



Honeybee Husbandry Survey Winter 09/10

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 and the Agricultural Research Institute of Northern Ireland (ARINI). Based at seven sites around Northern Ireland, AFBI carries out research and development, statutory, analytical, and diagnostic testing functions for DARD and other Government departments, public bodies and commercial companies.

Report Authors: Archie K. Murchie & Sam Clawson

Project managed by: Archie K. Murchie & Sam Clawson

Other Staff involved: Stephen Martin & Mark Browne (website development)

Period of investigation: February to June 2010

Date of report: December 2010

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 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.

Archie K. Murchie

Sam Clawson

Contents	Page
Summary	3
Method	3
Results	3
Q. 1. How many years have you kept bees?	4
Q. 2. Do you move your honeybee colonies?	4
Q. 3. In which county do you keep your bees for the majority of the season?	4
Q. 4. Please indicate the number of full-sized colonies and the number of nuclei that you had in: October 2009, April 2010	5
Q. 5. If applicable, what do you consider was the cause of your losses?	6
Q. 6. Were any of the remaining bees from failed colonies submitted to AFBI (Newforge Lane) for diagnosis, before or after failure?	7
Q. 7. Do any of your colonies contain imported queens?	7
Q. 8. Do you monitor the levels of <i>Varroa</i> in your colonies?	7
Q. 9. Do you treat for <i>Varroa</i> ?	8
Seasonality of <i>Varroa</i> treatments	10
Q. 10. Have you ever submitted bees to a laboratory for <i>Varroa</i> pyrethroid resistance testing or conducted such a test yourself?	11
Q. 11. Do you treat for <i>Nosema</i> ?	11
Q. 12. Do you practice full or partial comb replacement with new foundation during the spring?	12
Q.13. In your opinion, did any of your colonies or nucs suffer with <i>Nosema</i> or acarine (tracheal mite) between May 2009 and April 2010?	12
Q.14. Were any of your honeybee colonies diagnosed with either <i>Nosema</i> or acarine (tracheal mite) between May 2009 and April 2010 (i.e. microscopy/molecular diagnosis)?	12
Q. 15. Did you feed your colonies between May 2009 and April 2010?	13
Q. 16. Can you diagnose when bees have the following pests and diseases?	14
 COLOSS QUESTIONS	
Q. 1. How many production colonies did you have on 1st October 2009?	15
Q. 2. How many production colonies did you have on 1st April 2010?	15
Q. 3. How many splits or increases did you make or buy between 1st October 2009 and 1st April 2010?	15
Q. 4. How many of your colonies or splits did you remove (sell or give away) between 1st October 2009 and 1st April 2010?	15
APPENDIX. Original survey questionnaire	16

Summary

This is the second survey of beekeeping husbandry issues in Northern Ireland. A questionnaire survey was sent out hardcopy to beekeeping associations and an online copy made available on the AFBI website. One-hundred-and-thirty-four beekeepers responded. In addition, a separate set of four questions was included, specifically for the Europe wide COLOSS survey into bee colony losses.

Colony loss for the 2010 survey was 13% compared to 23% in 2009. One third of beekeepers maintained nuclei and the overwintering mortality of these was 49%. Typically, beekeepers had 1-2 colonies, which is lower than the 3-5 given in 2009. This may be to do with the majority of beekeepers who responded having 5 or less years experience. Forty-four percent of beekeepers reported no losses. Of those that did, the main problem was related to the queen (29%), then weather (16%) and disease (15%). Thirteen percent of beekeepers used imported queens, with most coming from RoI and then GB. Four beekeepers imported bees from Greece and/or Slovenia. Eleven percent of beekeepers made or bought splits or increases during the survey period (COLOSS question, $n = 113$). Of the 12 beekeepers that made splits/increases, 7 sold or gave them away.

Virtually all beekeepers (94%) treated for *Varroa*. The commonest treatment was Apistan (53% of beekeepers). However, there was an increase in the use of thymol-based treatments from 20% of beekeepers in 2009 to 31% in 2010. Only 1% of beekeepers had samples tested for *Varroa* pyrethroid resistance, which is fewer than 2009 at 12%. This is of concern because AFBI testing returned a borderline result for pyrethroid resistance. More testing is required to monitor the situation and thus provide advice on control measures for *Varroa*. Twenty-nine percent of beekeepers treated for *Nosema*, mostly using Fumidil-B. The prevalence of *Nosema* and acarine, as derived from laboratory testing, were 6% and 3%, respectively. For *Nosema*, beekeepers gave a higher estimate of prevalence with 14% suggesting that their bees were infected. Most beekeepers felt they could distinguish the major diseases of bees. Viruses (including sac brood), acarine disease and European foul brood were the least recognised diseases.

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 457 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 June.

Results

There were 134 responses, with 96 hardcopy and the rest online. This compares to 94 responses in 2009. As the COLOSS questions were incorporated after the initial batch of questionnaires had been dispatched, the response rate was lower at 113.

AFBI Questions

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

Beekeeping experience ranged from 0 to 70 years. The average experience was 12.5 years with the mode = 1 year (27% of beekeepers). The majority of beekeepers who responded to the survey (51%) had 5 or less years experience.

This is similar to the 2009 where most beekeepers had less than 10 years experience. This perhaps suggests an increase in new beekeepers, although the extent to which those who responded continue beekeeping is unknown.

Q. 2. Do you move your honeybee colonies?

Yes = 27 (20%), No = 107 (80%)

Twenty percent of beekeepers moved their colonies; with most to heather followed by apple and oilseed rape (Table 1).

Table 1. The number and percentage of beekeepers moving colonies to different crops.

Heather*	Apple*	Oilseed rape	Heather & OSR	Heather & apple	Apple & OSR
12 (9%)	7 (5%)	7 (5%)	3 (2%)	1 (<1%)	1 (<1%)

*In some cases, the colonies were not moved but remained on the crop

Q. 3. In which county do you keep your bees for the majority of the season?

Most responses were from beekeepers who kept their bees in counties Down, Antrim and Londonderry (Table 2). This is the same as the 2009 survey.

Table 2. The responses received from beekeepers in different regions

County	Responses
Antrim	32
Armagh	7
Donegal	2
Down	51
Fermanagh	7
Londonderry	24
Tyrone	11

Q. 4. Please indicate the number of full-sized colonies and the number of nuclei that you had in: October 2009, April 2010

The overall colony loss for Northern Ireland was 13% (Table 3), which is better than 2009 at 23%.

Table 3. Colony losses during the winter of 2009/2010 per region

Region	Live October 09	Live April 10	% loss
All respondents	589	513	13%
Antrim	152	125	18%
Down	251	220	12%
Londonderry	82	75	9%
Armagh/Fermanagh/Tyrone/Donegal	104	93	11%

Forty-four beekeepers (33%) maintained nuclei. The number of nuclei in October 2009 was 107, whereas in April 2010 this was 55, representing 49% mortality.

Typically, the beekeepers who responded to this survey had 1-2 colonies (Table 4). This was fewer than 2009, where the majority of beekeepers had 3-5 colonies.

Table 4. 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	4	63	27	24	12	2
April	9	66	26	22	9	1

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

Fifty-nine beekeepers (44%) reported no losses (Table 5). This is virtually the same as in 2009 when 43% reported no losses.

Table 5. Main perceived reason for losses

Perceived reason for losses	Count of beekeepers	%
Disease	11	8
Not Applicable	59	44
Other	22	16
Queen Problems	22	16
Starvation	8	6
Weather	12	9

Of those who did report losses (Table 6), the main problem was related to the queen (29%) then weather (16%) and disease (15%).

Table 6. Reason for losses amongst beekeepers directly affected

Perceived reason for losses	%
Disease	15
Other	29
Queen Problems	29
Starvation	11
Weather	16

Fifteen of the 'Other' category were non-specific. The remainder included: 'CCD', queen removed from hive, colonies too small, slurry spray and multiple combinations of disease, weather and queen problems.

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

Yes = 12 (9%), No = 122 (91%)

The answer above may reflect a general submission of bees to AFBI.

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

Yes = 18 (13%), No = 116 (87%)

Thirteen percent of beekeepers used imported queens, with the majority of these coming from within Ireland (Table 7).

Table 7. Source and numbers of bees imported into Northern Ireland

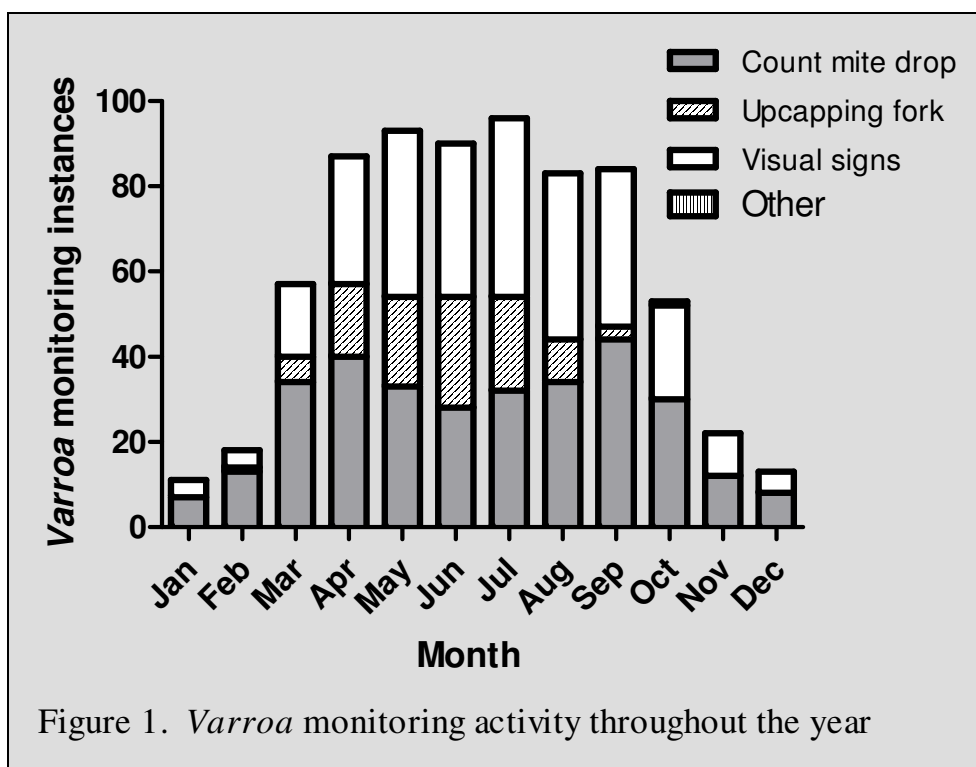
Source of bees	Count of beekeepers	Total colonies	EU countries
Rol	9	17	
GB	5	7	
EU	4	6	Greece, Slovenia
Non EU	0	0	

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

Yes = 96 (72%), No = 38 (28%)

Overall, the most common method of assessing *Varroa* was by counting mite drop on a floor insert (45%), followed by visual inspection (40%) and uncapping (15%). Most beekeepers that monitored used more than one method to assess *Varroa* (62%).

There was a clear seasonal pattern to *Varroa* monitoring, with activity peaking in the summer months (Figure 1).



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

Yes = 126 (94%), No = 8 (6%)

Most beekeepers treated for *Varroa*. One-hundred-and-twenty-four respondents provided details of treatment. The commonest treatment for *Varroa* was Apistan (used by 53% of beekeepers), followed by open mesh floors (37%), Bayvarol (31%), Apiguard (17%), drone comb removal (15%) and icing sugar/ground rice (11%) (Table 8).

Compared to 2009, Apistan replaced Bayvarol as the most common treatment against *Varroa*. There was also an increase in the use of thymol-based treatments from 20% of beekeepers in 2009 to 31% in 2010.

Table 8. 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 (n = 124)	% of beekeepers	Total usage (%)
Api Life Var	3	2	<1
Apiguard	21	17	4
Apistan	66	53	12
Apivar	1	1	<1
Bayvarol	39	31	7
Bee vital hive clean	1	1	<1
Drone comb removal	18	15	5
Dusting icing sugar /ground rice	14	11	5
Formic acid	2	2	<1
Lactic acid	2	2	<1
Open mesh floors	46	37	59
Other*	2	2	1
Oxalic acid	16	13	2
Thymol crystals	13	10	3
Thymomite	1	1	<1

*Other treatments were Happy Keeper floor and thymol syrup spray

The majority of beekeepers (54%) used more than one method to control *Varroa* (Figure 2). Those who used just one method (46%) mainly used the synthetic pyrethroid treatments (e.g. Apistan or Bayvarol), those who used two techniques tended to combine the pyrethroids with open mesh floors. Generally, for three treatments, beekeepers added drone brood removal.

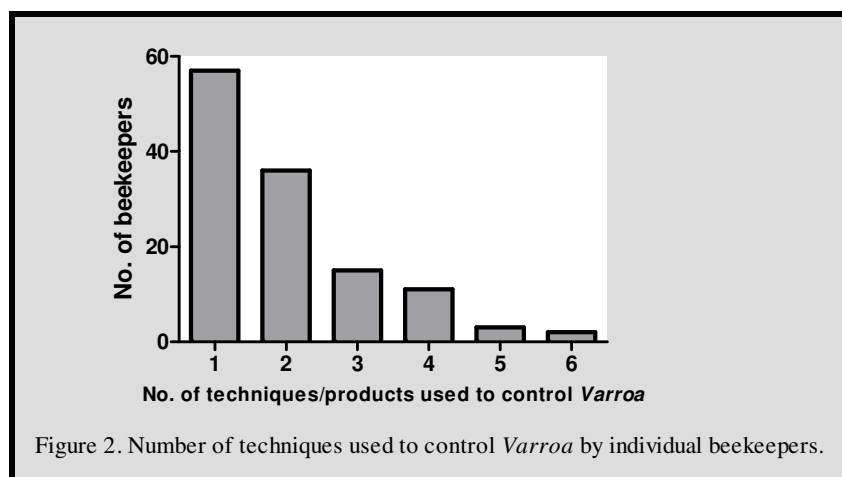
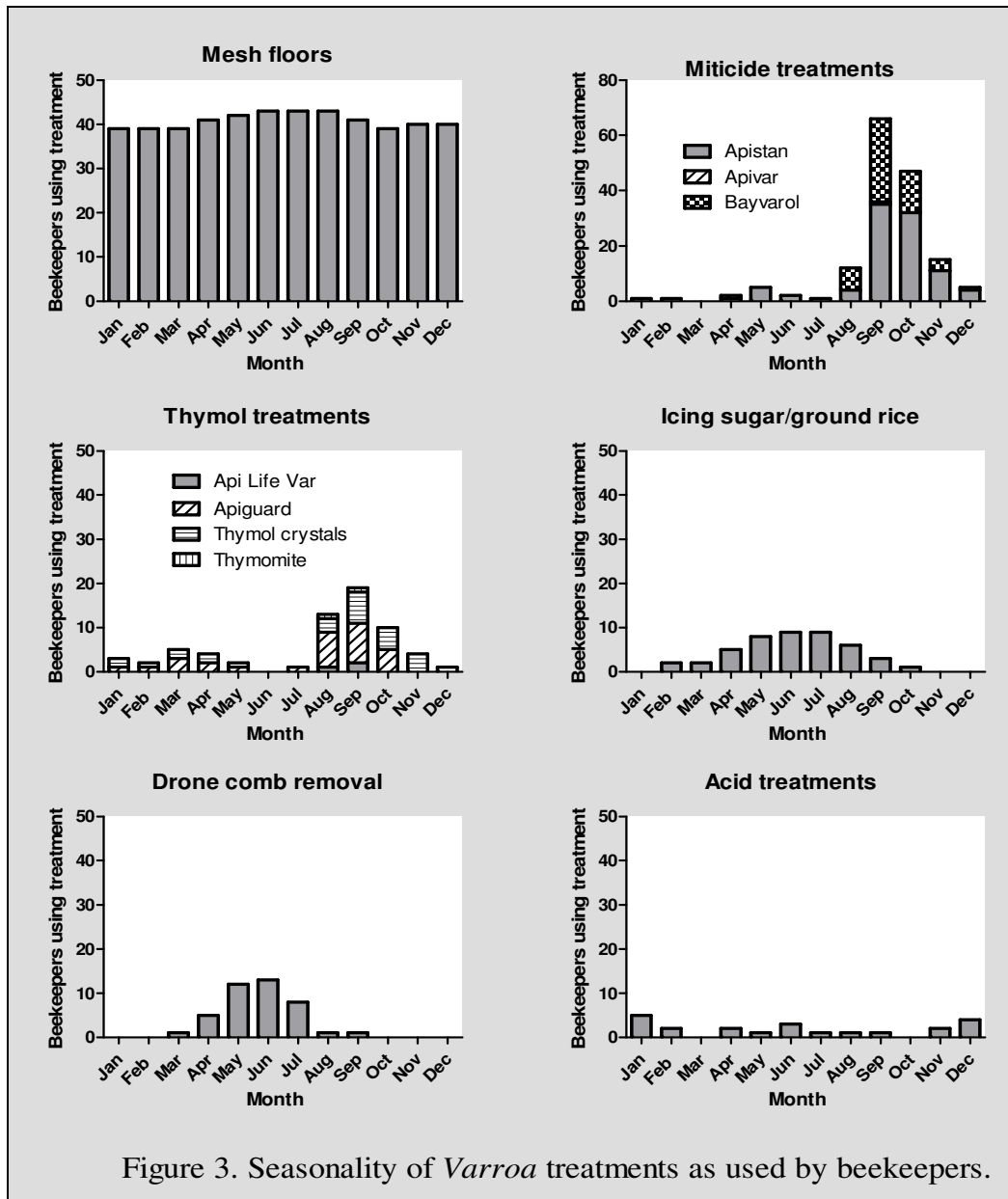


Figure 2. Number of techniques used to control *Varroa* by individual beekeepers.

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 Apistan and Bayvarol (Figure 3). Drone comb removal took place in the summer months, particularly May, June and July.



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

Yes = 2 (1%), No = 132 (99%)

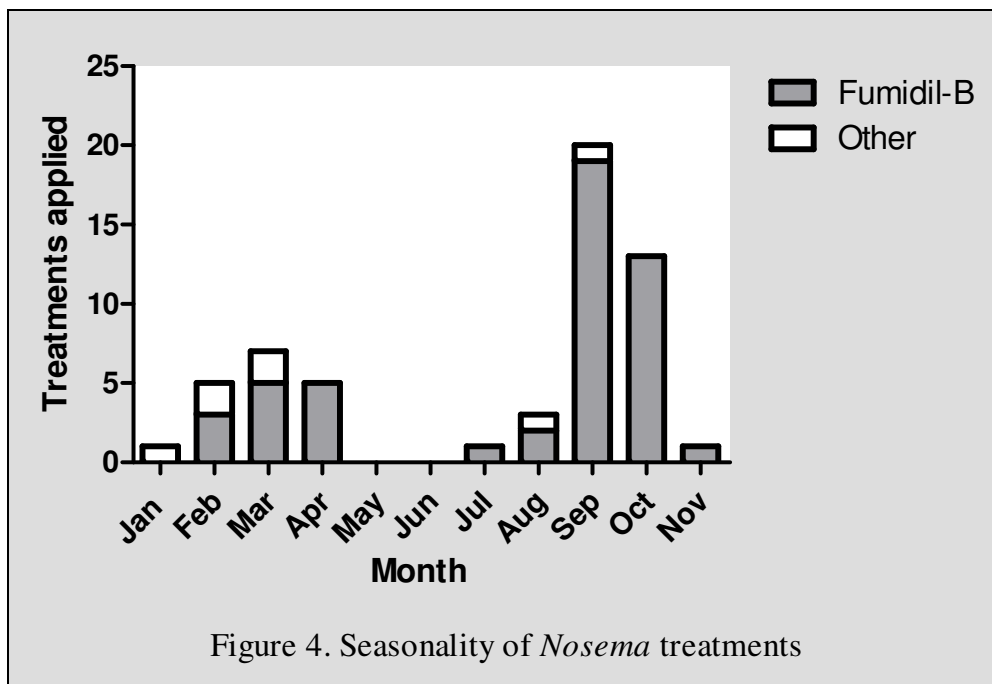
In 2009, 12% of respondents had had samples tested for varroacide resistance. The above result (1%) is much lower.

In 2010, a sample of *Varroa* tested by AFBI returned a borderline result for pyrethroid resistance. More testing is required to determine whether mites in Northern Ireland are becoming resistant to pyrethroids.

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

Yes = 39 (29%), No = 95 (71%)

Thirty seven (out of 39) beekeepers used Fumidil-B against *Nosema*. Other treatments were: Vitafeed Gold, thymol, formic and oxalic acid. Treatments were applied in the spring or mostly in the autumn, particularly September (Figure 4).



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

Full replacement	Yes = 12 (9%), No = 122 (91%)
Partial replacement	Yes = 106 (79%), No = 28 (21%)
If you replace some of the frames, how many?	
Frames	Beekeepers (<i>n</i> = 110, includes some full replacements)
1 to 2	33 (30%)
3 to 4	63 (57%)
5 or more	14 (13%)

Q.13. In your opinion, did any of your colonies or nucs suffer with *Nosema* or acarine (tracheal mite) between May 2009 and April 2010?

<i>Nosema</i>	Yes = 19 (14%), No = 115 (86%)
Acarine	Yes = 6 (4%), No = 128 (96%)

Q.14. Were any of your honeybee colonies diagnosed with either *Nosema* or acarine (tracheal mite) between May 2009 and April 2010 (i.e. microscopy/molecular diagnosis)?

Nosema affected 6% and acarine 3% of beekeepers (Table 8). However, most beekeepers did not have samples tested for these diseases. Of those tested, 27% were positive for *Nosema* and 17% for acarine.

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

Disease	Positive	Negative	Not tested
<i>Nosema</i>	8 (6%)	22 (16%)	104 (78%)
Acarine	4 (3%)	19 (14%)	111 (83%)

Q. 15. Did you feed your colonies between May 2009 and April 2010?

Yes = 131 (98%), No = 3 (2%)

Virtually all beekeepers fed their bees. Most used sugar syrup and candy/fondant (Table 9), in combination (Figure 5). Typically bees were fed with sugar syrup in the autumn, switching to candy/fondant during the winter (Figure 6).

Table 9. Feeding methods used by beekeepers in Northern Ireland

Feed for bees	Count of beekeepers (n = 130)	% of beekeepers	Total usage (%)
Ambrosia	3	2	1
Pollen/Patty feed product	7	5	2
Candy/Fondant	91	70	37
Feed supplement	10*	8	3
Honey	4	3	3
Sugar Syrup	120	92	53
Other	4**	3	1

* Vitafeed Gold, Vitafeed Green

** Thymol (anti-mould for sugar syrup)

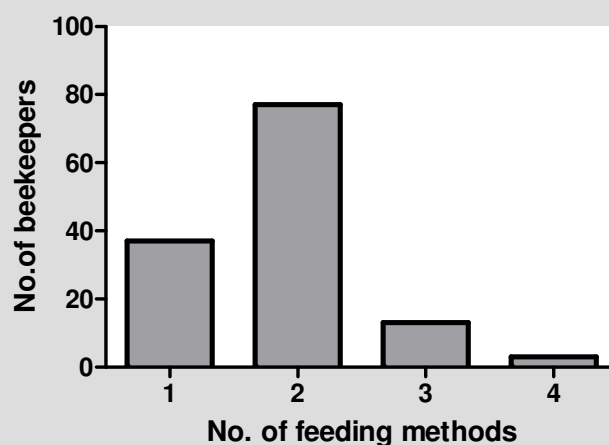
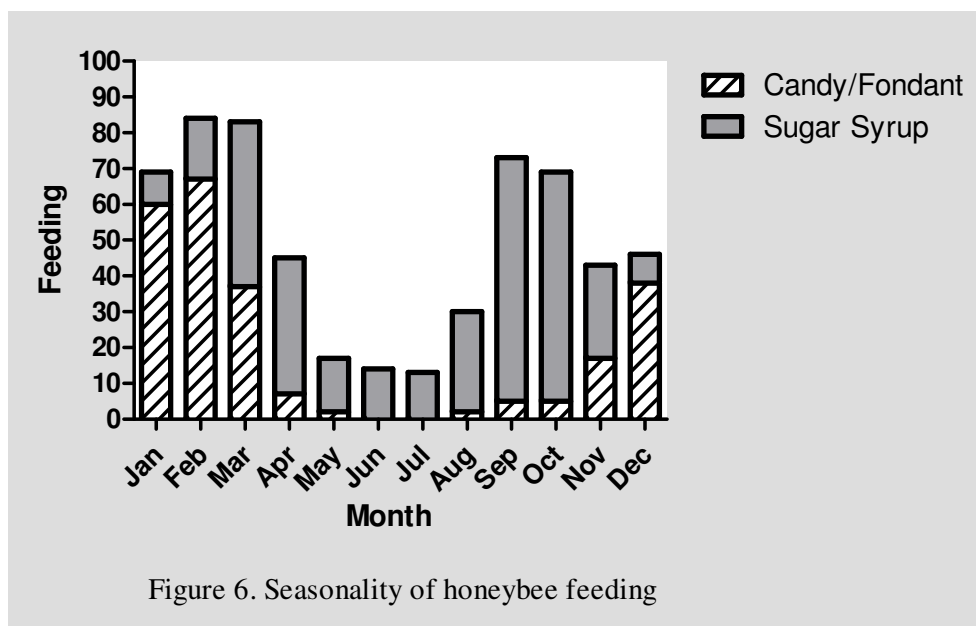


Figure 5. The number of different feeding methods used by beekeepers



Q. 16. Can you diagnose when bees have the following pests and diseases?

Beekeepers can recognise the main pests and diseases of honeybees (Table 10). *Varroa* was the most readily identifiable pest. Viruses (including 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 when bees have the following pests and diseases?					
	Yes		-----	No		
	Count	%		Count	%	
Acarine	68	51	66	49		
<i>Nosema</i>	88	66	46	34		
<i>Varroa</i>	125	93	9	7		
Chalk brood	110	82	24	18		
Sac brood	65	48	69	52		
European foul brood	92	67	42	33		
American foul brood	104	78	30	22		
Other viruses (DMW, APV)	27	20	107	80		

COLOSS questions

A separate group of questions were asked specifically to support the COLOSS project (Prevention of COLony LOSSes). This is an EU-funded project involving scientists in 49 countries, which aims to give an overall picture of bee losses across Europe.

113 responses were received for the COLOSS survey.

Q. 1. How many production colonies did you have on 1st October 2009?

Beekeepers started out in October 2009 with 1-24 colonies, with a mode = 1(33%) and a mean = 4.9.

Q. 2. How many production colonies did you have on 1st April 2010?

A range of 0-21, with a mode of 1 (37%) and a mean = 4.2.

The total overwintering decline in colony numbers was 78 colonies, from 555 to 477 = 14% loss.

Q. 3. How many splits or increases did you make or buy between 1st October 2009 and 1st April 2010?

Twelve beekeepers (11%) made or bought splits or increases during the survey period. The number of splits/increases was from 1-20, with mode = 1 and mean = 4.8.

Q. 4. How many of your colonies or splits did you remove (sell or give away) between 1st October 2009 and 1st April 2010?

Of the 12 beekeepers that made splits/increases, 7 sold or gave them away.

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 2010

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 questions are based-on and in conjunction-with a similar national survey conducted by the National Bee Unit at the Food and Environment Research Agency, 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 June 2010

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?
Tick your response
_____ Yes _____ No
Please tick the main crop
Heather Apple Oilseed rape

Q. 3. In which county do you keep your bees for the majority of the season?
Please tick your main location
Antrim Armagh Down Fermanagh
Tyrone Londonderry Other (e.g. Monaghan, Donegal)
Please specify _____

Q. 4. Please indicate the:
number of full sized colonies? number of nuclei?
October 2009 _____ October 2009 _____
April 2010 _____ April 2010 _____

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

Please tick one box

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 queens imported into Northern Ireland?

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	2009								2010			
	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	2009								2010			
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Apistan*												
Apiguard*												
Apivar*												
Api Life Var*												
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.13. In your opinion did any of your colonies or nucs suffer with *Nosema* or acarine (tracheal mite) between May 2009 and April 2010?

Tick your response

Nosema yes no

Acarine yes no

Q.14. Were any of your honeybee colonies diagnosed with either *Nosema* or acarine (tracheal mite) between May 2009 and April 2010 (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 2009 and April 2010?

Tick your response

Yes No

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

Feed Type	2009								2010			
	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 recognise when your bees have the following 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

h) Other viruses (DWV, APV)

Any other comments or notes?

Please use the attached envelope to return the completed form by 1 June 2010 to:

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