

Pilot study of the impact of environmental factors on experimental infection by avian pathogenic *Escherichia coli* (APEC) in laying hens

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COLIBACILLOSIS

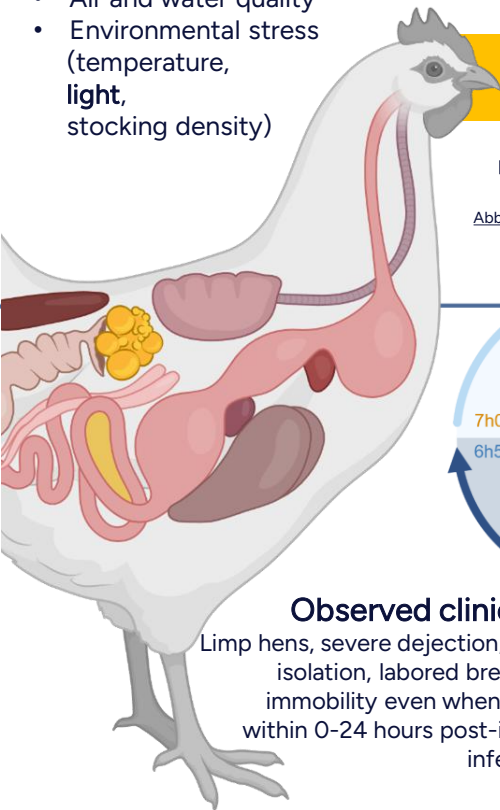
Infection caused by avian pathogenic *Escherichia coli* (APEC)



Main cause of mortality among laying hens in Quebec¹

Predisposing factors for infection at peak laying period²:

- Bacterial or viral infections
- Air and water quality
- Environmental stress (temperature, light, stocking density)

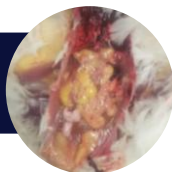


Observed clinical signs

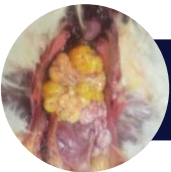
Limp hens, severe dejection, prolonged isolation, labored breathing, and immobility even when stimulated within 0-24 hours post-infection in infected hens.

Observed lesions at necropsy

Generalized congestion, presence of exudate in the abdominal cavity, friable/enlarged filter organs.



Congested follicular cluster, with deformation/burst of the eggs.



Intra-abdominal spawning, with the presence of pus in the abdominal cavity.



Image credits: Micaela Miyauchi

In the scientific literature:

Various studies have attempted to develop *in vivo* models of colibacillosis in laying hens to study the lesions associated with the disease³.

Phase 1

Evaluation of different infection modalities (doses and routes of infection) presented in the scientific literature.

Phase 2

Validation of the most promising experimental conditions (dose and route of infection) for inducing disease.

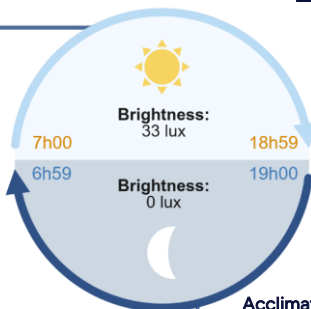
To this date, the tested conditions are not sufficient to promote the presence of lesional signs characteristic of infection within 96 hours post-infection.

What is the effect of light stress on infection?

EXPERIMENTAL GROUPS

Abbreviations: IV (intravenous); IP (intraperitoneal); CFU (colony-forming unit)

	GROUP 1 (n=12)	GROUP 2 (n=12)	GROUP 3 (n=12)
IV	0.1mL of NaCl 0.9%	IV 10 ⁸ UFC in 0.1mL of BHI	IV 10 ⁸ UFC in 0.1mL of BHI
IP	0.1mL of NaCl 0.9%	IP 10 ⁹ UFC in 0.1mL of BHI	IP 10 ⁹ UFC in 0.5mL of BHI

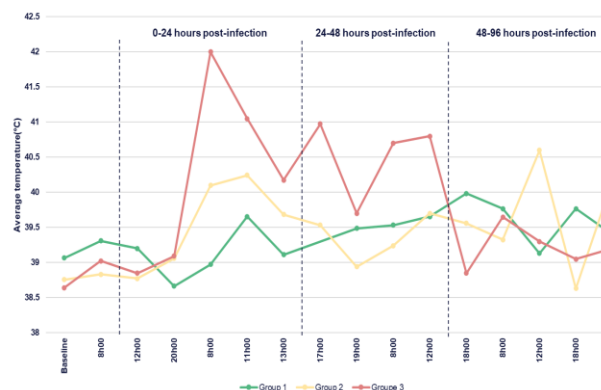


Acclimatization and post-infection period

During the light stress period (photoperiod extended for 24 hours)

Table 1. Mean values of lesion scores reported for different organs in hens of the control and infected groups following necropsy within 96 hours post-infection.

	Air sacs	Liver	Spleen	Heart	Lungs	Intestinal	Reproductive	Total score
Group 1 (control) (n=3)	0	0	0	0	0	0	0	0
Group 2 (infected) (n=3)	1	1	1	0	0	1	1	5
Group 3 (infected) (n=2)	2	1	1	0	0	2	2	7



Graphic 1. Variation of mean temperatures measured after infection with mean baseline values before infection.

IP infection using a higher injection volume, combined with pre-infection light stress, appears to promote the development of lesions characteristic of colibacillosis more effectively than other tested conditions.