1 Appendix 2 – Survey questionnaire

2

3

4 **Survey on Precision Livestock Farming technologies in dairy cattle farming**

5

6 Please provide a **code-word** below if you would like to retain the right to withdraw your data

7 after submission. You will need to provide us with the code-word for us to be able to identify

8 your data and delete it.

9 _____

10

11 Q1. What is your age category?

12

☐ 18 - 24   ☐ 55 - 64

☐ 25 - 34   ☐ 65 - 74

☐ 35 - 44   ☐ 75 - 84

☐ 45 - 54   ☐ 85 or above

13

14 Q2. What is your role on the farm?

15

☐ Registered business owner (land owner)   ☐ Herd manager

☐ Registered business owner (tenant)   ☐ Other (please specify)

☐ Farm manager (not business owner)   _____

16

17 Q3. In which of these regions is your farm located?

18

☐ Greater London   ☐ Yorkshire and the Humber

☐ South East   ☐ East Midlands

☐ South West   ☐ East of England

☐ West Midlands   ☐ Wales

☐ North West   ☐ Scotland

☐ North East   ☐ Northern Ireland

19

20 Q4. How many years of experience do you have in dairy farming?

21

□ Less than 5 years	□ Between 21 and 30 years
□ Between 6 and 10 years	□ Over 30 years
□ Between 11 and 20 years	

22

23 Q5. What is your herd size (12 months rolling herd size to include calved heifers and cows -
24 do not include youngstock)?

25

26

27 Q6. What type of milking system do you use?

28 □ Conventional milking parlour

29 □ Automated Milking System (robot milking)

30 Q7. How many full-time employees are working on your dairy enterprise (including you
31 and/or family)?

32

33

34 Q8. How many part-time and/or casual employees are working on your dairy?

35

1.1.1.1.1.

36

37 Q9. What type of grazing system are you operating?

38

39 □ Housed all year round

40 □ Grazed all year round

41 □ Both housed and grazing periods (please indicate how many months cows are grazed per
42 year)

43

44

45

In this survey, **Precision Livestock Farming** (PLF) technologies include devices such as sensors, cameras, microphones or boluses. More generally, PLF technologies are used on or around animals to help farmers monitor aspects of animal productivity, animal health and welfare or the environment, automatically and continuously.

Examples: sensors for heat detection, activity, feeding, productivity, cameras to monitor lameness or feeding, boluses to monitor rumen health, etc.

Q10. Please select which statement best describes your current situation in relation to PLF technologies:

☐   I do not currently use PLF technologies and have no intention of doing so

   (if selected, please continue at Q30)

☐   I do not use PLF technologies at the moment, but I would like to use them in the future

   (if selected, please continue at Q28)

☐   I am in the process of implementing one or more PLF technologies

   (if selected, please continue from Q11 to Q13, then from Q23 to end of survey)

☐   I am currently using one or more PLF technologies

   (if selected, please continue at Q11)

Q11. Which of the following parameters are you currently (or in the process of) monitoring using Precision Livestock Farming (PLF) technologies on your farm?

Please tick all that apply with the associated technology type.

	On-animal (wearable) sensors	Other Sensors	Camera	Bolus	Sound	Parlour/robot
Activity *(including lying and standing)*	☐	☐	☐	☐	☐	☐
Body condition	☐	☐	☐	☐	☐	☐
Body weight	☐	☐	☐	☐	☐	☐
Calving	☐	☐	☐	☐	☐	☐
Drinking behaviour	☐	☐	☐	☐	☐	☐
Environmental parameters *(temperature, ventilation...)*	☐	☐	☐	☐	☐	☐
Feeding behaviour	☐	☐	☐	☐	☐	☐
Heat	☐	☐	☐	☐	☐	☐
Lameness	☐	☐	☐	☐	☐	☐
Location	☐	☐	☐	☐	☐	☐
Mastitis	☐	☐	☐	☐	☐	☐
Methane emissions	☐	☐	☐	☐	☐	☐
Milk yield	☐	☐	☐	☐	☐	☐
Physiology *(pH, temperature...)*	☐	☐	☐	☐	☐	☐
Rumination	☐	☐	☐	☐	☐	☐
Other parameters *(please specify)*	☐	☐	☐	☐	☐	☐

76   Q12. If you would like to add any further details to the table above regarding the technologies

77   you are using, please describe them below.

78

79

80   Q13. Please indicate how important the following factors were in your decision to adopt PLF

81   technologies:

82

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Effects on productivity	☐	☐	☐	☐	☐
Health management	☐	☐	☐	☐	☐
Welfare management	☐	☐	☐	☐	☐
Ease of use	☐	☐	☐	☐	☐
Ease of installation	☐	☐	☐	☐	☐
Cost of installation	☐	☐	☐	☐	☐
Support available	☐	☐	☐	☐	☐
Address labour issues	☐	☐	☐	☐	☐
Lifestyle benefit	☐	☐	☐	☐	☐
Recommendation by advisors/peers	☐	☐	☐	☐	☐
Environmental benefits	☐	☐	☐	☐	☐
Other (*please specify*)	☐	☐	☐	☐	☐

83

84

85   Q14. What kind of changes to your farm management routines resulted from the use of PLF

86   technologies, if any?

87

	No changes	Minor changes	Major changes
Routine tasks	☐	☐	☐
Work schedule	☐	☐	☐
Number of full-time staff	☐	☐	☐
Number of part-time/casual staff	☐	☐	☐
Time spent on digital devices (computers, tablets, phones)	☐	☐	☐
Time spent with animals	☐	☐	☐
Other (*please specify*)	☐	☐	☐

88

89

90   Q15. How much do you or your staff rely on PLF technologies to monitor your herd in

91   comparison to visual or manual monitoring, across all management tasks?

92

93   *Please cross the bar under the appropriate percentage. For example, if you rely on technology*

94   *and manual monitoring equally, cross the bar under '50'.*

95

96

Not relying on PLF   50/50   Complete reliance on PLF
at all

0   10   20   30   40   50   60   70   80   90   100%

_____

97

98   Q16. How often do you manually or visually verify whether the data collected by the

99   technologies are accurate? *In the case of heat detection for example, by looking for additional,*

100   *visual signs of cows in heat.*

101

102   ☐   Never

103   ☐   Sometimes

104   ☐   About half the time

105   ☐   Most of the time

106   ☐   Always

107

108   Q17. How has the time spent visually or manually assessing the health and welfare of your

109   herd changed since the implementation of PLF technologies?

110

111   ☐   Substantially decreased

112   ☐   Somewhat decreased

113   ☐   About the same

114   ☐   Somewhat increased

115   ☐   Significantly increased

116

117   Q18. How has human contact with the cows in the herd changed since the implementation of

118   PLF technologies?

119

120   ☐   Substantially decreased

121   ☐   Somewhat decreased

122   ☐   About the same

123   ☐   Somewhat increased

124   ☐   Significantly increased

125

126 Q19. In your opinion, how is the relationship between stockpeople and the herd since the

127 implementation of the technology?

128

129 ☐ Much worse

130 ☐ Somewhat worse

131 ☐ About the same

132 ☐ Somewhat better

133 ☐ Much better

134

135

136

137 Q20. How did the technologies affect the parameters they are designed to monitor?

138

139 *For example, improved reproduction with heat detection or reduction of lameness prevalence*

140 *in the case of automatic lameness monitoring.*

141

	Much worse	Somewhat worse	About the same	Somewhat better	Much better
Technology 1: _____ (*Please indicate which technology you are referring to*)	☐	☐	☐	☐	☐
Technology 2: _____	☐	☐	☐	☐	☐
Technology 3: _____	☐	☐	☐	☐	☐
Technology 4: _____	☐	☐	☐	☐	☐
Technology 5: _____	☐	☐	☐	☐	☐

142

143 Q21. In your opinion, how has the welfare of animals in your herd changed due to the

144 implementation of PLF technologies?

145

146 ☐ Much worse

147 ☐ Somewhat worse

148 ☐ About the same

149 ☐ Somewhat better

150 ☐ Much better

151

152 Q22. In your opinion, how has the behaviour of your livestock changed since the

153 implementation of PLF technologies?

154

	They are more...	They are less...	No change
Relaxed	☐	☐	☐
Calm	☐	☐	☐
Content	☐	☐	☐
Friendly	☐	☐	☐
Nervous	☐	☐	☐
Indifferent	☐	☐	☐
Distressed	☐	☐	☐
Uneasy	☐	☐	☐

155

156 Q23. In your opinion, how effective was the training you have received to efficiently use the

157 technology?

158

159 ☐ Not effective at all

160 ☐ Slightly effective

161 ☐ Moderately effective

162 ☐ Very effective

163 ☐ Extremely effective

164 ☐ Not applicable

165

166   Q24. What kind of challenges, if any, have you encountered during the implementation of

167   PLF technologies on your farm?

168

169

170   Q25. If you have encountered any challenges, please describe whether these have been

171   overcome and if so, how?

172

173

174   Q26. If you have encountered any challenges, how have they affected your attitudes towards

175   the technologies?

176

177   ☐   Very negative impact

178   ☐   Slightly negative impact

179   ☐   No impact

180   ☐   Slightly positive impact

181   ☐   Very positive impact

182   ☐   Not applicable

183

184

185   Q27. To what extent do you agree with the following statements in relation to PLF

186   technologies on your farm?

187

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Not applicable
I was able to provide feedback to technology providers	☐	☐	☐	☐	☐	☐
Technology providers have helped me interpret the data efficiently	☐	☐	☐	☐	☐	☐
Technology providers are transparent regarding ownership and use of data	☐	☐	☐	☐	☐	☐
I believe my feedback is taken into account in the development of the technologies	☐	☐	☐	☐	☐	☐
Challenges met during implementation have been actively addressed by the technology providers	☐	☐	☐	☐	☐	☐

188

189   Q28. What has prevented you from implementing PLF technologies on your farm so far?

190   *Please provide examples where possible.*

191

192

193   Q29. Which types of PLF technologies would you like to implement in the future and why?

194

195   Q30. What are the reasons why you do not wish to implement PLF technologies on your

196   farm?

197

198

199