
Other (please give details)												

Q. 9. Do you treat for *Varroa*?

Tick your response

___ Yes ___ No

If YES, please tick to indicate treatment type and timing

Treatment Type	2008								2009			
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Apistan*												
Apiguard*												
Apivar												
Bayvarol*												
Bee Vital Hive Clean												
CheckMite+												
Drone comb removal*												
Dusting icing sugar/Ground rice												
Exomite apis												
Formic acid												
Lactic acid												
Open Mesh floor*												
Oxalic acid (pre mixed)												
Oxalic acid (self mixed)												
Perizin												
Thymol crystals												
Thymomite												
Other (please give details)												

* Indicates approved for use in the UK

Q. 10. Have you ever submitted bees to a laboratory for *Varroa* pyrethroid resistance testing or conducted such a test yourself?

Tick your response

___ Yes ___ No

If YES please tick the result of the Varroa pyrethroid resistance test

___ Resistant ___ Not resistant

Q. 11. Do you treat for *Nosema*?

Tick your response

___ Yes ___ No

If YES, please tick below to indicate the treatment dates

Treatment Type	2008								2009			
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Fumidil-B												
Other (please give details)												

Q. 12. Do you practice comb replacement with new foundation during the spring?

Tick your response

___ Yes ___ No

Q.13. In your opinion, did your bees suffer with *Nosema* between May 2008 and April 2009?

Tick your response

___ Yes ___ No

Q.14. Were any of your honeybee colonies diagnosed with either *Nosema* or acarine (tracheal mite) between May 2008 and April 2009 (i.e. microscopy/molecular diagnosis)?

Tick a single response for each disease

Nosema: ___ Positive ___ Negative ___ Not tested

Acarine: ___ Positive ___ Negative ___ Not tested

Q. 15. Did you feed your colonies between May 2008 and April 2009?

Tick your response

___ Yes ___ No

If YES, please tick below to indicate feed timings and product choice:

Feed Type	2008								2009			
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Ambrosia												
Pollen/Patty feed product												
Candy/Fondant												
Feed supplement (please indicate e.g. Vitafeed)												
Honey												
Sugar Syrup												
Other (please give details)												

Q. 16. Can you diagnose or access help on the following bee pests and diseases?

Please tick

a) Acarine

b) Nosema

c) Varroa

d) Chalk brood

e) Sac brood

f) European foul brood

g) American foul brood

Any other comments or notes?

Please use the attached envelope to return the completed form by 1 May 2009 to:

**Honeybee Husbandry Survey
Laboratory F25,
Applied Plant Science & Biometrics Division,
Agri-Food & Biosciences Institute,
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BT9 5PX**