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## Monitor Honey Bee Colony Losses 2010

### Explanation of the Coloss Basic Questionnaire 2009/2010

#### Introduction

The Coloss Cost action program expresses the need to achieve “reliable and internationally standardized data on colony losses, which can be compared between countries and years” (Cost Action FA0803 Proposal 2008). At the Belfast meeting (September 2008) Workgroup 1 of the Coloss network, Monitoring and Sampling, defined 3 levels of monitoring, (1) quantitative, (2) diagnostic and (3) specialist. For level 1 and 2 the development of questionnaires was given a start at the Belfast Coloss conference. At the Zagreb conference (March 2009) a draft of the first Coloss basic questionnaire was presented. As a result of discussions during the WG1 meeting an improved version was developed. This version was finalized in March 2009 and sent to the Coloss network. At the Amsterdam workshop (April 2009) the results of the first surveys with the basic questionnaire were discussed. New elements were proposed for the next edition like, (1) the value of ‘queen problems’, since these might be related to colony losses, (2) the value of lost colonies with dead bodies in or before the hive/beeyard, (3) more distinction between pre winter losses and winter losses, (4) apiary characteristics and (5) basic information about migration.

This questionnaire is a draft (2.2) for the second edition of the Basic Coloss Questionnaire in which the above mentioned remarks have been incorporated. Furthermore the concepts of honey production and pollination service during the foraging season have been worked-out to obtain better insight in the production dynamics over the years. After all, from an eco/economical perspective, it is not the number of available colonies, but the number of productive colonies that matters. In this questionnaire Production Rate 2009-2010 is proposed as the total number of productive colonies after winter 2009-2010 / number of productive colonies 2009.

In Belfast it has been decided that the standard for a representative survey is a participation of at least 5 % of the beekeepers of the intended population and a minimum of 5% of the colonies. It became clear at the Amsterdam workshop that some national surveys struggle in obtaining these minimum requirements. It must be concluded at the time, that meeting the standard is a pursuit that starts with implementation of good questionnaires. Representativity is restricted by local/national opportunities and available funding.

Next to the Basic Questionnaire a first draft of the diagnostic questionnaire was presented at the Amsterdam workshop. This has been further developed by Fleming Vejsnaes and will be also be presented at the Montpellier conference.

The aim of Coloss Workgroup 1 is to enable implementation of the finalized Basic Coloss Questionnaire version 2 immediately after winter 2009/2010.

#### About the proposed draft of the Basic Coloss Questionnaire

1. At this stage of development the proposed questions are open for discussion. The next step will be to decide which questions are essential or optional. The same goes for the personal beekeeper information. The actual status of the variables (and resulting questions) is represented as essential or undecided.
2. At the Amsterdam workshop a preference was expressed to collect data on apiary level assuming that a relation exists between winter losses and apiary location. This might lead to an increase in non response for beekeepers with several apiaries and needs for that further discussion.

#### Design Basic Coloss Questionnaire 2009/2010

43 What was the number of colonies, in a specific region or country, at a specific height, used for honey  
44 production or pollination service during the foraging season 2009, what was the average honey production per  
45 colony, to what extent have productive colonies been lost shortly before and after wintering in 2009, and  
46 during winter 2009/2010, what were the symptoms of lost colonies during winter 2009/2010, how many  
47 colonies were weak, queenless or had drone breeding queens after winter and how many productive colonies  
48 were available in spring 2010.

49 The design could also be worded as what was the difference in colony losses between operations on a specific  
50 height etc.

## 51 Variables

### 52 1. Productive Colonies 2009

53 Operationalization: The total number of productive colonies during foraging season 2009 .

54 Question: value of question 1.

55 Status: essential

56 comment: The aim of the basic questionnaire is to cover colonies that are used for honey production  
57 or pollination service. Colonies used for queen breeding, or other specialist reasons or small nukes  
58 kept for reserve are not covered by the basis questionnaire.

### 59 2. Migration to utilize honey flow

60 Operationalization: The number of times that the majority of colonies was migrated to utilize honey  
61 flow.

62 Question: value of question 2.

63 Status: undecided

64 comment: Migration might be related to colony losses because of (1) stress or (2) opportunities for  
65 horizontal transmission of pathogens in the event that many colonies are temporarily at close  
66 distance. In Europe (Monitoring survey Austria 2008/2009: Personal communication Robert  
67 Brodschneider at Amsterdam 2009 Coloss Workshop and the Netherlands, van der Zee 2007) found a  
68 negative relation between migration and colony losses, explained as a better food availability during  
69 the season.

70 The weakness in this variable is the use of the term 'majority'. It is a compromise between an exact  
71 quantification, which is to be avoided since it is too complex for a basic questionnaire and at the other  
72 hand the necessity to exclude bias in the event that only a few of the available colonies were  
73 migrated.

### 74 3. Average Honey Production 2009

75 Average honey production value per colony in 2009.

76 Operationalization: The average honey production per colony in 2009

77 Question: value of question 3.

78 Status: undecided

79 comment: The average honey production provides an insight in the economic significance. Honey  
80 production is dependent of available honey flow, weather conditions and condition of the colony. A  
81 relation between average honey production and colony losses cannot be derived from this variable  
82 alone. In etiological studies on colony losses however, where these factors are met, this variable may  
83 be used as a factor for colony health.

### 84 4. Productive colonies for agricultural pollination in 2009.

85 Operationalization: The total number of colonies used for pollination service in professional  
86 agriculture in 2009.

87 Question: value of question 4.

- 88 Status: undecided  
89 comment: The number of honeybee colonies deployed for pollination in the agricultural sector  
90 provides an insight in the economic significance. It was considered to ask for the average number of  
91 weeks that colonies were deployed to obtain a more detailed quantification. This would be an  
92 attractive indicator but probably not suitable for a basic questionnaire.  
93 Please give your opinion on this item.
- 94 5. Pre wintering colony losses 2009  
95 Operationalization: The total number of productive colonies lost shortly before wintering.  
96 Question: value of question 5.  
97 Status: essential  
98 comment: The timeframe in which losses occur is not explaining colony losses but might be helpful as  
99 an element for further diagnosis. Pre wintering losses could e.g. be associated with ABPV (Martin), or  
100 Nosema sps. .
- 101 6. Productive colonies wintered in 2009  
102 Operationalization: The total number of productive colonies wintered in 2009.  
103 Question: value of question 6.  
104 Status: essential  
105 comments: The use of the term 'wintering' was much discussed when the first edition of the  
106 questionnaire was developed. An exact description in time is not possible for international use, since  
107 winter starts at different moments in different climate zones. In the evaluation of the first edition in  
108 the Netherlands a group of 1135 beekeepers indicated that the concept 'wintering' was clear and  
109 understandable for them.  
110 The question has remained unchanged.
- 111 7. Early winter colony losses 2009  
112 Operationalization: The total number of productive colonies lost shortly after wintering.  
113 Question: value of question 8.  
114 Status: undecided  
115 comments: The timeframe in which losses occur is not explaining colony losses but might be helpful as  
116 an attractive element for further diagnosis. However, it remains unknown how many beekeepers  
117 control colonies after wintering with the effect that observations about early losses might (1) not  
118 represent the losses of the survey population or (2) only represent a specific group like beekeepers  
119 who manage colonies with oxalic acid in winter.  
120 To avoid this kind of selection error this question might better not be included in the basic coloss  
121 questionnaire.
- 122 8. Loss of wintered productive colonies 2009/2010 value  
123 Operationalization: The total number of productive colonies wintered in 2009.  
124 Question: value of question 9.  
125 Status: essential  
126 comments: This question of the first coloss questionnaire has remained unchanged.
- 127 9. Loss of productive colonies in winter 2009/2010 with dead bees in cells or on bottom board and no  
128 food supply value  
129 Operationalization: The number of lost production colonies during winter with no food present or  
130 within reach and dead bees in the cells or on the bottom board.  
131 Question: value of question 10.  
132 Status: essential  
133 comments: no further comments

134 10. Loss of productive colonies in winter 2009/2010 with many dead bees in or around the hive and  
135 enough food available 2009/2010 value  
136 Operationalization: The number of lost production colonies during winter:  
137 - with many dead bees in the hive, on the bottom board, in front of the hive, or in the beeyard,  
138 - while enough food supply was present.  
139 Question: value of question 11.  
140 Status: essential  
141 comments: This value is new and is thought to exclude CDS or CCD although the complex of  
142 determinants leading to the described symptoms of CDS or CCD losses is as yet poorly understood. It  
143 seems that the presence of dead bodies is in contrast with the complete disappearance of the colony  
144 as is characteristic for CDS or CCD. But it is not necessarily evident that other determinants are at  
145 stake.

146 11. Disappearance of productive colonies during winter 2009/2010 with no dead bees in or around the  
147 hive and enough food available value  
148 Operationalization: The number of disappeared production colonies during winter 2009/2010:  
149 - with few or no dead bees in the hive, on the bottom board, in front of the hive, or in the beeyard,  
150 - while enough food supply was present.  
151 Question: value of question 12.  
152 Status: essential  
153 comments: This question of the first coloss questionnaire has remained unchanged. See also  
154 comments under 12.

155 12. Disappearance of productive colonies during winter 2009/2010 with small patches of capped brood  
156 value  
157 Operationalization: The total number of disappeared productive colonies during winter in which  
158 capped brood was present.  
159 Question: value of question 13.  
160 Status: essential  
161 comment:  
162 This question of the first coloss questionnaire has remained unchanged.  
163 Colony Collapse Disorder (CCD) is a rather exclusive definition with the result that in most surveys the  
164 rather vague description, 'main CCD characteristics' is used. Sometimes also scaled as mild or severe.  
165 In the first edition of the Basic Questionnaire the CCD definition was split in 2 questions (1)  
166 disappearance with few or no dead bees in/around the hive, while enough food supply was present  
167 and (2) the presence of capped brood. In the event that only the first element (question 12) was  
168 answered positive the term Colony Depopulation Syndrome (CDS) is to be considered as more  
169 appropriate. When both questions were answered positive (now questions 12 and 13) the term main  
170 CCD characteristics might be considered as justified.  
171 See also comments under 10.

172 13. Queenless Colonies Spring 2010 value  
173 Operationalization: Value of the total number of observed queenless productive colonies in spring  
174 2010  
175 Question: value of question 14.  
176 Status: essential  
177 comment: Queen problems as a result of a failing queen succession can result in colony losses if not  
178 observed in time by beekeepers. Further insight in which way queen problems express specific  
179 determinants of colony losses is as yet limited. Quantification of these problems might be helpful for  
180 in depth diagnosis.

- 181 14. Drone breeding queens in Colonies Spring 2010 value  
182 Operationalization: Value of the total number of observed drone breeding queens in productive  
183 colonies after winter 2009/2010  
184 Question: value of question 15.  
185 Status: undecided  
186 comment: see comments 13
- 187 15. Weak Colonies in Spring 2010 value  
188 Operationalization: Value of the total number of productive colonies after winter 2009/2010, too  
189 weak to be productive in 2010 .  
190 Question: value of question 16.  
191 Status: essential  
192 comment: This question of the first coloss questionnaire remains unchanged.
- 193 16. Productive Colonies Spring 2010 value  
194 Operationalization: Value of the total number of productive colonies in spring 2010  
195 Question: value of question 17.  
196 Status: essential  
197 comment: The real number of productive colonies can be determined after eventually solving queen  
198 problems and uniting weak colonies.  
199 Please give your opinion if a question should be added about new colonies bought from third parties?
- 200 17. Height of the winter apiary above sea level value  
201 Operationalization: The height above sea level in meters .  
202 Question: value of question 19.  
203 Status: undecided  
204 comment: Height of the apiary is associated with colony losses (Otten 2008), probably due to an  
205 increase in Varroa reproduction cycles at lower heights (longer foraging season).
- 206 18. Degree of sunshine at the summer apiary value  
207 Operationalization: The classification of the apiary by the beekeeper as, in full shadow, half shadow or  
208 full sun.  
209 Question: value of question 20.  
210 Status: undecided  
211 comment: Otten (2008) found a positive correlation between hours of sunshine and colony losses,  
212 probably due to more opportunities of horizontal transmission of Varroa mites.
- 213 19. Differences in honeybee colony losses between apiaries during foraging season.  
214 Status: undecided  
215 comment: Not really a value, but an indication of regional differences in losses. Even at the lowest  
216 level significant differences in losses are observed. One of the aims of the basic questionnaire is to  
217 indicate where further diagnostic monitoring is advisable.
- 218 Indicators
- 219 1. Production Value 2009  
220 Colony Production Value2009 = number of productive colonies 2009
- 221 2. Migration Value 2009  
222 Colony Migration Value= number of times that colonies were migrated to utilize honey flow.

- 223 3. Average Honey Production Rate 2009.  
 224 Average Honey Production Rate 2009 = total number of productive colonies 2009 /honey production  
 225 2009 (in kg).
- 226 4. Agricultural Pollination Rate 2009  
 227 Agricultural Pollination Rate 2009= Productive colonies for pollination in 2009/ total number of  
 228 productive colonies 2009
- 229 5. Pre wintering mortality Rate 2009  
 230 Pre wintering mortality rate 2009 = total number of lost colonies shortly before wintering / total  
 231 number of productive colonies 2009
- 232 6. Wintered Colonies Value 2009  
 233 Wintered Colonies Value 2009 = total number of wintered colonies
- 234 7. Winter Mortality Rate 2009/2010  
 235 Winter Mortality Rate 2009/2010 = total number of lost production colonies in winter 2009-2010 /  
 236 total number of wintered production colonies 2009
- 237 8. Early Winter Mortality Rate 2009  
 238 Early wintering mortality rate 2009 = total number of lost colonies shortly after wintering 2009 / total  
 239 number of wintered production colonies 2009-2010
- 240 9. Colony Depopulation (Syndrome) Rate  
 241 Colony depopulation rate = (total number of disappeared production colonies during winter 2009-  
 242 2010, with few or no dead bees in the hive, on the bottom board, in front of the hive, or in the  
 243 beeyard, while enough food supply was present) / total number of wintered production colonies 2009-  
 244 2010
- 245 10. Colony Collapse Disorder Rate  
 246 Colony depopulation rate = (total number of disappeared production colonies during winter 2009-  
 247 2010, with few or no dead bees in the hive, on the bottom board, in front of the hive, or in the  
 248 beeyard, while enough food supply and capped brood was present) / total number of wintered  
 249 production colonies 2009-2010
- 250 11. Dead Bodies Present Winter Mortality Rate  
 251 Dead bodies present winter mortality rate = (total number of lost production colonies during winter  
 252 2009-2010 with many dead bees in the hive, on the bottom board, in front of the hive, or in the  
 253 beeyard, while enough food supply was present.) / total number of wintered production colonies  
 254 2009-2010
- 255 12. Hungered Colonies Mortality Rate  
 256 Dead bodies present winter mortality rate = (total number of lost production colonies during winter  
 257 2009-2010 with many dead bees while food was absent or out of reach.) / total number of wintered  
 258 production colonies 2009-2010
- 259 13. After Winter Queenless Colonies Rate 2010  
 260 After winter queenless colonies rate = total number of queenless colonies after winter 2009-2010 /  
 261 total number of wintered colonies 2009.
- 262 14. After Winter Drone Breeding Queens Rate 2010  
 263 After winter drone breeding queens rate = total number of colonies with a drone breeding queen after  
 264 winter 2009-2010 / total number of wintered colonies 2009.

- 265 15. After Winter Weak Colonies Rate 2010  
266 After winter weak colonies rate = total number of weak colonies after winter 2009-2010 / total  
267 number of wintered colonies 2009.
- 268 16. Spring Production Value 2010  
269 spring production value 2010 = total number of productive colonies after winter 2009-2010.
- 270 17. Production Rate 2009/2010  
271 Production rate 2009/2010 = total number of productive colonies after winter 2009-2010 / number of  
272 productive colonies 2009.
- 273 18. Apiary Height Value 2009  
274 Apiary height = number of meters above sea level of the apiary.
- 275 19. Apiary Sunshine Level Value 2009  
276 Apiary Sunshine= subjective classification by the beekeeper of sunshine level by choosing from 3  
277 values.
- 278
- 279 Questionnaire  
280 The proposed questionnaire is attached as loose supplement

