

Risk factors associated with the carriage of pathogenic *Escherichia coli* in healthy commercial meat chickens in Queensland, Australia

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Supplementary Table S1. Questionnaire for the cross-sectional study to identify risk factors associated with avian pathogenic *E. coli* on commercial broiler chicken farms in South East Queensland.

(Section one)

Details from slaughterhouse visit and farm list (To be completed by the researcher)

1. Date of field investigation: / /
2. Date of slaughterhouse visit: / /
3. Name of poultry slaughterhouse: _____
4. Name of farm: _____
5. Farm code: _____
6. City: _____
7. Farm location saved on the GPS? Yes ☐ No ☐
a) If yes, farm GPS location saved as: _____
8. Elevation: _____ metres; Longitude: _____; Latitude: _____
9. Phone No: _____
10. Fax No.: _____
11. Email: _____
12. Website: _____

Section Two

Farm details

(To be completed by the farmers/managers)

1. Date: / /
2. Surname: _____ First name: _____
3. Your role on the farm: Owner / Manager / Both
4. Email: _____
5. Farm address: _____ Post code: _____
6. How chickens are currently housed (tick all boxes that might apply)?
☐ Separate age groups housed on the farm at the same time
☐ Same age groups housed on the farm at the same time
☐ Other (please specify) _____
7. Where does the chickens' drinking water currently come from (tick all boxes that might apply)?
☐ Local water utility
☐ Well on the property
☐ River
☐ Other (please specify): _____

a) Is there any treatment of water currently conducted before it is given to the chickens?

Yes ☐ No ☐

If yes, how is the water treated?

8. Are there currently any vehicle tyre disinfection facilities on the farm?

Yes ☐ No ☐

9. If yes, how often are vehicle tyres disinfected by 'workers /visitors' when entering the farm?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Please specify who currently conducts the spreading service for litter used on the farm?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Which of these methods are currently used to clean the farm (tick all the boxes that applies)?

	At the removal of birds to the abattoir of each flock	At the removal of birds to the abattoir of every second flock	At the removal of birds to the abattoir of every third flock	At the removal of birds to the abattoir of every fourth flock	Other, please specify frequency
Litter removal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sweeping without water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure hose + mild detergent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sanitization of the shed(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Washing the walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please, specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Are there other farm animal (either backyard or commercial) currently kept within 500 m to this farm?

Yes ☐

No ☐

If No, go to next question

If Yes,

Type of farm animal	Number of animals (if known)	Distance to this farm

13. Number of chicken sheds currently on the farm: _____

14. What were the maximum numbers of birds per shed within the last 12 months?

15. _____
What were the minimum numbers of birds per shed within the last 12 months?

16. _____
What were the average numbers of birds per shed within the last 12 months?

17. Did the mortality vary between the shed(s) within the last 12 months?

Yes ☐

No ☐

If yes,

a) What was the highest mortality rate per shed within the last 12 months?

b) What was the lowest mortality rate per shed within the last 12 months?

c) What was the average mortality rate per shed within the last 12 months?

18. If you answered yes for Question 17, why do you think there were differences in the mortality rate between sheds?

19. Total number of birds supplied to the farm from the hatchery in the last year (2013):

20. _____
Total number of birds send to slaughter in the last year (2013): _____

21. Please specify the type of workers currently working on the farm (for example a) manger or b) causal farm worker c) other, (please specify). A worker is a person who works on the farm on daily basis or has contact with the chickens on the farm on a regular basis).

Type of worker	Average number of days/week	Type of work	Does the farm worker own or come into contact with other	Specify the animal type and frequency of contact with animals (daily, weekly,

	working on the farm		animals (pets, or livestock) regularly?	monthly, specify other frequency)
			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	

Section Three

Farm ----- shed number.....

Farm details (To be completed by the farmers/managers)

22. Please specify any visitors that visited the farm during the period the sampled flock was present on the farm.

Visitors	Average frequency of visits (daily/ Weekly/monthly, as required etc.)	Reasons for visit(s)	Did the visitor own or was into contact with other animals (pets, poultry or livestock) regularly?	Specify the animal type and frequency of contact with these animals (daily, weekly, monthly, specify other frequency)
Repairer			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
Cleaner			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
Management advisor			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
Veterinarian			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
Researcher			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	
Collector of chickens			Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>	

23. Have you noticed the presence of any of the following animals inside or within 300 m distance to the outside of the shed during the period the sampled flock was present on the farm?

Type of animals	Inside the shed	Outside the shed (within 300 m distance)
-----------------	-----------------	--

	Number of individuals	Average frequency seen (daily/weekly/monthly, specify other frequency)	Number of individuals	Average frequency seen (daily/weekly/monthly, specify other frequency)
Rats/mice				
Wild birds (specify)				
Amphibians or reptiles				
Domestic dogs				
Domestic cats				
Domestic ruminants (cow/sheep)				
Other domestic animals (specify) 1. 2.				
Stray/feral animal (specify) 1. 2.				
Kangaroos				
Possums				
Other (please specify) 1. 2. 3.				

24. Did farm workers or visitors use footbaths when entering the poultry sheds where the sampled flock was housed?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

a) If footbaths were used, what disinfectant was used in these foot baths specified above?

25. Did farm workers or visitors use overalls supplied by the farm when having contact with the chickens of the sampled flock?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. Is there any shower facility located on the farm?

Yes ☐

No ☐

27. Did farm workers or visitors use the shower facility located on the farm before entering the sheds where the sampled flock was kept?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28. Did farm workers or visitors use hand sanitiser before entering the shed or before handling the chickens from the sampled flock?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

a) If yes, can you please specify the type of sanitiser used?

29. What is the approximate distance in metres between the car park and poultry shed where the sampled flock was kept? _____

30. Did farm workers or visitors disinfect equipment (ladder, fixing tools, etc.) before entering the shed of the sampled flock?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Farm worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b) If so, what disinfectant was used?

31. How often was the following equipment cleaned in the shed where the sampled flock was kept?

	Always	Usually	Sometimes	Rarely	Never	Unknown
Pan feeder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

32. How frequently was litter changed where the sampled flock was kept?

At the removal of birds to the abattoir of each flock	At the removal of birds to the abattoir of every second flock	At the removal of birds to the abattoir of every third flock	At the removal of birds to the abattoir of every fourth flock	Other, specify frequency
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

33. Was the shed where the sampled flock was kept, cleaned after the litter removal?

Yes ☐

No ☐

34. Was insecticide used in the shed where the sampled flock was kept, after cleaning the shed?

Yes ☐

No ☐

a) If so, what type of insecticide was used?

35. How many birds died in the shed where the sampled flock was kept?

Week number	number of deaths
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

36. How frequently were dead birds removed from the shed(s) during the duration the sampled flock was kept in these sheds?

More than twice a day	Twice a day	Once a day	Every other day	Other, specify frequency
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

37. What was the peak density per kilogram per square metres for the shed where the sampled flock was kept?

38. In which week did you reach peak density in the shed(s) where the sampled flock was kept?

39. Can you describe the ammonia odour in the shed where the sampled flock were kept at peak density?

No odour	Slightly annoying (faint)	Annoying (distinct)	Very annoying (strong)	Extremely annoying (very strong)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40. Can you describe the ammonia odour in the shed of the sampled flock before slaughtering?

No odour	Slightly annoying (faint)	Annoying (distinct)	Very annoying (strong)	Extremely annoying (very strong)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

41. What type of ventilation was used in the shed where the sampled flock was kept, please describe in detail?

42. Were transport vehicles (for transport of chickens to the slaughterhouse) allowed to enter the farm during the sampling period?

Yes ☐ No ☐

- a) If yes, did the transport vehicles have chickens on them when they arrived at the farm?
Yes ☐ No ☐ Sometimes ☐

Section Five

Farm ----- shed number.....

Farm Management Details (To be completed by the farmers/managers)

43. Were there any second grade eggs 'dirty eggs' used for the sampled flock?
Yes ☐ No ☐

44. How many second grade eggs 'dirty eggs' were used for the sampled flock?

45. What was the weekly weight of the sampled flock?

Week number	Average weight for the sampled flock
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

46. Was there any stress-full events occurring during the period when the sampled flock was present on the farm?

Yes ☐ No ☐

If yes, Please provide details

Section Six

Farm ----- shed number.....

47. Has *E. coli* been diagnosed on this farm within the last 12 months?

Yes ☐ No ☐

Clinical signs observed	Diagnostic test method(s) used	Date (estimate)	Number of death associated with <i>E. coli</i> infection
		__/__/__	
		__/__/__	

48. Has *E. coli* diagnosed on this farm in the sampled flock?

Yes ☐ No ☐

If yes, please provide details below.

Clinical signs observed	Diagnostic test method(s) used	Date (estimate)	Number of death associated with the <i>E. coli</i> infection
		__/__/__	
		__/__/__	

49. Have any respiratory diseases other than *E. coli* been diagnosed on this farm within the last 12 months?

Yes ☐ No ☐

If yes, please provide details below.

Disease	Diagnostic test method(s) used	Date (estimate)	Symptoms of the disease observed
		__/__/__	
		__/__/__	

50. Have any respiratory diseases other than *E. coli* been diagnosed on this farm in the sampled flock?

Yes ☐ No ☐

If yes, please provide details below.

Disease	Diagnostic test method(s) used	Date (estimate)	Symptoms of the disease observed
		__/__/__	
		__/__/__	

51. Have any antimicrobial treatments been used on this farm within the last 12 months? Yes ☐ No ☐

If yes, please provide details below.

Type of antimicrobial used	Date (estimate)	Details (use for what problem, administration procedure etc.)
	__/__/__	
	__/__/__	

52. Where any antimicrobial treatments used on this farm in the sampled flock? Yes ☐ No ☐

If yes, please provide details below.

Type of antimicrobial used	Date (estimate)	Details (use for what problem, administration procedure etc.)
	__/__/__	